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2017/ED-15(SA)

November 13, 2017

Mr. Scott Glenn, Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

Dear Mr. Glenn:

SUBJECT: Special Management Area (SMA) Ordinance
Chapter 25, Revised Ordinances of Honolulu
Draft Environmental Assessment (DEA)

Project: Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
Applicant: Island Energy Services
Agent: CH2M Hill, Inc. (Lisa Kettley)
Location: 91-480 Malakole Street – Kapolei
Tax Map Key: 9-1-014: 010
Proposal: Special Management Area (SMA) Use Permit to allow installation of an SO_2 Scrubbing System and Replacement of Karbate Gas Coolers at the Kapolei Refinery

With this letter, the Department of Planning and Permitting hereby transmits the DEA and anticipated finding of no significant impact (DEA-AFONSI) for the Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers Project at the Kapolei Refinery located on Tax Map Key Parcel 9-1-014: 010 in the Honouliuli, Ewa District on the Island of Oahu, for publication in the **November 23, 2017**, edition of "*The Environmental Notice*."

Enclosed, please find a completed Office of Environmental Quality Control Publication form, a hard copy of the DEA-AFONSI, along with a CD copy of the DEA-AFONSI. We have also emailed an electronic copy of the publication form in MS Word.

18219

Should you have any questions, please contact Sarah Afong of our staff, at 768-8026.

Very truly yours,

FOR: Kathy K. Sokugawa
Acting Director

Enclosure: Publication Form (Word doc)
DEA-AFONSI Letter
CD with DEA-AFONSI

November 2015

NON-CHAPTER 343 DOCUMENT
PUBLICATION FORM
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

Project Name: Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers, Kapolei Refinery

Applicable Law: Revised Ordinances of Honolulu (ROH) Chapter 25

Type of Document: Draft Environmental Assessment

Island: Oahu

District: Ewa

TMK: 9-1-014:010

Permits Required: Special Management Area (SMA) Use Permit, Modification to Conditional Use Permit (CUP modification), Air Pollution Control Permit, Community Noise Permit, Federal Aviation Administration Notice of Proposed Construction or Alteration, Construction Permits

Applicant or Proposing Agency: Island Energy Services; 91-480 Malakole Street, Kapolei, HI 96707; Marc Dexter; marc.dexter@islandenergyservices.com

Approving Agency or Accepting Authority: City and County of Honolulu, Department of Planning and Permitting; 650 S. King Street, 7th Floor, Honolulu, Hawaii 96813; Sarah Afong; sarah.afong@honolulu.gov

Consultant: CH2M; 1132 Bishop Street, Suite 1100, Honolulu, Hawaii 96813; Lisa Kettley; lisa.kettley@ch2m.com

Status: Anticipated Finding of No Significant Impact (AFONSI)

Project Summary:
Island Energy Services, LLC (IES) owns and operates the Kapolei Refinery (formerly known as the Chevron Refinery), located in Campbell Industrial Park. IES is proposing to install a sulfur dioxide (SO_2) scrubbing system and replace the existing karbate gas coolers within the refinery's acid plant. The new scrubbing system would include an approximately 57-foot-tall SO_2 scrubbing tower and an approximately 33-foot-tall acidulation stripping tower, with an approximately 59-foot-tall steel support structure. The system would function to reduce SO_2 emissions generated by the acid plant to meet current industry best control practices. The existing karbate gas coolers, which are reaching the end of their design life, would be replaced with two new plate and frame heat exchangers. Replacement of the karbate gas coolers would improve equipment efficiency and allow the acid plant to operate at its design capacity. The proposed

project area comprises the existing footprint of the acid plant, which is located within the Special Management Area (SMA).

DRAFT ENVIRONMENTAL ASSESSMENT

Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers

Kapolei Refinery

‘Ewa District, Kapolei, Hawai‘i

Prepared for

Island Energy Services

October 2017

Project Summary

Project	Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
Location	Honouliuli, ‘Ewa District, O‘ahu
Tax Map Key	9-1-014:010
Project Area	Approximately 3 acres
State Land Use Designation	Urban
General Plan Designation	Secondary Urban Center
Development Plan / Land Use	‘Ewa Development Plan / Industrial
Zoning	Intensive Industrial (I-2)
Special Management Area	Yes (within SMA)
Existing Use	Petroleum Processing Facility (Kapolei Refinery)
Applicable Law	Revised Ordinances of Honolulu Chapter 25
Accepting Agency	City and County of Honolulu, Department of Planning and Permitting
Type of Document	Draft Environmental Assessment
Determination	Anticipated Finding of No Significant Impact
Applicant	Island Energy Services 91-480 Malakole Street Kapolei, Hawai‘i 96707 Marc Dexter Email: Marc.Dexter@islandenergyservices.com
Agent	CH2M HILL, Inc. 1132 Bishop Street, Suite 1100 Honolulu, Hawai‘i 96813 Attn: Lisa Kettley lisa.kettley@ch2m.com

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Abbreviations and Acronyms

AFONSI	Anticipated Finding of No Significant Impact
BMP	best management practice
CFR	*Code of Federal Regulations*
CH2M	CH2M HILL, Inc.
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CPVC	chlorinated polyvinyl chloride
CR	coral outcrop
CUP	Conditional Use Permit
CWRM	[State of Hawaiʻi] Commission on Water Resource Management
CZM	coastal zone management
dBA	A-weighted decibel
DBEDT	[State of Hawaiʻi] Department of Business, Economic Development and Tourism
DEM	Department of Emergency Management
DHHL	Department of Hawaiian Homelands
DLNR	[State of Hawaiʻi] Department of Land and Natural Resources
DPP	Department of Planning and Permitting
EA	environmental assessment
EISPN	Environmental Impact Statement Preparation Notice
EPPM	emergency plans and procedures manual
ESCP	erosion and sediment control plan
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
GIS	geographic information system
gpm	gallon(s) per minute
H_2SO_4	sulfuric acid
HAAQS	Hawaiʻi ambient air quality standards

HAR	Hawai‘i Administrative Rules
HDOH	State of Hawai‘i Department of Health
HECO	Hawaiian Electric Company
HP	horsepower
HRS	Hawai‘i Revised Statutes
IES	Island Energy Services, LLC
LCA	Land Commission Award
LUO	Land Use Ordinance
makai	oceanward
mauka	mountainward
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NaOH	sodium hydroxide
NFIP	National Flood Insurance Program
NH_4	ammonium-nitrogen
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OEQC	Office of Environmental Quality Control
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PM_{10}	particulate matter less than or equal to 10 micrometers in diameter
ROH	Revised Ordinances of Honolulu
ROW	rights-of-way
SHPD	State Historic Preservation Division
SMA	Special Management Area
SO_2	sulfur dioxide
TCP	traditional cultural property
TMDL	total maximum daily load
TMK	tax map key
TSP	total suspended particulates
USEIA	U.S. Energy Information Administration
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WRCC	Western Regional Climate Center

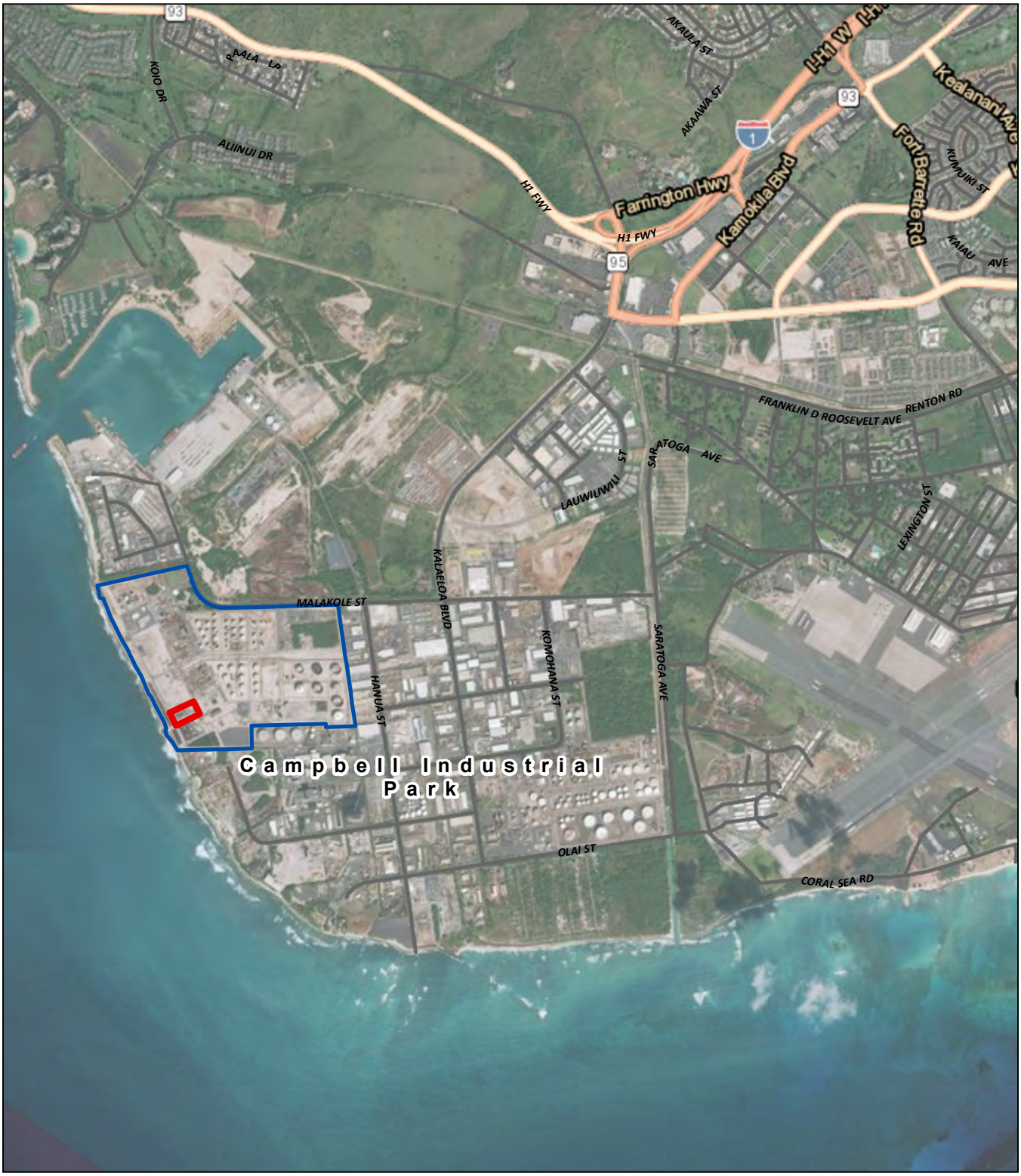
1 Introduction and Overview

Island Energy Services, LLC (IES) owns and operates the Kapolei Refinery (formerly known as the Chevron Refinery) located at 91-480 Malakole Street, Honouliuli (Kapolei), in the ʻEwa District on the southwestern side of Oʻahu, Hawaiʻi. The Kapolei Refinery (the refinery) occupies approximately 250 acres of Campbell Industrial Park and is within tax map key (TMK) 9-1-014:010 (Figures 1-1 and 1-2).

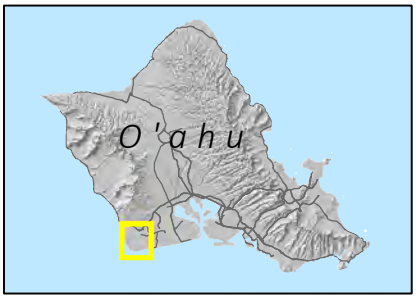
The refinery was constructed in 1959 and has been continuously operating since 1960. It is one of only two petroleum processing facilities in the State of Hawaiʻi (the other is the Par Hawaiʻi Refinery, also located at Campbell Industrial Park). The refinery processes mainly sweet (low sulfur content) crude oil and produces a variety of petroleum products such as fuel oil for power generation, motor gasoline, jet fuel, aviation fuel, propane, and diesel fuel. Several of the chemical processes required to produce these end products use concentrated sulfuric acid (H_2SO_4) as a catalyst or dehydrating agent. These processes result in weakening or contamination of the acid (referred to as spent acid). The refinery includes a spent acid regeneration plant (acid plant) that functions to regenerate spent acid back into a relatively pure and concentrated form for reuse in refinery processes.

IES is proposing to install a sulfur dioxide (SO_2) scrubbing system and replace the existing karbate gas coolers in the acid plant. The proposed project area consists of the existing footprint of acid plant, which is situated in the southwestern portion of the refinery. It is approximately 300 feet east of the shoreline, and is entirely within the Special Management Area (SMA), as shown in Figure 1-3. Pursuant to Revised Ordinances of Honolulu (ROH) Chapter 25-3.3, projects that require an SMA Use Permit shall be subject to an environmental assessment (EA) in accordance with the procedural steps set forth in Hawaiʻi Revised Statutes (HRS) Chapter 343.[1] This Draft EA has been prepared in compliance with this requirement.

[1] The proposed project does not involve any of the compliance triggers listed in HRS Chapter 343-5, and therefore does not require compliance with HRS Chapter 343.



VICINITY MAP



Legend

Proposed Project Area

IES Kapolei Refinery

N

0 1,800 3,600

Approximate scale in feet

FIGURE 1-1
Location of Kapolei Refinery
Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
IES Kapolei Refinery
Kapolei, Hawaii

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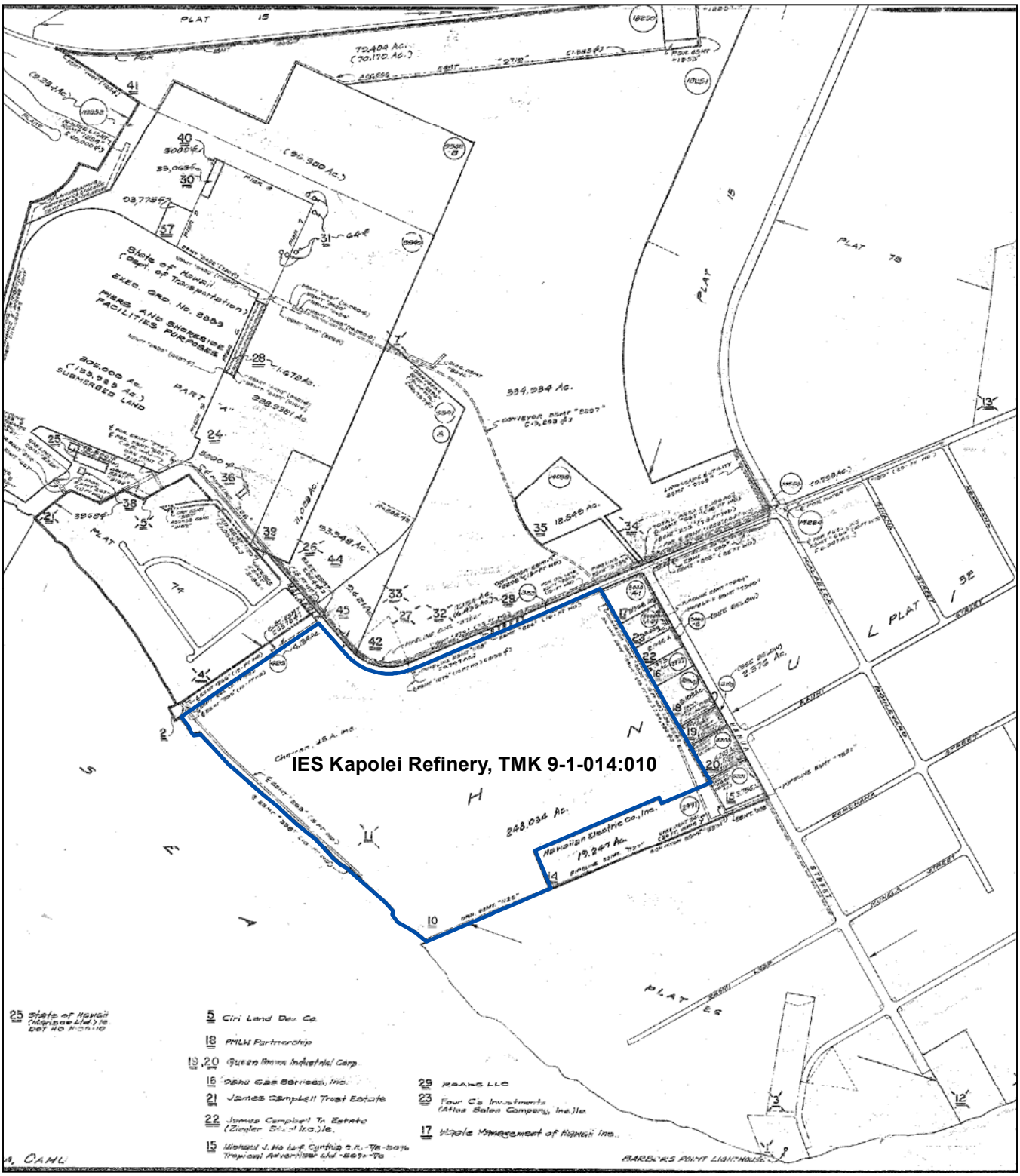

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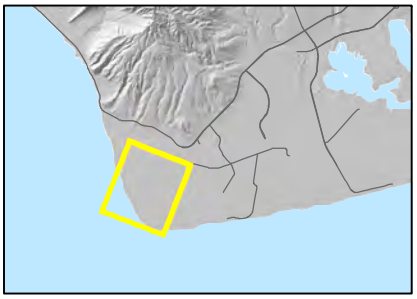

Legend

IES Kapolei Refinery

0 1,000 2,000

Approximate scale in feet

FIGURE 1-2
Tax Map Key
Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
IES Kapolei Refinery
Kapolei, Hawaii

VICINITY MAP

Legend

- Proposed Project Area
- IES Kapolei Refinery
- Special Management Area (SMA)

N

0 600 1,200

Approximate scale in feet

FIGURE 1-3
Project Location
Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
IES Kapolei Refinery
Kapolei, Hawaii

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2 Description of the Proposed Project

2.1 Background Information

The refinery's acid plant, which was originally installed when the refinery was constructed in 1959, is designed to regenerate relatively pure and concentrated sulfuric acid from spent acid through four processing steps: thermal decomposition, gas cleaning, conversion and absorption.

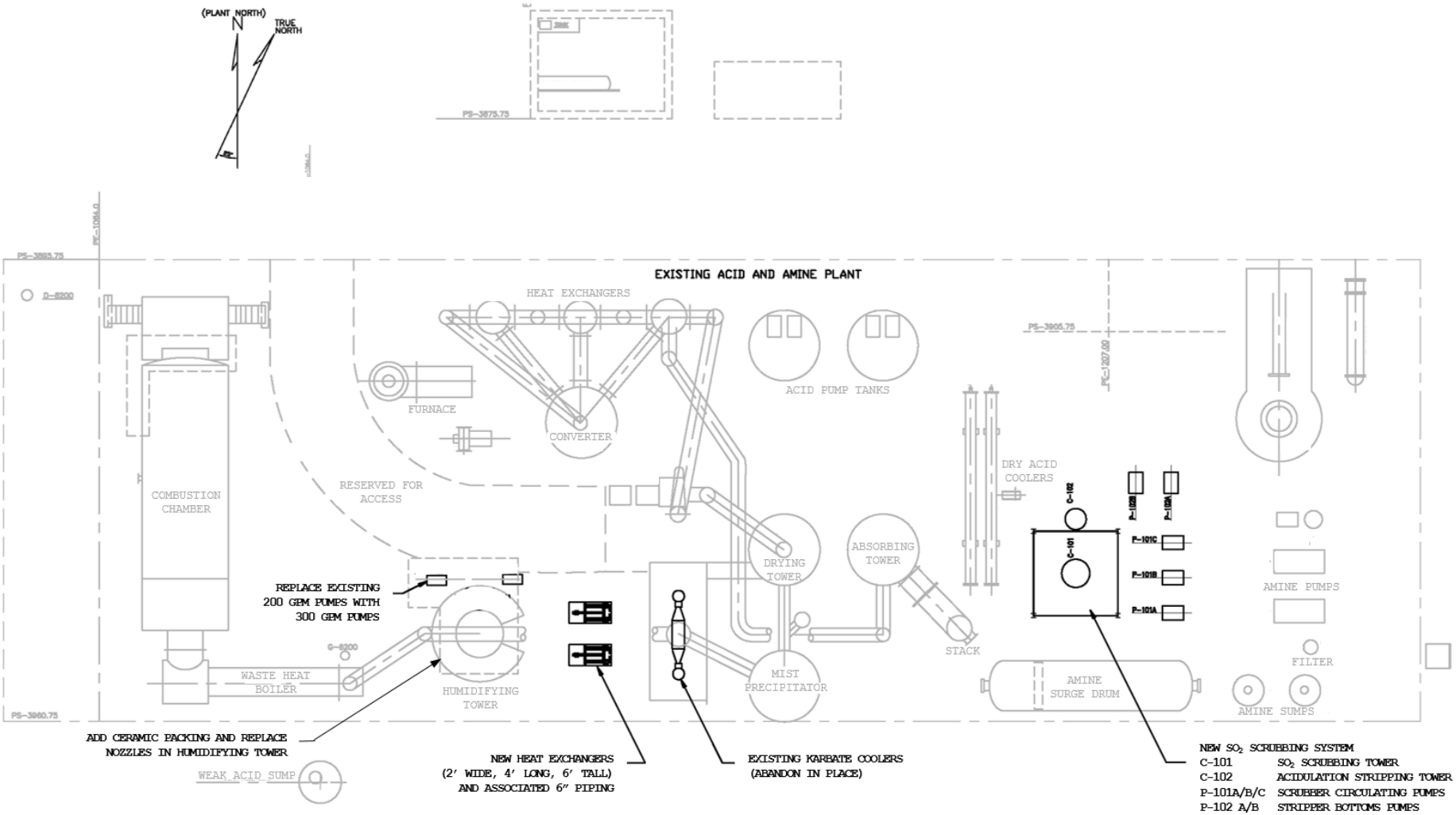
In thermal decomposition, the spent acid is burned in a combustion chamber, causing it to vaporize and decompose into SO_2 and steam. These gases are directed to a waste heat boiler where the steam is captured for use in other parts of the refinery, and the SO_2 is partially cooled before entering the gas cleaning process. The gas cleaning process removes ash or solid impurities from the SO_2, and further reduces the water vapor content. The SO_2 gas then flows to the humidifying tower, where it contacts a circulating stream of weak sulfuric acid and is cooled through evaporation of water. The gas from the humidifying tower is further cooled through a gas cooling system that includes heat exchangers constructed of impervious graphite (karbate); these karbate gas coolers use sea water to cool the gas through condensation of excess water vapor. The gas is then sent through an acid mist precipitator to capture the remaining particles of dust and ash and the acid mist formed from the hydration of undecomposed sulfur trioxide (SO_3). Following gas cleaning, the gas is dried by removing water through contact with sulfuric acid in a drying tower. The final step is absorption of converted SO_3 in oleum, sulfuric acid, or both. This is accomplished by converting the SO_2 to SO_3 in a multi-pass converter, then sending it through an absorbing tower where the remaining SO_3 is absorbed in sulfuric acid. The resulting product is regenerated sulfuric acid, which is transferred to onsite storage tanks for eventual reuse elsewhere within the refinery. Any remaining SO_2 from incomplete conversion to SO_3 as part of the absorption process is released to the atmosphere.

The general layout of the acid plant is illustrated in Figure 2-1.

2.2 Purpose and Need

The acid plant has been in continuous operation for more than 55 years, and although modifications have been made over time, some of the equipment is aging and no longer meets current industry best control practices for minimizing SO_2 emissions. In addition, the acid plant is limited by the functionality of the existing karbate gas coolers, and as such is not able to operate at its' design capacity. As the karbate gas coolers are reaching the end of their design life and are deteriorating, the system flow rates have been turned down, which limits the heat transfer capacity and subsequent ability to maintain acid concentrations at optimal levels. In addition, frequent shutdowns of the acid plant are required to backflush and clean the karbate gas coolers, which often become fouled due to buildup of silt and bioorganic materials.

The purpose of the proposed project is to install an SO_2 scrubbing system and replace the existing karbate gas coolers. The new scrubbing system would reduce SO_2 emissions generated by the acid plant to meet current industry best control practices. Replacement of the karbate gas coolers would improve equipment efficiency and allow the acid plant to operate at its design capacity.



PLAN VIEW

NOT TO SCALE

Figure **2-1**
Acid Plant Layout
SO_2 Scrubbing System Installation and Karbate Gas Cooler Replacement
Kapolei Refinery, Hawaii

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2.3 Proposed Project Components

The proposed project would entail (1) installation of a new SO_2 scrubbing system and (2) replacement of the existing karbate gas coolers within the acid plant. These two components are described in the following sections.

2.3.1 Installation of SO_2 Scrubbing System

The SO_2 scrubbing system would involve installation of new equipment designed to remove SO_2 from the acid plant tail gas as part of the absorption process. IES is voluntarily adding the system to the acid plant to meet current industry best control practices for SO_2 emissions. The system would be highly flexible and would control SO_2 emissions under a range of conditions, including a cold start-up, during which emissions can be higher than during normal operating conditions.

The SO_2 scrubbing system would be installed entirely within the existing footprint of the acid plant. It would require approximately 1,225 square feet of ground disturbance for the foundation (with excavation depths of up to approximately 3 feet). The following bullets list the specific equipment that would be installed as part of the system. The approximate location of this equipment is shown in Figure 2-1, with photographs of the location provided in Figure 2-2. Details showing an elevational and cross-sectional view of the steel support structure are provided in Figure 2-3.

- **SO_2 Scrubbing Tower:** The SO_2 scrubbing tower would be a vertical cylindrical fiber-reinforced plastic vessel, approximately 57 feet in height. It would consist of a tower base (4 feet in diameter, 53 feet tall), topped with a stack (24 inches in diameter, 4 feet tall). The scrubbing tower would be encased within a steel support structure (see below).
- **Acidulation Stripping Tower:** The acidulation stripping tower would be a vertical cylindrical fiber-reinforced plastic vessel, approximately 33 feet in height. It would include a bottom portion (4 feet in diameter, 6 feet tall) and top portion (20 inches in diameter and 27 feet tall). The stripping tower would be attached to the exterior of the steel support structure. The stripping tower would include a continually operated horizontal centrifugal fan (2.5 horsepower [HP]).
- **Steel Support Structure:** The steel support structure would be an approximately 59-foot-tall lattice frame (Figure 2-2). The SO_2 scrubbing tower would sit within the interior of the frame, and the acidulation stripping tower would be attached to the frame exterior.
- **Pumps:** The system would include a total of five pumps installed at ground level near the base of the towers. Three circulating pumps (including one spare) would be associated with the SO_2 scrubbing tower; these would be horizontal centrifugal pumps (75 gallons per minute [gpm], 5-HP motor drive). Two stripper bottom pumps (including one spare) would be associated with the acidulation stripping tower; these would be horizontal centrifugal pumps (10 gpm, 0.75-HP motor drive).

The SO_2 scrubbing system would be integrated into the acid plant as part of the absorption process. Acid plant tail gas from the absorbing tower and mist eliminator would be directed into the scrubbing tower. The scrubbing tower would have a liquid reservoir in its base, two packed beds (scrubbing stages) with polypropylene packing separated by a draw-off tray, an entrainment separator and a stack. A total of three circulating pumps would be installed at the base of the tower: one for each packed bed and one as a spare. Each scrubbing stage would be independently irrigated with a caustic solution (sodium hydroxide [NaOH]) pumped from the refinery's existing caustic storage tank. The caustic solution would react with the SO_2 in the tail gas to create a sodium sulfite/bisulfite solution.

Water would also be added to make up for evaporation and to ensure the specific gravity needed to maintain salts in the solution. Excess solution from the upper stage would overflow a draw-off tray (located between the two packed beds) to the top of the lower packed bed. The gas leaving the upper scrubbing stage would pass through an entrainment separator before entering the exhaust stack. The entrainment separator would be a polypropylene woven mesh pad, which would remove liquid droplets entrained in the gas. The gas exiting the stack to the atmosphere would be saturated with water vapor which, under certain atmospheric conditions, may result in a white steam plume that would dissipate in a short distance.

The sodium sulfite/bisulfite solution produced in the scrubbing process would be pumped from the bottom section of the scrubbing tower to an inline static mixer. Weak sulfuric acid purged from the gas cooling system would also be pumped to the inline mixer, and supplemented with 93 percent sulfuric acid from the drying tower, as needed. The sodium sulfite/bisulfite solution would acidulate (react) with the acid to produce a sodium sulfate solution and SO_2 gas. The acidulated stream from the inline mixer would enter the acidulation stripping tower, which would include polypropylene packing with a liquid surge section at the bottom. Within the tower, the sodium sulfate liquor would be collected and held up to ensure completion of the acidulation process. The liquor would overflow a stand pipe and would enter the packed section of the tower, where SO_2 would be air stripped from the sodium sulfate solution. Atmospheric air would be drawn into the stripping tower by negative pressure at the drying tower inlet and by a stripper air fan. Stripping air containing SO_2 would leave the packed section and re-enter the upper section of the tower to pass through an entrainment separator before leaving the tower. The gas stream leaving the tower, containing normally about 2 to 8 percent SO_2, would be returned to the acid plant drying tower. The stripped sodium sulfate solution collected in the bottom surge section of the tower would be pumped to the refinery's existing effluent treatment plant for final treatment and disposal.

Overall, once in operation, the SO_2 scrubbing system is expected to reduce SO_2 emissions from the acid plant by approximately 90 percent under normal operating conditions.

A basic flow diagram of the proposed SO_2 scrubbing system is shown in Figure 2-4.

2.3.2 Replacement of Karbate Gas Coolers

Replacement of the existing karbate gas coolers would entail installation of new plate and frame heat exchangers, as well as modifications to the humidifying tower. The existing karbate gas coolers would be decommissioned and left in place for the near term, with removal expected to occur over the long term.

All replacement activities would occur entirely within the existing footprint of the acid plant. No excavation would be required. Specific equipment that would be installed is listed below, with the approximate location shown in Figure 2-1 and associated photographs provided in Figure 2-5. Details of the new heat exchangers are provided in Figure 2-6.

- **Compact Plate and Frame Heat Exchangers:** The two new heat exchangers would have a total footprint of approximately 16 square feet (approximately 4 feet long by 2 feet wide, with a height of approximately 6 feet). They would be installed on a new concrete pad, which would be placed on the existing paved surface of the acid plant.
- **Modifications to Humidifying Tower:** Ceramic packing would be added to the existing humidifying tower, and would include beam packing support with ceramic grid blocks. In addition, the tower's existing ceramic silicon carbide spray nozzles would be replaced with new Teflon spiral full-cone spray nozzles.

Looking Northwest Within Acid Plant Toward Proposed Location of SO_2 Scrubbing System

Looking East Within Acid Plant Toward Proposed Location of SO_2 Scrubbing System

Figure 2-2
Photographs of the Proposed Project Area - SO_2 Scrubbing System
Installation of SO2 Scrubbing System and Replacement of Karbate Gas Coolers
Kapolei Refinery, Hawaii

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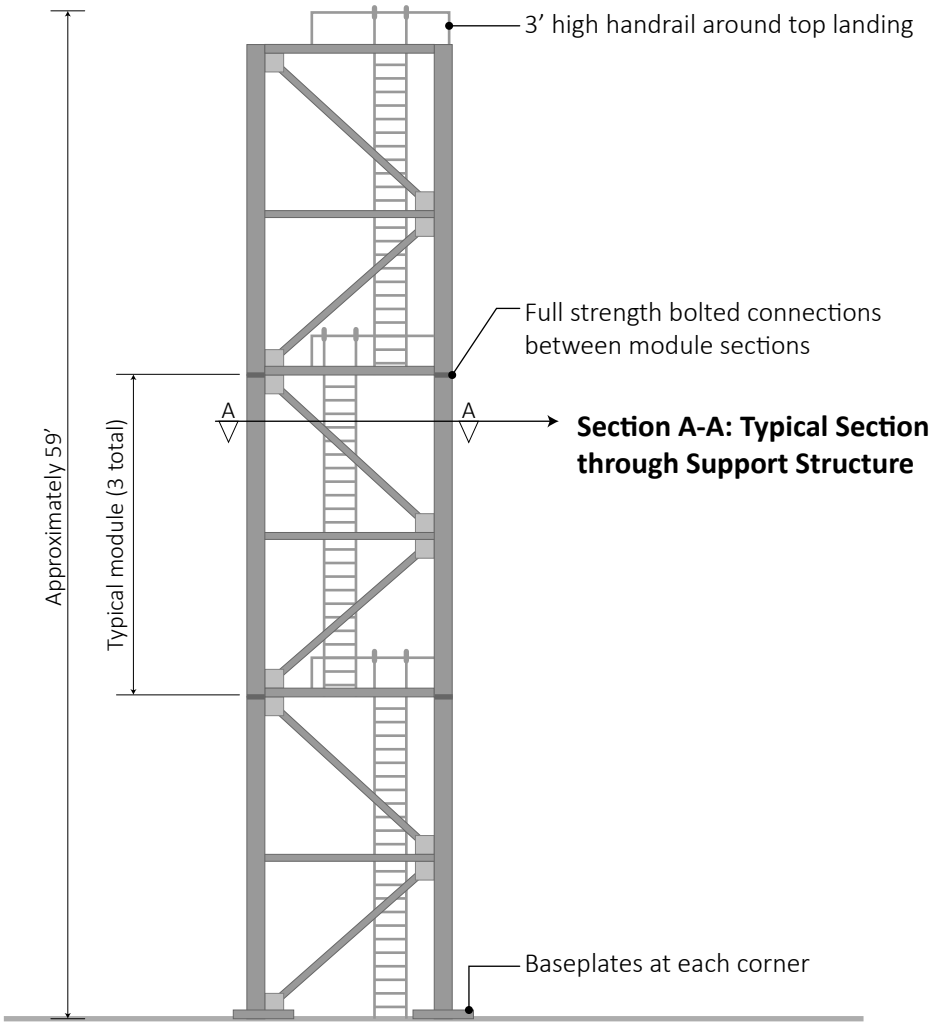
Elevation View (Typical, 4 Sides)



Section A-A

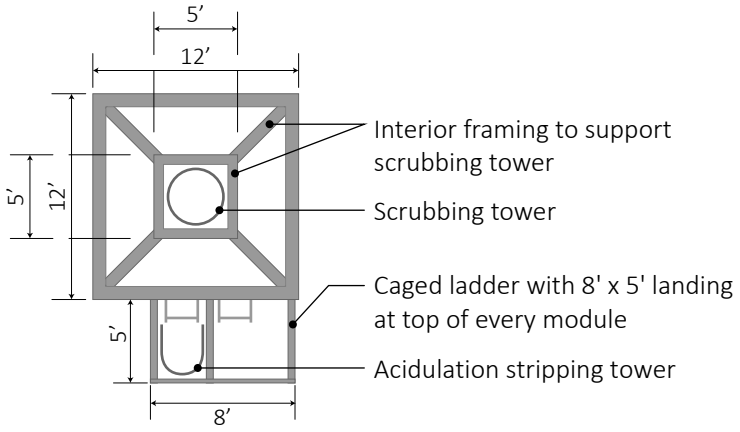


Figure 2-3
SO_2 Scrubbing Tower Support Structure
Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
Kapolei Refinery, Hawaii

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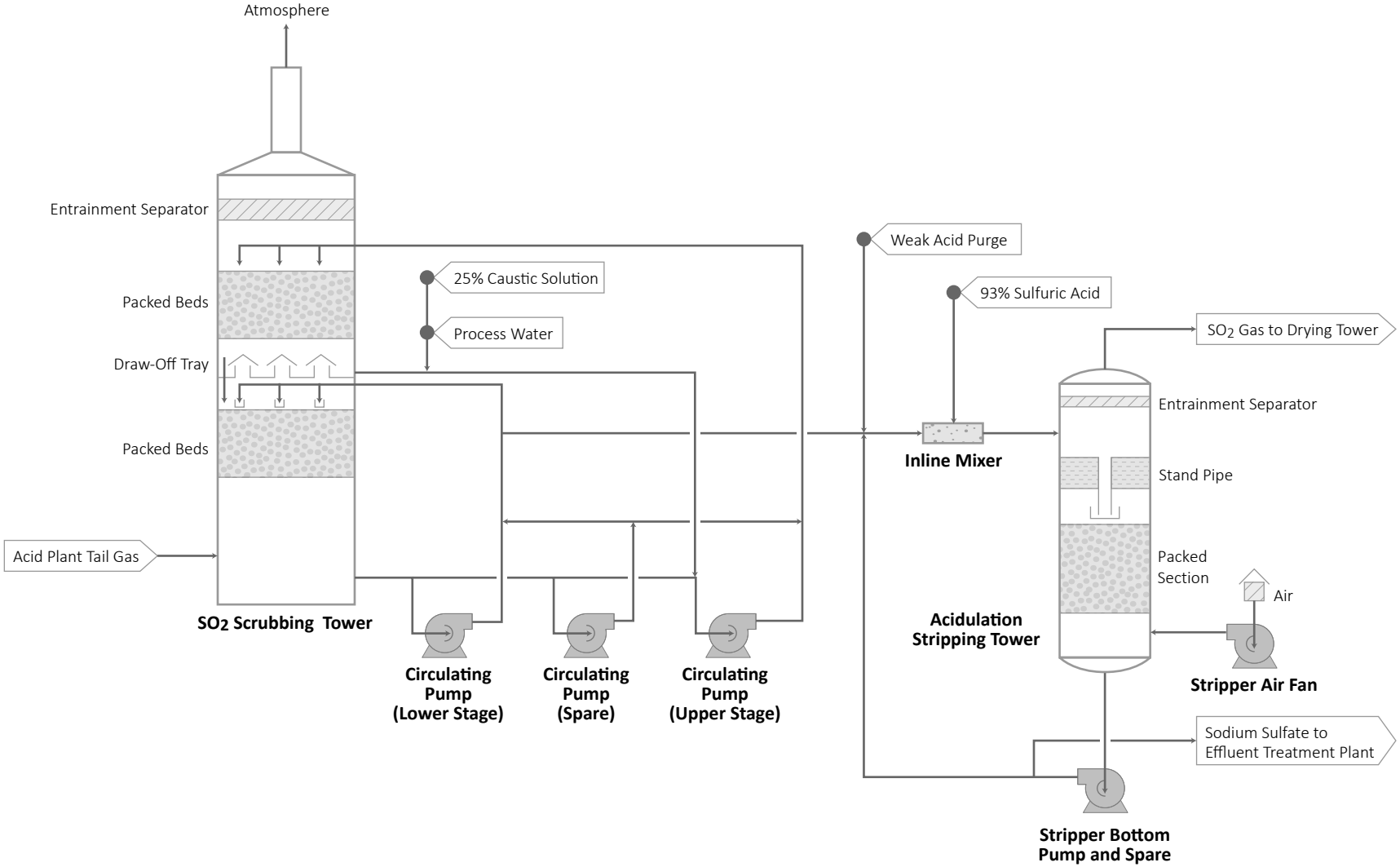

Figure 2-4
SO_2 Scrubbing System Flow Diagram
Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
Kapolei Refinery, Hawaii

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Looking Southeast Within Acid Plant Toward Proposed Location of Replacement Heat Exchangers

Looking Southeast Within Acid Plant Toward Proposed Location of Replacement Heat Exchangers (White Outline Indicates Footprint of Heat Exchangers)

Figure 2-5
Photographs of the Proposed Project Area - Replacement Heat Exchangers
Installation of SO2 Scrubbing System and Replacement of Karbate Gas Coolers
Kapolei Refinery, Hawaii

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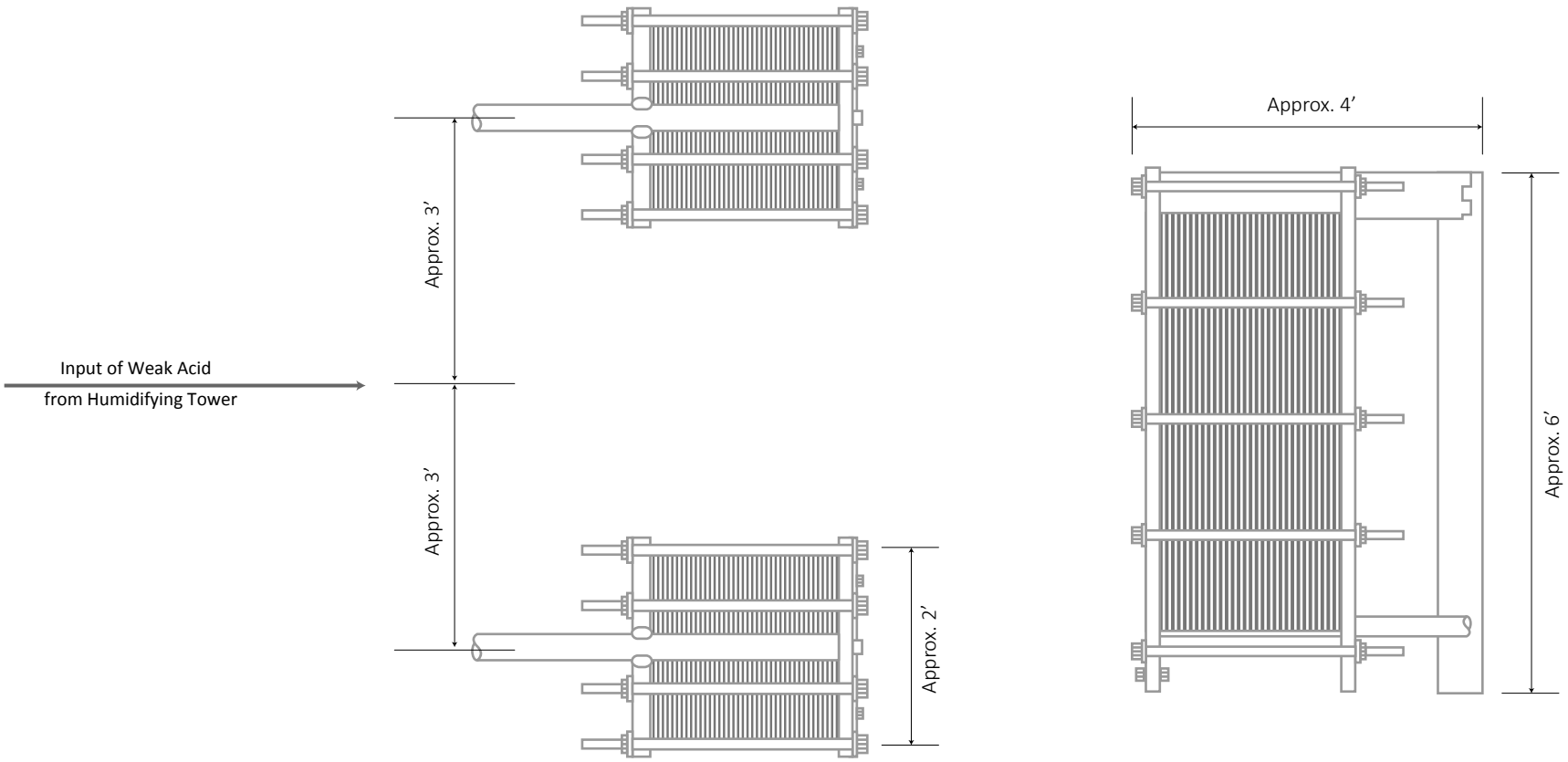

Figure 2-6
Replacement Plate and Frame Heat Exchangers
Installation of SO_2 Scrubbing System and Replacement of Karbate Gas Coolers
Kapolei Refinery, Hawaii

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- **Recirculating Pumps:** Two existing recirculating pumps (200 gpm) would be replaced with two new recirculating pumps (300 gpm).
- **Piping Modification:** The existing piping within the acid plant would be modified with new 3-inch and 6-inch chlorinated polyvinyl chloride (CPVC) components to tie-in the new heat exchangers and pumps to the humidifying tower.

The modifications to the humidifying tower would increase gas cooling capabilities within the tower through increased circulation of weak acid and contact with the ceramic packing, which would provide heat and mass transfer. These modifications would cool the gas with sufficient condensation to achieve product acid at 99 percent concentration, with the condensed water used in the absorbing tower to further control the product acid concentration. The new heat exchangers would operate in parallel to cool the circulating weak acid. This equipment would use the existing sea water circulation system, and would not require any modifications to this system. The exchangers would be designed to operate in reverse flow (backflush on both sides), and would have connections for acid washing.

2.3.3 Construction Activities

Construction of the SO_2 scrubbing system would require removal of the existing paved surface and pouring a new reinforced concrete foundation for the steel support structure. The maximum extent of ground disturbance would be approximately 1,225 square feet (with maximum excavation depths of up to approximately 3 feet, or until hard coral substrate is reached). Once the foundation has been installed, the SO_2 scrubbing tower would be erected on the foundation. The three modules of the steel support structure would be pre-assembled and installed incrementally, with each module lifted and placed over the tower with a crane. Once the support structure modules have been installed and secured, the acidulation stripping tower would be erected and fastened to the exterior of the support structure. The pumps would then be installed adjacent to the tower, with the necessary piping and electrical connections.

Construction activities for replacement of the karbate gas coolers would involve installing new concrete pads (overlaying the existing paved surface within the acid plant) for the new heat exchangers. Temporary scaffolding would be constructed to accommodate installation of the new and modified piping. Once the existing recirculating pumps have been removed and the new equipment has been set in place, the piping modifications would be made to tie the equipment to the drying and absorbing towers. These activities would require temporary shut-down of the acid plant for approximately 1 to 2 weeks.

Equipment to be used during construction is expected to include concrete saws, an excavator, a dump truck, a skid steer loader, a crane, concrete delivery trucks, jack hammers, and small electrical-powered handtools such as drills and saws. Access to the project site would occur via the existing main gate and existing refinery roads. All equipment and construction materials would be staged on the paved area around the perimeter of the acid plant. Waste generated during construction would be taken to an approved landfill or recycled as appropriate.

Groundwater is not expected to be encountered during construction, based on the known depths to groundwater. However, in the unlikely event that groundwater is encountered during excavation, dewatering would be conducted to temporarily remove water from the excavated area to accommodate construction. Any groundwater removed during dewatering would be temporarily stored in an onsite frac tank, then transferred to the effluent treatment plant, in accordance with the IES water management plan.

2.3.4 Operations and Maintenance Activities

Maintenance of the SO_2 scrubbing system and gas cooling system would be conducted as part of the standard acid plant maintenance process. Equipment repair would be conducted on an as-needed basis, with maintenance shutdowns for more extensive maintenance operations expected to occur every 3 to 5 years. During a maintenance shutdown, the acid plant is typically shut down for approximately one week, and the equipment is thoroughly inspected, cleaned and components are replaced as needed.

2.4 Project Schedule and Cost

Installation of the SO_2 scrubbing system and replacement of the karbate gas coolers is planned to occur in parallel. Construction is expected to occur in the fourth quarter of 2018, with a total duration of approximately 2 to 3 months.

The estimated value of the SO_2 scrubbing system is approximately $2.5 million. The estimated value of the replacement heat exchangers is approximately $450,000, for a total project valuation of just under $3 million.

2.5 Required Permits and Approvals

Table 2-1 presents the permits and approvals that are expected to be required for installation of the SO_2 scrubbing system and replacement of the karbate gas coolers.

Table 2-1. Anticipated Permits and Approvals

Permit/Approval	Regulatory Agency
Special Management Area (SMA) Use Permit	City and County of Honolulu, Department of Planning and Permitting (DPP)
Modification to the Conditional Use Permit (No. 87/CUP1-14)	DPP
Air Pollution Control Permit	State of Hawai‘i Department of Health (HDOH), Clean Air Branch
Community Noise Permit	HDOH, Indoor and Radiological Health Branch
Building Permit	DPP
Grading, Grubbing, and Stockpiling Permit	DPP
Notice of Proposed Construction or Alteration (Form 7460-1)	Federal Aviation Administration (FAA)

3 Affected Environment, Potential Impacts and Mitigation Measures

This section describes the affected environment and potential impacts of the proposed project relative to applicable environmental resources. Mitigation measures or best management practices (BMPs) that would be implemented to avoid or minimize potential impacts are identified, where relevant. In accordance with HRS Chapter 343 and Hawaiʻi Administrative Rules (HAR) §11-200, the description of the affected environment focuses on those resources and conditions potentially impacted by the proposed project; resources that are not present (or otherwise do not apply) are not discussed.

3.1 Climate

3.1.1 Existing Conditions

Hawaiʻi's climate is heavily influenced by the terrain and tradewinds. The island of Oʻahu consists of two parallel mountain ranges running in the northwestern to southeastern direction, which is perpendicular to the prevailing northeastern trade winds. As a result, the western (leeward) side of Oʻahu is drier and warmer than the windward side of the island.

Given its leeward location on the ʻEwa Plain, the proposed project area is relatively dry and arid. According to the Western Regional Climate Center (WRCC), temperatures in this area range from an average maximum of 87.2 degrees Fahrenheit to an average minimum of 61.4 degrees Fahrenheit (WRCC, 2017). Mean annual rainfall for this area is approximately 21.4 inches. The lowest rainfall levels occur in the summer months and the highest levels occur in the winter months; mean monthly rainfall ranges from approximately 0.3 inches in June to approximately 3.6 inches in December (Giambelluca et al., 2013).

3.1.1.1 Climate Change

Greenhouse gases (including carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) are chemical compounds that are emitted as a result of natural processes and human activities. Greenhouse gases trap heat in the atmosphere, thus affecting the earth's temperature. Scientific evidence indicates a trend of increasing global temperatures (that is, global warming) and other related climatic changes caused by an increase in global greenhouse gas emissions.

CO_2 emissions represent approximately 80 percent of total greenhouse gas emissions and therefore are used as a primary indicator for regional greenhouse gas emissions. The largest source of CO_2 and overall greenhouse gas emissions is fossil fuel combustion; the transportation sector is the largest contributor to greenhouse gas emissions. In 2014, fossil fuel consumption in Hawaiʻi resulted in an estimated 18 million metric tons of CO_2 emissions (USEIA, 2017).

A broad spectrum of climate change impacts has been investigated and described for Hawaiʻi, including rising surface air temperatures, decrease in prevailing trade winds, decline in rainfall levels, increasing intensity of storm events, rising sea levels, and increasing ocean temperature and acidification (University of Hawaii SeaGrant, 2014).

3.1.2 Potential Impacts and Mitigation Measures

Implementation of the proposed project would not be expected to have a measurable effect on climate, either during construction or as a result of long-term operations. A limited amount of greenhouse gas emissions, which contribute to climate change, would be associated with construction of the project from the use of construction equipment and vehicles. Published data from the U.S. Environmental Protection Agency (USEPA) indicate that 22 pounds of CO_2 are produced for every gallon of diesel fuel burned, and 19.4 pounds are produced for every gallon of gasoline used (USEPA, 2008). Given the scale of the proposed project, the total amount of emissions resulting from construction would be imperceptible at a regional scale, considering average greenhouse gas emissions in Hawaiʻi of approximately 18 million metric tons per year (USEIA, 2017). As such, the proposed project would be expected to have a negligible, short-term impact on greenhouse gas emissions and climate change. Over the lifetime of the proposed project, the effects of climate change are expected to be increasingly realized at a global scale, and climate change variables could influence the conditions within the proposed project site. Despite rising sea levels, the acid plant is expected to be sufficiently separated from the shoreline to maintain safe operations. The existing berm, which serves as a breakwater, will continue to be maintained as protection against any associated coastal surge. As such, sea level rise and other climate change factors are not expected to significantly affect the proposed project over the long term.

3.2 Geology, Topography and Soils

3.2.1 Existing Conditions

The proposed project area is located on the ʻEwa Plain, which extends south from the base of the Waianae mountain range. This coastal plain is a limestone platform that formed as a coral reef in the Pleistocene era when sea levels were higher than present, and has subsequently been exposed. According to data published by the Natural Resources Conservation Service (NRCS), the proposed project area (along with the rest of the refinery and most of Campbell Industrial Park) is mapped within the coral outcrop (CR) unit (NRCS, 2016). Coral outcrop is defined as coral or cemented calcareous sand found at elevations ranging from sea level to approximately 100 feet above sea level. In some areas, the limestone platform exhibits karst features, such as dissolution pit caves (also referred to as sinkholes) ranging in size up to several meters wide.

The elevation of the project site is approximately 5 feet above mean sea level. As a result of previous grubbing and grading conducted as part of refinery construction, the topography throughout the project area is flat, with a slight slope towards the shoreline. Within the acid plant, the ground surface is compacted or paved and no karst features are present.

Given the long-term use of the property for petroleum processing, there is a potential for soil contamination. However, available sampling data do not indicate the presence of contamination in the immediate vicinity of the proposed project area and the extent of excavation is limited, such that the likelihood of encountering contaminated soils is expected to be low.

3.2.2 Potential Impacts and Mitigation Measures

Construction of the proposed project would involve a minimal amount of ground disturbance within the existing footprint of the acid plant. Installation of the foundation for the SO_2 scrubbing system would require approximately 1,225 square feet of ground disturbance (with excavation depths up to approximately 3 feet); replacement of the karbate gas coolers would involve placement of small

concrete pads on the existing paved surface, with no additional ground disturbance. No significant geologic features or landforms would be affected, as none are present; nor would the local topography be altered as a result of construction.

Given that contamination is not known to occur within the area to be excavated, implementation of the proposed project is not expected to uncover or otherwise expose contaminated soils. However, in the event that contamination is encountered during excavation, appropriate measures would be implemented, including proper characterization, remediation, transport and disposal in accordance with the appropriate local, state, and federal laws and regulations.

Excavation and grading during construction of the SO_2 scrubbing system could result in soil erosion in the form of either fugitive dust or suspended sediment in stormwater runoff. Given the relatively limited area of disturbance and the type of substrate present, the erosion potential is considered to be low. Regardless, BMPs would be implemented to minimize the potential for construction-related erosion. BMPs related to water quality and air quality are discussed in Sections 3.3.2 and 3.10.2, respectively. With implementation of BMPs, construction of the proposed project is not expected to significantly impact soil erosion. Over the long term, operation of the SO_2 scrubbing system and replacement heat exchangers would not involve any ground disturbance, and as such, is not expected to further contribute to erosion.

3.3 Water Resources

3.3.1 Affected Environment

The Kapolei refinery is located within the Kalaeloa Watershed, which encompasses approximately 10.1 square miles with a maximum elevation of approximately 2,441 feet. The watershed comprises approximately 80 percent urban, 19 percent agricultural, and 1 percent conservation lands (Parnham et al., 2008). Although there are several streams within the Kalaeloa watershed, none are proximate to the proposed project area.

There are no natural water features located within the refinery property. Several man-made ponds have been constructed in support of refinery operations; these include Rowland's Pond, the Oxidation Ponds, Impounding Basin, and the North and South ocean ponds. Rowland's Pond is used for containment of stormwater runoff as well as emergency catchment for petroleum products in the unlikely event of a tank rupture. The Oxidation Ponds and Impounding Basin are part of the effluent treatment plant. The South Ocean Pond is a lined pond that functioned historically as temporary stormwater detention basin and is dry for most of the year. The North Ocean Pond was also formerly used for stormwater detention; however, the pond is unlined and stormwater is no longer routed to this basin. In addition, there is a drainage ditch that runs parallel to the southeastern edge of the acid plant; this ditch collects localized stormwater runoff from the southern portion of the property and drains to the ocean. The location of these features in shown in Figure 1-3.

The refinery property is located in the Malakole aquifer system of the Pearl Harbor aquifer sector. In this area, the 'Ewa caprock overlies the basal aquifer system (CWRM, 2008). Based on sampling data from wells within the refinery property, the depth to groundwater in the vicinity of the acid plant is approximately 3.5 to 4 feet below ground surface.

3.3.2 Potential Impacts and Mitigation Measures

The proposed project would not directly affect any surface water features, as none are present within the project area. As described in Section 2.3.3, the proposed project would involve ground disturbance

and excavation within an approximately 1,225 square-foot area for installation of the foundation for the SO_2 scrubbing system. Given that the ground surface within the acid plant is already paved, the proposed project would not increase impervious surface, and therefore, would not be expected to increase the volume or flow of stormwater runoff. However, construction activities could temporarily increase sediment and other pollutants (for example, trace oil, grease, and fuel) in stormwater runoff, which could affect water quality in receiving waters. Given the limited extent of ground disturbance and the relatively short duration of construction, the potential for sedimentation or increased pollutants in stormwater runoff is expected to be minimal. Regardless, BMPs appropriate for the type of construction work envisaged would be implemented during construction to minimize the potential for water quality impacts to receiving waters.

BMPs would be identified as part of an erosion and sediment control plan (ESCP), which would be prepared and submitted for approval in accordance with the requirements of DPP's Water Quality Rules (2017a). BMPs would include erosion prevention, sediment control and other good housekeeping measures that would be implemented to prevent and control erosion and sediment discharge from the proposed project site. These are expected to include measures similar to those listed below.

- Ground disturbance would be scheduled to occur during periods of minimal rainfall. No ground disturbance would occur during periods of heavy rain.
- Erosion and sediment control measures (for example, biobags or compost filter berms) would be installed before earth moving activities are initiated, and would be inspected and properly maintained throughout the construction period.
- The extent of ground disturbance would be minimized to the extent possible. Areas of disturbed soil would be stabilized as quickly as possible.
- Any stockpiled soil will be removed from the site or securely covered at the end of each day.
- Proper handling and storage procedures would be implemented to prevent spills or releases of hazardous materials used during construction (for example, diesel fuel or lubricants).
- Vehicles and equipment will be in inspected for leaks and to ensure that they are in proper working order. If found, leaks will be fixed or equipment replaced before resuming work.
- The construction area will be kept clean, with all trash and construction-related debris removed from the site at the end of each day.

Implementation of BMPs as part of an approved ESCP would minimize the potential for polluted runoff, such that water quality impacts to receiving waters are not anticipated. Therefore, the proposed project would be consistent with the State's policy on water quality degradation, which specifies that water quality and beneficial uses of state waters be maintained. Because construction would not disturb more than an acre, a National Pollutant Discharge Elimination System (NPDES) general permit authorizing discharges of stormwater associated with construction would not be required. However, notification of the proposed work would be provided as needed, in accordance with the conditions of the individual NPDES permit for the refinery property.

Groundwater is not expected to be encountered during construction based on the known depths to groundwater. In the unlikely event that groundwater is encountered during excavation, dewatering would be conducted; any groundwater removed would be temporarily stored in an onsite frac tank then transferred to the effluent treatment plant, in accordance with the IES water management plan. Implementation of these measures would allow for temporary dewatering of groundwater from the

excavation area to accommodate construction. Overall, the project would not affect groundwater levels, nor would it degrade ground water quality.

3.4 Coastal Resources

3.4.1 Affected Environment

The western edge of the refinery property abuts the Pacific Ocean, with the acid plant located approximately 300 feet inland from the shoreline. A variety of intervening features are located between the acid plant and shoreline, including a paved road, North Ocean Pond (a former stormwater detention basin surrounded by a 4-foot-high berm), and an 8-foot-high security fence. Beyond the security fence is a coral and sand roadway, as well as an approximately 6-foot-high breakwater feature comprised of large boulders and other material generated during grading of the refinery property. The shoreline is a relatively narrow strip of coral and sand overlaying a limestone shelf.

Coastal waters in the vicinity of the project area are identified as Class A marine waters according to the HDOH water quality standards map. The objective of the Class A designation is protection for recreational purposes and aesthetic enjoyment (HDOH, 2014). Pursuant to HAR §11-54-6, stormwater discharges associated with industrial activities to Class A marine waters must meet, at the minimum, the basic water quality criteria specified in HAR §11-54-4 and all applicable requirements of HAR §11-55 (Water Pollution Control).

Water bodies that do not currently meet the State's water quality criteria are designated as "impaired" and are placed on the Clean Water Act Section 303(d) List of Impaired Waters. Based on the data presented in the *2016 State of Hawai'i Water Quality Monitoring and Assessment Report*, the marine waters off Campbell Industrial Park are designated as impaired. The listed parameters not in attainment are chlorophyll-*a* and ammonium-nitrogen (NH_4). Development of a total maximum daily load (TMDL) for these parameters is listed as a low priority (HDOH, 2017).

3.4.2 Potential Impacts and Mitigation Measures

Given the distance from the shoreline and the intervening features, the proposed action is not expected to have any effect on coastal resources, either directly or indirectly. As described in Section 3.3, a drainage ditch that runs parallel to the southeastern edge of the acid plant collects localized stormwater runoff from the southern portion of the property and drains to the ocean. There is a potential for construction-related ground disturbance to temporarily increase the amount of sediment and other pollutants in stormwater runoff that flows to this drainage ditch, which would affect water quality in the coastal waters. However, an approved ESCP would be implemented during construction, including BMPs to prevent and control erosion and sediment discharge from the proposed project site. With implementation of these measures, the proposed project is not expected to result in polluted runoff or otherwise affect water quality criteria in the nearby coastal waters.

3.5 Biological Resources

3.5.1 Affected Environment

Prior to disturbance, the 'Ewa Plain was dominated by lowland coastal dry shrub and grassland habitat. Some of the remaining native plant species are now recognized as federally listed threatened or endangered. Other unique biological resources in this region include subterranean aquatic features in

limestone pit caves that provide habitat for anchialine pool shrimp (*opae ula*, *Halocaridina rubra* and *Metabetaeus lohena*), as well as various snail and damselfly species.

The entire refinery property has been extensively disturbed and transformed by human activity, and is now characterized by exotic grasses, weeds, and shrubs or has been grubbed bare. The acid plant has been entirely graded and is comprised of compacted coral, concrete, or both, such that there is no vegetation or other natural communities present. There are no pit caves or other karst features within the project area that could support subterranean habitat for anchialine pool shrimp species.

Elsewhere within the refinery, the surface ponds constructed for stormwater detention, emergency catchment, and wastewater treatment purposes may be used by waterbird species (including the endangered Hawaiian stilt [*ae'o*, *Himantopus mexicanus knudseni*] and the endangered Hawaiian coot [*'alae ke'oke'o*, *Fulica alai*]) for nesting or foraging. The closest ponds to the proposed project area are the North Ocean Pond and the South Ocean Pond; both of these are typically dry and have netting installed, so are generally not used by waterbird species. Waterbirds are routinely observed in the Oxidation Ponds, Impounding Basin, and Rowlands Pond (Figure 1-3). These areas are actively managed (for example, through vegetation removal) to minimize potential conflicts between waterbird use and refinery operations (AECOM, 2017).

Other bird species that have been documented within the refinery include Ruddy Turnstone (*'akekeke*, *Arenaria interpres*), Pacific Golden-Plover (*kolea*, *Pluvialis fulva*), Mallard-undetermined hybrids (*Anas platyrhynchos x unknown*), Sanderling (*Calidris alba*), Wandering Tattler (*Heteroscelus incanus*), and Wedge-tailed Shearwater (*Ardenna pacifica*) (AECOM, 2017). The only other wildlife species that would be expected to occur within the refinery are non-native species, such as the small Indian mongoose (*Herpestes auropunctatus*), feral cats (*Felis catus*), rats (*Rattus* sp.), and house mice (*Mus musculus*).

3.5.2 Potential Impacts and Mitigation Measures

The proposed project area has been extensively graded and is entirely composed of bare, compacted substrate or paved surface. The proposed project would not directly impact any biological resources, as none occur within the project area.

The presence of waterbird species within the refinery is strictly limited to the onsite ponds, including the Oxidation Ponds, Impounding Basin and Rowlands Pond. The proposed project would not involve any work within these features and waterbird habitat would not be affected. Noise and disturbance levels associated with construction and operation of the proposed project are expected to be similar to ongoing refinery activities, so indirect impacts to waterbird species (such as disruption of nesting or interference with species movement) are not anticipated. Therefore, the proposed project is not expected to have an impact on native biological resources.

3.6 Historic Properties

3.6.1 Affected Environment

An investigation for historic properties was conducted within the proposed project area by Cultural Surveys Hawai'i in August 2017. The scope of the investigation included historical research (for example, archival sources, historic maps, Land Commission Awards [LCAs], and previous archaeological reports) to construct a history of land use and to determine if archaeological sites have been recorded on or near the project area. It also included a field inspection of the project area to identify any surface archaeological features and to investigate and assess the potential for impact to any such sites. Based on the results of the historical research and field inspection, the potential for historic properties to occur

within the proposed project area was evaluated. A copy of the Literature Review and Field Investigation Report is provided in Appendix A.

The historical research indicates that, before extensive historic and modern land alteration, areas within the Honouliuli region would have yielded either or both of the remnants of traditional Hawaiian temporary habitations used during forays for marine resources or evidence of opportunistic seasonal agriculture and possibly burials. As determined based on ethnographic accounts and past archaeological investigations in the vicinity, limestone pit caves on the ‘Ewa Plain were used for agriculture and burial interment, with the largest overhangs used for temporary shelter. With the spread of western land use in the nineteenth century, the project area may have been used for ranching. Starting in 1959, construction began on the former Chevron oil refinery. Extensive land disturbance related to the refinery construction would have destroyed or buried portions of the project area’s traditional Hawaiian archaeological record, including surface features and pit caves. Some pit caves at Barbers Point have been shown to be a storehouse of data on more than a score of previously unknown, extinct, bird species.

No evidence of traditional Hawaiian occupation or potential historic properties were observed during the field inspection. All structures and infrastructure present within the project area is associated with the refinery. No intact pit caves, sand dune deposits, or cultural material were observed within the project area and none are believed to be present.

3.6.2 Potential Impacts and Mitigation Measures

Based on the findings of the archaeological investigation, no historic properties are known to occur within the proposed project area, and no project-related impacts to archaeological resources or other historic properties are anticipated.

In the unlikely event that sand dune deposits or historic resources (including structural remains, subsurface cultural deposits, pit caves with openings greater than 1 meter in diameter, or human remains) are encountered during construction, all work in the immediate vicinity would cease and the State Historic Preservation Division (SHPD) would be promptly notified.

3.7 Cultural Resources

3.7.1 Affected Environment

Pursuant to the requirements of HRS Chapter 343, Cultural Surveys Hawai‘i conducted a cultural assessment to evaluate the potential effect of the proposed project on cultural beliefs, practices, and resources, including traditional cultural properties (TCPs). The assessment included archival research of relevant background history, *ka’ao* (legends), traditional *mo’olelo* (stories), *wahi pana* (storied places), *mele* (songs), and traditional and historical accounts. Cultural documents, primary and secondary cultural and historical sources, historic maps, and photographs were reviewed for information pertaining to the study area. The findings of the cultural assessment are summarized below. A copy of the cultural assessment report is provided in Appendix B.

The proposed project area is located in the Honouliuli *ahupua’a* (land division usually extending from the uplands to the sea), which is the largest in the *moku* (district) of ’Ewa. One translation of the name for this district is given as “unequal.” Others translate the word as “strayed” and associate it with the legends of the gods Kāne and Kanaloa.

The traditional *ka'ao* associated with this area speaks of the *akua* (godly) brothers, Kāne and Kanaloa. It was their supernatural feat of hurling *pōhaku* (stone) across the island that determined the land division boundaries (Sterling and Summers, 1987). Additional *mo'olelo* speak of Hi'iaka and her travels across the plains of 'Ewa. In particular, the *wahi pana* of Kaupe'a (which is located northeast of the current project area) describes it as a wide plain with a grove of *wiliwili* (*Erythrina sandwicensis*) (Kamakau, 1991). This plain is an *ao kuewa*, a realm belonging to homeless souls. In general, *kama'āina* (native-born) made a point to avoid this place.

John Papa 'Ī'ī described a network of Leeward O'ahu trails, which in later historic times encircled and crossed the Wai'anae Range. These trails allowed passage from West Loch to the Honouliuli lowlands, past Pu'uokapolei and Waimānalo Gulch to the Wai'anae coast and onward, circumscribing the shoreline of O'ahu ('Ī'ī, 1959).

In traditional Hawaiian times, the areas of exposed coral (Pleistocene limestone) outcrop were undoubtedly more extensive. According to McAllister (1933), holes and pits in the coral were generally accessed for water, while larger pits, often containing soil, were used for cultivation of *mai'a* (banana; *Musaceae*) and *kō* (sugarcane; *Saccharum officinarum*).

Following the *Māhele* of 1848 (the division of Hawaiian lands that introduced private property into Hawaiian society), 99 individual land claims in Honouliuili *ahupua'a* were registered and awarded by King Kamehameha III. The project area appears to have been included in the largest award (Royal Patent 6071, LCA 11216, *'Āpana* [piece of land] 8) granted in Honouliuli *ahupua'a* to Miriam Ke'ahikuni Kekau'ōnohi on January 1848 (Native Register). Kekau'ōnohi acquired a deed to all unclaimed land within the *ahupua'a*, totaling 43,250 acres.

During the last half of the nineteenth century, an array of agricultural enterprises were attempted. In 1877, James Campbell purchased most of Honouliuli *ahupua'a*—including the current project area—for a total of $95,000. By 1889, the Ewa Plantation Company was established and lands throughout Honouliuli were designated for sugarcane cultivation. Sugar production exploded with the successful drilling of an artesian well by James Campbell on the 'Ewa Plain. Campbell's first well was named *Waianiani* ("crystal waters") by the *kama'āina* of Honouliuli (Nellist, 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho'okuleana, 2014).

3.7.2 Potential Impacts and Mitigation Measures

Based on the results of the cultural assessment, no cultural resources or practices are known to have been associated with the property since construction of the refinery. Construction and operation of the proposed project is not expected to affect cultural resources or practices. In the unlikely event that sand dune deposits or historic resources are encountered during construction, all work in the immediate vicinity would cease and the SHPD would be promptly notified. If *iwi kūpuna* (ancestors) are identified, the appropriate entities would be contacted and cultural and lineal descendants would be consulted, as appropriate.

3.8 Land Use and Recreation

3.8.1 Affected Environment

3.8.1.1 General Land Use

As previously described, the proposed project would be entirely within the existing footprint of the acid plant at the Kapolei Refinery. The refinery is part of Campbell Industrial Park, which was established in 1958 and now serves as Oʻahuʻs major industrial center. Campbell Industrial Park comprises approximately 1,380 acres and is occupied by nearly 250 businesses representing a wide range of manufacturing, import/export, power generation, construction, and waste management industries. The Kapolei Refinery is bounded by a variety of Campbell Industrial Park businesses to the south, east, and north. Kalaeloa Barbers Point Harbor is located further north, approximately 0.5 mile from the northern edge of the refinery. The Pacific Ocean borders the refinery to the west.

The existing refinery does not support any recreational activities. The nearest public beach park is Barbers Point Beach Park, which is located about 1 miles southeast of the refinery. A public shoreline access easement and public parking area is located about 0.6 mile north of the refinery. Lateral access exists along the shoreline. Recreational use along the shoreline is limited, but includes fishing and diving.

3.8.1.2 Land Use Districts and Zoning Designations

The refinery is located in an area that is designated as Urban District by the State of Hawaiʻi Land Use Commission. It is identified as industrial on the Urban Land Use Map in the ʻEwa Development Plan (DPP, 2013), and is zoned by the City and County of Honolulu as I-2 (industrial). Within this zoning district, a refinery is a permitted use subject to a Conditional Use Permit; in March 1987, the City and County of Honolulu issued a Conditional Use Permit (No. 87/CUP1-14) for operation of a refinery on the subject property.

A portion of the refinery, including the acid plant, is also within the SMA, which is a zoning overlay that triggers additional permitting requirements to ensure compliance with the objectives of the Hawaii coastal zone management (CZM) program. Within the refinery property, the SMA extends inland approximately 675 feet from the shoreline.

3.8.2 Potential Impacts and Mitigation Measures

The proposed SO_2 scrubbing system and replacement heat exchangers would be installed within the existing acid plant and integrated as part of ongoing refinery operations. The proposed project would not result in a change in the current land use within the refinery, nor would it have any effect on adjacent land uses. There are no recreational facilities in the immediate project vicinity, and the proposed project would not affect access to the shoreline or coastal recreational activities.

Use of the property for refinery operations would continue to be consistent with the applicable land use controls and policies. Additional detail regarding the consistency with the applicable land use control and policies. The appropriate zoning permits, including an SMA Use Permit, would be obtained (refer to Table 2-1). The proposed project is not expected to result in any impacts related to land use.

3.9 Visual Resources

3.9.1 Affected Environment

Visual resources include natural and built features that can be seen by the public and contribute to their appreciation and enjoyment of these features. Visual resources can include individual structures and natural landmarks (such as buildings, trees, and bodies of water) or entire landscapes.

Important public views and vistas in this region are identified in the ‘Ewa Development Plan; these include distant views of the shoreline from the H-1 Freeway above the ‘Ewa Plain (DPP, 2013). However, according to the Development Plan’s Open Space Map, these views are more directed to the southeast where the landscape is dominated by residential developments and open space, rather than south toward Campbell Industrial Park. Campbell Industrial Park is visible from H-1 Freeway and Farrington Highway (as well as other more *mauka* [mountainward] areas such as Makakilo), but this area is not a prominent feature of the landscape and is characterized by heavy industrial development. The Coastal View Study (Chu and Jones, 1987) characterizes views of this area as follows: “*The terrain is flat with no significant landforms. While expansive, views from Farrington Highway are very distant and have little visual significance due to an absence of noticeable land forms or other focal points*.”

The nearest designated open space to the proposed project area is Barbers Point Beach Park, which is located approximately 1 mile southeast of the refinery. The Coastal View Study identifies this beach park as having significant stationary coastal views to the east and west. These viewplanes do not include the proposed project area, as it is located northwest of the beach park (along a section of the shoreline that faces west, in comparison to the south-facing beach park). Along the west-facing shoreline, lateral views of the proposed project area are relatively limited due to the general orientation and extent of development along the shoreline.

3.9.2 Potential Impacts and Mitigation Measures

Impacts to visual resources are typically defined in terms of the extent to which a project would change the visual character and quality of the environment as seen by the public. In the case of the proposed project, the SO_2 scrubbing system and replacement heat exchangers would be similar in nature to the existing refinery equipment and the overall industrial character of Campbell Industrial Park. None of the new equipment would be visible from areas outside of the refinery, with the exception of the SO_2 scrubbing tower and associated support structure. Given an overall height of approximately 59 feet, the tower would be visible from surrounding areas.

Two visual simulations were prepared to illustrate the visibility of the tower from publicly-accessible locations in the project vicinity. Figures 3-1 and 3-2 show the simulated views from the shoreline immediately adjacent to the proposed project area and from the shoreline approximately 1.5 miles north of the proposed project area (near Ko Olina), respectively. As demonstrated in Figure 3-1, the tower would not be visible from this location (and other similar vantage points along the shoreline), as it would be blocked by intervening development. Along portions of the shoreline that are closer to the project area, such as shown in Figure 3-2, the upper portion of the tower would be visible. However, the tower would be similar in nature to the existing industrial development and would not significantly degrade existing views along the shoreline.

Given the industrial nature of Campbell Industrial Park and the lack of scenic views toward this area, the proposed tower is not expected to significantly affect visual resources.

3.10 Air Quality

3.10.1 Affected Environment

Under the authority of the Clean Air Act, the USEPA has established nationwide air quality standards to protect public health and welfare. These federal standards, known as National Ambient Air Quality Standards (NAAQS), represent the maximum allowable atmospheric concentrations for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), SO_2, ozone, lead, and particulate matter (respirable particulate matter less than or equal to 10 micrometers in diameter [PM_{10}] and respirable particulate matter less than or equal to 2.5 micrometers in diameter [$PM_{2.5}$]). The NAAQS are based primarily on evidence of acute and chronic (or short-term and long-term) health effects, and apply to outdoor locations to which the general public has access. Based on measurements of ambient criteria pollutant data, the USEPA designates areas of the United States as having air quality equal to or better than NAAQS (attainment) or worse than NAAQS (non-attainment). Hawaiʻi is designated as having attainment status for all criteria pollutants (HDOH, 2015).

Pursuant to HRS Chapter 342B (*Air Pollution Control*), the Clean Air Branch of the HDOH is responsible for implementing air pollution control in the State and has established Hawaiʻi ambient air quality standards (HAAQS), which in some cases are more stringent than the comparable federal standards or address pollutants that are not covered by the federal standards. The HAAQS are based primarily on health effects data, but also reflect other considerations, such as protection of crops, protection of materials, or avoidance of nuisance conditions (such as objectionable odors).

Pursuant to HRS Chapter 342B-18, HDOH generates an annual report to provide the community with an understanding of the air quality at Campbell Industrial Park (*Annual Report on Air Emissions from Facilities at Campbell Industrial Park*). Given the industrial nature of this area, there are a variety of facilities in Campbell Industrial Park that affect air quality. The facilities specifically identified by HDOH in the 2016 report include the AES Hawaiʻi Cogeneration Plant, Kapolei (Chevron) Refinery, HECO combustion turbine generating station, H-POWER, Kalaeloa Partners Cogeneration Plant, and Par Hawaiʻi Refining petroleum refinery. Specific to the Kapolei Refinery, the main sources of emissions are storage tanks, furnaces, boilers, combustion turbines, cooling tower, and flares. The primary air pollutants that are identified as emissions from these facilities are total suspended particulates (TSP), PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, and volatile organic compounds (VOCs) (HDOH, 2016).[2]

The air quality monitoring data for Campbell Industrial Park are obtained from the HDOH monitoring station located in Kapolei (approximately 1.5 miles from Malakole Street in Campbell Industrial Park). This station was established in 2002, with the primary objective of monitoring for population exposure. All of the NAAQS and HAAQS pollutants are monitored at this station. The 2016 readings from the Kapolei station indicate that criteria pollutant levels were below both the State and Federal ambient air quality standards. The trends for SO_2, NO_2, and CO in the Campbell Industrial Park area have been relatively level and well below the national and state standards. The PM_{10} values show greater variability but are still well below the standards (HDOH, 2016).

The refinery has obtained all required air quality permits and operates as a major covered source under the Hawaiʻi air quality permitting program.

[2] VOCs and TSP are not covered by the NAAQS or HAAQS. VOCs are a precursor of ozone (and consequently, smog). TSP was replaced as a criteria pollutant by PM_{10}. Both pollutants are controlled by permit (HDOH, 2016).

Existing View Toward Kapolei Refinery from North of Kalaeloa Harbor (near Ko Olina)

Simulated View Toward Kapolei Refinery (With SO_2 Scrubbing Tower, Revealed) from North of Kalaeloa Harbor (near Ko Olina)

Figure 3-1
Visual Simulation of SO_2 Scrubbing Tower
Installation of SO2 Scrubbing System
and Replacement of Karbate Gas Coolers
Kapolei Refinery, Hawaii

Existing View Toward Kapolei Refinery from the Adjacent Shoreline

Simulated View Toward Kapolei Refinery (With Proposed SO_2 Scrubbing Tower) from Adjacent Shoreline

Figure 3-2
Visual Simulation of SO_2 Scrubbing Tower
Installation of SO2 Scrubbing System
and Replacement of Karbate Gas Coolers
Kapolei Refinery, Hawaii

3.10.2 Potential Impacts and Mitigation Measures

Construction of the proposed project could result in short-term impacts on air quality. Impacts could be associated with (1) fugitive dust emissions from vehicular movement and soil excavation, and (2) exhaust emissions from onsite construction equipment. Given the relatively limited extent and duration of construction, these emissions would be temporary and localized in nature. In comparison to overall emissions in the region, the contribution by construction-related project activities would be negligible, and would not be expected to affect attainment of the federal or state ambient air quality standards. Furthermore, construction would be conducted in compliance with HAR §11-60.1 (Air Pollution Control), which requires the best practical operation or treatment such that there is not discharge of visible fugitive dust beyond the property lot line. In addition to the measures listed in Section 3.3.2, BMPs that would be implemented to reduce construction-related impacts to air quality are expected to include use and proper maintenance of diesel power equipment, covering open-bodied trucks whenever hauling material that may blow away, and keeping adjacent paved roadways clean. With implementation of these BMPs, construction-related impacts to air quality are expected to be less than significant.

The Kapolei Refinery is operated in compliance with the air pollution control permitting requirements that are administered by the HDOH Clean Air Branch. The applicable air quality documentation would be submitted and air quality permits would be obtained for the proposed project prior to implementation.

Once in operation, the proposed project is expected to provide a substantial benefit in terms of air quality. As detailed throughout this document, the purpose of the SO_2 scrubbing tower is to reduce SO_2 emissions to levels that are consistent with industry best control practices. Although the improved efficiency of the new heat exchangers will allow for increased acid production (at levels up to the design capacity), the SO_2 scrubbing system would be expected to decrease overall SO_2 emissions associated with the existing acid plant by approximately 90 percent. As SO_2 has been shown to contribute to human health issues (for example, respiratory conditions) and environmental impacts (for example, acid rain), the overall reduction of SO_2 emissions associated with the proposed project would positively impact human and environmental health.

3.11 Noise

3.11.1 Affected Environment

Campbell Industrial Park was established and continues to serve as O‘ahu‘s major industrial area. This area supports a wide variety of manufacturing, import/export, power generation, construction, and waste management industries, and as a result, ambient noise levels are relatively high. Noise generated by the Kapolei Refinery is commensurate with the surrounding industrial uses; noise levels associated with the acid plant are not distinguishable from those associated with the refinery and/or other nearby industrial operations. Given the industry setting, there are no sensitive receptors (for example, residential areas) located in the project vicinity.

3.11.2 Potential Impacts and Mitigation Measures

Construction of the proposed project would result in increased noise levels, primarily associated with the use of construction equipment, which is expected to include concrete saws, an excavator, a dump truck, a skid steer loader, a crane, concrete delivery trucks, and small electrical-powered handtools such as drills and saws. The *Construction Noise Handbook* (FHWA, 2006) indicates that the loudest

equipment would generally emits noise in the range of 80 to 90 A-weighted decibels (dBA) at a distance of 50 feet. Operation of construction equipment would be limited to typical working days and hours.

The State of Hawai‘i has adopted statewide noise standards, which are the maximum permissible sound levels (as measured from the property line) and vary according to land use district. Per HAR §11-46-3, the project area is located in the Class C Zoning District (industrial). In this zoning district, the maximum permissible sound levels (as measured from the property line) are 70 dBA during the daytime (7 am to 10 pm) and 70 dBA during the nighttime (10 pm to 7 am). Given the size of the refinery property and the interior location of the acid plant, construction-related noise is not expected to exceed these maximum permissible sound levels. If it is determined that construction-related noise will exceed the State’s maximum permissible property line noise levels, a noise permit would be obtained from HDOH pursuant to HAR §11-46-7. Given the proposed project location within the refinery property and the broader industrial setting, as well as the temporary nature of construction activities (with approval of a Community Noise Permit, as needed), construction-related noise impacts are expected to be less than significant.

Following construction, noise levels generated by the SO_2 scrubbing system and replacement heat exchangers are expected to be commensurate with the ambient noise levels associated with existing refinery operations and the surrounding industrial uses. Based on the overall size of the property and distance to adjacent uses, as well as the surrounding industrial activities (and lack of sensitive receptors), the proposed project is not expected to significantly impact noise levels beyond the property line.

3.12 Transportation and Traffic

3.12.1 Affected Environment

Access to the refinery is via Interstate H-1, one of O‘ahu‘s main state highways, and Kalaeloa Boulevard and Malakole Street, both of which are maintained by the City and County of Honolulu. With the exception of a bus stop located near the refinery on Malakole Street, there are no transportation resources in the immediate vicinity of the refinery. Other transportation resources in the broader project vicinity include Kalaeloa Airport (approximately 2 miles east of the proposed project area) and Kalaeloa Barbers Point Harbor (approximately 1 mile north of the proposed project area).

Public vehicle traffic is not permitted within the refinery. Vehicular access for refinery staff is relatively limited and is restricted to a perimeter road, which runs between the acid plant and North Ocean Pond, and a handful of other internal roadways. Most movement within the refinery occurs by foot or on bicycle.

3.12.2 Potential Impacts and Mitigation Measures

Construction of the proposed project would require delivery of construction vehicles, materials, and equipment, as well as construction crews to the refinery. The additional number of vehicles would only occur over the short-term construction period and is expected to fall within the range of normal conditions for Campbell Industrial Park. However, depending on the timing, the use of oversized delivery trucks could result in minor, localized impacts to traffic flow. To minimize potential impacts to traffic, delivery of construction materials and equipment using oversized trucks would occur during off-peak traffic hours. If any construction projects are planned to occur on nearby properties during the same time frame, the timing of deliveries would be coordinated to minimize traffic-related impacts. With implementation of these measures, traffic-related impacts are expected to be negligible.

Over the long-term, operational requirements for the SO_2 scrubbing system and replacement heat exchangers will be commensurate with the existing operations of the acid plant, such that there would not be an impact on the roadways. The proposed project is not expected to directly impact any other transportation resources, as none are located within or immediately adjacent to the proposed project site.

To ensure that the proposed tower (and use of a crane during construction) are compatible with operations at the nearby Kalaeloa Airport, Notice of Proposed Construction or Alteration (Form 7460-1) would be filed with the FAA in accordance with the requirements of the *Code of Federal Regulations* (CFR) Title 14 Part 77.9.

3.13 Natural Hazards

3.13.1 Affected Environment

Natural hazards that could affect portions of O‘ahu include flooding, tsunamis, and earthquakes. The applicable designations associated with the hazard risk at the proposed project site are summarized below.

Based on the Federal Flood Insurance Rate Map (FIRM), the refinery property is within Zone D, which are those areas in which flood hazards are undetermined. The adjacent shoreline is within Zone VE, which is a designation given to coastal areas with a 1 percent or greater chance of flooding with additional hazard associated with wave action (DLNR, 2017). Based on these data, the acid plant is not located within a flood hazard zone.

The hazard risk associated with tsunami inundation throughout Hawai‘i are depicted on tsunami evacuation maps prepared by the City and County of Honolulu, in coordination with the Hawai‘i Emergency Management Agency and the University of Hawaii (DEM, 2015). These maps show the *makai* [oceanward] portions of the property as within the tsunami evacuation zone, and the *mauka* portions of the property as within the extended tsunami evaluation zone (that is, the inundation area associated with a very large magnitude earthquake in the Aleutian Islands).

As the seismic risk on O‘ahu is relatively low compared to more volcanically active areas, the entire island is designated Seismic Zone 2A, indicating a low potential for ground motion created by seismic activity.

3.13.2Potential Impacts and Mitigation Measures

The proposed project would not affect geologic or natural processes, and would not result in an increased risk of natural hazards in the project vicinity.

As the acid plant is not located within a flood hazard zone or an area with increased potential for seismic-related ground motion, it is extremely unlikely that conditions associated with flooding or seismic activity would occur within the proposed project area, nor would the proposed project contribute to increased risk of flooding or seismic activity.

The proposed project area is located within the tsunami evacuation zone. In the event of a tsunami warning, all construction would stop and the refinery systems would be shut down, in accordance with the protocols specified in the IES emergency plans and procedures manual (EPPM). Personnel would evacuate to a designated safe zone and risk to workers in the project area would be minimized.

For these reasons, impacts associated with natural hazards are considered negligible over both the short and long term.

3.14 Public Services and Utilities

3.14.1 Affected Environment

The property is served by the Kapolei Fire and Police stations, which are located approximately 2 and 3 miles from the refinery (respectively).

Public utilities that provide service to the refinery include domestic water, waste water, electric and communications. Solid waste is collected by a private firm and disposed of at the municipal sanitary landfill, or is transported off-island for disposal.

3.14.2 Potential Impacts and Mitigation Measures

The proposed project is not expected to interrupt, increase the demand for, or otherwise affect police, fire, or emergency medical services. The proposed project would comply with the fire protection requirements of the fire code, and therefore is not expected to increase the need for fire response.

The proposed project would also not affect the existing utility infrastructure or the current level of service, nor would the proposed project increase the volume of liquid or solid waste generated as part of refinery operations. As such, the project is not expected to have any impact on public services or utilities.

3.15 Cumulative Effects

Cumulative impacts result from the incremental effects of the proposed project when added to other past, present, and reasonably foreseeable future projects, regardless of the person or agency that undertakes the other projects. The potential for cumulative impacts to the environment from the proposed project was evaluated with consideration given to other projects and activities in the region that could affect the same environmental resources within a similar timeframe. Actions that were considered include those projects that were recently completed, are currently underway, or are expected to occur in the foreseeable future.

Recent or planned projects within the Kapolei Refinery include replacement of the acid pump tanks, which was recently completed. Based on a review of the Office of Environmental Quality Control (OEQC) online library of environmental review documents, other projects and activities in the broader vicinity of the proposed project area include the following:

- Kenai Industrial Park Project (development of a 62-unit storage facility)
- Solid Waste to Energy Truck Receiving Station (facility to accept and process dewatered sewage sludge for disposal for the H-POWER Expansion Project)
- Western Kapolei Regional Drainage Plan (drainage system to collect runoff from multiple individual drainage systems)
- Kalaeloa Airport Development Plan Improvements (development of T-hangars and lease lots at the airport)
- Kalaeloa Energy Corridor (an underground electrical and communications distribution system within State and County roadway rights-of-way [ROW])

- Keahole Solar Power (two 5-megawatt solar photovoltaic facilities on Department of Hawaiian Homelands [DHHL] property)
- Kalaeloa Barbers Point Harbor Fuel Pier and Harbor Improvements (addition of berthing space and optimization of cargo handling efficiencies at the harbor)

The project area and the surrounding region is highly urbanized and has been for over 50 years. Given the limited scope of the project and the extent of existing development, the proposed project would not result in an incremental change to land use patterns or redevelopment activities. Impacts to biological resources or cultural resources are not anticipated, as none are present within the proposed project area. Short-term construction impacts include those related to increased dust, erosion, and noise. Most (if not all) of the related actions are expected to result in similar construction-type impacts. As described throughout this document, measures would be implemented to avoid and minimize project-related construction impacts; it is expected that the other recent and planned projects include similar measures to minimize and mitigate potential impacts. As such, it is not expected that these temporary construction-related impacts associated with the proposed project would combine with those of other projects in the vicinity to create substantial adverse cumulative impacts. Based on this analysis, the proposed project is not expected to result in any significant cumulative impacts to the human environment when considered with other known past, present, and foreseeable future actions.

4 Consistency with Plans, Policies, and Controls

4.1 State Plans, Policies, and Controls

4.1.1 Hawaii State Planning Act (HRS Chapter 226)

The Hawaii State Planning Act (HRS Chapter 226) is a broad policy document relating to the statewide planning system, including all activities, programs and decisions made by local and state agencies. It is intended to "improve the planning process in this state, to increase the effectiveness of government and private actions, to improve coordination among different agencies and levels of government, to provide for wise use of Hawaiʻi's resources and to guide the future development of the state" (HRS Chapter 226-1). The State Plan serves as written guide for the long-range development of the state by describing the desired future for the residents of Hawaiʻi and providing a set of goals, objectives, and policies that are intended to shape the general direction of public and private development. The stated goals of the state plan relate to a strong viable economy, a desired physical environment, and individuals and family well-being (HRS Chapter 226-4). Overall, the proposed project supports these goals; in particular, the project would serve to maintain efficient operation of the Kapolei Refinery while reducing SO_2 emissions to meet current industry best control practices, which would provide environmental and human health benefits. Consistency of the proposed project with the specific objectives and policies in the Hawaiʻi State Plan is summarized in Table 4-1.

In addition, HRS Chapter 226 directs state agencies to prepare state functional plans for priority issues. Functional plans that have been developed to date relate to agriculture, conservation lands, education, employment, energy, health, historic preservation, housing, human services, recreation, tourism and transportation. HRS Chapter 226 also establishes overall priority guidelines to address areas of statewide concerns. These related to economic development, population growth and land resource management, housing, crime and criminal justice, and quality education. None of the functional plans or priority guidelines are applicable to the proposed project (Office of Planning, 2017).

Table 4-1. Project Consistency with the Objective and Policies of the Hawaii State Plan (HRS Chapter 226)

Objective	Compliance with Specific Objectives and Policies
Population	This theme is not applicable to the project.
Economy—General	The project would be in compliance with this theme, particularly the following objectives and policies: (a)(2) A steadily growing and diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of industries on the neighbor islands. As described in Section 2, the proposed project would allow the refinery's acid plant to meet current industry best control practices for SO_2 emissions while operating at its design capacity. As one of the state's two petroleum processing facilities, efficient operations of Kapolei Refinery is important to maintaining Hawai'i's economy.
Economy—Agriculture, visitor industry, federal expenditures, potential growth and innovative activities, information industry	These themes are not applicable to the project.
Physical environment—Land-based, shoreline, and marine resources	The project would be in compliance with this theme, particularly the following objectives and policies: (a)(2) Effective protection of Hawai'i's unique and fragile environmental resources. The proposed project would involve work within the existing footprint of the refinery's acid plant and would not impact any natural resources. BMPs would be implemented to avoid and minimize short-term construction impacts related to erosion and sedimentation, such that no impacts to the nearby shoreline are anticipated.
Physical environment—Scenic, natural beauty, and historic resources	The project would be in compliance with this theme, particularly the following objectives and policies: (b)(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features. The proposed project would involve construction of a 59-foot-tall tower and associated structure. However, the tower is expected to be visually commensurate with the surrounding industrial landscape and would not affect any important scenic vistas or landscape views along the shoreline.
Physical environment—Land, air, and water quality	The project would be in compliance with this theme, particularly the following objectives and policies: (a)(1) Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources. (b)(3) Promote effective measures to achieve desired quality in Hawai'i's surface, ground, and coastal waters. (b)(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people. (b)(7) Encourage urban developments in close proximity to existing services and facilities.

Table 4-1. Project Consistency with the Objective and Policies of the Hawaii State Plan (HRS Chapter 226)

Objective	Compliance with Specific Objectives and Policies
	The proposed project would involve work within the existing footprint of the acid plant at the Kapolei Refinery. It would result in short-term, construction-related impacts (noise, dust, and erosion), but implementation of BMPs would minimize the effects to the environment. Once constructed, the SO_2 scrubbing system would significantly reduce SO_2 emissions from the refinery's acid plant, which would provide air quality benefits.
Facility systems—General	The project would be in compliance with this theme, particularly the following objectives and policies: (b)(1) Accommodate the needs of Hawaiʻi's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans. Kapolei Refinery is a private facility, but is one of two petroleum processing facilities in the state and is important component in meeting the state's energy needs. As detailed in this document, the proposed project is consistent with state and county plans.
Facility systems—Solid and liquid waste, water, transportation, telecommunications	These themes are not applicable to the project.
Facility systems—Energy	The project would be in compliance with this theme, particularly the following objectives and policies: (a)(1) Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people (b)(8) Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications; The Kapolei Refinery is one of two petroleum processing facilities in the state and is important component in meeting the state's energy needs. The proposed project would involve replacement and installation of equipment that would significantly reduce SO_2 emissions, while improving system efficiency to allow the refinery's acid plant to operate at design capacity.
Socio-cultural advancement—Health	The project would be in compliance with this theme, particularly the following objectives and policies: (b)(2) Maintenance of sanitary and environmentally healthful conditions in Hawaiʻi's communities. The proposed project would involve replacement and installation of equipment that would significantly reduce SO_2 emissions, which would provide environmental and health benefits.
Socio-cultural advancement—Housing, education, social, leisure, individual rights, culture, public safety, government	These themes are not applicable to the project.

4.1.2 State Land Use Law (HRS Chapter 205)

The Hawaiʻi State Land Use Law (HRS Chapter 205) established the State Land Use Commission and granted the authority to classify all lands in the state into one of four land use districts: Urban, Rural, Agricultural, and Conservation. The Kapolei refinery is located on land that is classified within the Urban District. Permissible uses in the Urban District are primarily defined and regulated by the County, as further discussed in Section 4.2.

4.1.3 Coastal Zone Management (HRS Chapter 205A)

Under the authority of the federal Coastal Zone Management Act (16 U.S.C. 1451-1456), the Hawaiʻi CZM Program was enacted as HRS Chapter 205A, and is administered by the State of Hawaiʻi Department of Business, Economic Development and Tourism (DBEDT) Office of Planning. The purpose of the Hawaiʻi CZM program is to provide for the effective management, beneficial use, protection, and development of the coastal zone. It is designed to integrate decisions made by state and county agencies to provide greater coordination and compliance with existing laws and rules. The CZM area encompasses the entire state.

The objectives of the Hawaiʻi CZM Program are listed in Table 4-2, with a brief statement on project consistency with each objective and the associated policies.

Table 4-2. Project Consistency with the Objective and Policies of the Hawaiʻi CZM Program (HRS Chapter 205A-2)

Objective	Statement of Compliance
Recreational Resources: Provide coastal recreational opportunities accessible to the public.	The proposed project area is within an actively operated refinery. The property does not support any coastal recreational resources. The nearest public recreational area is Barbers Point Beach Park, which is approximately 1 mile southeast of the project site. The proposed project would not impair access to the nearby shoreline, degrade the quality of coastal waters, or otherwise affect coastal recreational opportunities.
Historic Resources: Protect, preserve, and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.	Both an Archaeological Literature Review and Field Inspection and a Cultural Assessment were conducted for the proposed project by Cultural Surveys Hawaiʻi. As detailed in these studies, the project area was previously graded as part of the refinery construction in 1959. No surface historic properties were observed within or in the immediate vicinity of the project area. No intact pit caves, sand dune deposits, or cultural material was observed within the project area and none are believed to be present, nor are cultural resources or practices known to have been associated with the property since construction of the refinery. The proposed project would not be expected to affect historic or cultural resources.
Scenic and Open Space Resources: Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.	The proposed project is located in Campbell Industrial Park, which is designated as a heavy industrial center. It would involve installation and replacement of equipment within the existing footprint of the refinery's acid plant, and would not impact open space along the shoreline. There are no valued scenic resources in this area, and the proposed project would not alter natural landforms or significantly affect existing public views toward or along the shoreline.
Coastal Ecosystems: Protect valuable coastal ecosystems, including reefs, from disruption and to minimize adverse impacts on all coastal ecosystems.	The proposed project would be located within the existing footprint of the refinery's acid plant, and would not involve use or development of marine or coastal resources. A limited amount of ground disturbance during construction could temporarily increase the amount of sediment and other pollutants in stormwater runoff, which could affect water quality in receiving waters. However, BMPs would be implemented and no adverse impacts to coastal ecosystems are anticipated.

Table 4-2. Project Consistency with the Objective and Policies of the Hawaiʻi CZM Program (HRS Chapter 205A-2)

Objective	Statement of Compliance
Economic Uses: Provide public or private facilities and improvements important to the State's economy in suitable locations.	The proposed project involves installation and replacement of equipment in the existing footprint of the refinery acid plant, and would not involve a new coastal development. Although located adjacent to the coast, the refinery is located within an area that is designated for heavy industrial uses, and is important to the state's economy.
Coastal Hazards: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.	The proposed project is not located within a coastal flood hazard zone, but is located within the tsunami evacuation zone. In the event of a tsunami warning, all construction would stop and the refinery systems would be shut down, in accordance with the emergency plans and procedures specified in the IES EPPM. Personnel would evacuate to a designated safe zone, such that risk to workers in the project area would be minimized. The proposed project would not impact the geology of the region and therefore would not increase the tsunami risk to the surrounding area.
Managing Development: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.	The proposed project involves installation and replacement of equipment in the existing footprint of the refinery acid plant, and would not involve a new coastal development. The proposed project is not expected to conflict with any existing or proposed development, and would comply with all applicable laws.
Public Participation: Stimulate public awareness, education, and participation in coastal management.	The environmental review process for the proposed project includes a public participation component. Specifically, project-specific information is being disseminated and public input is being elicited through the EA and SMA permitting process.
Beach Protection: Protect beaches for public use and recreation.	The proposed project would not involve placement of any structures within the shoreline setback area, nor would it have any effect on erosion or other natural shoreline processes.
Marine Resources: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.	The proposed project would not directly or indirectly affect any marine resources.

Key components of the Hawaiʻi CZM Program include (1) regulation of development within the SMA, a designated area extending inland from the shoreline, (2) provisions related to a shoreline setback, which serves as a buffer against coastal hazards and erosion, and to protect viewplanes. The proposed project would not involve work within the shoreline setback, but is located entirely within the SMA and will require an SMA Use Permit. Authority for this permit program is delegated to the various counties, with DPP administering the program for the City and County of Honolulu. An SMA Use Permit will be obtained for the proposed project, as further discussed in Section 4.2.4.

4.2 County Plans, Policies and Controls

4.2.1 County General Plan

The General Plan for the City and County of Honolulu is a policy document for the long-range comprehensive development of the Island of Oʻahu and provides direction for future growth of Honolulu. The current General Plan was amended in October 2002 (Resolution 02-205, CD1) and outlines objectives and policies related to physical, social, economic and environmental resources for

the general welfare and prosperity of the people of O‘ahu. It is intended to serve as a guide for all levels of government, private enterprise, neighborhood and citizen groups. Organizations and individual citizens. In general, the proposed project is consistent with all of the objectives and policies outlined in the General Plan. In particular, the proposed project is consistent with the General Plan objectives and policies pertaining to Physical Development and Urban Design, Objective C, Policy 3, which supports the continued development of Barbers Point as a major industrial center (DPP, 2002).

4.2.2 ‘Ewa Development Plan

The General Plan for the City and County of Honolulu requires that community development plans be adopted by the City Council for each judicial district. These development plans are intended to provide detail to the elements presented in the General Plan and emphasize those elements most relevant to the issues and conditions of the specific area plan, in order to guide public policy, infrastructure investment and land use decision making over the next 25 years. The ‘Ewa Development Plan was originally adopted by the City Council in 1997, and was most recently revised in 2013 (Ordinance 13-26). The revised plan maintains the vision for protecting agricultural land, open space and natural, historic, and cultural resources; developing a secondary urban center around the City of Kapolei; building master planned residential communities that support walking, biking, and transit use; and providing adequate infrastructure to serve both existing and planned development.

The proposed project is located within an area designated as industrial on the Development Plan Urban Land Use Map, and more specifically, is defined as being part of the Barbers Point Industrial Area. The proposed project is consistent with the policies and guidelines for Barbers Point Industrial Area, which specify that this area should be maintained as one of O‘ahu‘s and the State’s most important industrial areas. Specific guidelines that are applicable to the proposed project include the following:

- Minimize the visibility of large building volumes and tall building or machinery elements from resort areas, residential area, commercial and civic districts, and parks through site planning and landscaping.
- Locate industries and utilities that discharge air or water pollutants, even when treated, in areas where they would impose the least potential harm on the natural environment in case the treatment process fails to perform adequately.
- Locate and operate uses that generate high noise levels in a way that will keep noise to an acceptable level in existing and planned residential areas.
- Set all buildings back a minimum of 60 feet from the shoreline (150 feet where possible, if justified based on historic and projected shoreline erosion data).
- Limit building heights generally not to exceed 60 feet when they consist of large mass.
- Allow taller, vertical structures when required as part of an industrial operation, but require a view plane study to be conducted for structures over 100 feet in height to determine if they can be sited or designed to minimize visibility from residential, resort and commercial areas, public rights-of-way, and the shoreline.

As discussed throughout this Draft EA, the proposed project is consistent with these policies. The proposed equipment would be installed within the existing footprint of the Kapolei Refinery, and would be located more than 300 feet from the shoreline. The equipment would be consistent in nature with the surrounding industrial setting, and would not increase ambient noise levels. The project would function to minimize existing impacts to the natural environment through a reduction of SO_2 emissions from the refinery. The proposed SO_2 scrubbing tower would not exceed the 60-foot height limit, and is not expected to significantly impact views from any residential or resort areas.

The Development Plan does not identify any important resources or panoramic views that would be affected by the proposed project. The Open Space Map identifies linear shoreline access adjacent to the refinery property; the proposed project would not impact shoreline access.

4.2.3 County Land Use Ordinance

The City and County of Honolulu's Land Use Ordinance (LUO) (ROH Chapter 21) regulates land use and specifies development and design standards for activities within each of the City and County zoning districts. The purpose of the LUO is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the Oʻahu general plan and development plans.

The proposed project area is located within the I-2 (Intensive Industrial) zoning district (DPP, 2017b). As specified in ROH Chapter 21-3.130, the intent of the I-2 zoning district is to "set aside areas for the full range of industrial uses necessary to support the city." Pursuant to the master use table contained in ROH Chapter 21-3, petroleum processing is allowed within the I-2 zoning district with a Conditional Use Permit (CUP). A CUP was originally granted for a petroleum processing plant and high octane blending facility in March 1987 (No. 87/CUP1-14). As this permit specifies that future work will require approval, a CUP modification will be requested from DPP for the proposed project.

Development standards related to the I-2 zoning district are enumerated in ROH 21-3.130-1; these include standards related to minimum lot area, minimum lot width and depth, yards, maximum building area, maximum density, maximum height and height setback. The proposed project would conform to these development standards.

4.2.4 Special Management Area

As discussed in Section 4.1.3, the Hawaiʻi CZM Program regulates development within the SMA, with authority for the permit program delegated to the respective county. The SMA program for the City and County of Honolulu is administered by DPP, with the implementing rules contained in ROH Chapter 25. As specified in these rules, the purpose of the SMA program is to regulate any use, activity, or operation that qualifies as a "development" to avoid permanent loss of valuable resources and ensure adequate public access to beaches, recreation areas, and natural reserves. An SMA Use Permit is required for development (1) with an estimated valuation that exceeds $500,000 or (2) that may have a substantial adverse environmental or ecological effect. As the proposed project is located entirely within the SMA (Figure 1-3) and has an estimated valuation of nearly $3 million, an SMA Use Permit will be required.

HRS Chapter 205A-26 establishes specific guidelines, standards and minimization requirements for development in the SMA. Consistency of the proposed project with these items is summarized in Table 4-3.

Table 4-3. Project Consistency with the Guidelines and Standards for Development in the SMA (HRS Chapter 205A-26)

Guideline/Standard/Minimization Requirement	Statement of Compliance
(1)(A) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas, and natural reserves is provided to the extent consistent with sound conservation principles;	The nearest public beach park is Barbers Point Beach Park, which is located about 1 mile southeast of the refinery. A public shoreline access easement and public parking area is located about 0.6 mile north of the refinery. Lateral access exists along the shoreline. The proposed project would not affect the access ways to the beach or along the shoreline.

Table 4-3. Project Consistency with the Guidelines and Standards for Development in the SMA (HRS Chapter 205A-26)

Guideline/Standard/Minimization Requirement	Statement of Compliance
(1)(B) Adequate and properly located public recreation areas and wildlife preserves are reserved;	The proposed project would not affect any public recreation areas. There are no wildlife preserves located in the vicinity of the proposed project.
(1)(C) Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources; and	Any waste generated during construction would be taken to an approved landfill or recycled as appropriate. In the unlikely event that groundwater is encountered during excavation, it would be removed and temporarily stored in an onsite frac tank then transferred to the refinery's existing effluent treatment plan. Operation of the proposed project would not generate any waste that would affect special management area resources.
(1)(D) Alterations to existing land forms and vegetation, except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, wind damage, storm surge, landslides, erosion, siltation, or failure in the event of earthquake.	The proposed project would not involve alteration of existing land forms or vegetation, as none are present within the proposed project area. Ground disturbance during construction could temporarily result in sedimentation or increased pollutants in stormwater runoff; however, BMPs would be implemented to minimize the potential for water quality impacts to receiving waters. No recreational amenities would be affected. In the event of a natural hazard, all construction would stop and the refinery systems would be shut down in accordance with the protocols specified in the IES EPPM.
(2)(A) The development will not have any substantial adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interests. Such adverse effects shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect, and the elimination of planning options;	The proposed project would not result in any substantial adverse environmental or ecological effects. Temporary construction impacts related to increased dust, erosion, and noise would be minimized with implementation of BMPs. No cumulative impacts are anticipated.
(2)(B) the development is consistent with the objectives, policies, and special management area guidelines of this chapter and any guidelines enacted by the legislature; and	As detailed in Section 4.1.3, the proposed project is consistent with the objectives and policies of the Hawai'i CZM Program.
(2)(C) That the development is consistent with the county general plan and zoning. Such a finding of consistency does not preclude concurrent processing where a general plan or zoning amendment may also be required.	As detailed in Section 4.2, the proposed project is consistent with the county General Plan and zoning.

Table 4-3. Project Consistency with the Guidelines and Standards for Development in the SMA (HRS Chapter 205A-26)

Guideline/Standard/Minimization Requirement	Statement of Compliance
(3)(A) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;	The proposed project does not involve any dredging, filling or alteration of any aquatic habitat.
(3)(B) Any development which would reduce the size of any beach or other area usable for public recreation;	The proposed project would not have any effect on the beach or other areas used for public recreation.
(3)(C) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management areas and the mean high tide line where there is no beach;	The proposed project would not affect public access to tidal and submerges lands, beaches or any other areas along the shoreline. There are no streams in the vicinity of the proposed project.
(3)(D) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast; and	The proposed project is expected to be visually commensurate with the surrounding industrial landscape and would not affect any important scenic vistas or landscape views from the state highway.
(3)(E) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.	Ground disturbance during construction could temporarily result in sedimentation or increased pollutants in stormwater runoff; however, BMPs would be implemented to minimize the potential for water quality impacts to receiving waters. The proposed project would not affect any existing areas of open water, fisheries or fishing grounds, wildlife habitat, or agricultural uses of land.

As specified in ROH Chapter 25-3.3, any proposed development requiring an SMA Use Permit is subject to an EA in accordance with the procedural steps set forth in the HRS Chapter 343. This Draft EA has been prepared in accordance with these requirements. Upon acceptance of the Final EA, an application for an SMA Use Permit will be submitted to DPP.

5 Alternatives to the Proposed Project

As detailed in Section 2, the purpose of the proposed project is to (1) install an SO_2 scrubbing system to reduce SO_2 emissions and (2) replace equipment associated with the existing gas cooling system. The proposed project is needed because the existing equipment is aging and no longer offers the best available technology for minimizing SO_2 emissions. The karbate heat exchangers are reaching the end of their design life and are deteriorating, resulting in limited functionality and more frequent shutdowns of the acid plant. The proposed project is the only technically viable approach that has been identified to meet the purpose and need. It is based on currently available technology and represents the industry standard for acid plant operations. The equipment will be integrated with the existing acid plant systems, such that there is no other viable location for the project. Therefore, no other action alternatives were considered.

The No Action alternative would involve continuing operations of the Kapolei Refinery without replacing the karbate coolers or installing the SO_2 scrubbing system. SO_2 emissions would continue, unabated, at levels that exceed current industry best control practice levels. Health and environmental benefits associated with reduced SO_2 emissions would not be realized. Furthermore, the refinery would continue to operate below capacity with further deterioration of the gas coolers, which would likely lead to additional loss of capacity and shutdowns of the acid plant for equipment cleaning. Over time, it is expected that the equipment would deteriorate to a point that the cooling system is no longer functional, which would significantly impact refinery operations and IES' ability to provide petroleum products for the state. As such, the No Action alternative would not achieve the purpose and need.

6 Coordination and Consultation

Coordination and consultation conducted to date has included consultation with DPP as the approving agency for the Draft EA, as well as scoping and distribution of the Draft EA for public comment, in accordance with the procedural requirements of HRS Chapter 343 and HAR §11-200. These efforts are briefly described in the following sections.

6.1 Scoping

As part of the scoping process, a variety of federal, state, and county agencies; elected officials; the neighborhood board; and neighboring property owners[3] were contacted before preparation of the Draft EA. They received a scoping letter containing preliminary project information and were asked to provide comments and related information for consideration in preparing the Draft EA. The scoping distribution list and a copy of the scoping letter are provided in Appendix C.

A total of 12 comment letters were received in response to the scoping request. The comments are summarized in Table 6-1, and have been considered in the preparation of this document. A copy of the comment letters and the responses provided are contained in Appendix D.

Table 6-1. Summary of Comments Received in Response to Scoping Request

Commenting Party	Date of Comment	Summary of Comment
City and County of Honolulu, Police Department	Letter dated September 6, 2017	Project should have no significant impact on the services or operations of the Honolulu Police Department at this time.
City and County of Honolulu, Department of Design and Construction	Letter dated September 7, 2017	No comments at this time.
City and County of Honolulu, Department of Transportation Services	Letter dated September 14, 2017	• Neighborhood board, area businesses, emergency personnel, transit services should be kept apprised. • Construction materials and equipment should be transferred to and from project site during off-peak traffic hours. • Construction schedule should be coordinated with nearby properties that have planned projects to minimize impacts to city streets.
Honolulu Board of Water Supply	Letter dated September 14, 2017	• The existing water system is adequate to accommodate the proposed project; final decision on water availability will be confirmed when building permit is submitted. • Applicant will be required to pay water system facility charges for resource development, transmission and daily storage. • Onsite fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.
State of Hawai‘i Department of Accounting and General Service	Letter dated September 15, 2017	• The project does not impact any Department of Accounting and General Services projects or facilities in this area; no comments at this time.

[3] For scoping purposes, neighboring property owners included owners of those properties located within 300 feet of the refinery TMK, consistent with the basis for notification required by DPP for the SMA Use Permit.

Table 6-1. Summary of Comments Received in Response to Scoping Request

Commenting Party	Date of Comment	Summary of Comment
HDOH, Clean Water Branch	Letter dated September 20, 2017	• Any project and its potential impact to state waters must comply with the State's antidegradation policy, designated uses, and water quality criteria. • Project may require NPDES permit coverage for discharges of wastewater, including stormwater runoff into state surface waters. • If project involves work in, over or under waters of the U.S., it is recommended that the U.S. Army Corps of Engineers be contacted. Clean Water Act Section 401 Water Quality Certification is required for any applicant for a federal license or permit to conduct any activity that may result in discharge into navigable water. • All project-related discharge must comply with the State's Water Quality Standards. • All projects must reduce, reuse and recycle to protect, restore and sustain water quality and beneficial uses of state waters. Considerations for the planning process (for example, reuse of stormwater, use of green building practices) are provided.
DLNR, Engineering Division	Letter dated September 20, 2017	The rules and regulations of the National Flood Insurance Program (NFIP) are in effect when development falls within a designated flood hazard zone. The owner of the project property is responsible to research the flood hazard zone. Local flood ordinances may take precedence over the NFIP standards as local designations prove to be more restrictive.
DLNR, Land Division	Letter dated September 20, 2017	No comments.
DLNR, Division of Aquatic Resources	Letter dated September 20, 2017	No major objections to the proposed project since it is not expected to have significant adverse impacts on aquatic resources provided that BMPs are addressed and adhered to. BMPs should address potential impacts of runoff and seepage from the project work site to aquatic resources found within the nearshore area as well as the subterranean aquatic habitat(s) found within the 'Ewa karst for the anchialine pool shrimps. Site work should be scheduled during periods of minimal rainfall and lands denuded of vegetation should be replanted or covered as quickly as possible to control erosion.

Table 6-1. Summary of Comments Received in Response to Scoping Request

Commenting Party	Date of Comment	Summary of Comment
HDOH, Environmental Planning Office	Letter dated September 20, 2017	• Recommends review of state and federal environmental health land use guidance. Projects are required to adhere to all applicable State standard comments. • Suggests review of the Clean Water Branch and the NPDES permit requirements. If project involves waters of the U.S., the U.S. Army Corps of Engineers Regulatory Branch should be contacted. • All wastewater plans must conform to applicable provisions. The Environmental Planning Office reserves the right to review plans for conformance to rules. • If temporary fugitive dust emissions could occur during construction, the need or requirements for a Clean Air Branch permit should be reviewed. Effective air pollution control measures need to be provided to prevent or minimize fugitive dust emissions, including those associated with offsite roadways used to enter or exit the project. • Wastes generated by the project (that are nonhazardous) needs to be disposed of at a solid waste management facility that applies with the applicable provisions. Open burning of waste is prohibited. • If noise during construction may exceed the maximum allowable levels, then a noise permit may be required. • Encourages use of the Hawaiʻi Environmental Health Portal and OEQC viewer.
City and County of Honolulu, Fire Department	Letter dated September 21, 2017	• Project should have no significant impact to fire department services. • All work on this project and refinery operations shall be in compliance with fire code requirements for hazardous materials.
State of Hawaiʻi, Department of Transportation Airports Division	Letter dated September 21, 2017	• The applicant needs to be aware of the duties of the state and county agencies to implement the State of Hawaiʻi Office of Planning Technical Assistance Memorandum related to projects within 5 miles of an airport. • FAA regulations require the submittal of FAA Form 7460-1, Notice of Proposed Construction or Alteration. Planned tower structure heights and any additional height of any cranes needed during construction need to be included in the submittal of FAA Form 7460-1.

Table 6-1. Summary of Comments Received in Response to Scoping Request

Commenting Party	Date of Comment	Summary of Comment
State of Hawai‘i Office of Planning	Letter dated September 25, 2017	• The Draft EA should include a discussion on the project’s ability to meet all part of HRS Chapter 226, the Hawai‘i State Planning Act. The analysis should examine consistency with these statutes or clarify where it is in conflict with them. • The Draft EA should include an assessment as to how the proposed action conforms to the goals and objectives as listed in HRS 205A-2. • Please consult with DPP on the policies and procedures for SMA permits. As a supporting document for a SMA permit application, the Draft EA should specifically discuss the requirements of the SMA use in accordance with the SMA guidelines pursuant to HRS 205A-26 and the City and County of Honolulu SMA ordinances. • The preferred action and alternatives considered in the Draft EA should be evaluated for the potential of polluted runoff, the increase od volume and velocity of storm runoff, and the risk of erosion caused by stormwater inundation, land disturbing activity, and the increase of impervious surface. • The proposed action may be subject to DPP rules for onsite stormwater management and post-construction low impact development. Please contact DPP on the application and necessity of these drainage standards as they pertain to this project. A summary of resources and guidance documents are provided.
City and County of Honolulu, Department of Facility Maintenance	Letter dated September 26, 2017	The Department of Facility Maintenance does not have any facilities or easements on the subject property; no comments at this time.

6.2 Distribution of Draft EA

Pursuant to the requirements of HRS Chapter 343, this Draft EA is being distributed for a minimum 30-day public review period. As required by HRS Chapter 343 and HAR §11-200-3, the OEQC notifies the public when a Draft EA is available for review in its bimonthly bulletin, the OEQC *Environmental Notice*. Notice of availability for the 30-day review period was announced in the November 23, 2017 edition of the OEQC *Environmental Notice*. Notice of the public review period was provided to the project stakeholder list; the distribution list is provided in Appendix E.

During the 30-day public comment period, written comments on the Draft EA may be provided either via U.S. Postal Service or email (addressed to CH2M, Attn: Ms. Lisa Kettley, 1132 Bishop Street, Suite 1100, Honolulu, Hawai‘i 96813, or lisa.kettley@ch2m.com). Comments must be postmarked on or before December 26, 2017. Comments received on the Draft EA will be considered and incorporated into the Final EA, as appropriate.

7 Anticipated Determination

Based upon the preliminary analysis and findings presented in this document, implementation of the proposed project is not expected to result in a significant adverse direct, indirect, or cumulative impact on the quality of the environment. As such, a Finding of No Significant Impact (FONSI) is anticipated in accordance with HRS Chapter 343. This assessment is based on an evaluation of the project impacts in relation to the significance criteria specified in HAR §11-200-12(b), as summarized in Table 7-1.

The anticipated determination is based on the preliminary analysis and findings of the environmental review process to date, as presented herein. Additional information and input obtained through the Draft EA public review process will be considered in finalizing the EA. A final determination will be made based on the analysis in the Final EA, and would be published accordingly. If a FONSI is warranted, IES will proceed with obtaining the required permits, then implementing the proposed project. If it is determined that implementation of the proposed project would result in significant impacts, IES would publish an Environmental Impact Statement Preparation Notice (EISPN) in the OEQC *Environmental Notice*, or would not undertake the proposed project.

Table 7-1. Evaluation of Significance Criteria (per HAR §11-200-12)

Significance Criteria	Project Evaluation
Involves an irrevocable commitment to loss or destruction of any natural or cultural resource	The proposed project is not expected to result in the loss or destruction of any natural or cultural resources, as none natural or cultural resources are known to exist within the project area.
Curtails the range of beneficial uses of the environment	The range of beneficial uses of the environment is determined by the physical setting and the land use controls that define its use. The proposed project site is part of an existing refinery and is located within an area that is zoned for intensive industrial uses. The proposed project is consistent with the setting and land use designations.
Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders	The stated purpose of Chapter 344 is to establish a state policy that will encourage productive and enjoyable harmony between people and their environment, promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, and enrich the understanding of the ecological systems and natural resources important to the people of Hawai'i. The proposed project is consistent with the specified policies, goals and guidelines. Project implementation would provide an environmental benefit through reduction of SO_2 emissions, and maintain safe and efficient operation of the existing refinery, which is important to Hawai'i's economy.
Substantially affects the economic welfare, social welfare, and cultural practices of the community or state	The proposed project is not expected to affect the economic or social welfare, nor the cultural practices of the community or state.
Substantially affects public health	The proposed project would significantly reduce SO_2 emissions associated with the refinery, which would be beneficial to public health.
Involves substantial secondary impacts, such as population changes or effects on public facilities	Installation of the SO_2 scrubbing system and replacement of the karbate gas coolers is not expected to result in secondary impacts such as a population increase or effects on public facilities.

Table 7-1. Evaluation of Significance Criteria (per HAR §11-200-12)

Significance Criteria	Project Evaluation
Involves a substantial degradation of environmental quality	Substantial degradation of environmental quality is not expected because the proposed project would be limited to work within the existing footprint of the refinery's acid plant and would be similar in nature to ongoing refinery operations. Overall, the proposed project would result in a significant decrease in SO_2 air emissions.
Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions	The proposed project does not involve a commitment to a larger action, and no cumulative impacts are anticipated. By decreasing SO_2 emissions, the proposed project would contribute to a reduction in air emissions in the region.
Substantially affects a rare, threatened, or endangered species, or its habitat	No rare, threatened, or endangered species, or its habitat, is present within the proposed project area. Endangered waterbirds nest and forage in surface water ponds adjacent to the proposed project area, but the proposed activities would be commensurate with existing refinery activities and are not expected to affect these species.
Detrimentally affects air or water quality or ambient noise levels	The proposed project is not expected to impact water quality, nor is it expected to increase noise levels beyond the property line. The SO_2 scrubbing system would function to improve air quality through reduction of SO_2 emissions.
Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters	The proposed project would not be located in an environmentally sensitive area. It is situated approximately 300 feet from the shoreline, but is located within the footprint of the existing acid plant which is separated from the shoreline by several intervening features including earthen and basalt berms.
Substantially affects scenic vistas and viewplanes identified in county or state plans or studies	The proposed project would involve installation of a tower enclosed within an 59-foot-tall metal support structure. Although the structure may be visible from surrounding areas, it is commensurate with the industrial setting and would not affect any established viewplanes or scenic vistas.
Requires substantial energy consumption	The proposed project will not increase energy consumption at the refinery.

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9 Appendices

The following information is provided as appendixes to the Draft EA:

Appendix A	Archaeological Literature Review and Field Investigation Report
Appendix B	Cultural Assessment Report
Appendix C	Scoping Letter and Distribution List
Appendix D	Scoping Comments and Responses
Appendix E	Draft EA Distribution List

Appendix A
Archaeological Literature Review and Field Investigation Report

Draft

Archaeological Literature Review and Field Inspection in Support of HAR §13-284-3 Consultation for a Proposed Island Energy Services Kapolei Refinery Acid Plant Project, Kalaeloa, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu TMK: [1] 9-1-014:010 por.

Prepared for
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and
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Management Summary

Reference	Archaeological Literature Review and Field Inspection in Support of HAR §13-284-3 Consultation for a Proposed Island Energy Services Kapolei Refinery Acid Plant Project, Kalaeloa, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: [1] 9-1-014:010 por. (Turran et al. 2017)
Date	September 2017
Project Number	Cultural Surveys Hawai‘i Inc. (CSH) Job Code: HONOULIULI 129
Investigation Permit Number	The fieldwork component of this literature review and field inspection (LRFI) was conducted under archaeological fieldwork permit number 17-08, issued by the Hawai‘i State Historic Preservation Division (SHPD), per Hawai‘i Administrative Rules (HAR) §13-282.
Agencies	SHPD, Honolulu Department of Planning & Permitting
Project Proponent	Island Energy Services
Project Funding	Island Energy Services
Land Jurisdiction	Private; Island Energy Services
Project Location	The Island Energy Services Kapolei Refinery property is located in coastal Kalaeloa, within the James Campbell Industrial Park. The project area, which encompasses the footprint of the existing acid plant, consists of an approximately 150 m (492 feet [ft]) long by 80 m (262 ft) wide rectangle within the west, *makai* (seaward) portion of the Island Energy Services Kapolei Refinery property. The project area is depicted on a portion of the 1998 Ewa USGS topographic quadrangle.
Project Acreage	The project area comprises approximately 3 acres (1.2 hectares).
Project Description and Related Ground Disturbance	The proposed project involves installation of a new SO2 scrubbing system and replacement of the existing karbate gas cooling system. All construction activities and staging would occur within the footprint of the existing acid plant. These components of the proposed project are further described below. The SO2 scrubbing system would function to remove SO2 from the acid plant tail gas as needed to meet best available control technology (BACT) emission levels for sulfuric acid plants. The system would consist of a scrubbing tower and an acidulation tower. The scrubbing tower would include a vertical tower (approximately 4 ft in diameter and 57 ft tall) with a stack (approximately 24 inches in diameter and 18 ft tall), and would be encased within an 80-ft-tall steel support structure. The acidulation tower would also be a vertical tower (approximately 33 ft tall), and would be attached to the exterior of the steel support structure. The system would include five associated pumps (at ground level) and a stripper air fan.

	The total extent of ground disturbance associated with installation of the SO2 scrubbing system is approximately 1,225 ft, with a maximum excavation depth of 3 ft for the support structure foundation. The existing karbate gas coolers would be replaced with two new compact plate and frame heat exchangers (each approximately 4 ft long by 2 ft wide, with a height of approximately 6 ft). In addition, ceramic packing would be added to the existing humidification tower, two acid recirculating pumps would be replaced with higher capacity pumps, and piping modifications would be made to tie in the new heat exchangers to the humidification tower and recirculating pumps. The existing karbate coolers would be blinded and left in place for the near term, and possibly removed over the long term. Replacement of the gas coolers is not expected to involve any excavation; all work would occur on the existing paved surface within the acid plant.
Area of Potential Effect (APE)	For the purposes of this LRFI, the APE is considered to be the entire approximately 3-acre (1.2 hectare) project area.
Document Purpose	This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project and, based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project’s planning and support the project’s historic preservation review compliance (Hawai ‘i Revised Statutes [HRS] §6E-42 and HAR §13-284). This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per HAR §13-276.
Fieldwork Effort	The fieldwork component of the LRFI was conducted on 16 August 2017 by CSH archaeologists, Brittany Beauchan, M.A., Tyler Turran, B.A., and project manager David W. Shideler, M.A., under the general supervision of principal investigator Hallett H. Hammatt, Ph.D. The fieldwork required 1 person-day to complete.
Summary of Findings	The project area was observed to have been almost entirely, if not entirely, previously graded raised reef limestone hard pan. No surface historic properties were observed within or in the immediate vicinity of the project area. Despite the prior heavy land disturbance, the potential for sinkholes and intact sand dune deposits, which could possibly contain human remains or other cultural deposits, was evaluated. No intact sinkholes, sand dune deposits, or cultural material were observed within the project area and none are believed to be present. All surface structures and infrastructure in the project area is associated with the Kapolei Refinery (formerly Chevron oil refinery).

Recommendations	Based on the extensive grading in the project area and no historic properties observed, no further archaeological work is recommended. However, as a general precaution, the project plans should include provisions stating that "In the event that sand deposits and/or historic resources, including structural remains, subsurface cultural deposits, pit caves (sinkholes) with openings greater than 1 m in diameter, or human skeletal remains, are identified during the construction project, cease all work in the immediate vicinity of the find, protect the find, protect the find from additional disturbance, and promptly notify SHPD at (808) 692-8015."

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Section 1 Introduction

1.1 Project Background

At the request of CH2MHill, Cultural Surveys Hawai‘i, Inc. (CSH) completed this literature review and field inspection (LRFI) for the proposed Island Energy Services (IES) Kapolei Refinery Acid Plant project, Kalaeloa, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu (TMK: [1] 9-1-014:010 por.). The IES Kapolei Refinery property is located in coastal Kalaeloa, within the James Campbell Industrial Park. The 3-acre (1.2 hectare) project area, which encompasses the footprint of the existing acid plant, consists of an approximately 150-m (492-feet [ft])-long by 80-m (262-ft)-wide rectangle within the west, *makai* (seaward) portion of the Island Energy Services Kapolei Refinery property. The project area is depicted on a portion of the 1998 Ewa U.S. Geological Survey (USGS) topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2013 aerial photograph (Figure 3).

The lands within the project area are privately owned by IES. The proposed project involves installation of a new SO2 scrubbing system and replacement of the existing karbate gas cooling system (Figure 4 through Figure 6). All construction activities and staging would occur within the footprint of the existing acid plant. These components of the proposed project are further described below.

The SO2 scrubbing system would function to remove SO2 from the acid plant tail gas as needed to meet best available control technology (BACT) emission levels for sulfuric acid plants. The system would consist of a scrubbing tower and an acidulation tower. The scrubbing tower would include a vertical tower (approximately 4 ft in diameter and 57 ft tall) with a stack (approximately 24 inches in diameter and 18 ft tall), and would be encased within an 80-ft-tall steel support structure. The acidulation tower would also be a vertical tower (approximately 33 ft tall), and would be attached to the exterior of the steel support structure. The system would include a total of five associated pumps (at ground level) and a stripper air fan.

The total extent of ground disturbance associated with installation of the SO2 scrubbing system is approximately 1,225 ft, with a maximum excavation depth of 3 ft for the support structure foundation.

The existing karbate gas coolers would be replaced with two new compact plate and frame heat exchangers (each approximately 4 ft long by 2 ft wide, with a height of approximately 6 ft). In addition, ceramic packing would be added to the existing humidification tower, two acid recirculating pumps would be replaced with higher capacity pumps, and piping modifications would be made to tie in the new heat exchangers to the humidification tower and recirculating pumps. The existing karbate coolers would be blinded and left in place for the near term, and possibly removed over the long term.

Replacement of the gas coolers is not expected to involve any excavation; all work would occur on the existing paved surface within the acid plant.

For the purposes of this LRFI, the project’s area of potential effect (APE) is considered to be the entire approximately 3-acre (1.2 hectare) project area.

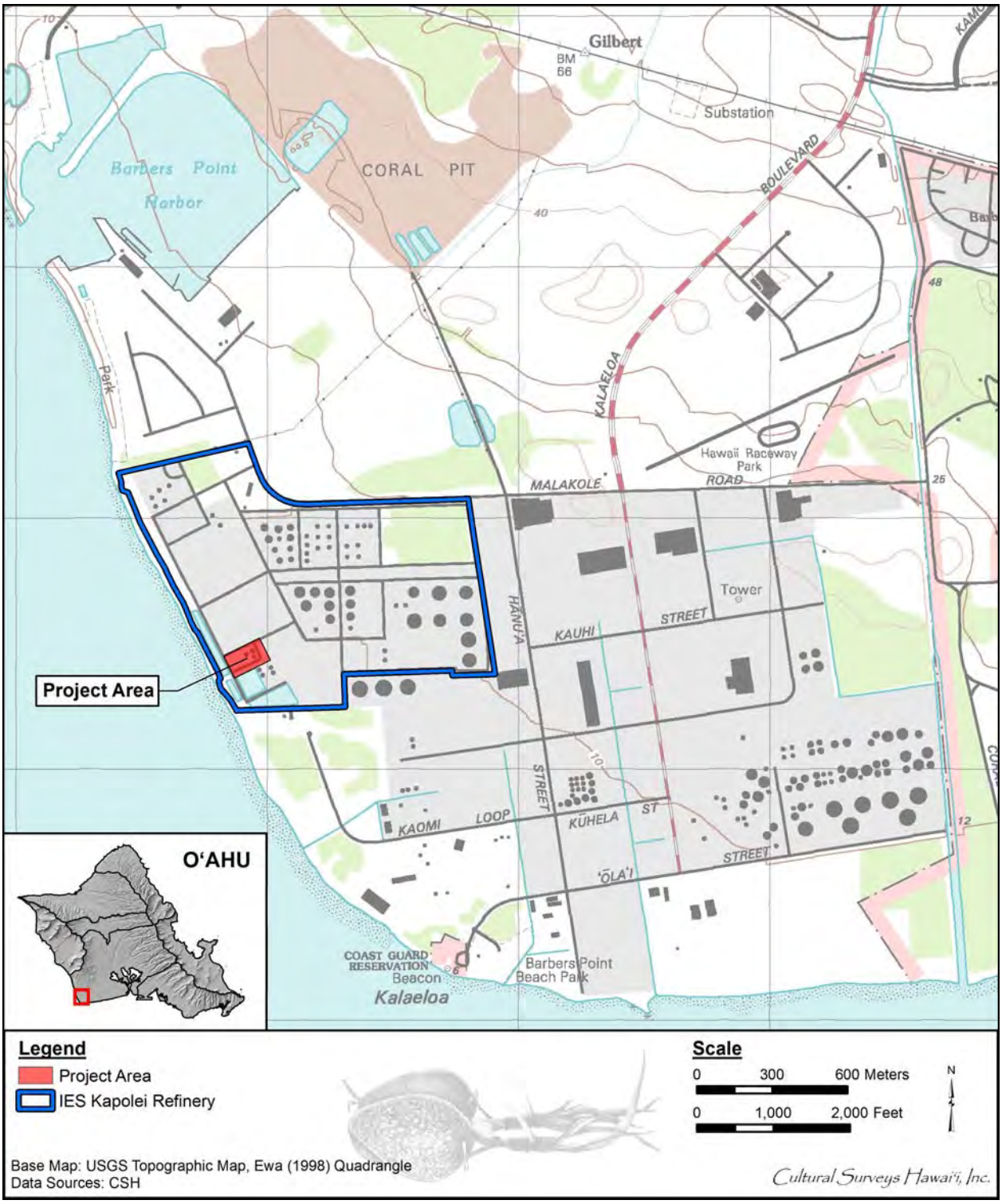

Figure 1. Portion of a 1998 Ewa USGS topographic quadrangle showing the location of the project area within the IES Kapolei Refinery

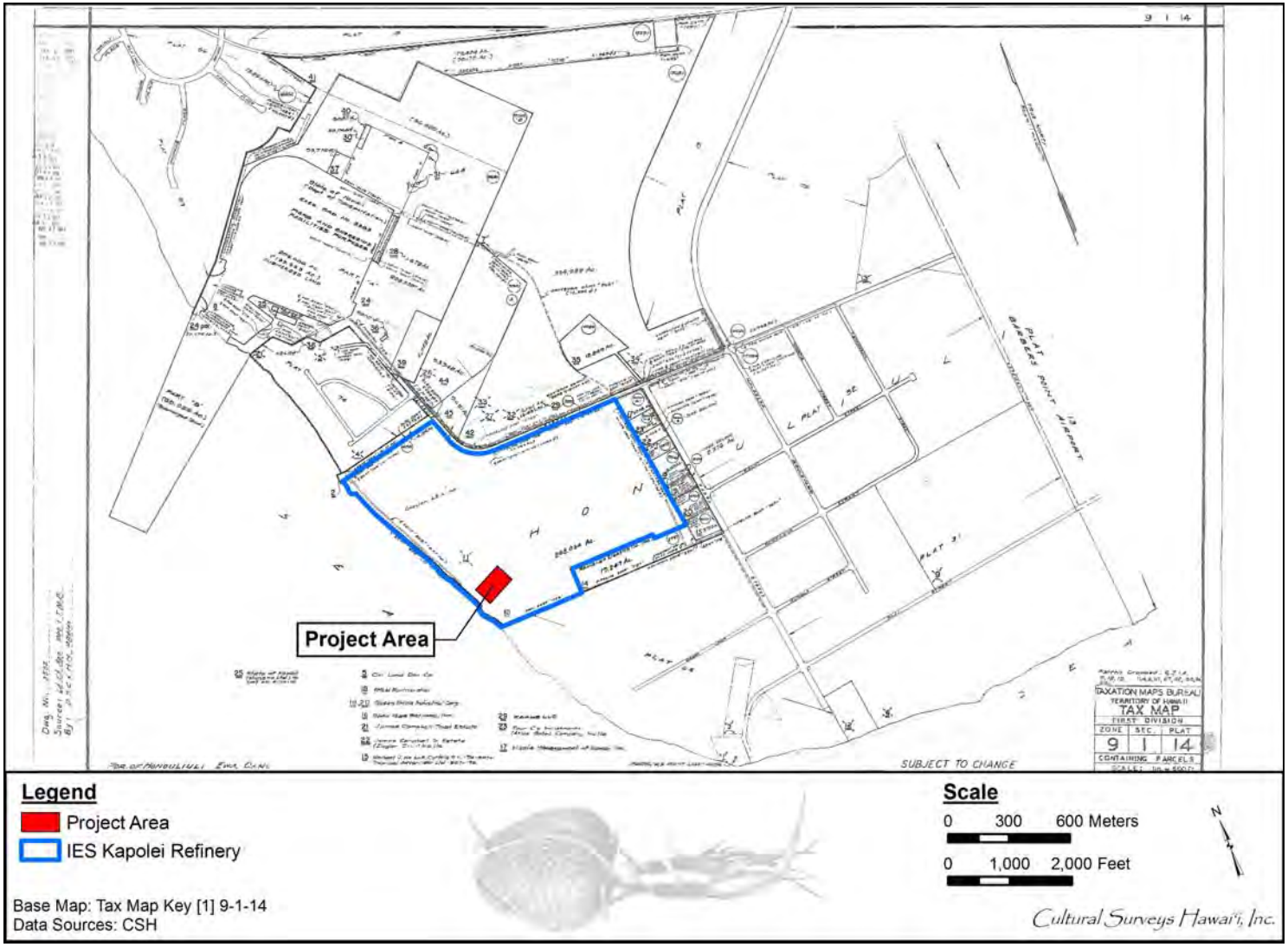

Figure 2. Tax Map Key (TMK) [1] 9-1-014, showing the location of the project area within the IES Kapolei Refinery (Hawai‘i TMK Service 2014)

Figure 3. 2013 Google Earth aerial photograph showing the location of the project area

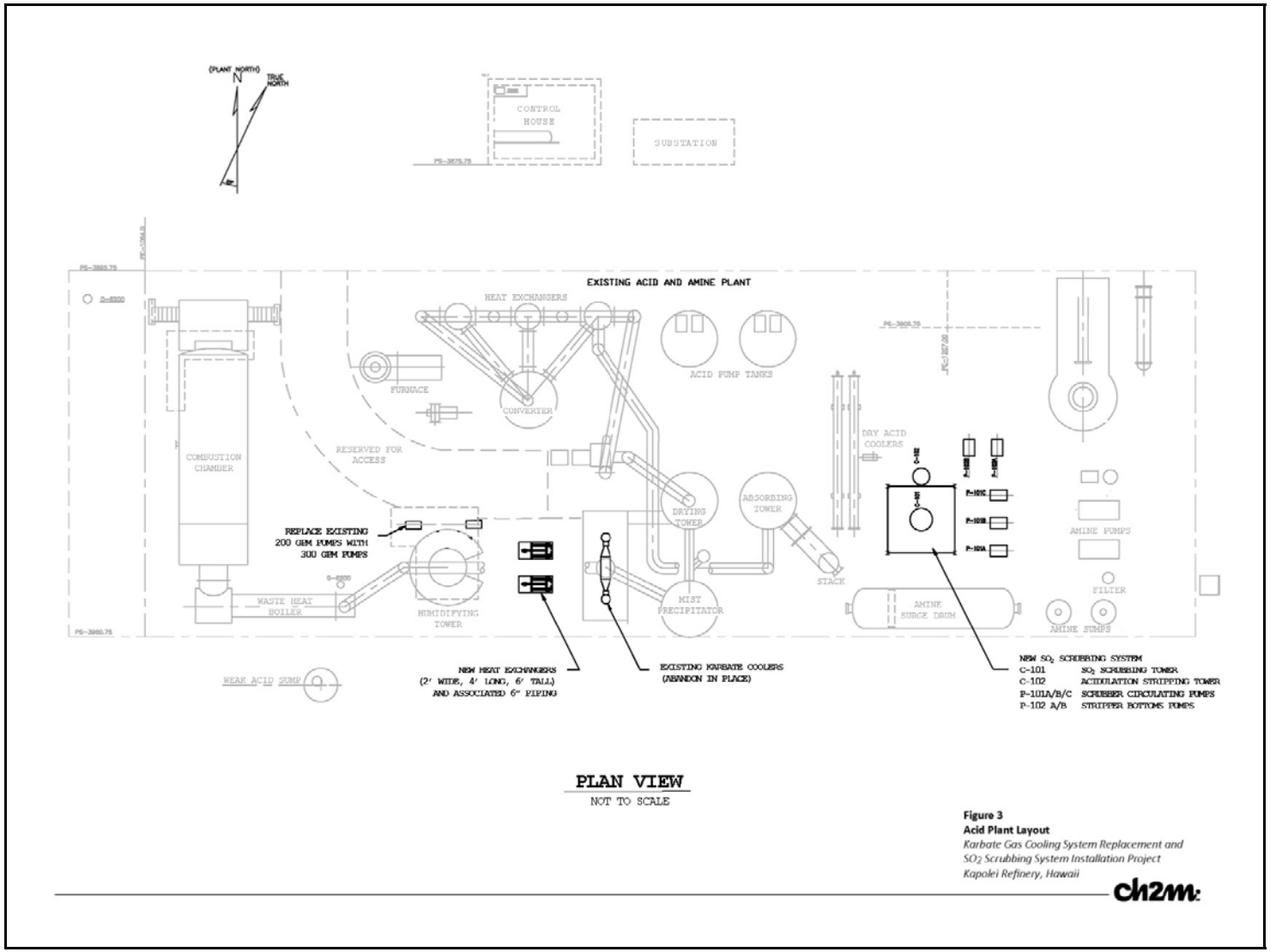

Figure 4. Acid plant layout within the existing acid plant area (client-supplied figure)

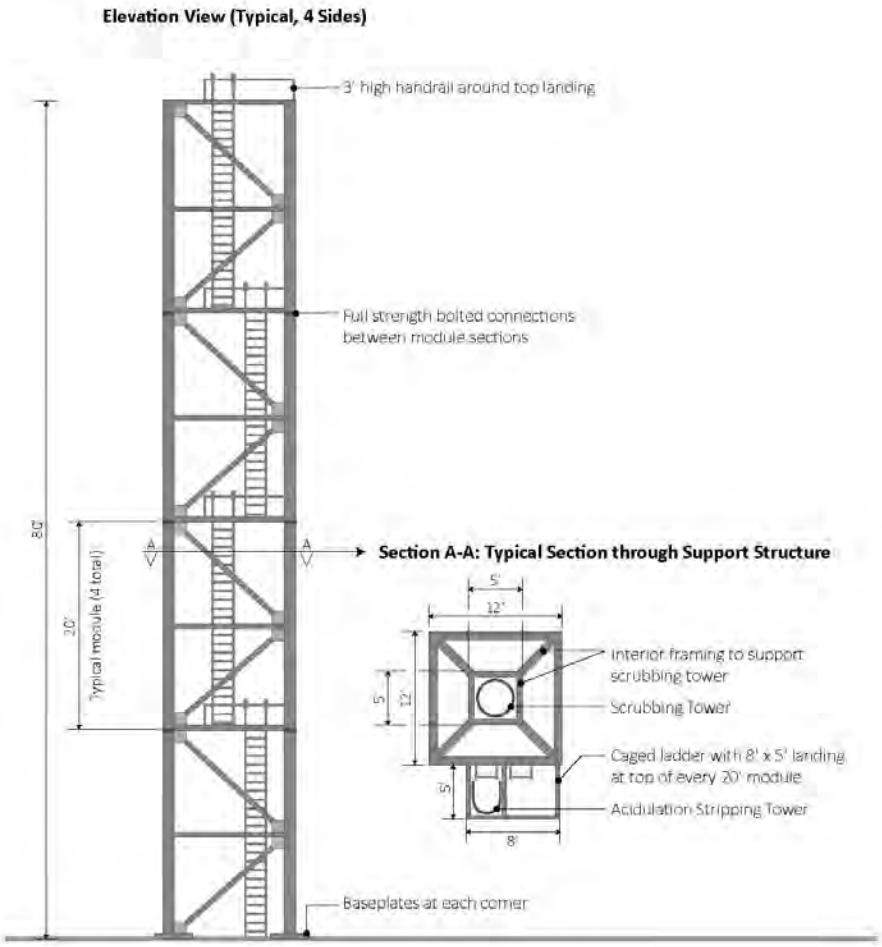

Figure 5
SO_2 Scrubber Tower Support Structure
Karbate Gas Cooling System Replacement and SO_2 Scrubbing System Installation Project
Kapolei Refinery, Hawaii

ch2m

Figure 5. SO2 scubber tower support structure elevation view (client-supplied figure)

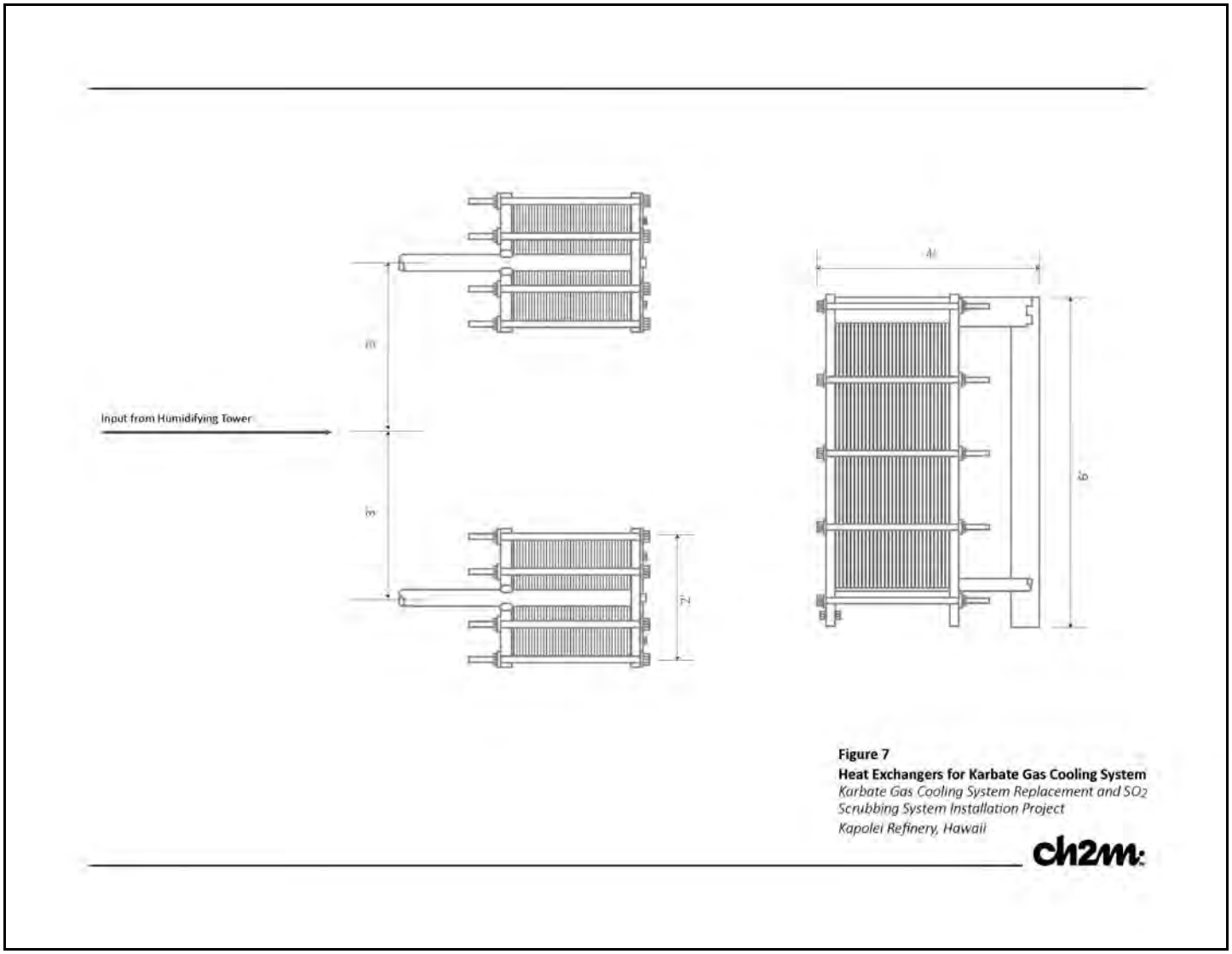

Figure 6. Heat exchangers for karbate gas cooling system design (client-supplied figure)

1.2 Document Purpose and Scope of Work

This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project and, based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project's planning and support the project's historic preservation review compliance (Hawai ‘i Revised Statutes [HRS] §6E-42 and HAR §13-284). This investigation does not fulfill the requirements of an archaeological inventory survey (AIS) investigation, per Hawai‘i Administrative Rules (HAR) §13-276.

The scope of work for this LRFI is as follows:

1. Historical research including study of archival sources, historic maps, Land Commission Awards (LCA), and previous archaeological reports to construct a history of land use and to determine if archaeological sites have been recorded on or near the project area.
2. Field inspection of the project area to identify any surface archaeological features and to investigate and assess the potential for impact to such sites. This assessment identifies any sensitive areas that may require further investigation or mitigation before the project proceeds.
3. Preparation of this report, including the results of the historical research and the field inspection, with an assessment of archaeological potential based on that research and recommendations for further archaeological work, if appropriate.

1.3 Environmental Setting

1.3.1 Natural Environment

Observations of less disturbed lands adjacent to the project area indicated the *makai* portion of the project area likely consisted of exposed limestone outcrop partially overlain with beach sand deposits. However, the beach sand and the surface of the coral shelf appear to have been graded and pushed *makai*, creating an approximately 2-m-high berm along the *makai* property line (west or outside the project area) consisting primarily of boulders and construction rubble.

The surface of the project area is approximately 1.0 m above mean sea level. According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area is within Coral Outcrop (Figure 7). The surface of the Pleistocene limestone outcrop, where not covered by alluvium or stockpiled material, has characteristic dissolution "pit caves" (Mylroie and Carew 1995), which are nearly universally, but erroneously, referred to as "sink holes" (Halliday 2005). These pit caves, or sinkholes, vary widely in areal extent and depth, with some of the more modest features comparable in volume to 5-gallon buckets, while some of the larger features, although usually irregularly shaped, are several meters wide and several meters deep.

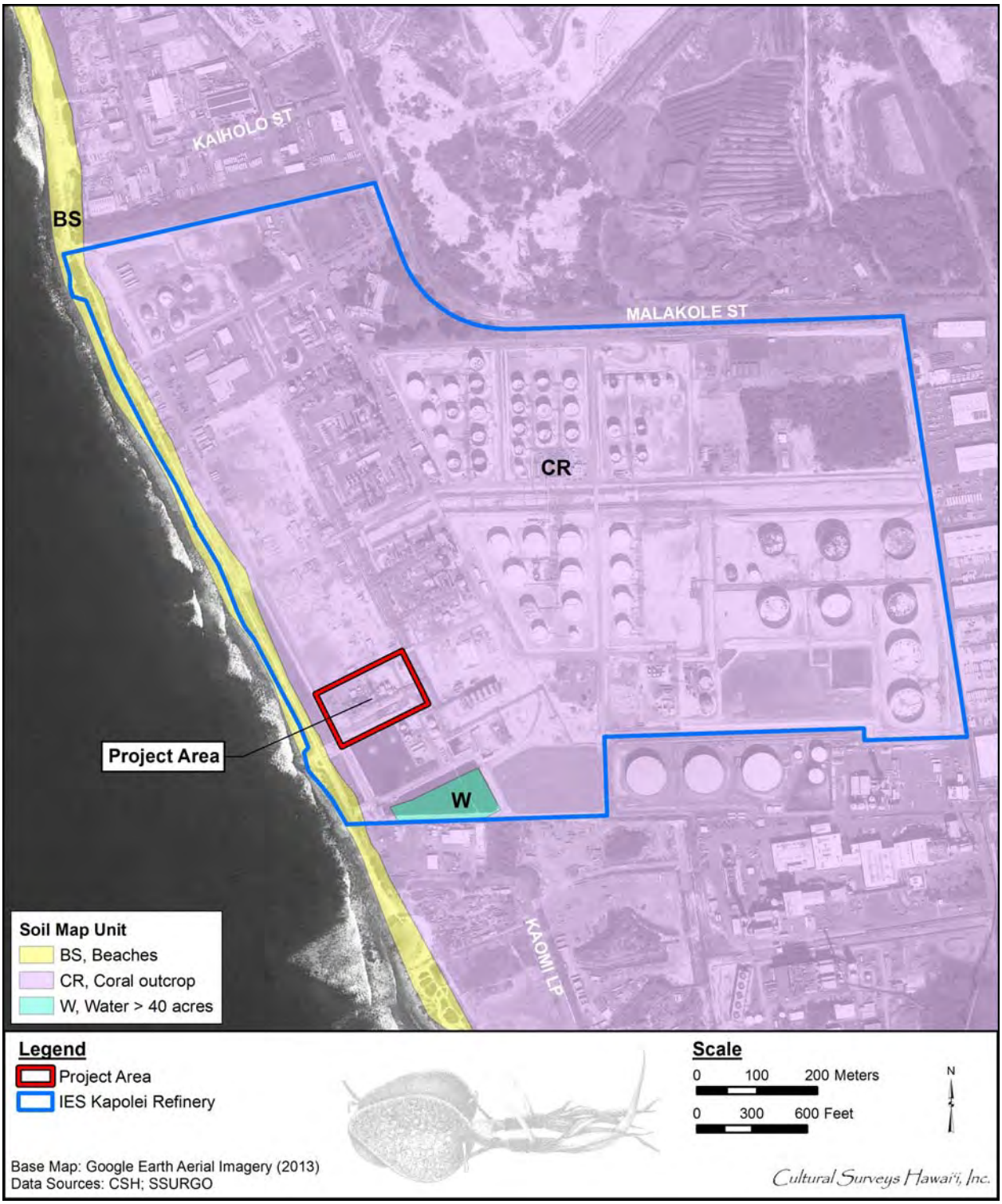

Figure 7. 2013 Google Earth aerial photograph with overlay of USDA *Soil Survey of the State of Hawaii* (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and in the vicinity of the project area

Lying in the lee of the Wai‘anae mountain range, the project area is one of the driest areas of O‘ahu with most of the area averaging about 547.2 mm (21.5 inches) of rainfall annually (Giambelluca et al. 2013). The annual average temperature in the project area is 23.8 ℃ (74.8 ℉) (Giambelluca et al. 2014). No natural streams are located in the vicinity of the project area. The Pacific Ocean is approximately 70 m (230 ft) southwest of the project area.

In pre-Contact Hawai‘i, the vicinity of the project area would have been mostly lowland coastal dry shrub and grassland. However, this area has been extensively disturbed and transformed by human activity, with most of the land dominated by a variety of exotic grasses, weeds, and shrubs or graded and grubbed bare. These grasses and shrubs, along with pockets of *kiawe* (*Prosopis pallida*), castor bean (*Ricinus communis*), *klu* (*Acacia farnesiana*), *koa haole* (*Leucaena leucocephala*), and a few scattered ficus (*Ficus* spp.) trees are characteristic of the vegetation of the project vicinity. Native Hawaiian plants observed near the project area included *‘akulikuli* (*Sesuvium portulacastrum*) and *milo* (*Thespesia populnea*). The project area is almost completely barren of vegetation and ground visibility is excellent.

1.3.2 Built Environment

The project area consists of the *makai* portion of the IES Kapolei Refinery property. The entire project area has been drastically altered by historic and modern land use including grubbing and grading during initial and ongoing construction within the refinery property. A major berm along the *makai* edge of the refinery property is understood to be composed of bulldozer push from the grading and grubbing of the project lands. Structures within or adjacent to the project area include the existing perimeter security fence, settling ponds, and equipment storage areas.

The IES Kapolei Refinery property is located within the James Campbell Industrial Park, which includes heavy and medium industrial developments and the State’s only two oil refineries. The IES Kapolei Refinery is a relatively small-scale oil refinery consisting of numerous heavy industrial structures and storage tanks. South of the refinery property is the Brewer Environmental Industries (BEI) chemical production facility. Immediately north of the refinery is a wide-drainage ditch parallel to the north side. Further north of the refinery property is the developing Kenai Industrial Park. The Barbers Point Deep Draft Harbor is located approximately 0.8 km (0.5 miles) north of the project area.

Section 2 Methods

2.1 Field Methods

The fieldwork component of this LRFI was conducted under archaeological fieldwork permit number 17-08, issued by the SHPD, per HAR §13-282. The fieldwork component of the archaeological assessment study was conducted on 16 August 2017 by CSH archaeologists Brittany Beauchan, M.A., Tyler Turran, B.A., and project manager David W. Shideler, M.A., under the general supervision of principal investigator Hallett H. Hammatt, Ph.D. The fieldwork required 1 person-day to complete.

In general, fieldwork included a 100% pedestrian inspection of the project area's two components, GPS data collection, photography, and brief field notes.

The pedestrian inspection of the project area was undertaken for the purpose of potential historic property identification and documentation. The pedestrian survey was accomplished with transects spaced 5 m apart conducted by three CSH archaeologists to ensure the entire surface of the project area was observed with sufficient ground visibility (Figure 8). The graded nature of the project area made for excellent ground visibility.

Photographs were taken of the general study area to document the area's natural and/or built environment and potential historic properties. When potential historic properties were identified, their locations were documented. This included GPS data collection of the horizontal extent of the potential historic property and associated features. The features were photographed with a scale and generally described, which often included descriptions of shape, materials, method of construction, integrity, and evidence of age and function of the feature. The dimensions of all features and the general condition were often recorded.

All potential historic properties encountered were examined. The locations of the potential historic properties, as well as the extent of transects, were recorded using hand-held Garmin GPS devices and graphically displayed using ESRI's ArcGIS 10.3. CSH utilizes the NAD 83 HARN datum and UTM Zone 4N coordinate system.

2.2 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i at Mānoa, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2000).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of cultural resources in the project area.

Figure 8. 2013 Google Earth aerial photograph showing GPS track log for one of the three archaeologists showing general pedestrian inspection coverage in relation to the project area

Section 3 Background Research

3.1 Traditional and Historical Background

3.1.1 Mythological and Traditional Accounts and Early Historic Period

Various legends and early historical accounts indicate the *ahupua‘a* (traditional land division) of Honouliuli (Figure 9) was once heavily populated by pre-Contact Hawaiians. This substantial settlement is attributable for the most part to the plentiful marine and estuarine resources available at the coast, as well as lowlands fronting the west loch of Pearl Harbor (Kaihuopala‘ai) suitable for wetland taro cultivation. In addition, forest resources along the slopes of the Wai‘anae Range, as suggested by E.S. and E.G. Handy, probably acted as a viable subsistence alternative during times of famine and/or low rainfall:

> The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the wao, or upland jungle, than was the case on the windward coast. Yet the wao here was more extensive, giving greater opportunity to forage for wild foods during famine time. [Handy and Handy 1972:469-470]

John Papa ‘Ī‘ī describes a network of Leeward O‘ahu trails that in historic times encircled and crossed the Wai‘anae Range, allowing passage from West Loch to the Honouliuli lowlands, past Pu‘u Kapolei and Waimānalo Gulch to the Wai‘anae coast and onward, circumscribing the shoreline of O‘ahu (‘Ī‘ī 1959:96–98). Following ‘Ī‘ī's description, a portion of this trail network would have passed close to the present Farrington Highway alignment (Figure 10).

The Hawaiian *ali‘i* (chiefly class) were also attracted to this region. One historical account of particular interest refers to an *ali‘i* residing in Ko‘olina, approximately 1.5 km (0.9 miles) north of the current project area:

> Koolina is in Waimanalo near the boundary of Ewa and Waianae. This was a vacationing place for chief Kakuhihewa and the priest Napuaikamao was the caretaker of the place. Remember reader, this Koolina is not situated in the Waimanalo on the Koolau side of the island but the Waimanalo in Ewa. It is a lovely and delightful place and the chief, Kakuhihewa loved this home of his. [*Ke Au Hou* 13 July 1910 in Sterling and Summers 1978:41]

Other early historical accounts of the general region typically refer to the more populated eastern portion of the ‘Ewa district, where missions and schools were established and subsistence resources were perceived to be greater. However, the presence of archaeological sites along the barren coral plains and coast of southwest Honouliuli Ahupua‘a indicate pre-Contact and early post-Contact populations also adapted to less inviting areas, despite the environmental hardships.

Barbers Point is named after Captain Henry Barber, whose ship ran aground on 31 October 1796. Subsequent to Western Contact in the area, the landscape of the ‘Ewa plains and Wai‘anae slopes was adversely affected by the over-harvesting of the sandalwood forest, and particularly

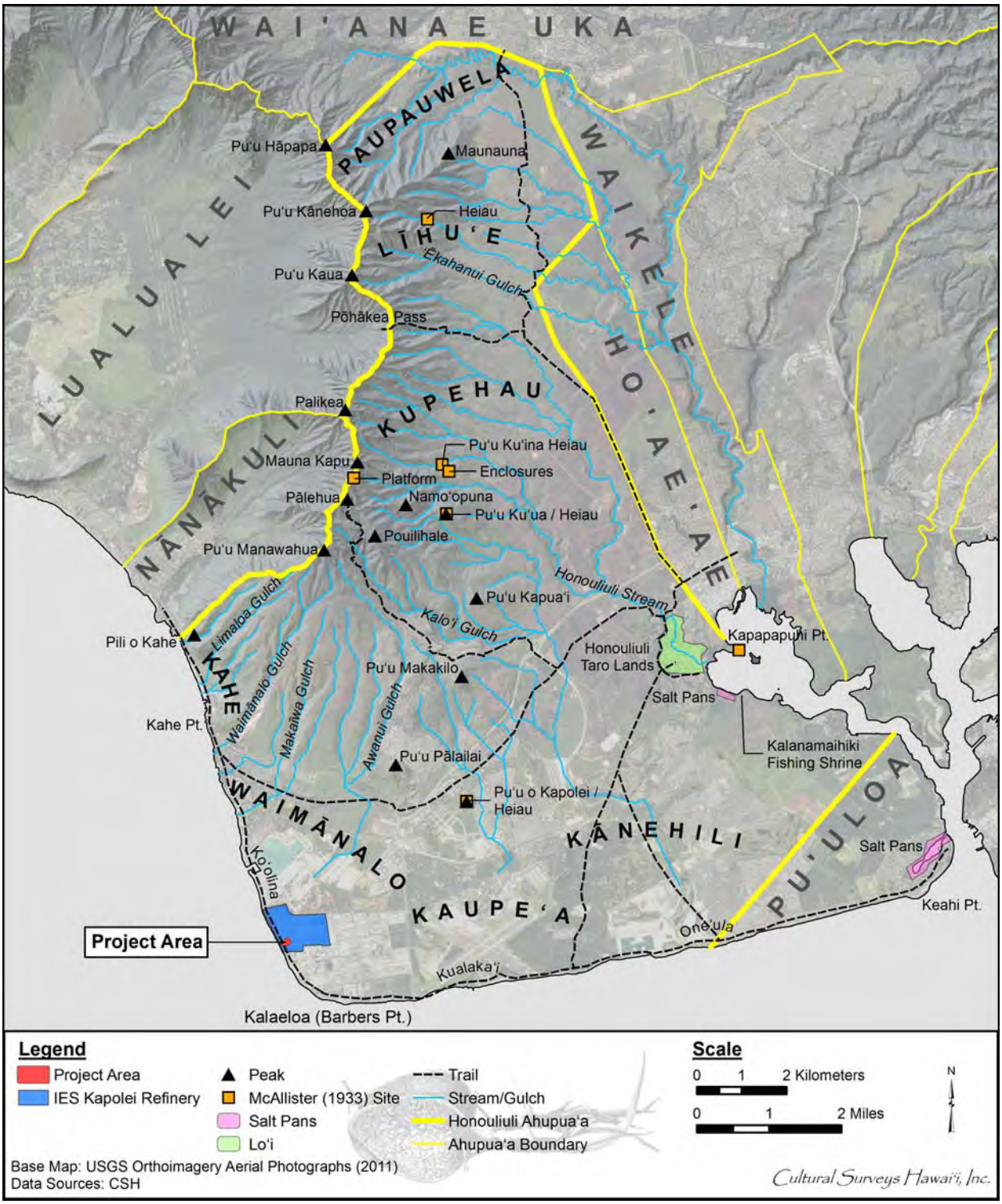

Figure 9. 2011 USGS Orthoimagery aerial photograph with overlay of place names in Honouliuli Ahupua‘a

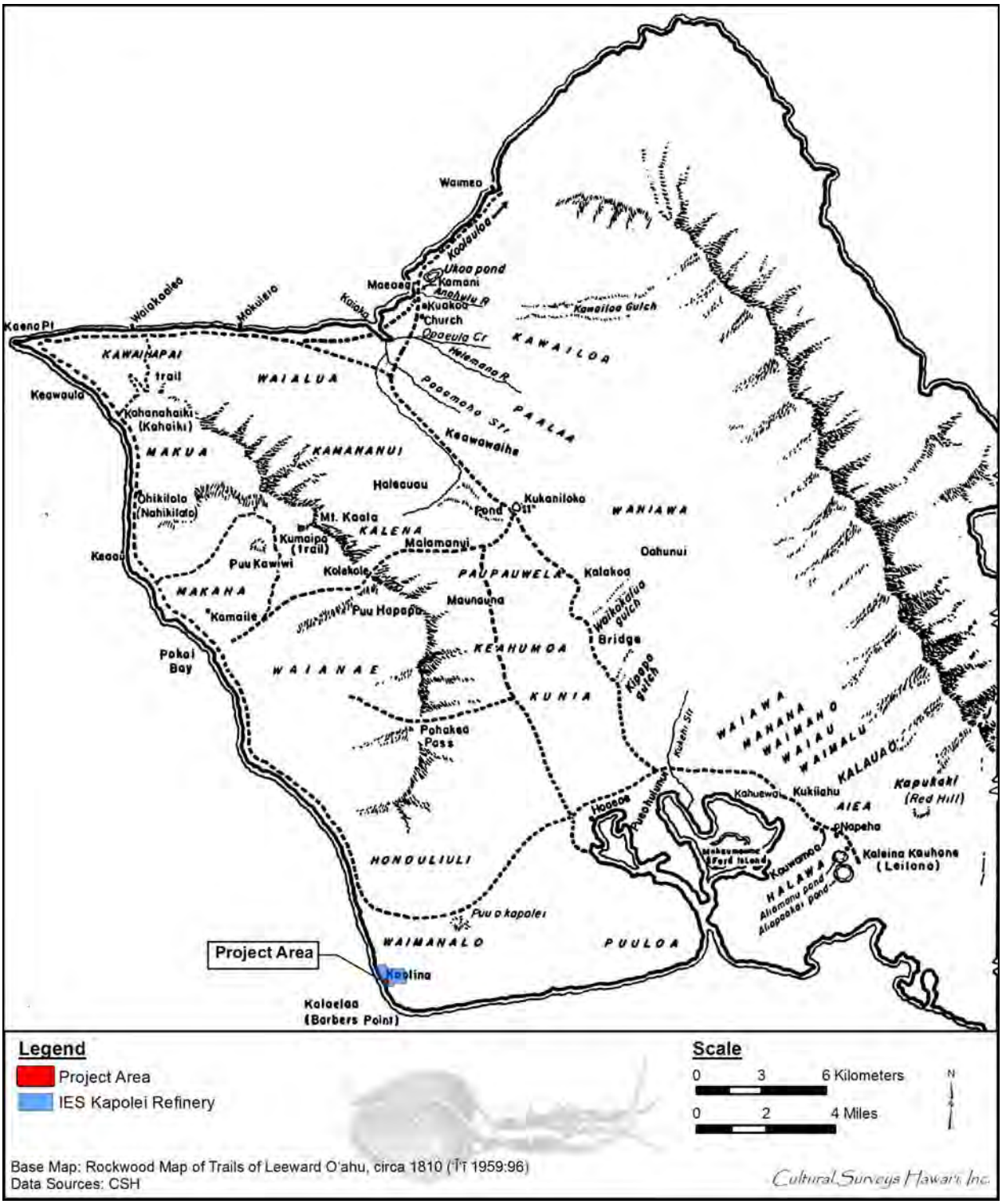

Figure 10. Portion of the Rockwood map of trails of Leeward O‘ahu, ca. 1810 (‘Ī‘ī 1959:96) showing relationship to the project area

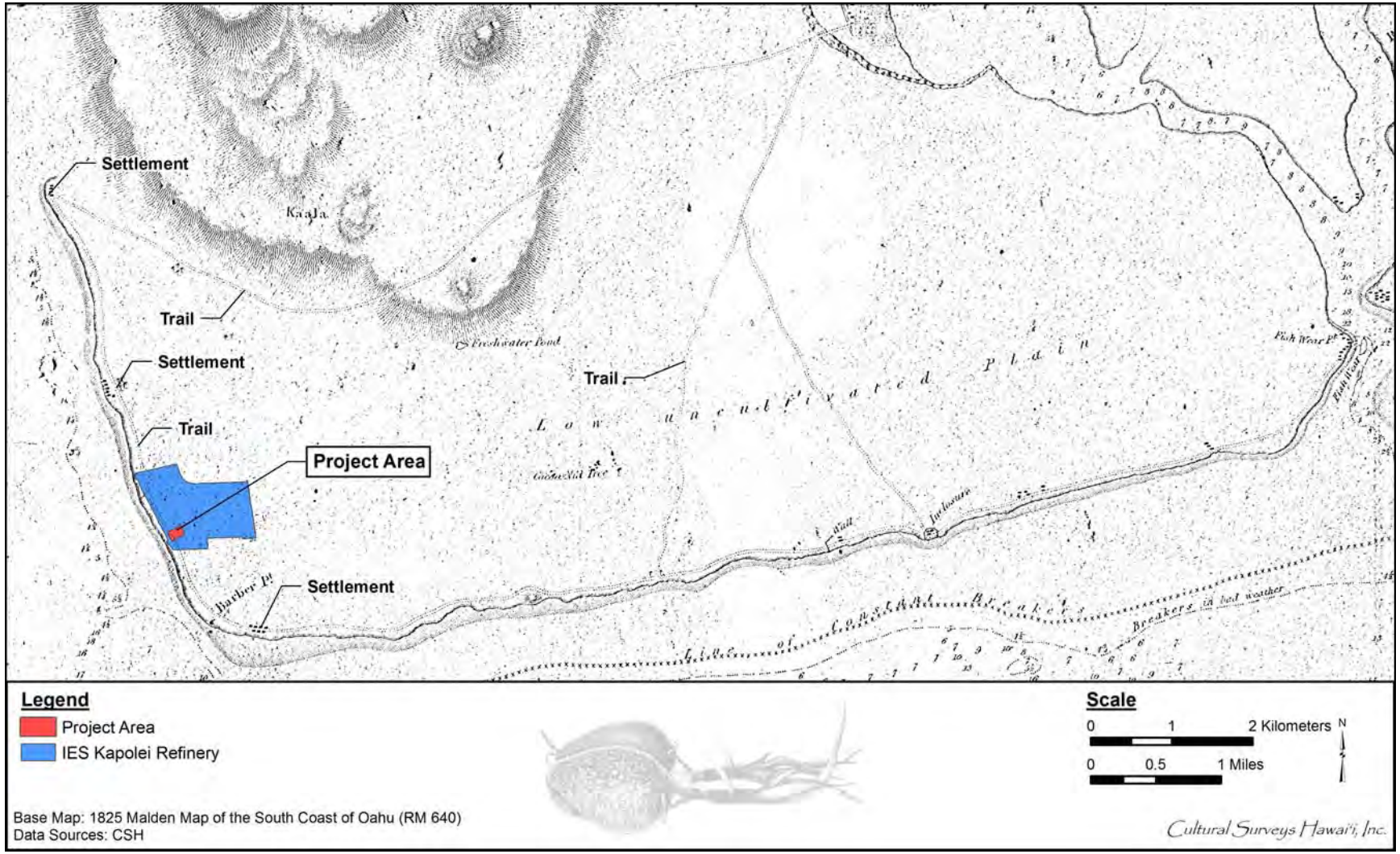

Figure 11. Portion of the 1825 Malden map of the South Coast of O‘ahu showing the project area

by the introduction of domesticated animals and exotic plant species. In the early 1790s, Captain George Vancouver brought to the Hawaiian Islands goats, sheep, and cattle, which were allowed to graze freely about the land for some time after. L.A. Henke reports the existence of a longhorn cattle ranch in Wai‘anae by ca. 1840 (Frierson 1972:10).

During this same time, perhaps as early as 1790, exotic plant species were introduced and flourished in the area. The following dates of specific vegetation introduced to Hawai‘i are given by R. Smith and outlined by Frierson (1972:10–11):

“early”, c. 1790:	Prickly pear cactus, Opuntia tuna
	Haole koa, Leucaena glauca
	Guava, Psidium guajava
1835-1840	Burmuda [*sic*] grass, Cynodon dactylon
	Wire grass, Eleusine indica
1858	Lantana, Lantana camara

The kiawe tree came in about this same time, and there is some debate about whether the date was 1828 or 1837. . . [Frierson 1972:10–11]

3.1.2 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele, the division of Hawaiian lands, which introduced private property into Hawaiian society. In 1848, the crown, the Hawaiian government, and the *ali‘i* (royalty) received their land titles. The common people (*maka‘āinana*) received their *kuleana* awards (individual land parcels) in 1850. It is through records for Land Commission Awards (LCA) generated during the Māhele that the first specific documentation of life in ‘Ewa, as it had evolved up to the mid-nineteenth century, come to light.

Following the Māhele of 1848, 99 individual land claims in the *ahupua‘a* of Honouliuli were registered and awarded by King Kamehameha III. The project area appears to have been included in the largest award (Royal Patent 6071, LCA 11216, *‘Āpana* [lot] 8) granted in Honouliuli Ahupua‘a to Miriam Ke‘ahi-Kuni Kekau‘ōnohi on January 1848 (Native Register). Kekau‘ōnohi acquired a deed to all unclaimed land within the *ahupua‘a*, totaling 17,503 ha (43,250 acres).

3.1.3 Mid- to Late 1800s

Kekau‘ōnohi was one of Liholiho’s (Kamehameha II’s) wives, and after his death, she lived with her half-brother, Luanu‘u Kahala‘i‘a, who was governor of Kaua‘i. Subsequently, Kekau‘ōnohi ran away with Queen Ka‘ahumanu’s stepson, Keli‘i-ahonui, and then became the wife of Chief Levi Ha‘alelea. Upon her death on 2 June 1851, all her property was passed on to her husband and his heirs. When Levi Ha‘alelea died, the property went to his surviving wife, who in turn leased it to James Dowsett and John Meek in 1871 for stock running and grazing.

In 1877, James Campbell purchased most of Honouliuli Ahupua‘a—including the current project area—for a total of $95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek, and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva 1983:C-12). By 1881, the Campbell property of Honouliuli

prospered as a cattle ranch with “abundant pasturage of various kinds” (Briggs in Haun and Kelly 1984:45).

In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway and Land Company (OR&L) as the result of a franchise granted by King Kalākaua in 1886. In 1889, Dillingham opened the first 9 miles of narrow gauge track on the King’s birthday. To attract business to his new railroad system, Dillingham subleased all land below 200 ft to William Castle who in turn sublet the area to the Ewa Plantation Company for sugarcane cultivation (Frierson 1972:15).

Ewa Plantation Company grew quickly and continued in full operation up into modern times. As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Company installed ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

The first western ship recorded as wrecking in the Hawaiian Islands was the brig *Arthur* under the command of Captain Henry Barber that ran aground at Kalaeloa Point on the southwest corner of O‘ahu at 8:00 p.m. on 31 October 1796. Captain Barber was en route from Honolulu to Canton with a cargo of sea otter hides. Breakers broke up the ship on the rocks and six of the 22-man crew drowned. The point became known as Barber’s Point and in 1968 the apostrophe was officially deleted from the name by the U.S. Board of Geographic Names (Dean 1991:17). One of the most interesting shipwrecks at the point occurred in 1804 when a demasted Japanese vessel drifted ashore at Waialua while being towed to Honolulu. In 1855, the French whaler *Marquis de Turenne* ran aground reportedly about a mile off the point and was a total loss.

In 1880, the surveyor general of the Hawaiian Kingdom, William Dewitt Alexander, selected a location at Barbers Point for an aid to navigation in what was then a very undeveloped area and money was appropriated that same year. There were delays in obtaining the Fresnel lens, lamps, and lantern from New York and by the time they arrived funds had been expended. In 1888, a lighthouse was constructed of stone and cement mortar “42 ft above mean tide” seemingly on a 6-ft-high coral shelf along with a small frame house and a water cistern (Dean 1991:19). It appears the light station site was originally 2 acres but was expanded to 5 acres with lands acquired by condemnation in 1910 (Dean 1991:207). Improvements were made to the residence, a storehouse, and a separate oil house in 1905 and 1915 and 3 ½ miles of water pipe was laid to the facility ca. 1915. A U.S. army transport ship, the *Sheridan,* arriving from Manila ran aground in 1906, but was successfully recovered. A 60-ft Japanese sampan smashed apart at Kalaeloa in 1919. In 1920, the *West Eldura,* also en route from Manila, ran aground but was also hauled off the reef.

To address continuing navigation concerns a new 72-ft-high tower (still extant) was built in 1933 adjacent to the old 40-ft tower and the old tower was toppled. The tower was automated in 1964 ending 76 years of lighthouse keeping. The Barbers Point lighthouse is located approximately 1.3 km (0.8 miles) southeast of the current project area.

3.1.4 1900s

Twentieth century land use in the vicinity of the project area included transportation along the former OR&L alignment that ran roughly parallel to the coast 500 m inland. Passenger totals on the OR&L line increased throughout the first half of the twentieth century. In 1908, 446,318 people rode on the line. This total rose to approximately 1,200,000 by 1922 and 1943 saw an all-time high of 2,642,516 passengers. Throughout World War II, the railway served a critical function in moving both personnel and equipment.

The development of a better road system and more cars on the island began to cut into passenger totals on the OR&L. According to the National Register of Historic Places Inventory forms on file at SHPD, on 12 December 1947, all operations outside of Honolulu ceased. In 1950, the U.S. Navy purchased the track and right-of-way from Pearl Harbor to the Naval Ammunition Depot (NAD) access road in Nānākuli for $1.00 in the name of “National Defense.” The NAD maintained this 25.5-mile stretch of track until the early 1950s when a 6.5-mile stretch from Pearl Harbor to Waipahu was ceded to the state of Hawai‘i. A further 6 miles reverted to the state in 1954 after a heavy flood. The final 13-mile stretch was in use until 1968 and was ceded to the state in 1980.

The 1919 fire control map (Figure 12) shows a road and structures in the Gilbert Station area 3 km northeast of the project area, the site of Gilbert Camp associated with the railway and Ewa Plantation. An unimproved loop access road extends from Gilbert Station down to Barbers Point, passing through the present project area and looping back to the OR&L alignment. These features also appear in the 1936 War Department terrain map (Figure 13), which also shows the relatively new tank and pipeline that provided water to the lighthouse compound. A 1939 Ewa Plantation Company field map (Figure 14), and a 1943 U.S. Army War Department map (Figure 15) shows a number of new unimproved roads in the vicinity, one of which passes through the central portion of the present project area. A road corresponding to the modern Malakole Road is also shown along the northern boundary of the IES Kapolei Refinery property. The 1943 U.S. Army War Department map does not show the new Barbers Point Military Reservation infrastructure; however during the time of war, new military bases would not necessarily be shown on maps. It appears the Barbers Point Military Reservation was established in 1921. Between 1937 and 1942 there were two sets of two “Panama Mount” 155 mm guns. Batteries of up to four guns on Panama mounts often served as temporary defenses while nearby permanent batteries awaited construction (Fort Wiki 2014). The two sets of 155 mm guns were separated by the Barbers Point lighthouse. “This site was an early training firing point for 155 mm guns” (North American Forts 2007). The military installations are shown on Figure 16.

The 1951 aerial photograph (Figure 17) and 1953 Army Map Service map (Figure 18) show little post-war development in the vicinity other than the relocation of a U.S. Coast and Geodetic Survey Observatory 500 m to the east on the north side of what is now Ōla‘i Street. The oil refinery and acid plant was built around 1959-1960. The 1961 aerial photograph (Figure 19), however, reflects the boom that accompanied statehood with the establishment of the Chevron oil refinery, a major cement plant south of the project area, and additional industrial development in the vicinity. The Camp Malakole Military Reservation and the Barbers Point Barge Harbor are also indicated north of the project area. The 1968 USGS map (Figure 20) shows the increased industrial development within the James Campbell Industrial Park, near the project area.

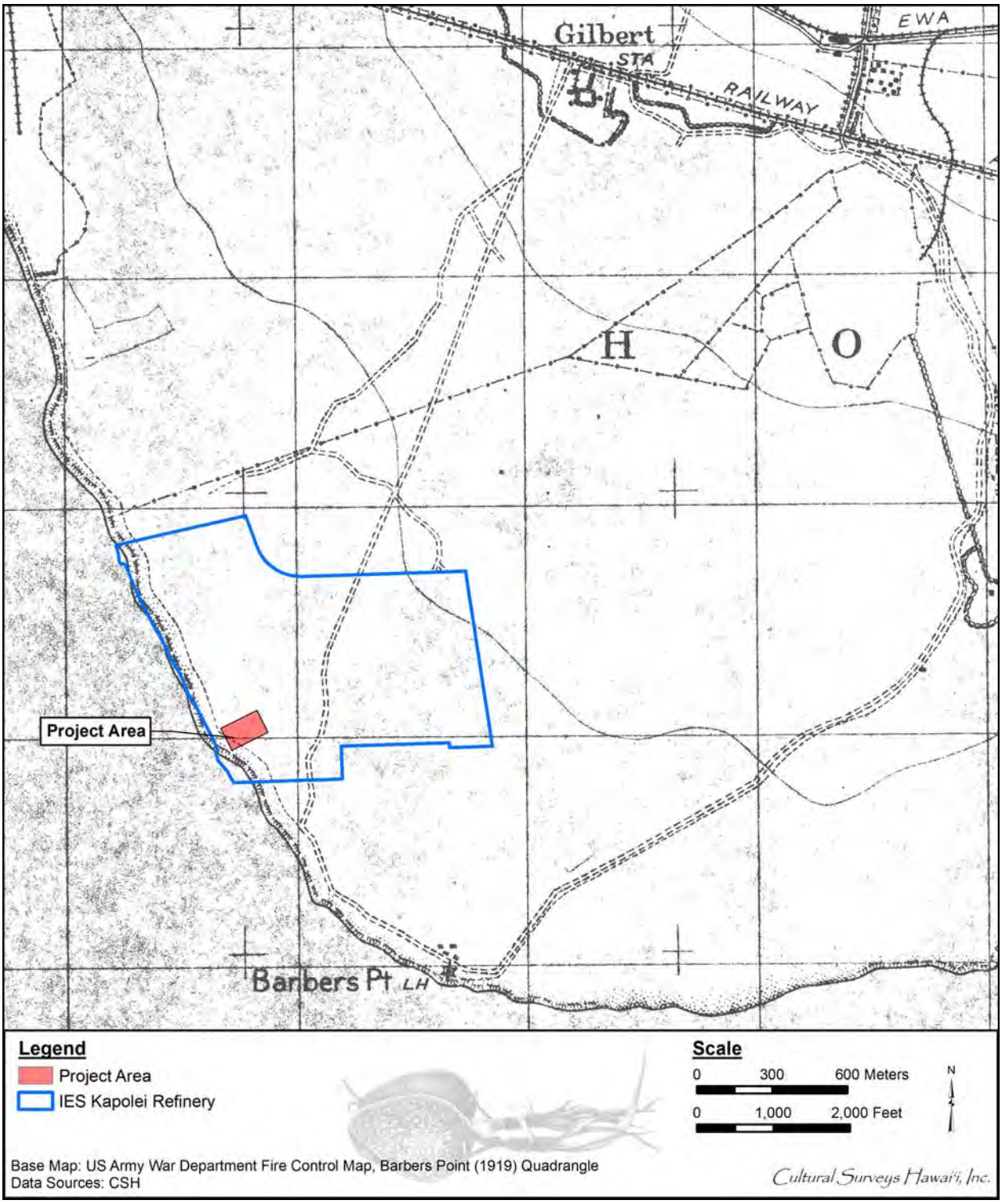

Figure 12. Portion of the 1919 U.S. Army War Department fire control map, Barbers Point Quadrangle, showing the location of the project area

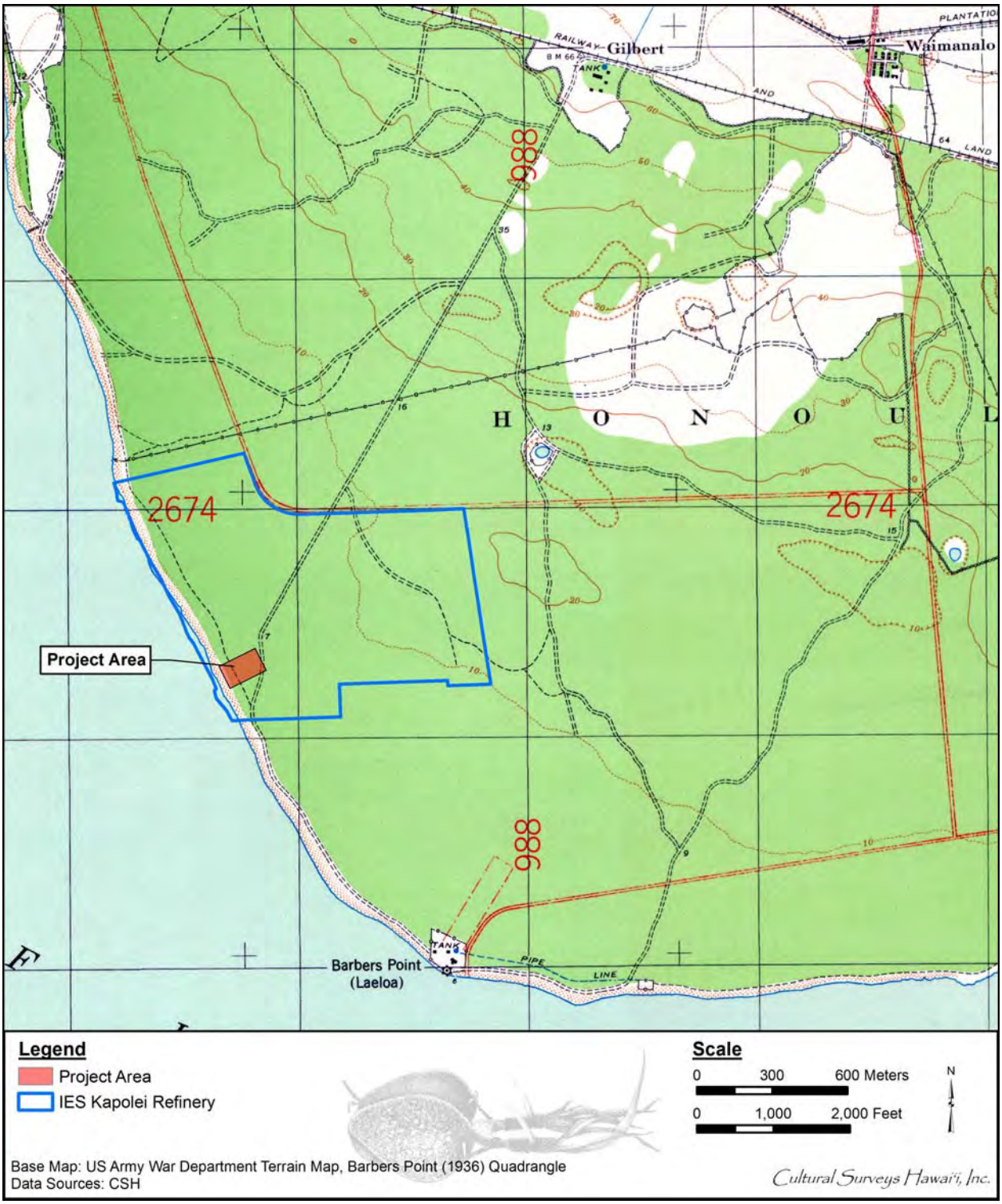

Figure 13. Portion of the 1936 U.S. Army War Department terrain map, Barbers Point Quadrangle, showing the location of the project area.

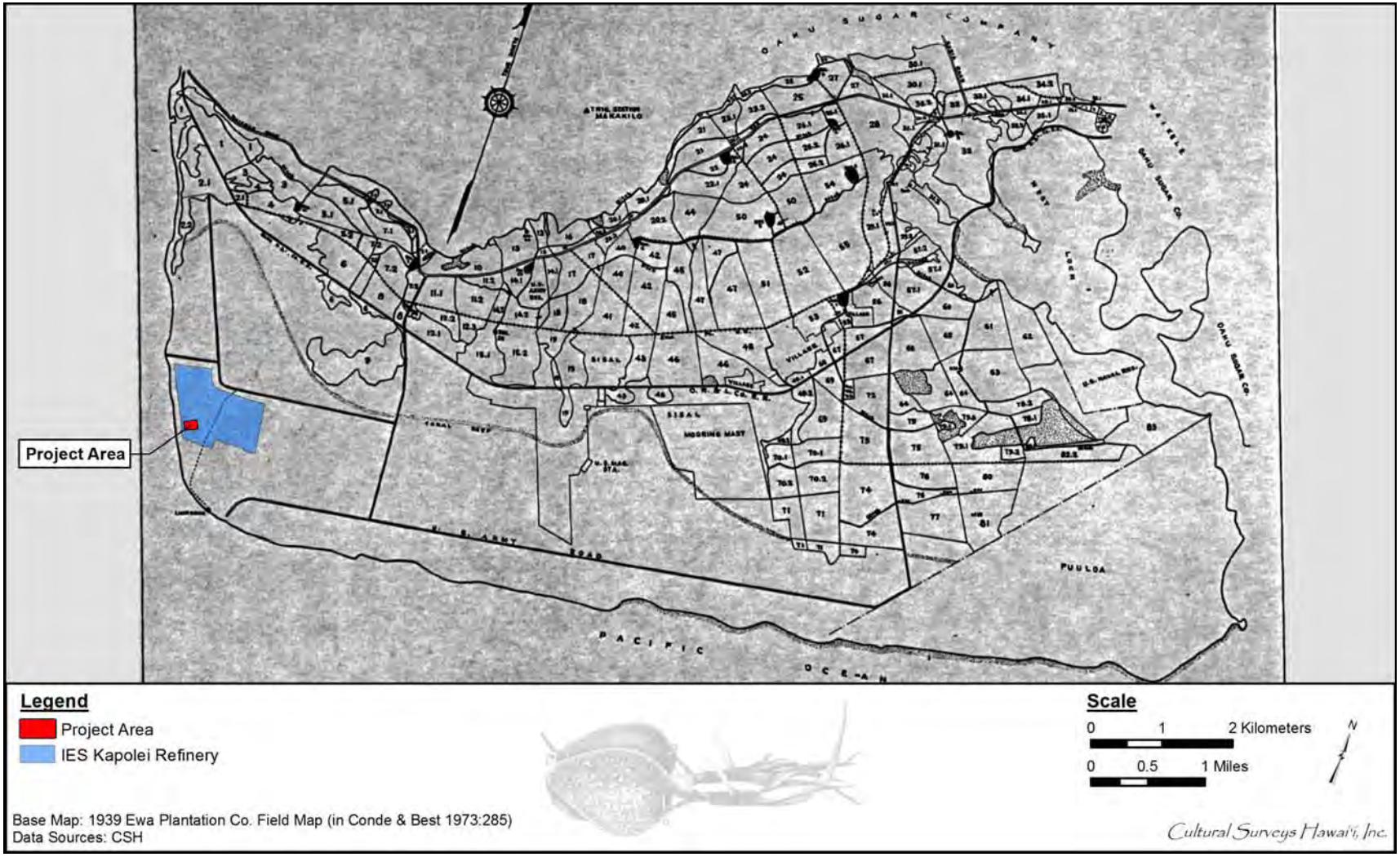

Figure 14. Portion of the 1939 Ewa Plantation Company field map (from Condé and Best 1973:285) showing the project area

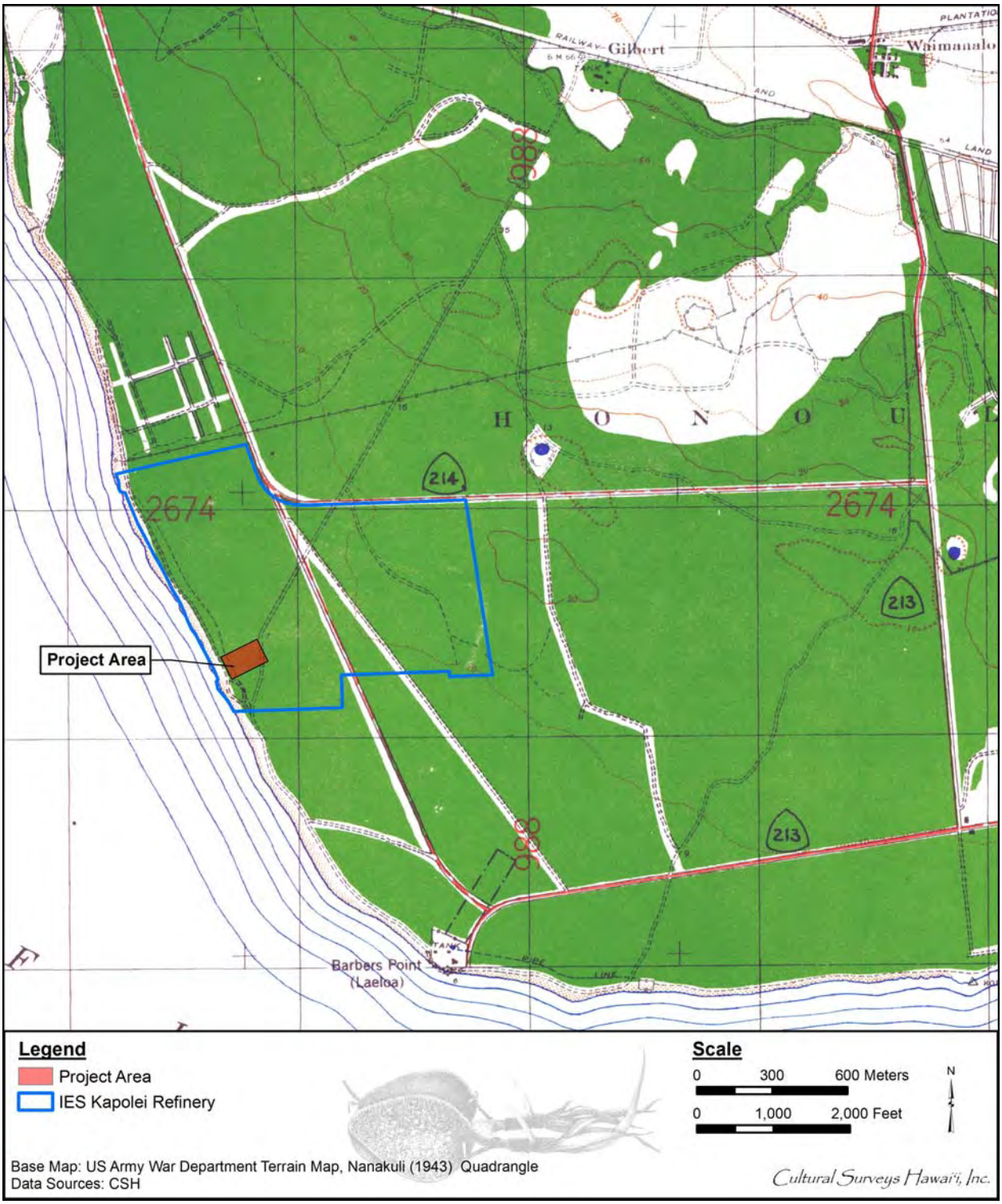

Figure 15. Portion of the 1943 U.S. Army War Department terrain map, Nanakuli Quadrangle, showing the location of the project area

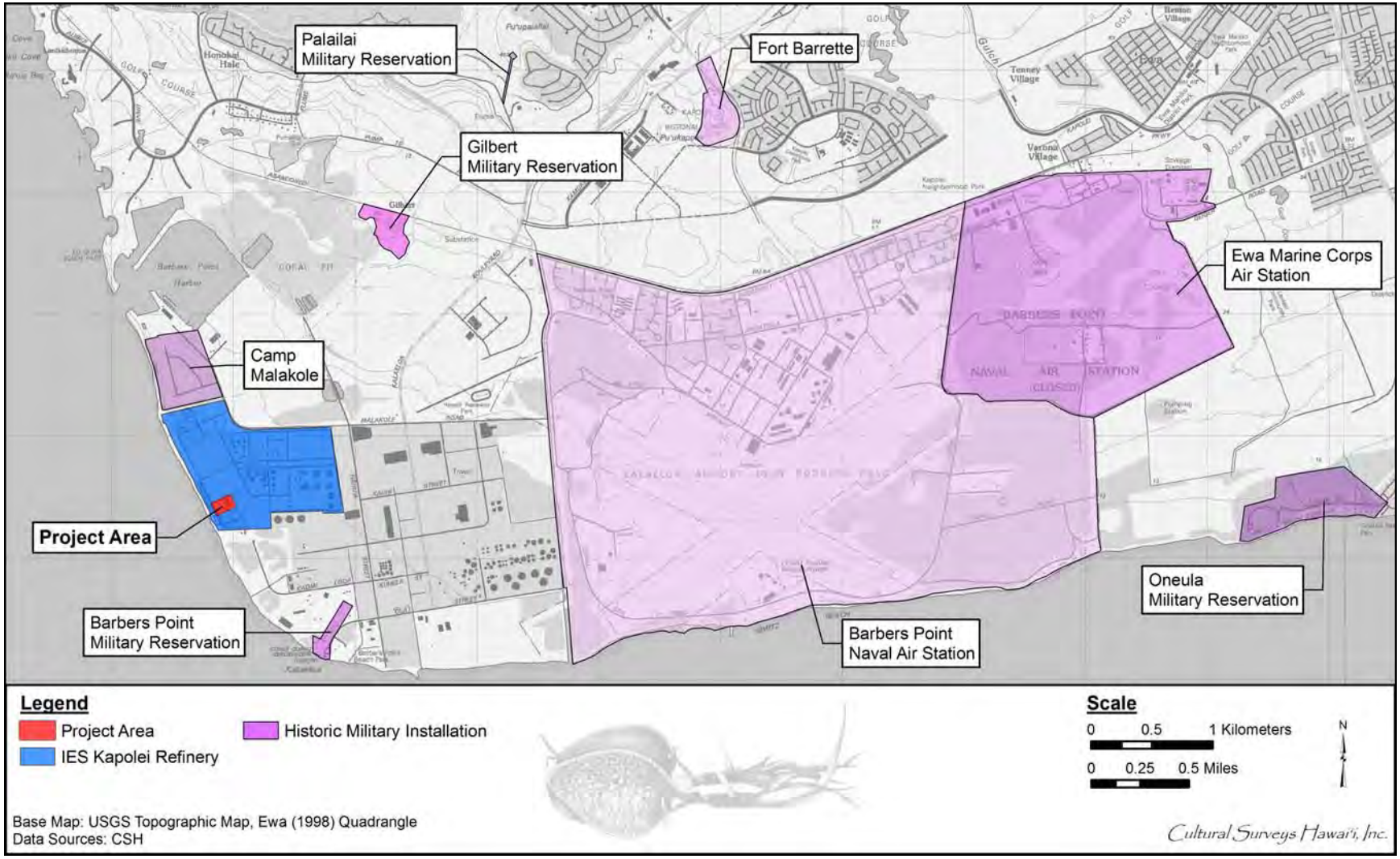

Figure 16. Portion of the 1998 Ewa USGS topographic quadrangle with overlay of historic military infrastructure in the vicinity of the project area

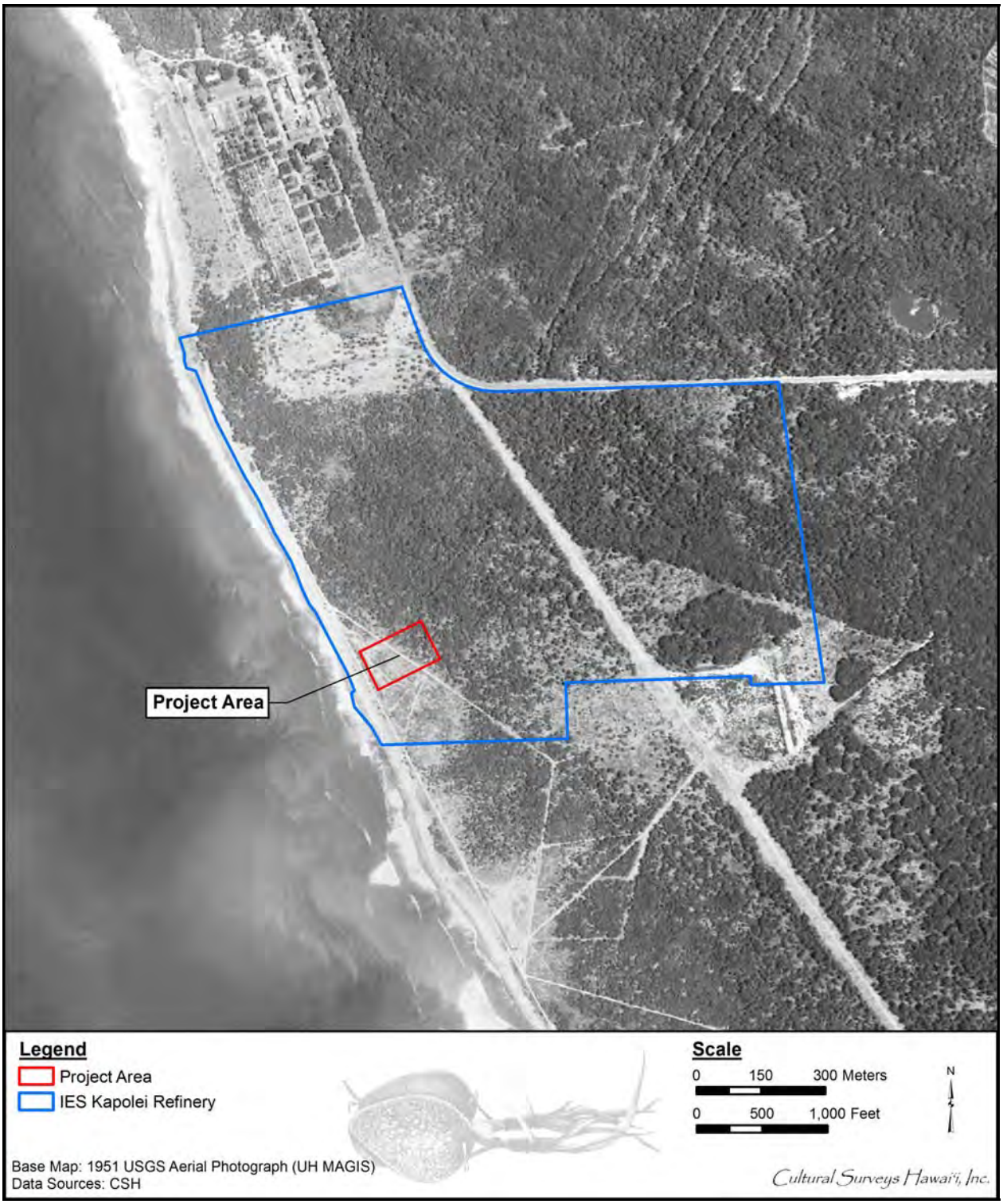

Figure 17. 1951 USGS aerial photograph (UH MAGIS) showing the project area

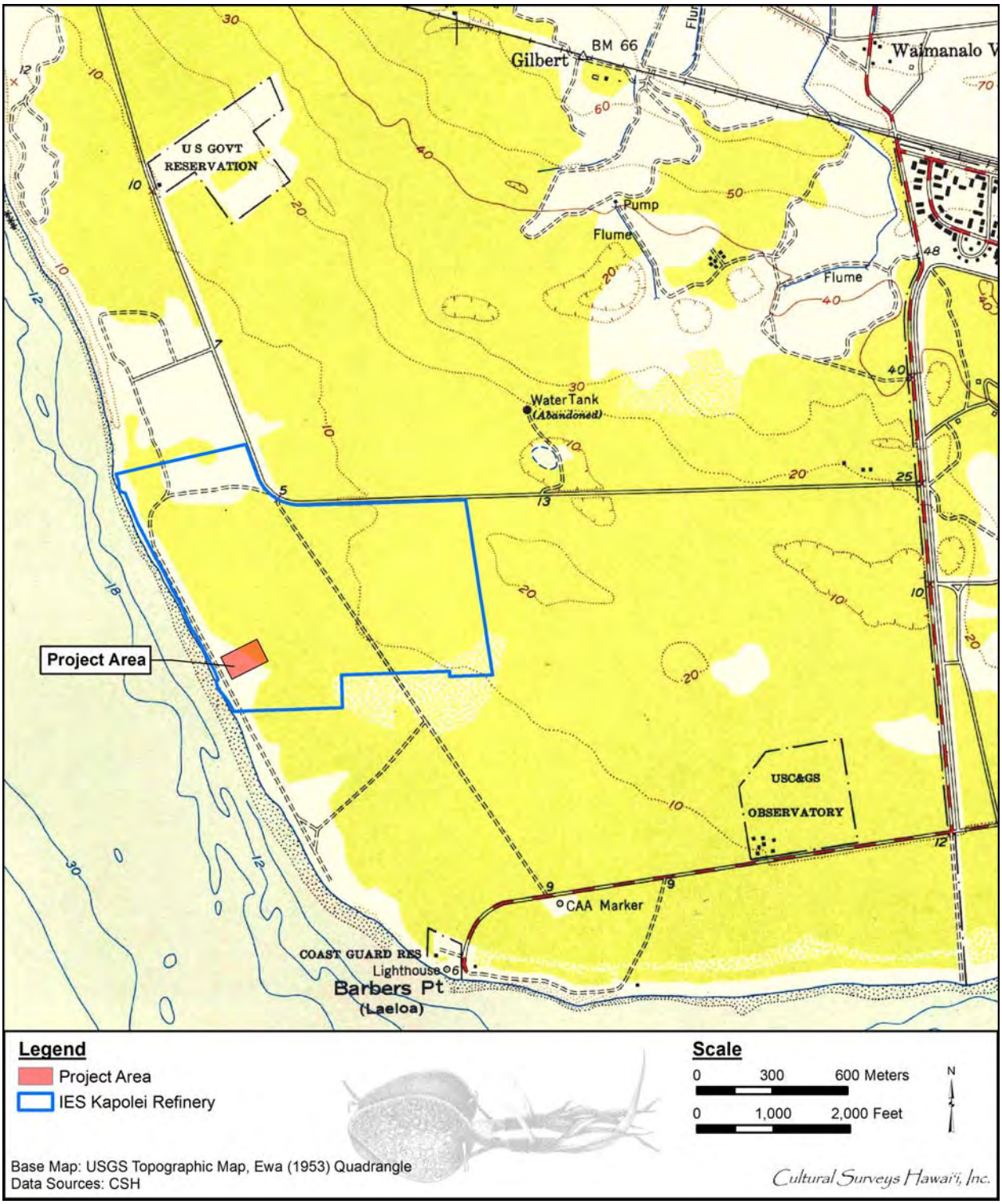

Figure 18. Portion of the 1953 Ewa USGS topographic quadrangle showing the location of the project area

Figure 19. 1961 aerial photograph (UH SOEST) showing the project area

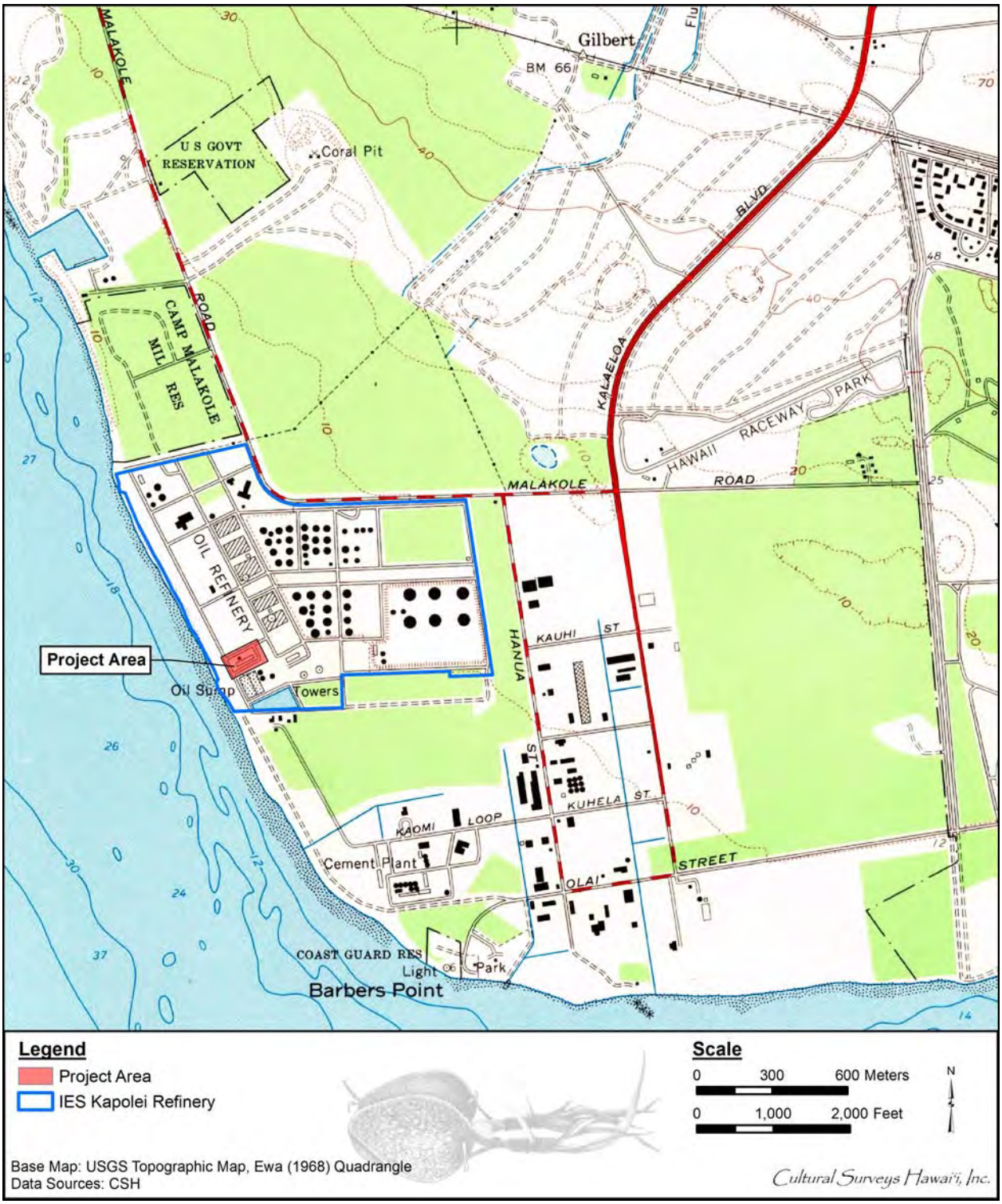

Figure 20. 1968 Ewa USGS topographic quadrangle showing the location of the project area

3.2 Previous Archaeological/Paleontological Research

An overview of previously conducted archaeological and paleontological studies in the vicinity of the project area is summarized in Table 1, and depicted in Figure 21. Previously identified historic properties are shown in Figure 22. Relevant studies in the vicinity of the project area and findings germane to the project area are discussed below.

3.2.1 Early Archaeological Studies

The first effort to record archaeological sites in Honouliuli was by Thrum (1906:46), who references “a *heiau* on Kapolei hill, ‘Ewa—size and class unknown. Its walls thrown down for fencing.” The former *heiau* was on Pu‘u Kapolei, 5 km northeast of the present study area.

In his 1930 surface survey of the island of O‘ahu, archaeologist J. Gilbert McAllister recorded the specific locations of important archaeological and cultural sites, and the general locations of some sites of lesser importance. McAllister (1933:107–108) recorded seven specific sites at Honouliuli (numbered 133–139) and these became the first seven sites in the Bernice Pauahi Bishop Museum (BPBM) Site Numbering System (OA-B6-1 through OA-B6-7). The nearest of these specific sites to the present project area is McAllister Site 138, including the Pu‘u Kapolei *heiau* and an adjacent rock shelter. McAllister (1933:109), however, designated McAllister Site 146 to include archaeological features covering a large but poorly defined area along the coast. His impressions of Site 146 are recorded as follows:

> ‘Ewa coral plains, throughout which are remains of many sites. The great extent of old stone walls, particularly near the Pu‘uloa Salt Works belongs to the ranching period of about 75 years ago [ca. 1850s]. It is probable that the Hawaiians formerly used the holes and pits in the coral. Frequently the soil on the floor of larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here. [McAllister 1933:109]

These archaeological sites of the ‘Ewa coral plains would be the subject of some 40 or so archaeological reports in the 1970s and 1980s with approximately a hundred studies to date.

From the period between McAllister’s 1930 study and the flurry of work that began in 1969, there are only a few sporadic pieces of poorly documented research. “In 1933, Dr. Kenneth P. Emory examined a well-preserved house site and a possible *heiau* in the western part of the coral plain; these sites were later destroyed by sugar-cane planting” (Sinoto 1976:1). In 1959, William Kikuchi removed a number of burials from a burial cave site (BPBM Site OA-B6-10) at the Standard Oil Refinery, which was subsequently destroyed (Barrera 1975:1). Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road (Kikuchi 1959; Davis 1990a:146–147). Specific location data is not available but if this find was close to the big bend in Malakole Road then it would appear to have been within 400 m of the northeast end of the current project area.

Table 1. Archaeological and related studies in the vicinity of the project area

Reference	Type of Study	Location	Results
Kikuchi 1959	Burial removal and relocation	Standard Oil Refinery	Removed 12 to 16 incomplete primary and/or secondary burials (BPBM Site # 50-OA-B6-10; SIHP # 50-80-12-2315).
Lewis 1970	Campbell project preliminary investigation	Freshwater marsh near corner of Malakole and Kalaeloa Blvd	Two house compounds identified and excavated, 50-OA-B6-15 (SIHP # 50-80-12-9242) and 50-OA-B6-21 (SIHP # 50-80-12-9544); additional testing recommended
Barrera 1975	Archaeological reconnaissance survey	Barbers Point Harbor	Two excavations conducted in large, presently fenced, sinkhole SIHP # 50-80-12-9545, located north of barge harbor; large sinkhole yielded archaeological remains and a radiocarbon date from a hearth feature, as well as bones of extinct bird species
Sinoto 1976	Cultural resources survey	Barbers Point Area	Hundreds of sites documented and recorded (see Table 2); eventually became Barbers Point Archaeological District (SIHP # 50-80-12-2888)
Davis and Griffin 1978	Studies in natural history and human settlement	Deep Draft Harbor, Barbers Point	Recommended defined sample of all resources in area be salvaged
Sinoto 1979	Cultural resources survey	Deep Draft Harbor, Barbers Point	Additional sites documented and recorded (see Table 2); became Barbers Point Archaeological District (SIHP # 50-80-12-2888)
Hammatt and Folk 1981	Archaeological and paleontological investigation	Federal Study Areas 1a and 1b, and State of Hawai‘i Optional Area 1, Barbers Point	Of 148 sites known or documented, tested 88, and 26 subjected to excavation; radiocarbon dates yielded calibrated age of AD 550 ± 55 to 1760 ± 21
Ahlo and Hommon 1983	Archaeological reconnaissance survey	Proposed solid waste processing and resource recovery facility	Reported two sinkholes, three rectangular pits and a possible cultural deposit; finds discounted in Hommon and Ahlo 1984

Reference	Type of Study	Location	Results
Hommon and Ahlo 1984	Archaeological subsurface testing	Proposed solid waste processing and resource recovery facility	Discounted import of earlier reported finds
Davis 1988, 1989, 1990b	Reconnaissance survey, archaeological and paleontological investigation	Barbers Point (harbor area)	Some 15+ pit caves identified, 13 recorded and tested and extensive excavation undertaken; extinct bird bones identified in all tested pit caves; a human burial encountered in pit cave site Fea. 1; SIHP # 50-80-14-4099 identified
Cleghorn and Davis 1990	Archaeological and paleontological investigations	Deep Draft Harbor, Barbers Point	Survey concluded Native Hawaiians adapted to their environments and met needs of a growing population
Folk 1991	Archaeological reconnaissance	Proposed drainage canal in Kapolei Business Park	Additional subsurface testing recommended
Folk and Hammatt 1992	Archaeological subsurface testing	Proposed drainage canal in Kapolei Business Park	Additional testing called for in Folk 1991; excavated two trenches; one yielded a cultural layer (SIHP # 50-80-12-4526)
McIntosh and Cleghorn 1999	Archaeological archival research	Honouliuli Wastewater Treatment Plant	Noted possibility of finding subsurface archaeological sites including sinkholes that could contain cultural materials and possibly human burials
McDermott et al. 2006	Archaeological inventory survey	Kapolei Harborside Center, Barbers Point	Documented three previously identified historic properties (SIHP #s 50-80-12-6679 drainage channel, 50-80-12-2888 Barbers Point Harbor Archaeological District, and 50-80-12-9714 OR&L ROW) and three newly recorded historic properties (SIHP #s 50-80-12-6876 and 50-80-12-6877, pre-Contact stacked stone enclosures, and 50-80-12-6878 sinkhole features)
Rasmussen and Tomonari-Tuggle 2006	Archaelogical monitoring	Waiau fuel pipeline	Adjacent portion of project area appears not to have been monitored; not perceived as an area of archaeological sensitivity

Reference	Type of Study	Location	Results
Hammatt et al. 2007	Archaeological literature review and field inspection	Chevron Refinery Fencing project, Kalaeloa, TMK: [1] 9-1-014:010 por.	No surface historic properties observed
Tulchin et al. 2007	Archaeological literature review and field inspection	Approx. 790-acre parcel at Pālehua, Honouliuli Ahupua‘a, TMKs: [1] 9-2-003:002 por. and 005 por.	Archaeological features include pre-Contact indigenous Hawaiian habitation and associated agricultural and ceremonial features (SIHP #s 50-80-08-2316; 50-80-12-2602); historic ranching and related features (SIHP # 50-80-12-2601); and historic quarrying and related features (SIHP # 50-80-12-6680) and various pre- and post-Contact features (designated with temporary site #s CSH1–CSH22)
Groza et al. 2008	Archaeological inventory survey (recorded as an archaeological assessment)	Kalaeloa, TMK: [1] 9-1-015:020 por.	No historic properties identified
Groza and Hammatt 2010	Archaeological monitoring	Kalaeloa City and County Beach Park (Barbers Point Beach Park), TMK: [1] 9-1-026:027	No historic properties identified
Condit and Allen 2011	Archaeological monitoring	Hawaiian Electric Company generator and substation site, TMKs: [1] 9-1-014:014 and 9-1-026:038	No historic properties identified
Titchenal et al. 2011	Archaeological inventory survey	H-Power expansion	SIHP # 50-80-12-7417, pit cave with paleontological avifauna material

Reference	Type of Study	Location	Results
Hammatt and Shideler 2012	Archaeological inventory survey (recorded as an archaeological assessment)	Solar site within Chevron Refinery, Kalaeloa, TMK: [1] 9-1-014:010 por.	No surface historic properties observed within or in immediate vicinity of project area; no intact sinkholes larger than 60 cm in diameter, sand dune deposits, or cultural material observed within project area and none believed to be present
Runyon et al. 2012	Archaeological inventory survey (recorded as an archaeological assessment)	Chevron solar site at James Campbell Industrial Park, TMK: [1] 9-1-031:002 por.	No historic properties identified
McElroy et al. 2015	Archaeological inventory survey	Kalaeloa Barbers Point Harbor Fuel Pier, TMKs: [1] 9-1-014:008 por., 024 por., 025, 030, 031, 037, 038, 040; 9-1-074:037 por., and 038 por.	No historic properties identified
Medina and Hammatt 2015	Archaeological monitoring	James Campbell Industrial Park, TMK: [1] 9-1-026:026	One subsurface cultural layer, SIHP # 50-80-02-7402, which likely functioned as a temporary/short term occupation and subsistence procurement activity area
DeMaio Starr et al. 2016	Archaeological inventory survey	Western Kapolei Regional Drainage System, TMKs: [1] 9-1-014:002 (por.), 9-1-074:036, and 040 (por.)	SIHP # 50-80-12-2888, Barbers Point Archaeological District; SIHP # 50-80-12-4526, buried A horizon and cultural deposit layer; SIHP # 50-80-12-7672, a post-Contact historic fence and corral system; SIHP # 50-80-12-7673, sewage septic treatment system structure associated with former Army installation of Camp Malakole
Stark et al. 2016	Archaeological inventory survey	Kapolei Business Park Wastewater Pump Station, TMK: [1] 9-1-075:051	One new historic property identified, SIHP # 50-80-12-7763 a drainage culvert and wall feature

Reference	Type of Study	Location	Results
Belluomini et al. 2017	Archaeological inventory survey	Kapolei Corporation Yard, TMK: [1] 9-1-026:004	One historic property documented (SIHP # 50-80-12-6866), remnants of Barbers Point Military Reservation (three features including two 155 mm “Panama Mount” artillery bases and an associated cement slab); presence of areas of pit caves noted

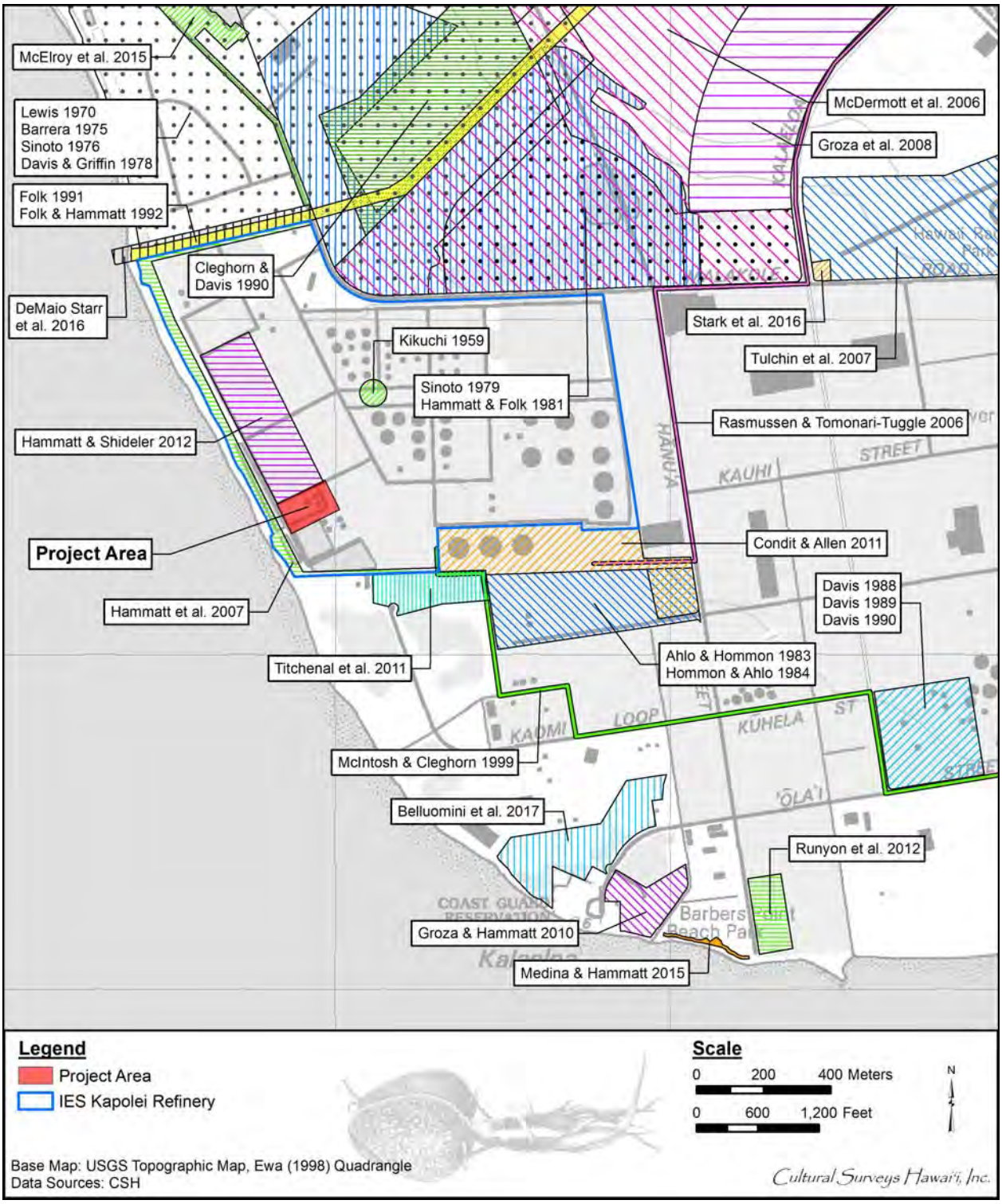

Figure 21. Portion of a 1998 Ewa USGS topographic quadrangle showing previously conducted archaeological and paleontological studies in the vicinity of the project area

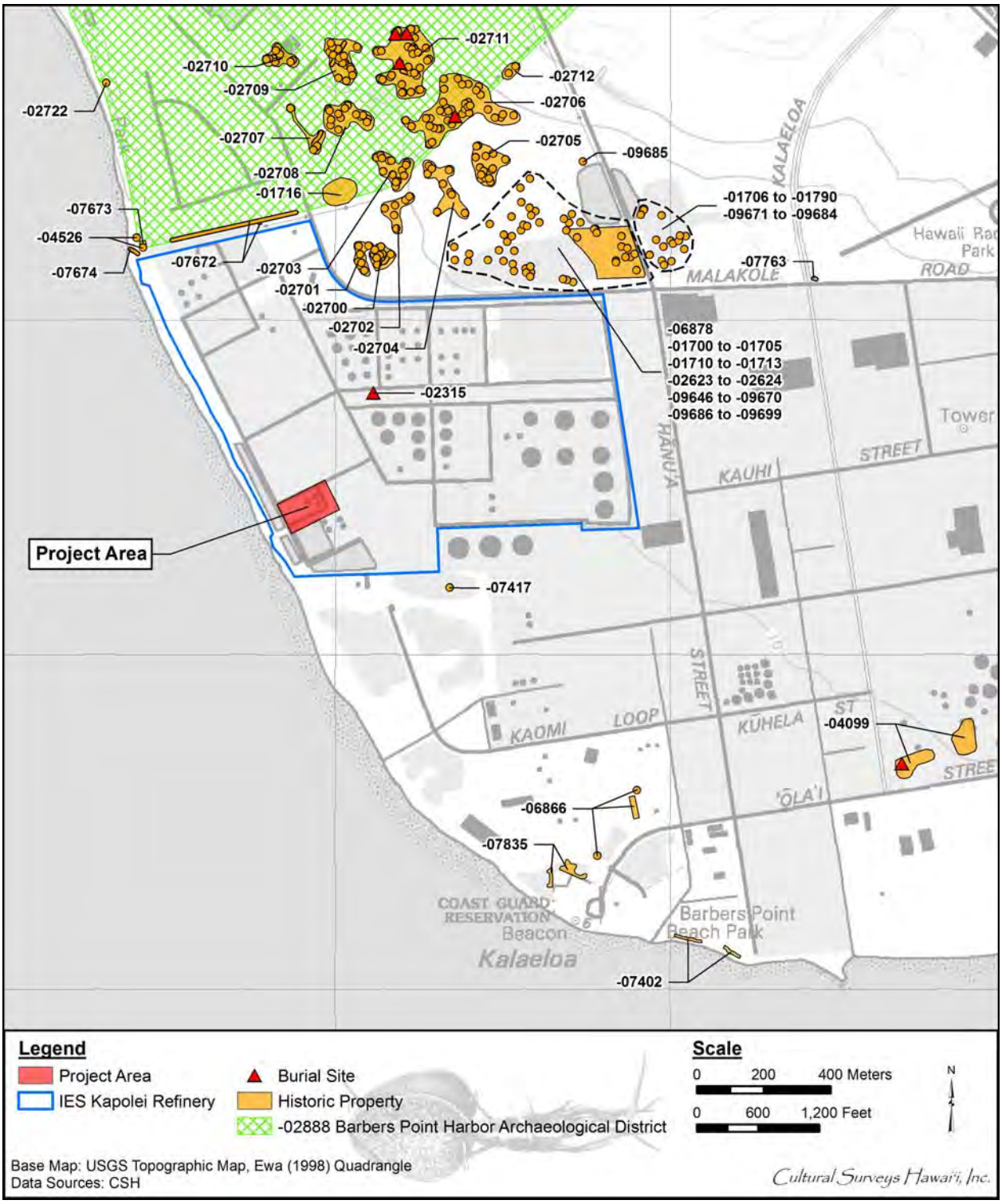

Figure 22. Portion of a 1998 Ewa USGS topographic quadrangle showing previously identified historic properties in the vicinity of the project area

3.2.2 Kikuchi 1959

In 1959, William Kikuchi removed a number of burials from a burial cave site (BPBM Site OA-B6-10) at the Standard Oil Refinery, which was subsequently destroyed (Barrera 1975:1). Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road (Kikuchi 1959; Davis 1990a:146–147). Specific location data is not available but if this find was close to the big bend in Malakole Road, it would appear to have been within 400 m of the northeast end of the current project area.

3.2.3 Lewis 1970

In 1970, Ernest Lewis conducted a brief survey around the intersection of Malakole Road and Kalaeloa Boulevard. This project was done as part of a seminar in archaeological methods at the University of Hawai‘i at Mānoa. Two house compounds were identified and excavated, 50-OA-B6-15 (State Inventory of Historic Places [SIHP] # 50-80-12-9242) and 50-OA-B6-21 (SIHP # 50-80-12-9544). The author noted there is great possibility for this area to yield information, and that excavations should be done to sample the house compounds further. The report does not make any additional recommendations (Lewis 1970).

3.2.4 Barrera 1975

In 1975, William Barrera of the BPBM, under contract with the U.S. Army Corps of Engineers (USACE), conducted an archaeological reconnaissance survey for the proposed Barbers Point Harbor. The USACE continued the archaeological research in 1976 by requesting another survey (Sinoto 1976) of the cultural remains in the area previously surveyed in 1970 (Lewis) and 1975 (Barrera). Sinoto’s work included mapping 68 new archaeological sites and more complete mapping of 30 previously recorded sites. In the course of this research, two excavations were conducted in the large, presently fenced, sinkhole Site 9545, located north of the barge harbor. This large sinkhole yielded archaeological remains and a radiocarbon date from a hearth feature, as well as bones of extinct bird species.

3.2.5 Sinoto 1976

In 1976, Aki Sinoto of the Bishop Museum conducted a survey for the Army Corps of Engineers for a preliminary survey of the Barbers Point Deep Draft harbor. During the course of the survey, 92 sites were confirmed or documented (see Table 2). One site, 50-Oa-B6-58 (SIHP # 50-80-12-9554), was completely mitigated. Of the remaining sites, approximately half of them had test units placed within the site boundaries (Sinoto 1976). The author did not make any additional recommendations for any of the remaining sites. As a result of the survey, further work was recommended for the entire project area. The area surveyed eventually became the Barbers Point Archaeological District (SIHP # 50-80-12-2888).

3.2.6 Davis and Griffin 1978

In 1978, Davis and Griffin of the Archaeological Research Center Hawai‘i, Inc. (ARCH) conducted a survey for the proposed Deep Draft harbor. This fieldwork was conducted at the request of the State of Hawai‘i as part of additional work called for in Sinoto (1976). The

objectives of the research were to 1) develop an integrated research design stringing together all known research about the area, 2) determine the population and distribution of the endangered plant species in the survey area, and 3) determine the presence and distribution of cultural and potential archaeological resources in the project area. The report recommended a defined sample of all the resources in the area should be salvaged (Davis and Griffin 1978).

3.2.7 Sinoto 1979

In 1979, Aki Sinoto of the Bishop Museum conducted a survey for new dredged material deposit sites at Barbers Point. Forty sites were located and recorded including seven stone mounds, six C-shape, one enclosure, two filled-paved areas, two habitation sinkholes, one L-shape, one modified depression, eight modified sinks, three platforms, six wall remnants, and one U-shape (see Table 2). The author recommended further research for the entire project area (Sinoto 1979). The area surveyed eventually became the Barbers Point Archaeological District (SIHP # 50-80-12-2888).

3.2.8 Hammatt and Folk 1981

In 1981, Hammatt and Folk of ARCH conducted a survey of the Barbers Point Federal Study Areas 1a and 1b and State of Hawai‘i Optional Area 1. Of the 148 sites known or documented, 88 were tested and 26 were subjected to excavation. Most of the excavations were habitation sites, which gathered data to test a hypothesis of settlement systems. Radiocarbon dates yielded a calibrated age of AD 550 ± 55 to 1760 ± 21. This information, as well as the paleontological study done on the bones recovered from the sink holes, led to the hypothesis that this was the first area occupied by early Native Hawaiians (Hammatt and Folk 1981).

3.2.9 Ahlo and Hommon 1983 and Hommon and Ahlo 1984

Ahlo and Hommon (1983) and Hommon and Ahlo (1984) carried out two studies at a proposed solid waste processing and resource recovery facility project area 500 m (1,640 ft) southeast of the present study area extending west from Hanua Street. Examination of two sinkholes indicated no cultural material. Three rectangular pits were determined to be recent backhoe excavations. A possible cultural deposit was determined to be recent and the result of a brush fire and subsequent leveling of the area by a backhoe (Ahlo and Hommon 1983; Hommon and Ahlo 1984).

3.2.10 Davis 1988, 1989, and 1990

Bertell Davis (1988, 1989, 1990b) carried out three studies at the location of a 20-acre parcel proposed for a HECO generating station on the north side of Ōla‘i Street approximately 600 m east of the present study area. Some 15+ sinkholes were identified; 13 were recorded and tested and extensive excavation was undertaken at four of the sinkholes. Extinct bird bones were identified in all four of these sinkholes. A human burial was encountered in sinkhole SIHP # -4099-1 (Davis 1990b:33–37). This burial was of particular interest as it was dated to AD 1422-1664 and appeared to show signs of syphilis, which was understood to be a western introduced disease.

3.2.11 Cleghorn and Davis 1990

In 1990, an archaeological and paleontological study was done on the Barbers Point Deep Draft Harbor site. The research was used to determine if Native Hawaiians brought about ecological changes in the region. This was done by reinvestigating previously excavated sites and building on the knowledge. Results of the survey showed Native Hawaiians adapted to their environments and met the needs of a growing population. By doing this they unintentionally altered the landscape.

3.2.12 Folk 1991

CSH prepared an archaeological reconnaissance report (Folk 1991) for a 30.5-m (100-ft)-wide proposed drainage channel extending from north of the OR&L Right-of-Way (ROW) through the Kapolei Business/Industrial Park to the coast. The study (Folk 1991:3, 10) noted historic remains of former Camp Malakole, and solution sinks in the limestone bedrock corresponding to Rosendahl's (1988) designated Complex 1 with aluminum tag labels "52," "SH-53," and "54" just to the north of the drainage channel (Figure 24). Because of the possibility of disturbing dune deposits containing cultural layers at the *makai* end of the channel, archaeological subsurface testing was recommended to determine the presence or absence of cultural material and to make evaluations of significance (Folk 1991:14).

3.2.13 Folk and Hammatt 1992

In keeping with the recommendations of the Folk (1991) reconnaissance study, Hammatt and Folk (1992) carried out two hand-dug excavation units for the drainage channel project. These test units were placed on the north side of the channel (Unit 1) and north of the drainage channel (Unit 2) "because of the absence of the beach ridge in the southern part of the 45.7 m (150 ft) wide drainage corridor (Figure 25)."

Stratigraphy in Unit 1 was limited to a single layer of fine, well-sorted coralline sand with dark colored mottles and marbling extending from the surface to the reef-rock substrate and attributed to disturbance from modern pipe line trenching (Figure 26 through Figure 28) (Hammatt and Folk 1992:10). Unit 2 contained four basic strata (Figure 29 through Figure 32) described by Hammatt and Folk (1992) as follows:

> Stratum I: 0-75 centimeters depth. Pale brown fine sand with dark colored marbling, rusted metal, tin can fragments and other miscellaneous modern rubbish.
>
> Stratum IIA: 75-100 centimeters depth. Fine gray sand lenses from a few millimeters to 2 centimeters thick, interbedded with fine pale brown sand. No cultural material present.
>
> Stratum II: 100-120 centimeters depth. Fine dark gray sand with discontinuous very dark gray bands 1 to 2 centimeters thick. No cultural material present except for charcoal bits and a 5 centimeter thick black fire pit deposit. A Charcoal sample was collected.
>
> Stratum III: 120-170 centimeters depth. Fine pale brown sand. No cultural material present.

Stratum IV: Emerged reef-rock substrate. [Hammatt and Folk 1992:10]

A remnant cultural layer with only charcoal was identified (SIHP # 50-80-12-4526) outside the proposed drainage corridor and a charcoal sample was collected and dated, yielding a radiocarbon age calibrated to AD 1260 to 1405 (Hammatt and Folk 1992:10). The study concluded that

> Previous 20th century activities in the area of the proposed drainage channel include the building and use of Camp Malakole during the 1940s, and development of the existing drainage way at that time or later followed by the laying of a major pipeline parallel to the shore within the beach ridge. This has resulted in the destruction of any prehistoric cultural layers that may have existed in the proposed 150 foot wide drainage channel corridor as evidenced by excavation Unit 1. North, a minimum of 18.3 m. (60 ft) beyond the boundaries of the proposed drainage, remnants of former land use in ancient times do exist and have been radiocarbon dated to A.D. 1260 to 1405 from charcoal in an apparently isolated firepit.
>
> The proposed construction project will probably involve down-cutting and grading, but no archaeological sites or deposits along the beach ridge will be impacted as none are present within the drainage corridor. [Hammatt and Folk 1992:15]

3.2.14 McIntosh and Cleghorn 1999

McIntosh and Cleghorn (1999) carried out archival research for the Honouliuli wastewater treatment plant including a 19.3-km (12-mile) pipeline. They concluded the likelihood of encountering surface archaeological sites is low but “there is the possibility of encountering subsurface resources in the form of sinkholes containing cultural materials and possibly human burials” (McIntosh and Cleghorn 1999:i).

3.2.15 McDermott et al. 2006

CSH carried out an archaeological inventory survey (AIS) for the proposed 345-acre Kapolei Harborside Center project. Three previously identified historic properties (SIHP #s 50-80-12-6679 drainage channel, 50-80-12-2888 Barbers Point Harbor Archaeological District, and 50-80-12-9714 OR&L ROW) and three newly recorded historic properties (SIHP #s 50-80-12-6876 and 50-80-12-6877, pre-Contact stacked stone enclosures, and 50-80-12-6878 sinkhole features) were identified (McDermott et al. 2006).

3.2.16 Rasmussen and Tomonari-Tuggle 2006

The International Archaeological Research Institute, Inc. (IARII) (Rasmussen and Tomonari-Tuggle 2006) carried out archaeological monitoring for a Waiau fuel pipeline project extending from a Barbers Point Tank Farm in Campbell Industrial Park to the Waiau Generating Station east of Pearl City Peninsula. No historic properties nor any data were present near the current project area which appears not to have been monitored as it was not perceived as an area of archaeological sensitivity (Rasmussen and Tomonari-Tuggle 2006:4).

3.2.17 Hammatt et al. 2007

CSH carried out an archaeological literature review and field inspection for a proposed Chevron Refinery fencing project (Hammatt et al. 2007). The project area had been almost entirely, if not entirely, previously graded raised reef limestone hard pan. No surface historic properties were observed within or in the immediate vicinity of the project area. No intact sinkholes, sand dune deposits, or cultural material were observed within the project area (Hammatt et al. 2007).

3.2.18 Tulchin et al. 2007

In 2007, an archaeological literature review and field inspection (Tulchin and Hammatt 2007) was done of an approximately 790-acre parcel at Pālehua, Makakilo. The inspection covered portions of Makaīwa Gulch, Awanui Gulch, and Kalo‘i Gulch. The southeastern boundary of the study area is adjacent to Pālehua Road. Twenty-six archaeological sites were identified during the field inspection. Four archaeological sites were identified during previous archaeological studies. SIHP # 50-80-08-2316, consists of a *ku‘ula* stone documented by the Bishop Museum (Kelly 1959). SIHP # 50-80-12-2601, a pre-Contact wall utilized as a water control feature, and SIHP # 50-80-12-2602, a pre-Contact wall possibly utilized for agriculture, were originally documented by Bordner in 1977 (Bordner 1977). SIHP # 50-80-12-6680, a complex of concrete and iron structures associated with industrial rock quarry operations was identified by CSH in 2004 (Tulchin and Hammatt 2004).

Additional identified archaeological sites (designated with temporary CSH site #s) included CSH 1, wall; CSH 2, mounds; CSH 3, large enclosure; CSH 4, platform; CSH 5, mounds; CSH 6, adze; CSH 7, platform; CSH 8, terraces; CSH 9, enclosure and two small caves; CSH 10, enclosure; CSH 11, mound; CSH 12, platform; CSH 13, enclosure; CSH 14 terrace; CSH 15, wall remnant, hearth, and military “foxhole”; CSH 16, terrace and *hau* thicket; CSH 17, level soil along ridge; CSH 18, enclosure; CSH 19, trail; CSH 20, water tunnel; CSH 21, large boulder with petroglyphs; and CSH 22, enclosure with stone uprights. These potential historic properties were not assigned SIHP #s.

3.2.19 Groza et al. 2008

In 2008, CSH conducted a survey on two parcels for future industrial development and a film studio plus associated infrastructure. The project area was subjected to pedestrian survey, which entailed walking parallel transects at 10-m (30-ft) intervals. No historic properties were recorded as a result of this survey and no additional recommendations were made (Groza et al. 2008).

3.2.20 Groza and Hammatt 2010

CSH carried out archaeological monitoring for wastewater improvements at Kalaeloa City and County Beach Park (also known as Barbers Point Beach Park) southeast of the present study area. No subsurface deposits, cultural material or sinkholes were identified as a result of the project’s monitoring program (Groza and Hammatt 2010).

3.2.21 Condit and Allen 2011

IARII carried out archaeological monitoring at the request of Hawaiian Electric Company for the excavation for the equipment foundation and storm-water retention basin. No historic properties were observed (Condit and Allen 2011).

3.2.22 Titchenal et al. 2011

Titchenal et al. (2011) conducted an archaeological inventory assessment for the H-Power Expansion project. Several relatively small pit caves (<2.5 m in diameter) were identified and four were tested. All four pit caves contained paleontological avifauna and one contained medium mammal bone. The pit cave containing the medium mammal bone was deemed eligible for inclusion in the Hawai‘i Register of Historic Places and was designated SIHP # 50-80-12-7417.

3.2.23 Hammatt and Shideler 2012

CSH carried out an archaeological assessment (archaeological inventory survey with negative findings) for a proposed solar site project within the Chevron Refinery at Kalaeloa adjacent to the north of the present study area. That project area was observed to have been almost entirely, if not entirely, previously graded raised reef limestone hard pan. No surface historic properties were observed within or in the immediate vicinity of the project area. No intact sinkholes larger than 60 cm (23 inches) in diameter, sand dune deposits, or cultural material were observed within their project area and none were believed to be present (Hammatt and Shideler 2012).

3.2.24 Runyon et al. 2012

CSH carried out an archaeological assessment (archaeological inventory survey with negative findings) for a Chevron solar energy site at James Campbell Industrial Park 500 m (1,640 ft) east of the Kalaeloa (Barbers Point) Lighthouse. No historic properties were observed. It was concluded that due to extensive prior grading and the development and modern commercial use of the project area, it was unlikely undisturbed subsurface deposits will be affected by the proposed development (Runyon et al. 2012).

3.2.25 McElroy et al. 2015

Keala Pono Archaeological Consulting carried out an AIS for the Department of Transportation Harbors Division (DOT-H) development of a fuel pier at Kalaeloa Barbers Point Harbor, to include new facilities at the pier. No historic properties were observed (McElroy et al. 2015).

3.2.26 Medina and Hammatt 2015

CSH carried out an archaeological monitoring program for the Hanua Street Containment Cap and Barrier project, within the James Campbell Industrial Park. Archaeological monitoring identified SIHP # 50-80-02-7402, a pre-Contact buried cultural layer with six associated pit features of various functions and containing shell midden, fire-cracked rock (FCR), charcoal, fish and faunal bone, and volcanic glass. No human remains were encountered during the project (Medina and Hammatt 2015).

3.2.27 DeMaio Starr et al. 2016

CSH prepared an AIS report (DeMaio Starr et al. 2016) for the Western Kapolei Regional Drainage System project (TMKs: [1] 9-1-014:002 [por.], 9-1-074:036, and 040 [por.]). This project was located approximately 105 m (346.5 ft) south of the intersection of Malakole Street (HI-95) and Kaiholo Street, and approximately 1.6 km (1.0 miles) west of the intersection of Malakole Street and Kalaeloa Boulevard. Three previously unrecorded historic properties and two previously recorded historic properties were documented as a result of this survey. Four historic properties were identified within or directly adjacent to the DeMaio Starr et al. (2016) study area, including SIHP # 50-80-12-2888, the Barbers Point Archaeological District, SIHP # 50-80-12-4526, buried A horizon and cultural deposit layer, SIHP # 50-80-12-7672, a post-Contact historic fence and corral system, and SIHP # 50-80-12-7673, sewage septic treatment system structure associated with the former Army Installation of Camp Malakole.

3.2.28 Stark et al. 2016

CSH carried out an AIS for the Kapolei Business Park Wastewater Pump Station project. One new historic property, SIHP # 50-80-12-7763, is identified within the project area. SIHP # -7763 is a drainage culvert and wall feature built in 1961, which includes a wall dressing two drainage culvert openings in the southwest corner of the project area (Stark et al. 2016).

3.2.29 Belluomini et al. 2017

CSH carried out an AIS for the Kapolei Corporation Yard. One historic property was identified (SIHP # 50-80-12-6866) consisting of two “Panama Mount” 155-mm gun emplacements and an associated cement slab. SIHP # 50-80-12-7385 identifies 68 pit caves that were documented but no cultural materials and no deliberate modifications (such as a wall segment or cairn) were positively identified at any pit cave (Belluomini et al. 2017).

3.3 Background Summary and Predictive Model

The one general observation regarding the archaeology of the ‘Ewa Plain is that there was more pre-Contact utilization of the area than may be expected given its present day uninviting ambiance and “marginal ecology” (Sinoto 1976:71). Given that the project area is not only on the coast but adjacent to a prominent point of land, pre-Contact use was likely significant.

Prior to extensive historic and modern land alteration, this area of Honouliuli would be expected to yield the remnants of traditional Hawaiian temporary habitations used during forays for marine resources and/or evidence of opportunistic seasonal agriculture and possibly burials. Based on ethnographic accounts and past archaeological investigations in the vicinity, limestone sinkholes on the ‘Ewa Plain were used for agriculture and burial interment, with the largest overhangs used for temporary shelter. With the spread of western land use in the nineteenth century, the project area may have been used for ranching. Following statehood in 1959, construction began on the former Chevron oil refinery. Extensive land disturbance related to the refinery construction would have destroyed or buried portions of the project area’s traditional Hawaiian archaeological record, including surface features and sinkholes. Some sinkholes at Barbers Point have been shown to be a storehouse of data on more than a score of previously unknown, extinct, bird species.

Section 4 Results of Field Inspection

The field inspection consisted of a complete pedestrian inspection of the project area. As previously discussed, the project area for the current study consists of an approximately 3-acre (1.2-hectare) rectangle measuring 150 m by 80 m in the *makai* portion of the IES Kapolei refinery property (see Figure 8).

The project area was observed to have been almost entirely, if not entirely, previously graded raised reef limestone hard pan (Figure 23 through Figure 26). Generally, the project area is covered with a thin (< 10 cm thick) layer of coral silt and gravel. Occasional coral outcrops were observed which appeared to have been graded flat. No vegetation was observed within the project area.

The current acid plant facility is still extant in the project area (see Figure 23 through Figure 26). A drainage channel (Figure 27) related to the Acid Plant facility was observed within the project area. A section of eight concrete culverts associated with the drainage channel with the purpose of directing the water under roadway were also observed just outside the project area (Figure 28), and a concrete block with a steel top embankment was also present and likely associated with a former pathway over channel (see Figure 28 and Figure 29).

No evidence of traditional Hawaiian occupation or potential historic properties were observed during the field inspection. All structures and infrastructure present within the project area appears to be associated with the Kapolei Refinery (formerly the Chevron oil refinery).

Figure 23. West side project area showing the graded ground surface, view to south

Figure 24. North corner of the project area showing the graded ground surface, view to south

Figure 25. East corner of the project area showing the graded ground surface, view to southwest

Figure 26. South corner of the project area showing the graded ground surface, view to northwest

Figure 27. Drainage channel along southeast edge of project area, view to southwest

Figure 28. Concrete culvert and concrete embankment at south corner of project area, view to west

Figure 29. Concrete embankment near culvert in south corner of project area, view to northwest

Section 5 Summary and Recommendations

To the best of our knowledge no sites have been formally reported in the immediate vicinity of the Acid Plant project area. Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road (Kikuchi 1959; Davis 1990a:146–147). Specific location data is not available but if this find was close to the big bend in Malakole Road, it would have been within 400 m of the northeast end of the present project area. Artifacts were recovered by Roger Green in 1969 from a beach midden site (B6-14), south of the barge harbor but the exact location is uncertain.

Two archaeological studies were conducted for a proposed drainage channel to the north of the current project area, including an archaeological reconnaissance (Folk 1991) and subsequent subsurface testing of a beach berm along the coast (Hammatt and Folk 1992). The archaeological reconnaissance study resulted in the identification of a homestead (*kuleana*) lot with undisturbed sinkhole features at the northern end of the proposed drainage channel; sinkholes and remnants of the Camp Malakole Military Reservation between the Barbers Point Harbor and the IES Kapolei Refinery; and a beach berm/sand dune along the coast. Following that reconnaissance study, subsurface testing was conducted within the beach berm at locations 500 m and 760 m north of the current project area (Hammatt and Folk 1992). The authors indicated testing was not conducted further south because of the absence of the beach berm due to prior grading. Subsurface testing indicated the berm had been previously disturbed by the installation of an oil pipeline related to the adjacent IES Kapolei Refinery. A remnant cultural layer (SIHP # 50-80-12-4526) with charcoal deposits was identified in the northern portion of their study area.

During the present fieldwork, particular attention was given to consideration of whether the historic properties identified north of the northwest corner of the IES Kapolei Refinery in the Folk (1991) and Hammatt and Folk (1992) studies were likely to extend into the present project area. There appears to be a significant change in landform with the coastal dunes in which cultural resources were documented not extending as far south as the IES Kapolei Refinery. No soft sediments were observed within the present project area. Based on the results of the field inspection, no sand dune deposits are believed to be present in the present project area.

The project area is almost entirely, if not entirely, previously graded raised reef limestone hard pan. The potential for pit caves (popularly called “sink holes”), which could possibly include burials and or other cultural deposits, was evaluated. Because of previous grading, no undisturbed pit caves were observed in the project corridor.

Recommendations

Based on the extensive grading in the project area and no historic properties observed, no further archaeological work is recommended. However, as a general precaution, the project plans should include provisions stating that “In the event that sand deposits and/or historic resources, including structural remains, subsurface cultural deposits, pit caves (sinkholes) with openings greater than 1 m in diameter, or human skeletal remains, are identified during the construction project, cease all work in the immediate vicinity of the find, protect the find, protect the find from additional disturbance, and promptly notify SHPD at (808) 692-8015.”

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Appendix B
Cultural Assessment Report

Draft
Cultural Assessment for the Proposed Island Energy Services Kapolei Refinery Acid Plant Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu TMK: [1] 9-1-014:010 por.

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Management Summary

Reference	Cultural Assessment for the Proposed Island Energy Services Kapolei Refinery Acid Plant Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: [1] 9-1-014:010 por. (Beauchan et al. 2017)
Date	October 2017
Project Number	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: HONOULIULI 134
Agencies	City and County of Honolulu, Department of Planning and Permitting (DPP)
Land Jurisdiction	Private; Island Energy Services
Project Proponent	Private; Island Energy Services
Project Location	The Island Energy Services Kapolei Refinery property is located in coastal Kalaeloa, within the James Campbell Industrial Park. The project area, which encompasses the footprint of the existing acid plant, consists of an approximately 150 m (492 feet [ft]) long by 80 m (262 ft) wide rectangle within the west, *makai* (toward the sea) portion of the Island Energy Services Kapolei Refinery property. The project area is depicted on a portion of the 1998 Ewa USGS topographic quadrangle.
Project Description	The proposed project involves installation of a new SO2 scrubbing system and replacement of the existing karbate gas coolers. All construction activities and staging would occur within the footprint of the existing acid plant. These components of the proposed project are further described below. The SO2 scrubbing system would function to remove sulfur dioxide (SO2) from the acid plant tail gas as needed to meet current industry best control practices for sulfuric acid plants. The system would consist of a scrubbing tower and an acidulation tower. The scrubbing tower would include a vertical tower (approximately 4 ft in diameter and 53 ft tall) with a stack (approximately 24 inches in diameter and 4 ft tall), and would be encased within a 59-ft-tall steel support structure. The acidulation tower would also be a vertical tower (approximately 33 ft tall), and would be attached to the exterior of the steel support structure. The system would include five associated pumps (at ground level) and a stripper air fan. The total extent of ground disturbance associated with installation of the SO2 scrubbing system is approximately 1,225 ft, with a maximum excavation depth of 3 ft for the support structure foundation. The existing karbate gas coolers would be replaced with two new compact plate and frame heat exchangers (each approximately 4 ft long by 2 ft wide, with a height of approximately 6 ft). In addition, ceramic packing would be added to the existing humidification tower, two acid

	recirculating pumps would be replaced with higher capacity pumps, and piping modifications would be made to tie in the new heat exchangers to the humidification tower and recirculating pumps. The existing karbate coolers would be blinded and left in place for the near term, and possibly removed over the long term. Replacement of the gas coolers is not expected to involve any excavation; all work would occur on the existing paved surface within the acid plant.
Project Acreage	The project area comprises approximately 3 acres (1.2 hectares).
Document Purpose	The proposed project is located within the Special Management Area (SMA), and pursuant to the Revised Ordinances of Honolulu (ROH) §25-3.3, projects that require an SMA Use Permit shall be subject to an environmental assessment in accordance with the procedural steps set forth in Hawaii Revised Statutes (HRS) §343. This cultural assessment was prepared to comply with these requirements, which specify evaluation of a proposed project's potential effect on cultural beliefs, practices, and resources. Through document research, this report provides information compiled to date pertinent to the assessment of the proposed project's potential impacts to cultural beliefs, practices, and resources (pursuant to the Office of Environmental Quality Control's *Guidelines for Assessing Cultural Impacts*) which may include traditional cultural properties (TCPs). These TCPs may be significant historic properties under State of Hawai‘i significance Criterion e, pursuant to Hawai‘i Administrative Rules (HAR) §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that "have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity" (HAR §13-275-6 and §13-284-6). The document will likely also support the project's historic preservation review under HRS §6E and HAR §13-275 and §13-284.The document is also intended to support the project's environmental review.
Results of Background Research	Background research for this study yielded the following results, in approximate chronological order: 1. The ‘Ewa plains, south of the Wai‘anae mountain range consist largely of limestone and alluvial deposits pockmarked with karsts formed by the dissolution of limestone by underground fresh water. The project area in pre-Contact Hawai‘i would have consisted of lowland dry shrub and grasslands. 2. Honouliuli is the largest *ahupua‘a* (land division usually extending from the uplands to the sea) in the *moku* (district) of ‘Ewa. One translation of the name for this district is given as

	“unequal” (Saturday Press, 11 August 1883). Others translate the word as “strayed” and associate it with the legends of the gods Kāne and Kanaloa. 3. Generally, Honouliuli was described as very hot and dry. Evidence for drought-like conditions are further supported by the relative lack of traditional rain names associated with Honouliuli Ahupua‘a. The Nāulu rain is the only known associated rain name for Honouliuli. Due to the lack of rainwater, freshwater resources were accessed via a karstic system. 4. In traditional Hawaiian times, the areas of exposed coral (Pleistocene limestone) outcrop were undoubtedly more extensive. According to McAllister (1933), holes and pits in the coral were generally accessed for water, while larger pits, often containing soil, were used for cultivation. McAllister additionally remarked that even “today” (McAllister began his survey work in 1930, and thus his comments are a reflection of the Honouliuli environment during the early twentieth century), *mai‘a* (banana; *Musaceae*) and *kō* (sugarcane; *Saccharum officinarum*) were being cultivated within the pit caves (sink holes) (McAllister 1933:109). 5. The traditional *ka‘ao* (legends) associated with the area speak of the *akua* (godly) brothers, Kāne and Kanaloa. It was their supernatural feat of hurling *pōhaku* (stone) across the island that determined the boundaries of land divisions (Sterling and Summers 1987:1). Additional *mo‘olelo* (stories) speak of Hi‘iaka and her travels across the plains of ‘Ewa. In particular, the *wahi pana* (storied place) of Kaupe‘a (located northeast of the current project area) is described. Kamakau describes Kaupe‘a as a wide plain where a grove of *wiliwili* (*Erythrina sandwicensis*) stands (Kamakau 1991:47). This plain is an *ao kuewa*, a realm belonging to homeless souls. In general, the *kama‘āina* (native born) of both Honouliuli Ahupua‘a and ‘Ewa District made a point to avoid this place. 6. Pu‘uokapolei is a prominent hill located on the ‘Ewa coastal plain that was the primary landmark for travelers on the trail running from Pearl Harbor to Wai‘anae. A *heiau* (temple) was once on the summit of the hill, however, by the time of McAllister’s survey of O‘ahu it had been destroyed (McAllister 1933:108). The hill was also used as a point of solar reference or as a place for celestial observations of the winter and summer solstice. A ceremony at a *heiau* on Pu‘uokapolei provides a vantage point to capture the sun setting directly behind Pu‘ulailai, a peak farther west in the Wai‘anae range. A

	coinciding ceremony at Kūpalaha Heiau in Waikīkī captures the same essence as the sun sets behind Pu‘uokapolei. 7. Additional *heiau* located within Honouliuli included Pu‘u Ku‘ua located at Palikea, in addition to two unidentified *heiau*. These two unidentified *heiau* are located at the foot of Pu‘u Kanehoa and Pu‘u Kuina, respectively. 8. John Papa ‘Ī‘ī describes a network of Leeward O‘ahu trails, which in later historic times encircled and crossed the Wai‘anae Range, allowing passage from West Loch to the Honouliuli lowlands, past Pu‘uokapolei and Waimānalo Gulch to the Wai‘anae coast and onward, circumscribing the shoreline of O‘ahu (‘Ī‘ī 1959:96–98). 9. The rich resources of Pu‘uloa—the fisheries in the lochs, the shoreline fishponds, the numerous springs, and the irrigated lands along the streams—made ‘Ewa a prize for competing chiefs. ‘Ewa Moku was also a political center and home to many chiefs in its day. Oral accounts of *ali‘i* (royalty) recorded by Hawaiian historian Samuel Kamakau date back to at least the twelfth century. *Ali‘i* associated with Honouliuli and greater ‘Ewa Moku included Kākuhihewa, Keaunui, Lakona, Mā‘ilikūkahi, and Kahahana. 10. Early foreign accounts describe the southwest coast of O‘ahu, including Honouliuli Ahupua‘a, as an area “a little distance from the sea, [where] the soil is rich and all the necessaries of life are abundantly produced” (Vancouver 1798 in Sterling and Summers 1978:36). A sailor among Vancouver’s crew observed, however, that “from the number of houses within the harbor it should seem to be very populous; but the very few inhabitants who made their appearance were an indication of the contrary” (Vancouver 1798 in Sterling and Summers 1978:36). 11. The first western ship recorded as wrecking in the Hawaiian Islands was the brig *Arthur* under the command of Captain Henry Barber that ran aground at Kalaeloa Point on the southwest corner of O‘ahu at 8:00 p.m. on 31 October 1796. The traditional name of Kaleloa was changed to Barber’s Point, and in 1968 the apostrophe was officially deleted from the name by the U.S. Board of Geographic Names (Dean 1991:17). The propensity for shipwrecks off the Honouliuli coast eventually led to the construction of a lighthouse at Barbers Point in 1888. However, shipwrecks continued to occur well into the early twentieth century. To respond to navigational concerns, a 72-ft-high tower was constructed; this Barbers Point lighthouse is located approximately 1.3 km (0.8 miles) southeast of the current project area.

	12. Following the Māhele of 1848, 99 individual land claims in the *ahupua‘a* of Honouliuli were registered and awarded by King Kamehameha III. The project area appears to have been included in the largest award (Royal Patent 6071, LCA 11216, *‘Āpana* [lot] 8) granted in Honouliuli Ahupua‘a to Miriam Ke‘ahikuni Kekau‘ōnohi on January 1848 (Native Register). Kekau‘ōnohi acquired a deed to all unclaimed land within the *ahupua‘a*, totaling 17,503 ha (43,250 acres). 13. With the increasing foreign interests on O‘ahu Island during the last half of the nineteenth century, an array of agricultural enterprises were attempted. In 1877, James Campbell purchased most of Honouliuli Ahupua‘a—including the current project area—for a total of $95,000. 14. By 1889, the Ewa Plantation Company was established and lands throughout Honouliuli were designated for sugarcane cultivation. Sugar production exploded with the successful drilling of an artesian well by James Campbell on the ‘Ewa Plain. Campbell’s first well was named Waianiani (“crystal waters”) by the *kama‘āina* of Honouliuli (Nellist 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho‘okuleana 2014). 15. The early twentieth century saw the lands of Honouliuli heavily utilized by both civilians and the U.S. military for transportation. The nearby Barbers Point Military Reservation was established in 1921. 16. Following World War II, the Honouliuli and Kalaeloa areas were largely devoid of industrial development. In around 1959-1960, the oil refinery and acid plant was constructed. Industrial development continued in earnest and following Statehood, the James Campbell Industrial Park area was expanded.
Impacts and Recommendations	Based on the information gathered from the cultural and historic background detailed in this cultural component report, the proposed project should not have any impacts to cultural resources. Although highly unlikely, in the event that any cultural resources are encountered during construction, we recommend the following: 1. Should burials, subsurface cultural deposits, or pit caves (sinkholes) with openings greater than 1 m in diameter be encountered during ground disturbance or via construction activities, all work should cease immediately and the appropriate agencies should be notified pursuant to applicable law, HRS §6E. 2. In the event that *iwi kūpuna* (ancestors) are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the State Historic Preservation Division (SHPD) and

	Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. 3. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and/or preservation plan.

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Section 1 Introduction

1.1 Project Background

At the request of CH2MHill, Cultural Surveys Hawai‘i, Inc. (CSH) completed this cultural assessment for the proposed Island Energy Services (IES) Kapolei Refinery Acid Plant project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu (TMK: [1] 9-1-014:010 por.). The IES Kapolei Refinery property is located in coastal Kalaeloa, within the James Campbell Industrial Park. The 3-acre (1.2 hectare) project area, which encompasses the footprint of the existing acid plant, consists of an approximately 150-m (492-feet [ft])-long by 80-m (262-ft)-wide rectangle within the west, *makai* (toward the sea) portion of the Island Energy Services Kapolei Refinery property. The project area is depicted on a portion of the 1998 Ewa U.S. Geological Survey (USGS) topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2013 aerial photograph (Figure 3).

The lands within the project area are privately owned by IES. The proposed project involves installation of a new SO2 scrubbing system and replacement of the existing karbate gas coolers (Figure 4 through Figure 6). All construction activities and staging would occur within the footprint of the existing acid plant. These components of the proposed project are further described below.

The SO2 scrubbing system would function to remove sulfur dioxide (SO2) from the acid plant tail gas as needed to meet current industry best control practices for sulfuric acid plants. The system would consist of a scrubbing tower and an acidulation tower. The scrubbing tower would include a vertical tower (approximately 4 ft in diameter and 53 ft tall) with a stack (approximately 24 inches in diameter and 4 ft tall), and would be encased within a 59-ft-tall steel support structure. The acidulation tower would also be a vertical tower (approximately 33 ft tall), and would be attached to the exterior of the steel support structure. The system would include five associated pumps (at ground level) and a stripper air fan.

The total extent of ground disturbance associated with installation of the SO2 scrubbing system is approximately 1,225 ft, with a maximum excavation depth of 3 ft for the support structure foundation.

The existing karbate gas coolers would be replaced with two new compact plate and frame heat exchangers (each approximately 4 ft long by 2 ft wide, with a height of approximately 6 ft). In addition, ceramic packing would be added to the existing humidification tower, two acid recirculating pumps would be replaced with higher capacity pumps, and piping modifications would be made to tie in the new heat exchangers to the humidification tower and recirculating pumps. The existing karbate coolers would be blinded and left in place for the near term, and possibly removed over the long term.

Replacement of the gas coolers is not expected to involve any excavation; all work would occur on the existing paved surface within the acid plant.

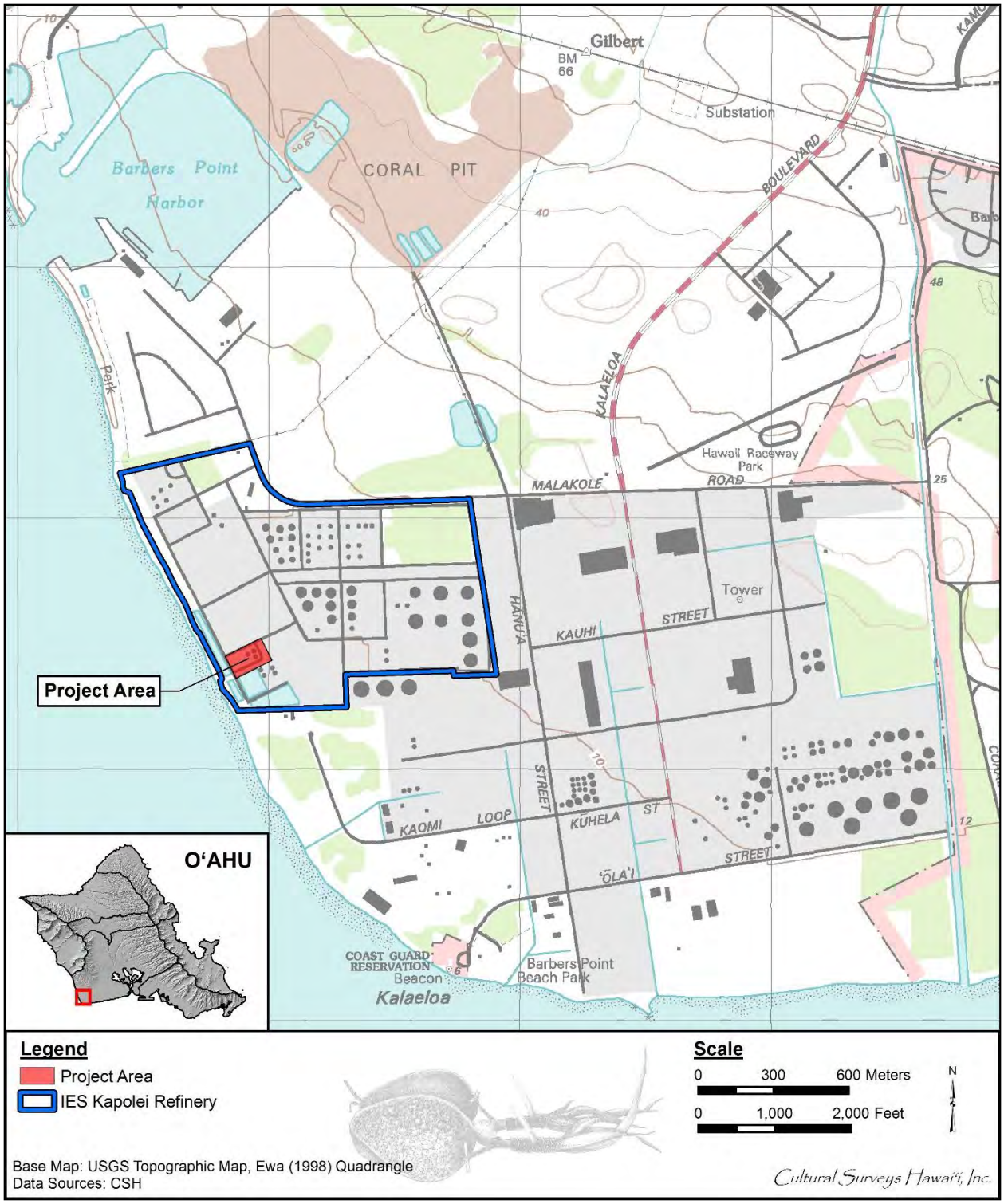

Figure 1. Portion of a 1998 Ewa USGS topographic quadrangle showing the location of the project area within the IES Kapolei Refinery

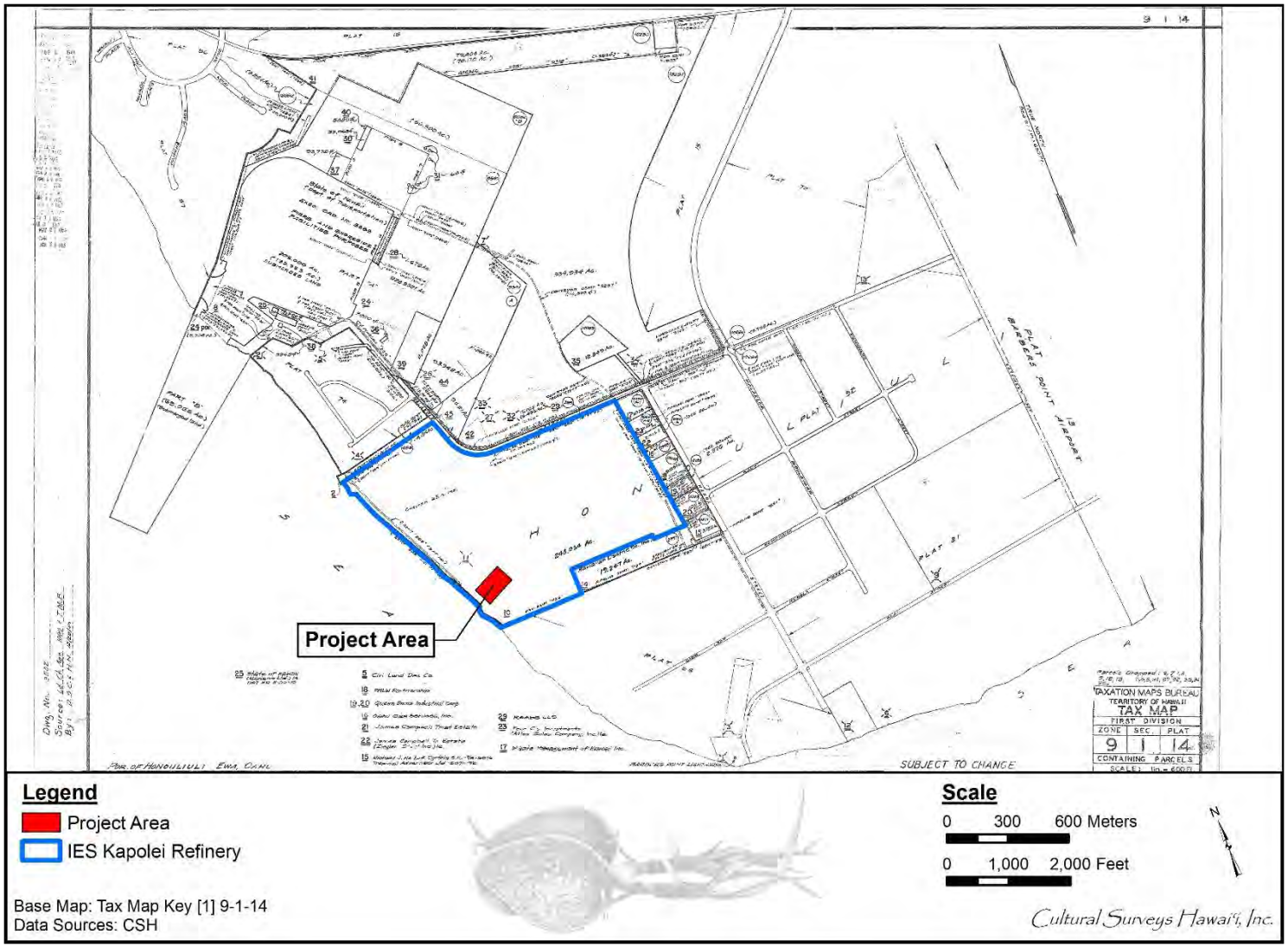

Figure 2. Tax Map Key (TMK) [1] 9-1-014, showing the location of the project area within the IES Kapolei Refinery (Hawai‘i TMK Service 2014)

Figure 3. 2013 Google Earth aerial photograph showing the location of the project area

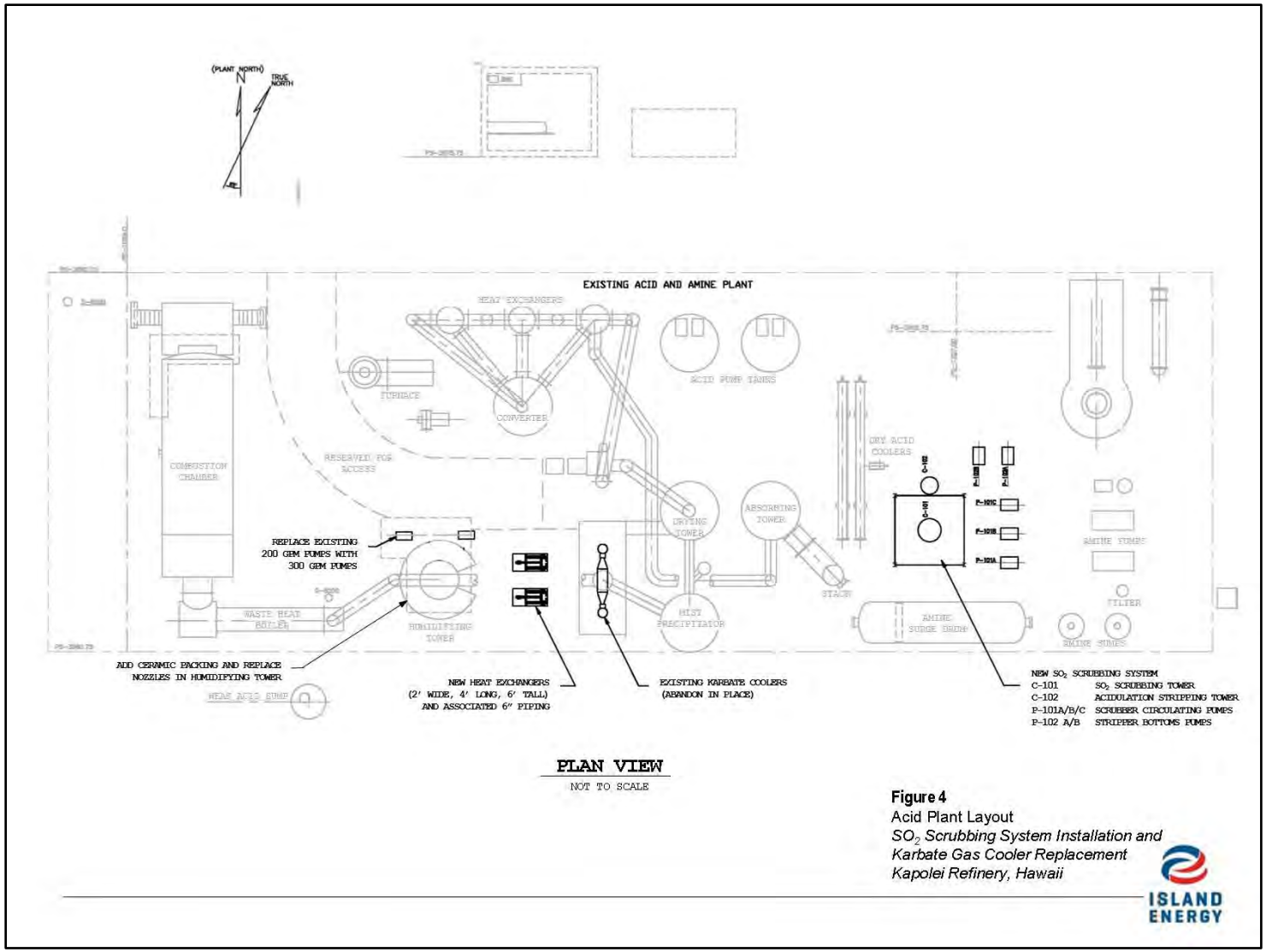

Figure 4. Acid plant layout within the existing acid plant area (courtesy of client)

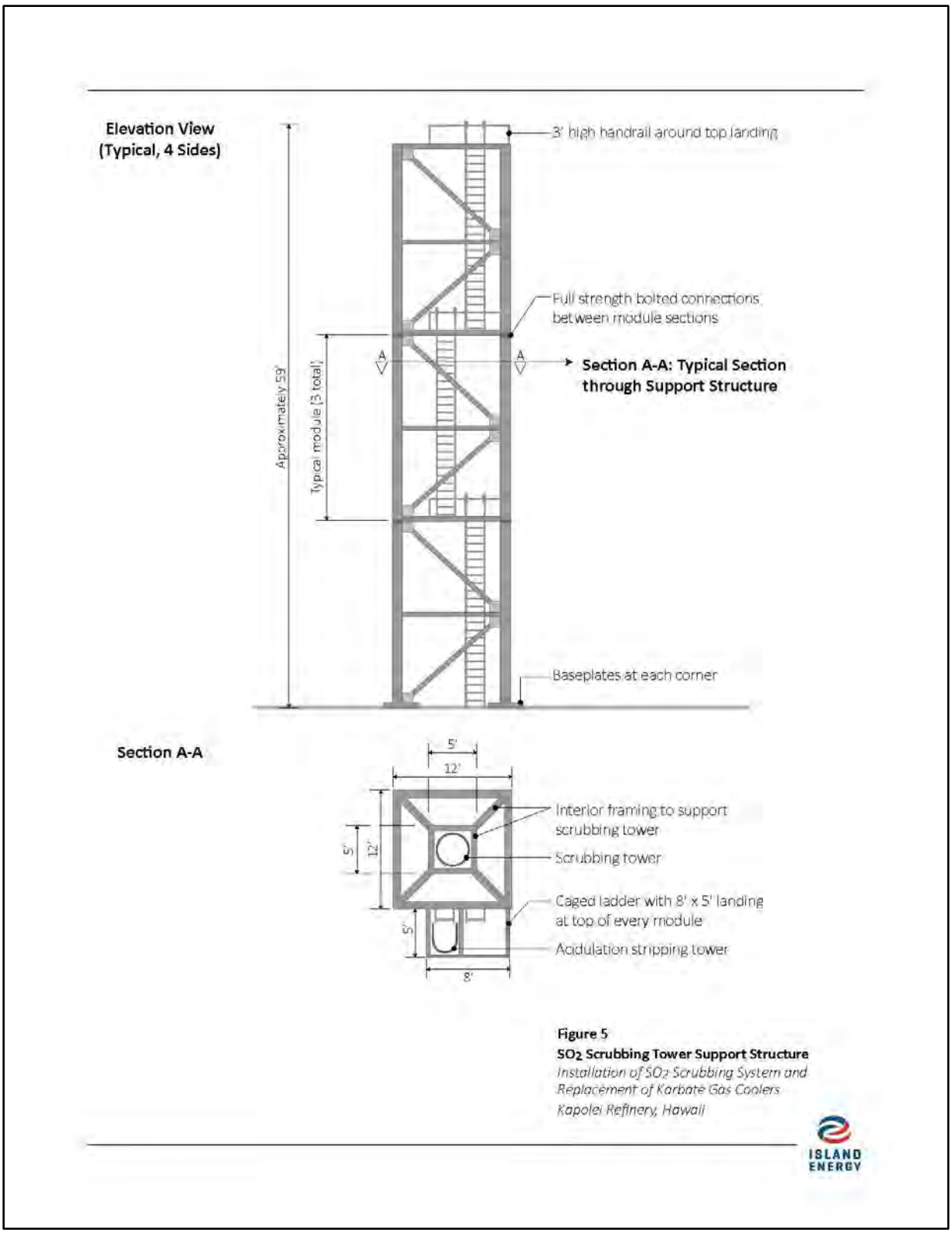

Figure 5. SO2 scubber tower support structure elevation view (courtesy of client)

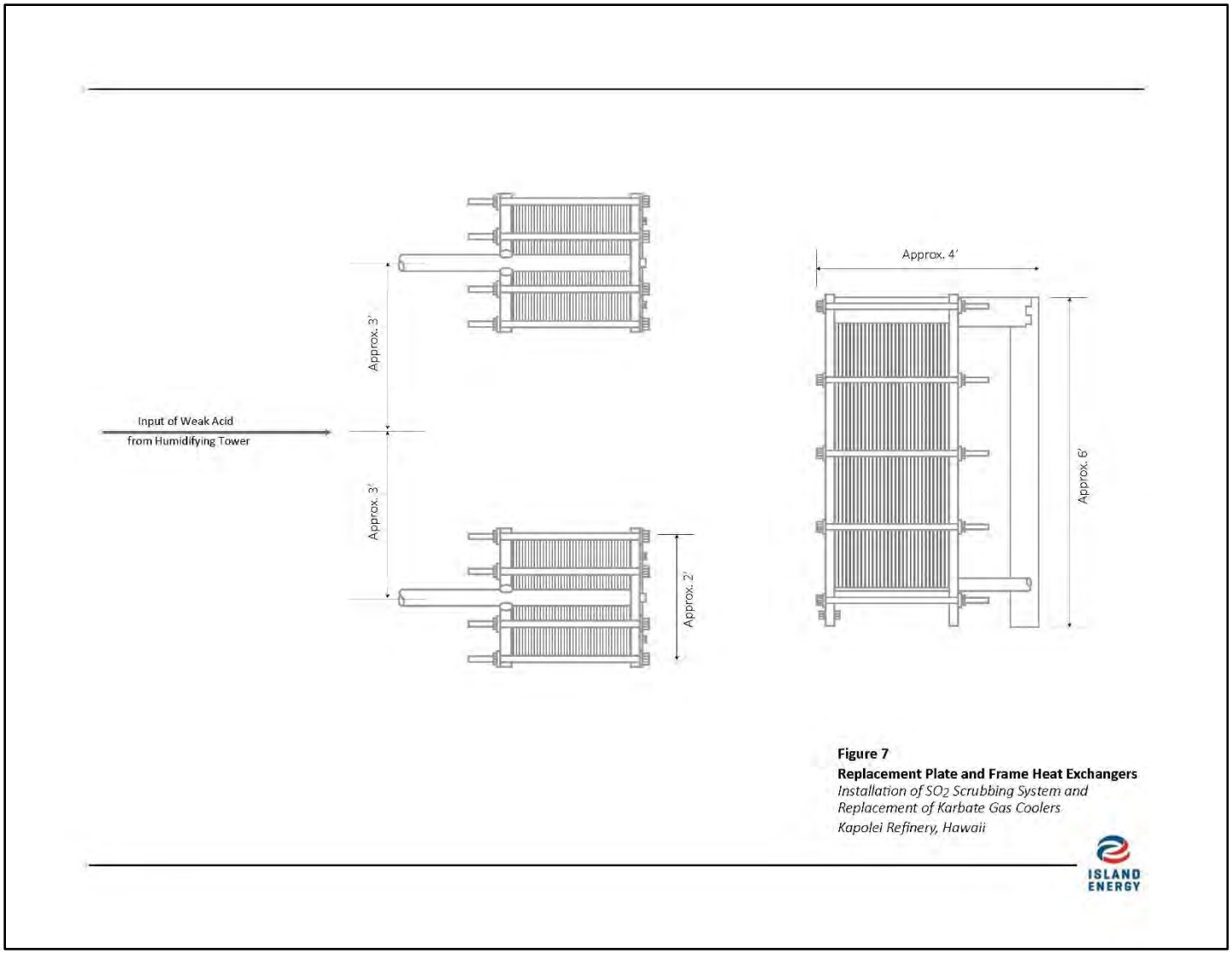

Figure 6. Heat exchangers for karbate gas cooling system design (courtesy of client)

1.2 Document Purpose

The proposed project is located within the Special Management Area (SMA), and pursuant to the Revised Ordinances of Honolulu (ROH) §25-3.3, projects that require an SMA Use Permit shall be subject to an environmental assessment in accordance with the procedural steps set forth in Hawaii Revised Statutes (HRS) §343. This cultural assessment was prepared to comply with these requirements, which specify evaluation of a proposed project's potential effect on cultural beliefs, practices, and resources. Through document research, this report provides information compiled to date pertinent to the assessment of the proposed project's potential impacts to cultural beliefs, practices, and resources (pursuant to the Office of Environmental Quality Control's *Guidelines for Assessing Cultural Impacts*) which may include traditional cultural properties (TCPs). These TCPs may be significant historic properties under State of Hawai‘i significance Criterion e, pursuant to Hawai‘i Administrative Rules (HAR) §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that "have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or till carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity" (HAR §13-275-6 and §13-284-6). The document will likely also support the project's historic preservation review under HRS §6E and HAR §13-275 and §13-284.The document is also intended to support the project's environmental review.

1.3 Scope of Work

The scope of work for this cultural component includes the following:

1. Examination of cultural and historical resources including Land Commission documents, historic maps, and previous research reports for the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal, and other resources or agricultural pursuits as may be indicated in the historic record.
2. Review of previous archaeological work within and near the subject parcel that may be relevant to reconstructing traditional land use activities; and to the identification and description of cultural resources, practices, and beliefs associated with the parcel.
3. Preparation of a report that summarizes the results of these research activities and provides recommendations based on findings.

1.4 Environmental Setting

1.4.1 *Ka Lepo* (Soils)

Observations of less disturbed lands adjacent to the project area indicated the *makai* portion of the project area likely consisted of exposed limestone outcrop partially overlain with beach sand deposits. However, the beach sand and the surface of the coral shelf appear to have been graded and pushed *makai*, creating an approximately 2-m-high berm along the *makai* property line (west or outside the project area) consisting primarily of boulders and construction rubble.

The surface of the project area is approximately 1.0 m above mean sea level. According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and

soil survey data gathered by Foote et al. (1972), the project area is within Coral Outcrop (Figure 7). Coral Outcrop is described as follows:

> Coral outcrop (CR) consist of coral or cemented calcareous sand on the island of Oahu. The coral reefs formed in shallow ocean water during the time the ocean stand was a higher level. Small areas of coral outcrop are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. Elevations range from sea level to approximately 100 feet. The annual rainfall amounts t o18 to 40 inches. Coral outcrop is geographically associated with Jaucus Keaau, and Mokuleia soils.
>
> Coral outcrop makes up about 80 to 90 percent of the acreage. The remaining 10 to 20 percent consists of a thin layer of friable, red soil material in cracks, crevices, and depressions within the coral outcrop. This soil material is similar to that of the Mamala series.
>
> This land type is used for military installations, quarries, and urban development. Vegetation is sparse. It consists of Kiawe, koa, haole, and fingergrass. [Foote et al. 1972:29]

The surface of the Pleistocene limestone outcrop, where not covered by alluvium or stockpiled material, has characteristic dissolution “pit caves” (Mylroie and Carew 1995), which are nearly universally, but erroneously, referred to as “sink holes” (Halliday 2005). These pit caves, or sinkholes, vary widely in areal extent and depth, with some of the more modest features comparable in volume to 5-gallon buckets, while some of the larger features, although usually irregularly shaped, are several meters wide and several meters deep.

Lying in the lee of the Wai‘anae mountain range, the project area is one of the driest areas of O‘ahu with most of the area averaging about 547.2 mm (21.5 inches) of rainfall annually (Giambelluca et al. 2013). The annual average temperature in the project area is 23.8 ˚C (74.8 ˚F) (Giambelluca et al. 2014). No natural streams are located in the vicinity of the project area. The Pacific Ocean is approximately 70 m (230 ft) southwest of the project area.

In pre-Contact Hawai‘i, the vicinity of the project area would have been mostly lowland coastal dry shrub and grassland. However, this area has been extensively disturbed and transformed by human activity, with most of the land dominated by a variety of exotic grasses, weeds, and shrubs or graded and grubbed bare. These grasses and shrubs, along with pockets of *kiawe* (*Prosopis pallida*), castor bean (*Ricinus communis*), *kolū* (*Acacia farnesiana*), *koa haole* (*Leucaena leucocephala*), and a few scattered ficus (*Ficus* spp.) trees are characteristic of the vegetation of the project vicinity. Native Hawaiian plants observed near the project area included *‘ākulikuli* (*Sesuvium portulacastrum*) and *milo* (*Thespesia populnea*). The project area is almost completely barren of vegetation and ground visibility is excellent.

1.4.2 *Ka Makani* (Winds)

Makani is the general Hawaiian term for the wind. A‘e Loa is another of the Hawaiian names given to the prevailing northeasterly trade winds (Nakuina 1992:138) along with A‘e (Pukui and Elbert 1986:3), Moa‘e, and Moa‘e Lehua (Pukui and Elbert 1986:249). In the traditional story *The Wind Gourd of La‘amaomao*, Pāka‘a and his son Kuāpāka‘a are descendants of the wind goddess

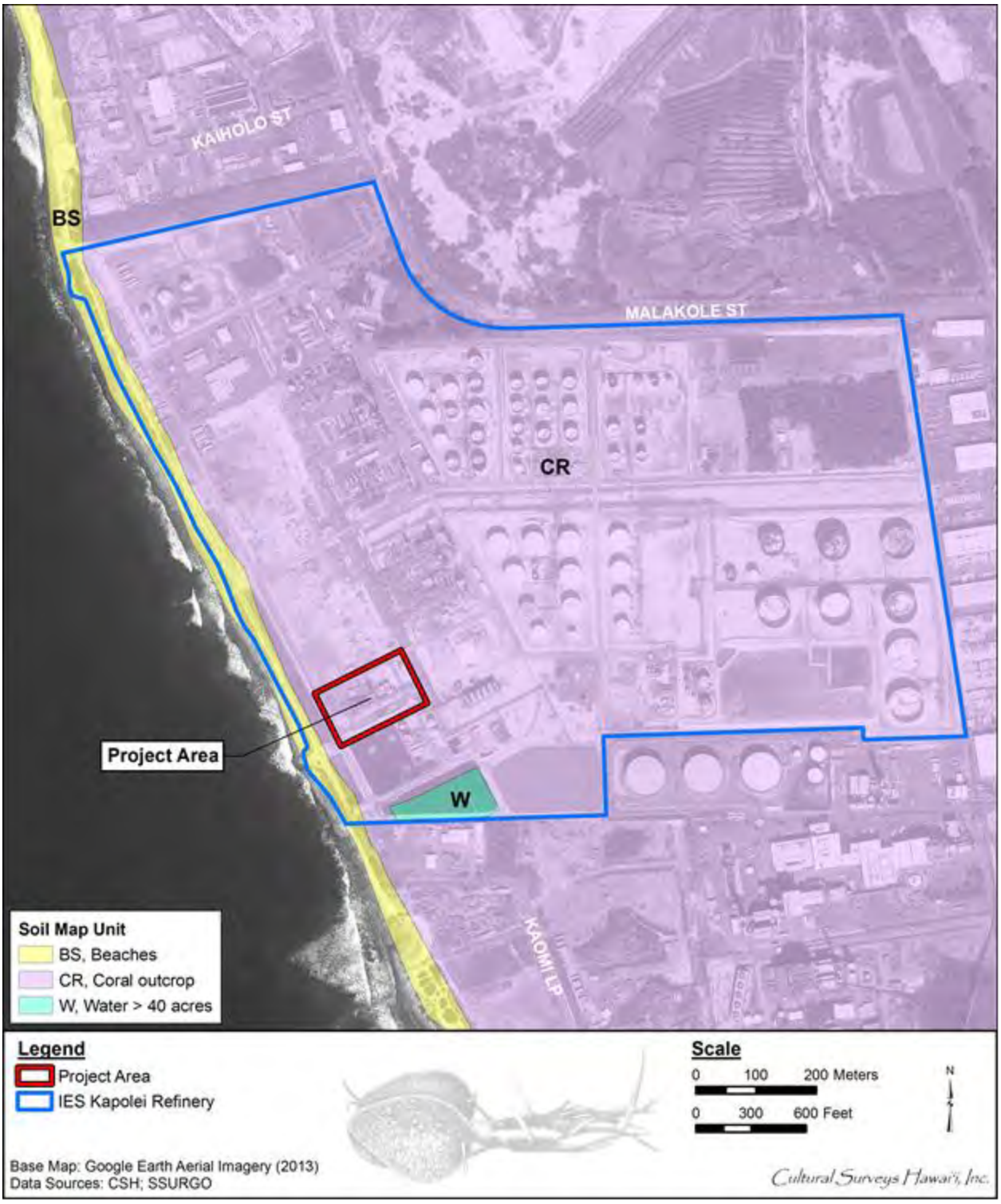

Figure 7. 2013 Google Earth aerial photograph with overlay of USDA *Soil Survey of the State of Hawaii* (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and in the vicinity of the project area

La‘amaomao whose traditional home was in a wooden *calabash* (bowl), a gourd that also contained all of the sacred winds of Hawai‘i. La‘amaomao controlled and called forth the winds by chanting their names (Nakuina 1990). Pāka‘a’s chant traces the winds from the *moku* (district) of ‘Ewa. The winds of the Kapolei region are poetically recalled as follows:

> Moa‘e-kū is of ‘Ewaloa
>
> Kēhau is of Waiopua
>
> Waikōloa is of Līhu‘e
>
> Kona is of Pu‘uokapolei.
>
> [Nakuina 1990:51]

In *The Epic Tale of Hi‘iakaikapoliopele*, Hi‘iaka, upon reaching Pōhākea (“white stone”), a boundary point between ‘Ewa and Wai‘anae Moku, gazes toward Hawai‘i Island; standing upon this lofty point she watches as her beloved friend Hōpoe is killed by the embers of her sister Pele. She chants atop of Pōhākea and tells of the winds of Waikōloa and Wai‘ōpua.

Aloha ku‘u hoa i ka pū‘ali lā	Alas my friend of the rugged mountain pass
A luna i Pōhākea, he luna o Kamaoha	On high at Pōhākea, above Kamaoha
He lae ‘ino ‘o Maunauna	Maunauna is a dangerous escarpment
‘O Līhu‘e ke hele ‘ia	Līhu‘e’s high plain yet to be traversed
Honi i ke ‘ala mau‘u	inhaling the scent of the grasses
I ke ‘ala o ke kupukupu	The fragrance of kupukupu fern
E linoa ala e ka Waikōloa	Entwined by the Waikoloa breeze
E ka makani he Wai‘ōpua	By the wind called Wai‘ōpua
Ku‘u pua, me he pua lā i ku‘u maka	My blossom, like a flower in my sight
Ka ‘oni i ka haku ‘ōnohi, kā ka wai lā i li‘u	Moving before my eyes, washed salty by tears
I ku‘u maka lā, e uē au lā.	There in my sight, I weep.

(Ho‘oulumāhiehie 2008a:280; Ho‘oulumāhiehie 2008b:262)

1.4.3 *Ka Ua* (Rains)

The project area, contained within the ‘Ewa District on the leeward side of O‘ahu, is typically very hot and dry. Honouliuli receives an annual rainfall of about 550 mm (22 inches) on the coastal and inland region of the *ahupua‘a* (land division usually extending from the uplands to the sea) and about 39 inches (1,200 mm) in the northern region up into the Wai‘anae mountain range (Giambelluca 2013).

Precipitation remains a major component of the Hawaiian water cycle. The life-giving waters or *wai*, helped to sustain pre-Contact populations. Traditionally, the year was divided by two distinct annual seasons. The first, known as *kau* (period of time, especially summer), typically

lasted from May to October and is marked by a high-sun period corresponding to warmer temperatures and steady trade winds. The second season, *ho‘oilo* (winter, rainy season), continued through the end of the year from November to April and represented a much cooler period. Trade winds were less frequent, and widespread storms and rainfall were common (Giambelluca et al. 1986:17). Typically, the maximum rainfall occurs in January and the minimum in June (Giambelluca et al. 1986:17).

Each small geographic area on O‘ahu had a Hawaiian name for its own wind, rain, and seas. Honouliuli was no exception to this naming practice. According to Akana and Gonzalez (2015),

> Rain names are a precious legacy from our kūpuna who were keen observers of the world around them and who had a nuanced understanding of the forces of nature. They knew that one place could have several types of rain, each distinct from the other. They knew when a particular rain would fall, its color, its duration, its intensity, its path, its sound, its scent, and its effect on the land and their lives . . . Rain names are a treasure of cultural, historical, and environmental information. [Akana and Gonzalez 2015:n.p.]

Rainfall within the southwestern portion of O‘ahu Island is generally light. Consequently, only the Nāulu rain is known to be associated with the *ahupua‘a* of Honouliuli. This rain is generally understood as a sudden shower, and more commonly associated with Kawaihae, Hawai‘i and Ni‘ihau (notoriously dry locations as well) (Akana and Gonzalez 2015:187). The Nāulu rain is mentioned in a chant offered by Hi‘iakaikapoliopele, the young sister of the fire goddess Pele. In *Ka Mo‘olelo o Hi‘iakaikapoliopele*, the goddess Hi‘iaka, born an egg and carefully warmed and nourished by Pele herself (Westervelt 1916:69), embarks on a quest to retrieve her older sister’s lover, Lohi‘auipo. While traversing the island chain, Hi‘iaka encounters various gods and demi-gods, spirits and shapeshifters, as well as chiefs and commoners.

Hi‘iaka often offers *oli* (chant) and *mele* (song) as she travels the various lands of the *pae ‘āina* (archipelago). Within many of the songs and chants, she references sites and natural phenomena associated with a particular locality. Although Honouliuli Ahupua‘a is not explicitly linked to the Nāulu rain within the Hi‘iaka tale, Hi‘iaka is known to have traveled across the deadlands of Kaupe‘a. Kaupe‘a is a *wahi pana* or storied place of Honouliuli Ahupua‘a. Kamakau describes Kaupe‘a as a wide plain where a grove of *wiliwili* (*Erythrina sandwicensis*) (Figure 8) stands. This plain is an *ao kuewa*, a realm belonging to homeless souls. It is where

> . . . wandering souls would go to catch moths and spiders. However, wandering souls would not go far in the places mentioned earlier before they would be found catching spiders by *‘aumakua* souls, and be helped to escape. Those souls who had no such help were indeed friendless *(he po‘e ‘uhane hauka‘e lakou)*, and there were many who were called by this name, *po‘e ‘uhane hauka‘e.* [Kamakau 1964:47–49]

Hi‘ika, upon traversing this ghostly plain, recalls the Kai‘okia edict placed upon her and Lohi‘au by Pele. In wistfulness, she offers this affectionate chant,

‘A‘ole au e hele i ke kaha o Kaupe‘a	I shall not tread Kaupe‘a’s expanse
Kēlā kaha kūpā koili a ka lā i ke kula	That stretch where the sun beats down on the plain

Figure 8. *Wiliwili* tree endemic to the islands; a grove of *wiliwili* was famously located at Kaupe‘a, Honouliuli Ahupua‘a, ‘Ewa District (Liborio 2016)

Ua kūpono a‘ela ka lā i ka piko o Wākea	The sun is right overhead, at the navel of Wākea
Ola i ke ahe aka makani Māunuunu	I am spared by the Māunuunu wind
I ka hapahapai mai aka makani ‘Ao‘aoa	By the uplifting ‘Ao‘aoa breeze
Ke koi lā i ke ao o ka Nāulu *e hanini i ka wai*	Urging the Nāulu storm clouds to pour down their waters
Ola ihola nā kupa kama‘āina i ka wai *a ka ‘ōpua*	The natives here survive on water from the clouds
Ke halihali a‘ela nā ‘ōpua i ke awa lau	Which billowing clouds carry along to the branch ing lochs
E koi mai ana iā Hi‘iaka e kūo‘e hele *i ke kula*	Compelling Hi‘iaka to trudge that open stretch
I kuleana i lāhui ai ka moe i Laila	Duty making rest forbidden there
I laila au lohe i ke kani leo le‘a a ka *‘ō‘ō i ke kula*	There I heard the happy trill of the *‘ō‘ō* bird on the plain
Ho‘āikāne ana lāua me ke kai o *Wāwaemoku*	Befriending the sea of Wawaemoku
Mokumokuāhua loko, kupākupā koili *i ka ‘ino*	My heart grieves, thrashed by harm
I ‘ino ho‘i au i kēia kanaka i ka hiki *‘ana mai*	I may be harmed by this person upon arrival
I kahela a‘ela ka ‘ai a ka manu	Leaving the birds to feed expansively
I ka pua o ka wiliwili	On the blossoms of the *wiliwili* trees
Wili a‘ela nā ‘ōpua i luna	The clouds spin above
No luna wau	I am from above
Wili a‘ela nā ‘ōpua i lalo	The clouds spin below
Lalo ē!	Below indeed!
Lilo i lalo ka hele ‘ana a ke kanaka	The movement of mankind is cast down
Kalakala ke ao no Hawai‘i	Craggy are the clouds from Hawai‘i
I ka pā ‘ia mai e kēia makani	Blown here by this wind
‘A‘ole a‘u makana i ka lā o ka hilahila	I have no gift to offer on this day of shame
E hili hewa paha auane‘i au	I shall perhaps end up astray
Wilia i na‘e, wilia i lalo	Spiraling windward, or to the lee

Wilia i kai, wilia i uka	Spinning toward the sea, toward the highlands
‘O kauhale a ka ‘ōlelo	O house made of words
Ho‘ohiki ihola i kānāwai	Utter as an edict
Kau ihola i kānāwai	Place as a law
He kānāwai ‘okia	An order of separation
‘Ālina ihola ka ‘o Pu‘uloa	Thus Pu‘uloa is branded by epithet
He ‘āina kauā.	A land of outcasts and slaves.

[Ho‘oulumāhiehie 2008a:294–295; Ho‘oulumāhiehie 2008b:275–276]

The general lack of rain names is indicative of historic environmental conditions within the *ahupua‘a*; these conditions, in turn, shaped agricultural practices in the area. Environmental limitations forced ingenuity and innovation. McAllister provides written evidence of the innovative ways in which Honouliuli’s *kama‘āina* approached agricultural activities:

> . . . It is probable that the holes and pits in the coral were formerly used by Hawaiians. Frquently the soil on the floor of the larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here. [McAllister 1933:109]

1.4.4 *Nā Kahawai* (Streams)

Honouliuli Ahupua‘a, and the encompassing ‘Ewa District, are notoriously dry. Agricultural sink holes, as described in Section 1.4.3, were especially important on the ‘Ewa plain. In traditional Hawaiian times, the areas of exposed coral (Pleistocene limestone) outcrop were undoubtedly more extensive. Limestone outcrop, composed of detritus, calcareous sand, reef dwelling organisms, and coralline algae, is subject to dissolution from water. This dissolution has formed a series of connected and isolated caves under the ‘Ewa Plains. Although invisible to human eyes, streams flow under the surface of Honouliuli via the karsic system. “Sink holes” would accumulate water within them via a subterranean water or karst system; this water also contained nutrient-rich sediment that allowed plants such as *kalo* (taro; *Calocasia esculenta*), *kī* (ti; *Cordyline fruticosa*), and *noni* (Indian mulberry; *Morinda citrifolia*) to survive.

Proceeding *mauka* (toward the mountain) from this limestone plain is a series of gulches draining the Wai‘ānae Mountains. The largest of these is Honouliuli Gulch toward the east side of the plain that drains into West Loch. The gulch is bisected by the Honouliuli Stream, the primary water body of the Honouliuli Watershed. The “perennial/intermittent” Honouliuli Stream and its tributaries “have a total stream length of 32.5 miles” (O‘ahu Resource Conservation and Development Council 2013:16).

To the west are fairly steep gradient gulches forming a more linear than dendritic drainage pattern. The major gulches from east to west are Awanui, Pālailai, Makaīwa, Waimānalo, and Limaloa. These gulches are steep-sided in the uplands and generally of a high gradient until they emerge onto the flat ‘Ewa plain. The alluvium they have carried has spread out in delta fashion

over the *mauka* portions of the plain, which comprises a dramatic depositional environment at the stream gradient change. These gulches are generally dry, but during seasonal Kona storms they carry immense quantities of runoff onto the plain and into the ocean. As typical drainages in arid slopes, they are either raging uncontrollably or are dry, and do not form stable water sources for traditional agriculture in their upper reaches. The western Honouliuli gulches, in contrast to those draining into Pearl Harbor to the east, do not have valleys suitable for extensive irrigated agriculture. However, this lack is more than compensated by the rich watered lowlands at the base of Honouliuli Gulch.

The lowlands fronting the west loch of Pearl Harbor (Kaihuopala‘ai) were suitable for the cultivation of the traditional Hawaiian staple crop, *kalo*. For spiritual and dietary reasons, *kalo* was a sacred staple in the Hawaiian diet. According to Hawaiian mythology, man was born from the taro plant.

The *Kumulipo* (“origin, genesis”) details this kinship. Hāloa, “he of the long breath,” is the second son of Wākea and Papa. Wākea and Papa’s first born, Hāloa-naka was born premature and died shortly after his birth (Kanahele 1995:17). After burying Hāloa-naka, a *kalo* plant sprouted at his grave. Shortly after, a second son (Hāloa) was born. A human child, Hāloa symbolizes *kalo* and man. *Kalo* is a metaphor for life, Kanahele explains as follows:

> In the mythologies of many cultures, plants have been used to symbolize human spiritual growth. Hawaiians made taro a metaphor for life because, like the taro plant, it needs to be rooted in good soil and to be constantly nourished with the waters of Kāne. As the stalk grows taller with its leaves reaching toward the light of the sun, symbolized by Wākea, so Hawaiians grow aspiring to be closer to their heavenly spirit. Just as every young shoot can become a full-grown plant, so can they become gods as descendants of Hāloa. As every plant must die, however, they too must die. And from the remains a new plant lives again. In this continuity of life, both plant and man repeat the mystery of the unending cycle. [Kanahele 1995:18]

However, by the mid-nineteenth century traditional agriculture was becoming quickly supplanted by large-scale commercial ventures. The focus of agricultural production soon shifted towards sugarcane and pineapple, with concerted efforts made to turn open space into plantations. The drilling for artesian wells began in 1879 with cattle rancher James Campbell on the ‘Ewa Plains (Board of Water Supply, City and County of Honolulu 2017). Utilizing a well driller, Campbell drilled several hundred feet down until reaching a large supply of pure, fresh water (Board of Water Supply, City and County of Honolulu 2017). According to the Board of Water Supply (2017):

> This discovery led to a water boom on the island, as ranchers and plantation developers began drilling furiously for more of the precious resource. Within 20 years, the boom came to a bust. Artesian wells, abandoned and neglected, wasted millions of gallons of water. By the turn of the century, Oahu suffered a water panic. Wells were salting up. Water levels were dropping. The problem was that the system had grown too much, too fast and too haphazardly. [Board of Water Supply 2017]

Campbell’s first well was named Waianiani (“crystal waters”) by the *kama‘āina* of Honouliuli (Nellist 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho‘okuleana 2014). Campbell’s original Honouliuli well was finally sealed by the City and County of Honolulu in 1939 (Ho‘okuleana 2014).

1.4.5 *Lihikai ame ka Moana* (Seashore and Ocean)

There exist several naming traditions for Honouliuli. Invaraibly, there are several explanations for Honouliuli’s name. One tradition notes that Honouliuli means “dark water,” “dark bay,” or “blue harbor,” and was named for the waters of Pearl Harbor (Jarrett 1930:22), which marks the eastern boundary of the *ahupua‘a*. The Hawaiians called Pearl Harbor Pu‘uloa (“long hill”). According to *mo‘olelo*, this location was a storied place, due to the presence of Ka‘ahupāhau. Ka‘ahupāhau, queen of all sharks of O‘ahu, dwelled in a large cavern on the Honouliuli side of Pearl Harbor (Clark 1977:69).

Both seashore and ocean provided physical and spiritual sustenance (NOAA 2017) for the people of Honouliuli. According to Malo, the ocean was divided into smaller divisions, stretching from *ae kai* (strip of the beach over which waves ran after they had broken) to *moana* (pelagic zone) (Malo 1951:25–26). Outside the coastal areas was the belt known as *kua au*, where the shoal water ended (Malo 1951:26). Further out was the *kai au*, deeper waters designated for surfing, swimming, or spearing squid (Malo 1951:26). For Honouliuli Ahupua‘a, specifically between Kalaeloa and Kualaka‘i, the sea of this region was identified as Hilo one. It appears that the name is drawn from an on-shore locality known as Hilo one. According to Maly and Maly (2012),

> Hilo one and the spring of Hoakalei—Near the shore of Honouliuli were once found places of fame in the traditions of Hiiaka-i-ka-poli-o-Pele, youngest sister of the Pele clan, who traveled across Honouliuli while on her return trip to Hawai‘i Island, from Kauai. While traveling along the shore between Kalaeloa and Kualakai, Hiiaka was adorned with blossoms of the lehua trees which grew in the vicinity. At the place called Hilo one, she found the spring Hoakalei, where she stopped and looked at the water. Upon looking in the water, she saw her own reflection, adorned with the lei of lehua blossoms, thus the name Hoakalei (reflections of the garland). [Maly and Maly 2012]

While walking the coastline between Kalaeloa and Kualaka‘i, the goddess sang out the following,

O Hiiaka ka wahine,	Hiiaka is the woman
Ke ako la i ka pua o Hoakalei,	Who picked the flowers of Hoakalei,
Ke kui la, ke uo la i ka manai	And with a needle strung and made them into
Eha ka lei, ka apana lei lehua	four garlands, the sectioned lei of the woman,
A ka wahine la, kuu pokii.	O my younger sibling.

Kuu pokii mai ke ehu makani o lalo.	My younger sibling who came from the place
Lulumi aku la i ke kai o Hilo one.	where the dusty wind rises from below.
No Hilo ke aloha, Aloha wale ka lei—e.	Overturned in the sea of Hilo-one.

[Maly and Maly 2012]

Moving westward from Pu‘uloa are Iroquis Beach, ‘Ewa Beach park, One‘ula Beach Park, in addition to Keahi Point. These beaches comprise the coastal portion of Honouliuli Ahupua‘a; use of these beaches increased during the plantation era, when employees of the nearby sugar plantations utilized the coastal areas for subsistence and recreation.

Traditionally, the seashore and ocean areas were vitally important for resource extraction in the early days of settlement. Fishermen along the coast maintained a respected status within traditional Hawaiian society; Kanahele asserts that “early Hawaiians regarded fishing as the oldest, and hence the most prestigious of professions (Kanahele 1995:17).

According to Charles Howard Edmondson (1946:5), the coastal waters of Pearl Harbor were “a natural aquarium for many varieties of marine animals.” Titcomb (1952:7) identifies the Pearl Harbor area as the only large natural inland lagoon, famous for its fish and fishponds. The *nehu* (anchovy; *Anchoviella purpurea*) was said to fill the lochs of Pearl Harbor. Citing Kamakau, Margaret Titcomb writes that the *nehu*, “filled the lochs from the channel of Pu‘uloa (Pearl Harbor) inland to the Ewas” (1952:97). Due to the presence of the *nehu*, the *kama‘āina* of Honouliuli and ‘Ewa developed this saying,

> *He kai puhi nehu, puhi lala ke kai o ‘Ewa e, e noho i ka la‘i o ‘Ewa nui a La‘akona* (“A sea that blows up nehu, blows them up in rows, is ‘Ewa, until they rest in the calm of great ‘Ewa-a-La‘akona”). [Kamakau 1964:84]

La‘akona (also identified as Lakona of ‘Ewa), was the *‘ai moku* (ruler of a district) of ‘Ewa, Wai‘anae, and Waialua on O‘ahu. During La‘akona’s reign, O‘ahu was divided among the descendants of Māweke, an early eleventh century *ali‘i nui* (high chief) from Tahiti. The grandchildren of Māweke were said to be the very highest of nobility. La‘akona was one of Māweke’s high-ranking grandchildren. His father, Keaunui of ‘Ewa was one of Māweke’s sons.

From Keaunui and Wehelani, three children were born: La‘akona, a son, Nu‘akea, a daughter (sister of La‘akona), and Mo‘i, a son (brother of La‘akona). Nu‘akea would later become the Queen consort of Moloka‘i as the wife of Ke‘olo‘ewa-a-Kamauaua. Mo‘i would eventually become a *kāula* or prophet under the service of Ke‘olo‘ewa-a-Kamauaua’s brother, Kaupe‘epe‘e-nui-kauila. La‘akona’s first cousins were Kumuhonua, Mo‘ikeha, ‘Olopana, Hainakolo, and Hinakaimauli‘awa.

La‘akona inherited ‘Ewa Moku from Keaunui, his father:

> Oral accounts indicate that during the A.D. 14CCs, the island was unified into one polity, which can be called the O‘ahu Kingdom. Around A.D. 1420-1440, La‘akona was the ruler of ‘Ewa, Wai‘anae and Waialua Districts, and evidently he was also

> recognized as the overall ruler by the other districts, for in his line descended the dignity of Moi of Oahu. [Fornander 1880:88 in Cordy 1996]

Kamakau also notes that the ‘Ewa area, spanning from Honouliuli to Hālawa, was known for *mahamoe* and *‘okupe* (both edible bivalves); these *i‘a* (marine animals), however, had disappeared sometime in the nineteenth century. Other marine animals included species such as sponges, clams, mollusks, barnacles, and crustaceans (Edmondson 1946:5).

Currently, no coastal resources are known to exist immediately *makai* of the current project area. This *makai* area remains fenced off to the public, and is mostly filled with large coral and basalt boulders (Figure 9 and Figure 10). However, body surfing and sport diving occur in the offshore areas located immediately southeast and immediately northwest of the current project area.

1.4.6 *Built Environment*

The project area consists of the *makai* portion of the IES Kapolei Refinery property. The entire project area has been drastically altered by historic and modern land use including grubbing and grading during initial and ongoing construction within the refinery property. A major berm along the *makai* edge of the refinery property is understood to be composed of bulldozer push from the grading and grubbing of the project lands. Structures within or adjacent to the project area include the existing perimeter security fence, settling ponds, and equipment storage areas.

The IES Kapolei Refinery property is located within the James Campbell Industrial Park, which includes heavy and medium industrial developments and the State’s only two oil refineries. The IES Kapolei Refinery is a relatively small-scale oil refinery consisting of numerous heavy industrial structures and storage tanks. South of the refinery property is the Brewer Environmental Industries (BEI) chemical production facility. Immediately north of the refinery is a wide drainage ditch parallel to the north side. Further north of the refinery property is the developing Kenai Industrial Park. The Barbers Point Deep Draft Harbor is located approximately 0.8 km (0.5 miles) north of the project area.

Figure 9. General overview of coastal areas adjacent to current project area; coral cobbles and boulders visible in foreground

Figure 10. General overview of coastal areas adjacent to current project area; basalt cobbles and boulders visible in foreground

Section 2 Methods

2.1 Archival Research

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

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

Section 3 *Ka‘ao* and *Mo‘olelo* (Legends and Stories)

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

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

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

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

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

The traditions of Honouliuli Ahupua‘a have been compiled by several authors, in studies by Sterling and Summers (1978), Hammatt and Folk (1981), Kelly (1991), Charvet-Pond and Davis (1992), Maly (1992), and Tuggle and Tomonari-Tuggle (1997). Some of the traditional themes associated with this area include connections with Kahiki, the traditional homeland of Hawaiians in central Polynesia. There are several versions of the chief Kaha‘i leaving from Kalaeloa for a trip to Kahiki; on his return to the Hawaiian Islands he brought back the first breadfruit (Kamakau 1991:110) and planted it at Pu‘uloa, near Pearl Harbor in ‘Ewa (Beckwith 1940:97). Several stories associate places in Honouliuli with the gods Kāne and Kanaloa, with the Hawaiian pig god

Kamapua‘a and the Hina family, and with the sisters of Pele, the Hawaiian volcano goddess, all of whom have strong connections with Kahiki (Kamakau 1991:111; Pukui et al. 1974:200).

3.1 *Ka‘ao*

3.1.1 Kāne and Kanaloa and the Boundaries of ‘Ewa

Pukui translates the name ‘Ewa as “crooked” in reference to the Kāne and Kanaloa *ka‘ao* describing them throwing stones to mark boundaries. The ‘Ewa stone was lost, but later found to be at Pili-o-Kahe (Pukui et al. 1974:28).

> When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere in the Waimanalo section. When they went to find it, they could not locate the spot where if fell. So Ewa (strayed) became known by that name. The stone that strayed. [Sterling and Summers 1978:1]

3.1.2 Kāne and Kanaloa and the *Loko I‘a* (Fishpond) of Pu‘uloa

According to an account in the Hawaiian newspaper *Ka Loea Kālai‘āina* (10 June 1899), several of the fishponds in the Pu‘uloa area were made by the brother gods, Kāne and Kanaloa. A fisherman living in Pu‘uloa, named Hanakahi, prayed to unknown gods, until one day two men came to his house. They revealed to him that they were the gods to whom he should pray. Kāne and Kanaloa then built fishponds at Ke‘anapua‘a, but were not satisfied. Then they built the fishpond Kepo‘okala, but were still not satisfied. Finally they made the pond Kapākule, which they stocked with all manner of fish. They gifted all of these fishponds to Hanakahi and his descendants (Handy and Handy 1972:473; *Ka Loea Kālai‘āina*, 8 July 1899).

Mary Pukui (1943:56–57), who visited Kapākule Fishpond when she was young, writes that the pond was built by the *menehune* (legendary race of small people who worked at night, building fishponds, roads, temples) under the direction of the gods Kāne and Kanaloa. Pukui describes several unique aspects of this pond:

> On the left side of the pond stood the stone called Hina, which represented a goddess of the sea by that name. Each time the sea ebbed, the rock became gradually visible, vanishing again under water at high tide. Ku, another stone on the right, was never seen above sea level. This stone represented Ku‘ula, Red Ku, a god for fish and fishermen. From one side of the pond a long wall composed of driven stakes of hard wood, ran toward the island [Laulaunui] in the lochs. When the fish swam up the channel and then inside of this wall, they invariably found themselves in the pond. A short distance from the spot where the pond touched the shore was a small koa or altar composed of coral rock. It was here that the first fish caught in the pond was laid as an offering to the gods. [Pukui 1943:56]

The fishpond contained many fish, especially the *akule* (bigeye scad; *Selar crumenophthalmus*), thus its name, “the enclosure for *akule* fish” (Pukui 1943:56–57). The pond was destroyed when the channel to Pearl Harbor was dredged in the early twentieth century. The caretaker of the pond took the stones Kū and Hina to a deep place in the ocean and sunk them so “none would harm or defile them.” Cobb (1903:733) writes that the pond was used to catch the larger *akule* (goggler), *‘ōpelu* (mackerel scad; *Decapterus macarellus*), *weke* (goat fish; *Mullidae*), *kawakawa* (bonito; *Euthynnus affinis*), and sharks. It was unusual for having walls made of coral. This contradicts much of the *mo‘olelo* saying that sharks were not killed in Pearl Harbor. However, Kamakau does relate that Kekuamanoha and Kauhiwawaeono, two conspirators against Kamehameha I, lived at Pu‘uloa. The chief Kauhiwawaeono was known to murder people and use their bodies as shark bait (Kamakau 1992:182, 232).

3.1.3 Kamaunuaniho at Pu‘u-o-Kapolei

Pu‘uokapolei was the home of Kamaunuaniho, the grandmother of Kamapua‘a, the pig god. She was one of the three migrants from Kahiki who were ancestors to the people of O‘ahu. The following excerpt tells of taking his grandmother to Pu‘uokapolei (Fornander 1919:5:318; Kahiolo 1978:81, 107).

> Kamapua‘a subsequently conquered most of the island of O‘ahu, and, installing his grandmother [Kamaunuaniho] as queen, took her to Puuokapolei, the lesser of the two hillocks forming the southeastern spur of the Wai‘anae Mountain Range, and made her establish her court there. This was to compel the people who were to pay tribute to bring all the necessities of life from a distance, to show his absolute power over all. [Nakuina 1904:50]

Emma Nakuina goes on to note, “A very short time ago [prior to 1904] the foundations of Kamaunuaniho’s house could still be seen at Puuokapolei” (Nakuina 1904:50). Another account in the Hawaiian newspaper *Ka Loea Kālai‘āina* (13 January 1900 in Sterling and Summers 1978:34) speaks of Kekele‘aikū, the older brother of Kamapua‘a, who also lived on Pu‘uokapolei. Kamapua‘a was born and raised in Kaluanui, an *ahupua‘a* located in the *moku* of Ko‘olauloa, but later escaped to ‘Ewa when he was pursued by the chief Olopana.

In Lilikalā Kame‘eleihiwa’s version of the *mo‘olelo* of Kamapua‘a, Pele and Kamapua‘a meet and a battle ensues on Hawai‘i Island between the two. Kamapua‘a tells Kekele‘aikū, “Listen to me, elder brother. You wait here. When you smell the stench of burning bristles, then you must assume I am dead. However, if indeed you do not smell the stench of the bristles, you will know that your younger brother has not been harmed and that he has ‘eaten of the cooked taro’” (Kame‘eleihiwa 1996:62). Kamapua‘a travels to Hawai‘i Island where Pele chases him with fire out of the *lehua* (*Metrosideros*) forest. Kamapua‘a ran from Pele but could only cling to an *‘ama‘uma‘u* (*Sadleria cyatheoides*) fern (Kame‘eleihiwa 1996:95). The fire continued to burn around Kamapua‘a as he clung on for his life. His bristles began to burn as well, sending a stench of burning pig bristles around the Hawaiian Islands. Kekele‘aikū smelled the stench of burning pig bristles and began to cry, thinking that his brother perished in battle with Pele (Kame‘eleihiwa 1996:95). Kekele‘aikū then hung himself, deeply saddened for the loss of his beloved brother, Kamapua‘a. Kekele‘aikū’s body was left at Pu‘uokapolei with grandmother.

Kamapua‘a eventually makes his way back to O‘ahu where he begins to call to Kekele‘aikū’s spirit:

Ho‘ālohaloha main a ana ia‘u ku‘u kaikua‘ana

Show me your love and compassion, O my elder brother

‘O ka pili manu kahi a kāua e haele pū ai

In the bird-catching places where we two have traveled together

I ke kula o Kahinahina

On the plain of Kahinahina

Iā ‘Oloheimiki

At ‘Oloheimiki

Iā ‘olua la ke kia holomanu

You two had the bird-snaring rod

Ia‘u la ke kia mahi‘ai

I had the farming rod

I na kea ali‘i kaikaina

Made by the younger brother chief

‘O koko maka pehupehu i ka lā e—

Of the bloody eyes, swollen in the sun

E ha‘a—e, ha‘a kai ‘a ha‘o o Ko‘olina—e

Dancing, dancing is the humble fish of Ko‘olina

‘O nā pa‘ako pani ua o Waiku‘i la

Of the rain-filled coral beds of Waiku‘i

Iā Waku‘i ho‘i e—

Yes, at Waiku‘i!

Ho‘ohali i kana i‘a ma waho

Bearing his fish outside

Ma loko ka ‘i‘o, ma waho ka iwi

Inside is the flesh, outside are the bones

‘O ka pipipi kai welawela

O the pipipi of the burning sea

‘O Kahunaiki‘ulalena nei la e—

O this Kahunaiki‘ulalena

> *‘O kou inoa ia, e ō mai ‘oe!*
>
> Her is your name chant—answer! [Kame‘eleihiwa 1996:130]

The spirt of Kekele‘aikū returned and Kamapua‘a urged his brother’s spirit to return to Pu‘uokapolei to where his body lay with his grandmothers, Kamaunuaniho and Wahineokama‘o (Kame‘eleihiwa 1996:131). Kamapua‘a traveled to ‘Ewa when he saw several canoes filled with calabashes of food. Kamapua‘a watched the people eat until they were full and slept in a comfortable area (Kame‘eleihiwa 1996:132). Of the eight canoes that landed, Kamapua‘a raided six canoes of their provisions. Kamapua‘a filled the empty calabashes of food with his excrement and filled the water gourds with his urine. When the people awoke the next morning, they thought they did something wrong until they came across the remaining food in two canoes. The people began to realize this was the doing of Kamapua‘a. The two canoes with provisions left for Kou (Honolulu) while those who had come from the six canoes hiked *mauka* (inland) to gather more food. As the two canoes began to set sail, a pig appeared on the peninsula crying. The visitors grabbed Kamapua‘a and planned to roast him for the *ali‘i* (Kame‘eleihiwa 1996:134). Kamapua‘a jumped out of the canoe near Kepo‘okalā and swam to Honouliuli Pond (Kalo‘i) where a woman was gathering *‘ohā*, taro that grows from an older root (Kame‘eleihiwa 1996:135).

3.1.4 The Realm of Homeless Souls on the ‘Ewa Plain

There are several places on the ‘Ewa coastal plain associated with *ao kuewa*, the realm of the homeless souls. Samuel Kamakau (1991) explains the Hawaiian beliefs in the afterlife:

> There were three realms (*ao*) for the spirits of the dead. . . . There were, first, the realm of the homeless souls, the *ao kuewa*; second, the realm of the ancestral spirits, the *ao ‘aumakua*; and third, the realm of Milu, *ke ao o Milu* . . .
>
> The *ao kuewa*, the realm of homeless souls, was also called the *ao ‘auwana*, the realm of wandering souls. When a man who had no rightful place in the *‘aumakua* realm (*kanaka kuleana ‘ole*), his soul would wander about and stray amongst the underbrush on the plain of Kama‘oma‘o on Maui, or in the *wiliwili* grove of Kaupe‘a on Oahu. If his soul came to Leilono [in Hālawa, ‘Ewa near Red Hill], there he would find the breadfruit tree of Leiwalo, *ka‘ulu o Leiwalo*. If it was not found by an *‘aumakua* soul who knew it (*i ma‘a mau iaia*), or one who would help it, the soul would leap upon the decayed branch of the breadfruit tree and fall down into endless night, *the pō pau ‘ole o Milu*. Or, a soul that had no rightful place in the *‘aumakua* realm, or who had no relative or friend (*makamaka*) there who would watch out for it and welcome it, would slip over the flat lands like a wind, until it came to a leaping place of souls, a *leina a ka ‘uhane*. . . . [Kamakau 1991:47]
>
> On the plain of Kaupe‘a beside Pu‘uloa [Pearl Harbor], wandering souls could go to catch moths (*pulelehua*) and spiders (*nanana*). However, wandering souls could not go far in the places mentioned earlier before they would be found catching spiders by *‘aumakua* souls, and be helped to escape. [Kamakau 1991:49]

The breadfruit tree Leilono was said to have been located on the ‘Ewa-Kona border, above Āliamanu. In another section of his account of the dead, Kamakau (1991:29) calls the plain of wandering souls the “plain at Pu‘uokapolei.” Fornander (Fornander 1919:6[2]:292) states

Pu‘uokapolei may have been a jumping off place (also connected with the setting sun) and associated with the wandering souls who roamed the plains of Kaupe‘a and Kānehili, *makai* of the hill. Kamakau also writes,

> There are many who have died and have returned to say that they had no claim to an *‘aumakua* [realm] (*kuleana‘ole*). These are the souls, it is said, who only wander upon the plain of Kama‘oma‘o on Maui or on the plain at Pu‘uokapolei on Oahu. Spiders and moths are their food. [Kamakau 1991:29]

3.2 *Mo‘olelo*

3.2.1 Legend of Lepeamoa

Another explanation for the name Honouliuli comes from the “Legend of Lepeamoa,” the *kupua* (demigod or cultural hero, especially a supernatural being possessing several forms) of Pālama. In this legend, Honouliuli is the name of the husband of the chiefess Kapālama and grandfather of Lepeamoa (Westervelt 1923:164–184). One translation of the name for this district is given as “unequal” (*Saturday Press*, 11 August 1883). Others translate the word as “strayed” and associate it with the legends of the gods Kāne and Kanaloa who surveyed the islands and marked land boundaries with large stones, as told in the associated *ka‘ao* in the previous sub-section.

According to S.K. Nawaa (22 March 1954) in Sterling and Summers, the stone that was found at Pili o Kahe and is the dividing marker between two hills that run parallel, the hill on the ‘Ewa side was considered male and on the Wai‘anae side marking the boundary between Nānākuli and Honouliuli was interpreted as female. The name “Pili o Kahe (Pili = cling to, Kahe = flow) refers, therefore, to the female or Waianae side hill. And that is where the boundary between the two districts runs” (Sterling and Summers 1978:1). The boundaries of Honouliuli Ahupua‘a extend from Paupauwela in the north, Ho‘ae‘ae to the east, and Pu‘uloa to the south with the coastline on the southern border.

3.2.2 Coastal Village of Kūalaka‘i

“Legend of the Children” is a tale that foretold the breaking of the eating *kapu* (taboo) by the *ali‘i*. A young brother and sister always fished at Kūalaka‘i, a beach area on the southern coast of Honouliuli. On this day, they laid out their nets, but all they caught was one *palani* (surgeonfish; *Acanthurus dussumieri*), a fish that was *kapu* for men; only women could eat it.

> . . . They fished again and again until the afternoon and nothing was caught. The children were weary and went home without fish. When they came as far as Pu‘u-o-Kapolei where the blossoms of the ma‘o looked golden in the sunlight, the sister sat down to make ma‘o leis for themselves. When the leis were made they went across the breadth of Kaupe‘a to Waipio. [*Ka Loea Kālai‘āina*, 22 July 1899:15; translation in Sterling and Summers 1978:7]

They stopped at the stream of Ka‘aimalu on the way to their home and the sister convinced her brother to share the fish between the two, thus breaking the *kapu*. “Because these children ate fish secretly, the spot is called Ka‘ai-malu (Secret eating) to this day” (Sterling and Summers 1978:7).

3.2.3 The Death of Kahahana at Hō‘ae‘ae

The association of Pu‘uokapolei and Kānehili with wandering souls is also illustrated in a lament on the death of Kahahana, the paramount chief of O‘ahu who was killed by his foster father, the Maui chief Kahekili, after Kahahana became treacherous and killed the high priest Ka‘opulupulu.

E newa ai o hea make i ka la,	Go carefully lest you fall dead in the sun,
Akua noho la i Puuokapolei.	The god that dwells on Kapolei hill
E hanehane mai ana ka la i na	The sun is wailing on account of the
wahine o Kamao,	women of Kamao,
Akua pee,	A hiding god, blossoming
pua ohai o ke kaha,	*ohai* of the banks,
I walea wale i ke a-	Contented among the stones—
I ka ulu kanu a Kahai.	Among the breadfruit planted by Kahai.
Haina oe e ka oo— T	hou wast spoken of by the *oo*—
E ka manu o Kanehili.	By the bird of Kanehili.
[Fornander 1919:6:297]	

Fornander provides some notes on this lament. The god dwelling at Kapolei is the god Kahahana, stating that this is where his soul has gone. Kamao is one of the names to the door of the underworld. This lament draws an association between wandering souls and the place where the first breadfruit tree was planted by Kaha‘i at Pu‘uloa (Fornander 1919).

> Upon the arrival here at O‘ahu of Kahekili, Kahahana fled, with his wife Kekuapoi, and friend Alapa‘i, and hid in the shrubbery of the hills. They went to Āliamanu, Moanalua, to a place called Kinimakalehua; then moved along to Keanapua‘a, and Kepo‘okala, at the lochs of Pu‘uloa, and from there to upper Waipi‘o; thence to Wahiawā, Helemano, and on to Līhu‘e; thence they came to Po‘ohilo, at Honouliuli, where they first showed themselves to the people and submitted themselves to their care.
>
> While they were living there, report thereof was made to Kahekili, the King, who thereupon sent Kekuamanoha, elder brother of Kekuapoi, the wife of Kahahana, with men in double canoes from Waikiki, landing first at Kupahu, Hanapouli, Waipio, with instructions to capture and put to death Kahahana, as also his friend Alapa‘i, but to save alive Kekuapoi. When the canoes touched at Hanapouli, they proceeded thence to Waikele and Hoaeae, and from there to Poohilo, Honouliuli, where they met in conference with Kahahana and his party. At the close of the day Kekuamanoha sought by enticing words to induce his brother-in-law to go up with him and see the father King and be assured of no death condemnation, and by skilled flattery he induced Kahahana to consent to his proposition; whereupon preparation was made for the return. On the following morning, coming along and

> reaching the plains of Hoaeae, they fell upon and slew Kahahana and Alapa‘i there. [Fornander 1919:6:304]

Through deceit, Kahahana was induced to leave Po‘ohilo, Honouliuli and was killed on the plains of Hō‘ae‘ae (Thrum 1907:213–214).

3.2.4 The Traveling Mullet of Honouliuli

The story of (Ka) Ihuopala‘ai is also associated with the tradition of the *‘anae-holo* or traveling mullet (Thrum 1906:270-272):

> The home of the *anae-holo* is at Honouliuli, Pearl Harbor, at a place called Ihuopalaai. They make periodical journeys around to the opposite side of the island, starting from Puuloa and going to windward, passing successively Kumumanu, Kalihi, Kou, Kalia, Waikiki, Kaalawai, and so on, around to the Koolau side, ending at Laie, and then returning by the same course to their starting point. [Thrum 1907:271]

In Thrum’s account, Ihuopala‘ai is a male who possesses a *kū‘ula*, or fish god, which supplied the large mullet known as *‘anae* (also *‘ama‘ama*; *Mugil cephalus*; when 12 inches or more, they are referred to as *‘anae*). His sister lived in Lā‘ie and there came a time when there were no fish. She sent her husband to visit Ihuopala‘ai who was kind enough to send the fish following his brother-in-law on his trip back to Lā‘ie.

This story is associated with a poetical saying documented by Mary Kawena Pukui about Honouliuli:

> *Ōlelo No‘eau* #1330
>
> *Ka i‘a hali a ka makani*
>
> The fish fetched by the wind. [1983:145]

Pukui explains, “The *‘anaeholo*, a fish that travels from Honouliuli, where it breeds, to Kaipāpa‘u on the windward side of O‘ahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong” (1983:145).

McAllister offers a variation of the *mo‘olelo*:

> The site is named for Kaihuopalaai, said to be a daughter of Konikonia and his wife Hinaaimalama. Fornander (37, vol. 5, p. 270) writes: ‘. . . on Oahu, Kaihuopalaai saw a goodly man by the name of Kapapaapuhi [see Site 139] who was living at Honouliuli, Ewa; she fell in love with him and they were united, so Kailuopalaai has remained in Ewa to this day. She was changed into that fishpond in which mullet are kept and fattened, and this fish is used for that purpose to this day.’
>
> According to old Hawaiians, there never was a fishpond by this name. In another version (77, p. 270), Ihopalaai is the brother of a woman living in Laie. As the fish were scarce in Laie, this woman sent her husband to Ihuopalaai, who had the mullet follow her husband on his return trip which was made along the shore around Makapuu Point with the mullet following in the water. Makea tells me that Kaihuopalaai’s sister was named Malaekahana. Another story tells of a man who

> lured the mullet around the island by tossing sweet potatoes into the sea (68, p. 38). [McAllister 1933:108]

3.2.5 *He Mo‘olelo Ka‘ao no Keaomelemele*

In recounting the legend of Keaomelemele, Moses Manu makes a reference to a *mo‘o* (supernatural water spirit or lizard) named Maunauna who lived above Līhu‘e (presumably at the landform of that name in extreme northern Honouliuli) and who was regarded as a bad lizard (Manu 2002:161).

3.2.6 Kanekua‘ana

Kanekua‘ana is a *kia‘i*, a guardian in the form of a *mo‘o*, of ‘Ewa that took care of the people that lived from Hālawa to Honouliuli. Even those who were not her descendants were cared for in times of need. When *i‘a* became scarce they would build a *waihau heiau* (a temple where hogs, bananas, and coconuts were sacrificed, but not human beings; a *heiau* for *mo‘o* spirits) and pray for Kanekua‘ana’s blessing. She would in turn, bless them with an abundance of *i‘a*.

> The *pipi* (pearl oyster)—strung along from Namakaohalawa to the cliffs of Honouliuli, from the *kuapa* fishponds of inland ‘Ewa clear out to Kapakule. That was the oyster that came in from deep water to the mussel beds near shore, from the channel entrance of Pu‘uloa to the rocks along the edges of the fishponds. They grew right on the *nahawele* mussels, and thus was this *i‘a* obtained. Not six months after the *hau* branches [that placed a kapu on these waters until the *pipi* should come in] were set up, the *pipi* were found in abundance—enough for all ‘Ewa—and fat with flesh. Within the oyster was a jewel (*daimana*) called a pearl (*momi*), beautiful as the eyeball of a fish, white and shining; white as the cuttlefish, and shining with the colors of the rainbow—reds and yellows and blues, and some pinkish white, ranging in size from small to large. They were of great bargaining value (*he waiwai kumuku‘ai nui*) in the ancient days, but were just “rubbish” (*‘opala*) in ‘Ewa. [Kamakau 1991:83]

The people were also blessed with many other *i‘a*, including *‘ōpae huna* (transparent shrimp), *‘ōpae kakala*, spiked shrimp, *nehu maoli* (anchovy), *nehu pala* (anchovy), *mahamoe*, and *‘okupe*. Some of these marine resources are no longer seen today (Maly 2003:60).

3.2.7 The First *‘Ulu* (Breadfruit) Brought from Kahiki

The chief Kaha‘i left from Kalaeloa, a coastal area in Honouliuli Ahupua‘a, for a trip to Kahiki. On his return to the Hawaiian Islands, he brought back the first breadfruit (Kamakau 1991:110) and planted it near the waters of Pu‘uloa or “long hill,” now known as Pearl Harbor (Beckwith 1940:97).

3.2.8 Palila

In the *mo‘olelo* of the hero Palila, the famous warrior had a supernatural war club. He could throw the club a long distance, hang on to the end of it, and fly along the club’s path. Using this power, he touched down in several places in Honouliuli, Waipi‘o, and Waikele. One day he used his supernatural war club to carry himself to Ka‘ena Point at Wai‘ānae, and from there east across the district of ‘Ewa. Fornander writes,

> *Ha‘alele keia ia Ka‘ena, hele mai la a Kalena, a Pōhākea, Maunauna, Kānehoa, a ke kula o Keahumoa, nana ia ‘Ewa. Kū kēia i laila nānā i ke kū a ka ea o ka lepo i nā kānaka, e pahu aku ana kēia i ka la‘au palau aia nei i kai o Honouliuli, kū ka ea o ka lepo, nu lalo o ka honua, me he olai la, makau nā kānaka holo a hiki i Waikele. A hiki o Palila, i laila, e pa‘apu ana nā kānaka i ka nānā lealea a ke ‘li‘i o O‘ahu nei, oai o Ahuapau.*
>
> After leaving Ka‘ena, he came to Kalena, then on to Pōhākea, then to Manuauna [a peak in Honouliuli], then to Kānehoa [a peak in Honouliuli], then to the plain of Keahumoa [upland plain from Honouliuli to Waipi‘o] and looked toward ‘Ewa. At this place he stood and looked at the dust as it ascended into the sky caused by the people who had gathered there; he then pushed his war club toward Honouliuli. When the people heard something roar like an earthquake they were afraid and they all ran to Waikele. When Palila arrived at Waikele he saw the people gathered there to witness the athletic games that were being given by the king of O‘ahu, Ahupau by name. [Fornander 1918:142–143]

3.2.9 Kākuhihewa

The Hawaiian *ali‘i* (royalty) were also attracted to Honouliuli Ahupua‘a. One historical account of particular interest, appearing in the newspaper *Ke Au Hou*, refers to an *ali‘i* residing in Ko‘olina, to the west of the project area:

> Ko‘olina is in Waimānalo near the boundary of ‘Ewa and Wai‘ānae. This was a vacationing place for chief Kākuhihewa and the priest Napuaikamao was the caretaker of the place. Remember reader, this Ko‘olina is not situated in the Waimānalo on the Ko‘olau side of the island but the Waimānalo in ‘Ewa. It is a lovely and delightful place and the chief, Kākuhihewa loved this home of his. [*Ke Au Hou* 13 July 1910 in Sterling and Summers 1978:41]

3.3 *Wahi Pana* (Storied Places)

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

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

As McGregor makes clear, *wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, offshore islands, and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a* or *‘ili* (land division smaller than an *ahupua‘a*), and man-made structures such as fishponds. In this way, the *wahi pana* of Honouliuli tangibly link the *kama‘āina* of Honouliuli to their past. It is common for places and landscape features to have multiple names, some of which may only be known to certain *‘ohana* or even certain individuals within an *‘ohana*, and many have been lost, forgotten or kept secret through time. Place names also convey *kaona* (hidden meanings) and *huna* (secret) information that may even have political or subversive undertones. Before the introduction of writing to the Hawaiian Islands, cultural information was exclusively preserved and perpetuated orally. Hawaiians gave names to literally everything in their environment, including individual garden plots and *‘auwai* (water courses), house sites, intangible phenomena such as meteorological and atmospheric effects, *pōhaku* (rock, stone), *pūnāwai* (freshwater springs), and many others. According to Landgraf (1994), Hawaiian *wahi pana* "physically and poetically describes an area while revealing its historical or legendary significance" (Landgraf 1994:v).

Honouliuli is the largest *ahupua‘a* in the *moku* of ‘Ewa. One translation of the name for this district is given as "unequal" (*Saturday Press*, 11 August 1883). Others translate the word as "strayed" and associate it with the legends of the gods Kāne and Kanaloa.

Another explanation for the names comes from the "Legend of Lepeamoa," the chicken-girl of Pālama. In this legend, Honouliuli is the name of the husband of the chiefess Kapālama and grandfather of Lepeamoa. The land of Honouliuli was named for the grandfather of Lepeamoa (Westervelt 1923:164–184).

It is likely that the boundaries of the westernmost *ahupua‘a* of ‘Ewa were often contested with people of the neighboring Wai‘anae District. The ‘Ewa people could cite divine sanction that the dividing point was between two hills at Pili o Kahe.

Place names and *wahi pana* of Honouliuli are identified on Figure 11. A table of Honouliuli place names is located in Appendix A.

3.3.1 Pu‘uokapolei

Pu‘uokapolei was the primary landmark for travelers on the cross-*ahupua‘a* trail that ran from Pearl Harbor in the east to Wai‘anae in the west (‘Ī‘ī 1959:27, 29; Nakuina 1992:54; E.M. Nakuina 1904 in Sterling and Summers 1978:34). The plain southwest of the hill was called Kaupe‘a.

Pu‘u means hill and Kapolei means "beloved Kapo," a reference to the sister of the Hawaiian volcano goddess, Pele. Kamakau says ancient Hawaiians used Pu‘uokapolei as an astronomical marker to designate the seasons:

> . . . the O‘ahu people who reckoned the time (*O‘ahu pō‘e helu*) called the season Kau for the setting of the sun from Pu‘uokapolei, a hill in Honouliuli, ‘Ewa, to the opening of Mahinaona (*i ke kawaha o Mahinaona*). When the sun moved south from Pu‘uokapolei—and during the season of the sun in the south—for the coming of coolness and for the sprouting of new buds on growing things—the season was called Ho‘oilo [winter, rainy season] [Kamakau 1976:14].

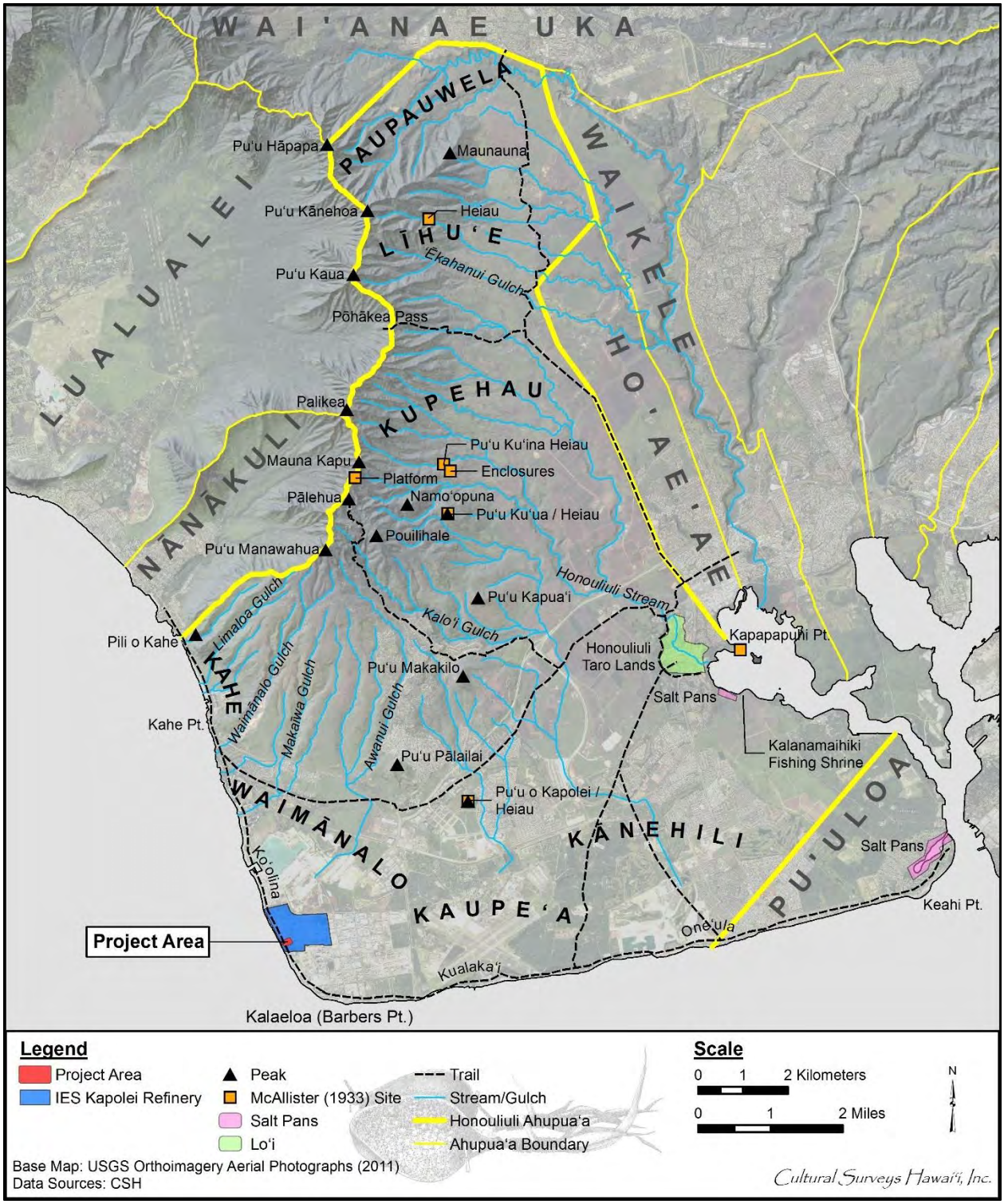

Figure 11. Place names of Honouliuli in relation to the project area overlying a 2011 USGS Orthoimagery aerial photograph; note the modern Farrington Highway generally follows the ancient cross-*ahupua'a* trail

A *heiau* (temple) was once on Pu‘uokapolei, but had been destroyed by the time of McAllister's (1933:108) survey of the island in 1930. The hill was used as a point of solar reference or as a place for making astronomical observations (A Lamentation for Kahahana, Fornander 1919:6[2]:292). Pu‘uokapolei may have been regarded as the gate of the setting sun, just as the eastern gate of Kumukahi in Puna is regarded as the gate of the rising sun; both places are associated with the Hawaiian goddess Kapo (Emerson 1993:41). This somewhat contradicts some Hawaiian cosmologies in which Kū was the god of the rising sun and Hina, the mother of Kamapua‘a, was associated with the setting sun.

Several place names in ‘Ewa are mentioned by Hi‘iaka as she traveled from Pu‘uokapolei toward the ‘Ewa coast. As Hi‘iaka is moving downhill from Kaupe‘a (adjacent to Pu‘uokapolei), and toward the coast, to the plains of Kānehili, she offers a chant. The chant also refers to Pe‘e-kaua, which may be a variation of Kau-pe‘e or Kaupe‘a.

Hi‘iaka sang this bitter chant addressed to Lohi‘au and Wahine‘ōma‘o, and it uses the association of the Plains of Kaupe‘a as a place for the wandering of lost souls. The name Kānehili also refers to wandering, as the word hili means "to go astray" (Emerson 1993:162).

Ku‘u aikane i ke awa lau o Pu‘uloa,

Mai ke kula o Pe‘e-kaua, ke noho oe,

E noho kaua e kui, e lei i ka pua o ke kauno‘a,

I ka pua o ke akuli-kuli, o ka wili-wili;

O ka iho‘na o Kau-pe‘e i K-hili,

Ua hili au; akahi no ka hili o ka la pomaika‘i;

E Lohiau ipo, e Wahine-oma‘o,

Hoe ‘a mai ka wa‘a i a‘e aku au.

Let us sit, if you will on this lea

And bedeck us with wreaths of Kauno‘a,

Of akuli-kuli and wili-wili,

My soul went astray in this solitude;

It lost the track for once, in spite of luck,

As I came down the road to Kau-pe‘a.

No nightmare dream was that which tricked my soul.

This way, dear friends; turn the canoe this way;

Paddle hither and let me embark.

[Emerson 1993:167–168]

A ceremony commemorating the changing of the seasons is still observed each year in the beginning of May at Waikīkī and Honouliuli. This ceremony was documented in a previous

cultural impact assessment conducted by CSH (Genz et al. 2012). Sam ‘Ohukani‘ōhi‘a Gon III, Na Wa‘a Lalani Kahuna O Pu‘u Koholā, and the late Kumu Hula John Keola Lake’s *hula hālau* (dance school) perform *‘oli* and *hula*, explaining that the *kilo hōkū* (astronomers) of O‘ahu observed how, from the perspective of Waikīkī, the sun sets in a southerly direction over the ocean during the winter solstice and in a northerly direction behind the ‘Ewa ridgeline during the summer solstice. During the springtime, the position of the setting sun marches steadily northward each day, and at the beginning of May, the sun sets behind Pu‘uokapolei, perfectly centered within its depression from the vantage point of Kūpalaha Heiau just west of the Waikīkī Aquarium. A coinciding ceremony at a *heiau* on Pu‘uokapolei similarly views the setting of the sun behind Pu‘ula‘ila‘i farther west, and a line of sight extending eastward from Pu‘ula‘ila‘i, Pu‘uokapolei, and the former site of Kūpalaha Heiau ends at the closely associated Papa‘ena‘ena Heiau. Mr. Gon suggests Papa‘ena‘ena Heiau may have been part of the ceremonies of this astronomical event.

3.3.2 Plains of ‘Ewa

Portions of the ‘Ewa plains were understood as the plains of Kaupe‘a, the plains of Pukaua, and the plains of Keahumoa.

3.3.2.1 The Plain of Kaupe‘a

Several places on the ‘Ewa coastal plain are associated with *ao kuewa*, the realm of the homeless souls (see Section 3.1.4 and Section 3.2.3). Pukui (1983:180) offers this Hawaiian saying, which places the wandering souls in a *wiliwili* grove at Kaupe‘a.

> *‘Ōlelo No‘eau* #1666
>
> *Ka wiliwili o Kaupe‘a.*
>
> The wiliwili grove of Kaupe‘a
>
> In ‘Ewa, O‘ahu. Said to be where homeless ghosts wander among the trees.

Beckwith (1970:154) has stressed that “the worst fate that could befall a soul was to be abandoned by its *‘aumakua* (family or personal gods) and left to stray, a wandering spirit (*kuewa*) in some barren and desolate place.” These wandering spirits were often malicious, so the places where they wandered were avoided.

3.3.2.2 The Plains of Pukaua

The Hawaiian language newspaper *Ka Loea Kālai‘āina* (13 January 1900) relates that near Pu‘uokapolei, on the plain of Pukaua, on the *mauka* side of the road, there was a large *pōhaku* (rock). This *mo‘olelo* suggests the plain around Pu‘uokapolei was called Pukaua. The *mo‘olelo* is as follows:

> If a traveler should go by the government road to Waianae, after leaving the village of gold, Honouliuli, he will first come to the plain of Puu-ainako and when that is passed, Ke-one-ae. Then there is a straight climb up to Puu-o-Kapolei and there look seaward from the government road to a small hill. That is Puu-Kapolei. . . You go down some small inclines, then to a plain. This plain is Pukaua and on the mauka side of the road, you will see a large rock standing on the plain . . . There were two supernatural old women or rather peculiar women with strange powers and Puukaua

> belonged to them. While they were down fishing at Kualaka‘i [near Barbers Point] in the evening, they caught these things, ‘a‘ama crabs, pipipi shellfish, and whatever they could get with their hands. As they were returning to the plain from the shore and thinking of getting home while it was yet dark, they failed for they met a one-eyed person [bad omen]. It became light as they came near to the plain, so that passing people were distinguishable. They were still below the road and became frightened lest they be seen by men. They began to run—running, leaping, falling, sprawling, rising up and running on, without a thought of the ‘a‘ama crabs and seaweeds that dropped on the way, so long as they would reach the upper side of the road. They did not go far for by then it was broad daylight. One woman said to the other, ‘Let us hide lest people see us,’ and so they hid. Their bodies turned into stone and that is one of the famous things on this plain to this day, the stone body. This is the end of these strange women. When one visits the plain, it will do no harm to glance on the upper side of the road and see them standing on the plain. [*Ka Loea Kālai‘āina*, 13 January 1900, translation in Sterling and Summers 1978:39]

In another version of this story, the two women met Hi‘iaka as she journeyed toward the ‘Ewa coast. The women were *mo‘o* (supernatural beings) and were afraid that Hi‘iaka would kill them, so they changed into their lizard form. One of the lizards hid in a little space on a stone beside the coastal trail, and the other hid nearby (*Ka Hōkū o Hawai‘i*, 15 February 1927, translated in Maly 1997:19). From that time on the stone was known as “Pe‘e-kāua,” meaning “we two hidden.” Hi‘iaka greeted the two women but did not harm them, and passed on.

When she reached Pu‘uokapolei, she also greeted two old women who lived at an *‘ohai* (*Sesbania tomentosa*) grove on the hill. These women were named Pu‘uokapolei and Nāwahineokama‘oma‘o (*Ka Hōkū o Hawai‘i*, 22 February 1927, translated in Maly 1997:19). As she continued her travels, she looked to the ocean and saw the canoe carrying Lohi‘au:

Ku‘u kāne i ke awa lau o Pu‘uloa	My man on the many harbored sea of Pu‘uloa
Mai ke kula o Pe‘ekāua ke noho	As seen from the plain of Pe‘ekāua
E noho kāua i ke kaha o ka ‘ōhai	Let us dwell upon the ‘ōhai covered shore
I ka wiliwili i ka pua o ka lau noni	Where the noni blossoms are twisted together
O ka ihona i Kānehili la	Descending along Kānehili
Ua hili ho‘i au-e	I am winding along.

[*Ka Hōkū o Hawai‘i*, 22 February 1927, translated in Maly 1997:20]

3.3.2.3 The Plains of Keahumoa

In several *mo‘olelo* of ‘Ewa, mention is made of the “plain of Keahumoa.” John Papa ‘Ī‘ī (1959:96) has this plain opposite the trail to Pōhākea Pass, stretching across the *ahupua‘a* of Honouliuli and Hō‘ae‘ae. McAllister (1933:107) states the plain was west of Kīpapa Gulch in

Waikele; it is also mentioned in the *mo‘olelo* of Waipi‘o. Thus, this is probably a general name for the flat plain *mauka* of the productive floodplain area directly adjacent to Pearl Harbor.

According to the Hi‘iaka legend, the goddess passed through ‘Ewa and met women stringing *ma‘o* (Hawaiian cotton; *Gossypium tomentosum*) flowers to make *lei* (garland). Hi‘iaka offered a chant, making known her desire to wear this *lei* around her own neck. Keahumoa is mentioned in the chant:

E lei ana ke kula o Ke‘ahumoa i ka ma‘o	The plains of Keahumoa are garlanded with ma‘o
‘Ohu‘ohu wale nā wāhine kui lei o ka nahele	The lei-stringing women of the forest are festively adorned

[Ho‘oulumahiehie 2008a:268; 2008b:287]

3.3.3 *Nā Ala Hele* (Trails)

John Papa ‘Ī‘ī described a network of Leeward O‘ahu *ala hele* (trails), which in historic times encircled and crossed the Wai‘anae Range, allowing passage from Lualualei to Honouliuli by three different trails (‘Ī‘ī 1959:96–98). The following description of the trails is provided by ‘Ī‘ī:

> The trail went down to the stream and up again, then went above the taro patches of Waiau, up to a makai field, to Waimano, to Manana, and to Waiawa; then to the stream of Kukehi and up to two other maika [ancient Hawaiian game suggesting bowling] fields, Pueohulunui and Haupuu. At Pueohulunui was the place where a trail branched off to go to Waialua and down to Honouliuli and on to Waianae. As mentioned before, there were three trails to Waianae, one by way of Pu‘u o Kapolei, another by way of Pohakea, and the third by way of Kolekole. [‘Ī‘ī 1959:97] [see Figure 12]

The cross-*ahupua‘a* (east-west) trail that skirted Pearl Harbor, passed north of Pu‘uokapolei, and continued along the coast to Wai‘anae, is depicted in an 1825 map of the South Coast of O‘ahu by Charles Malden (Figure 13) of the British ship, the *Blonde*. The trail generally follows the route of the modern Farrington Highway. Malden’s 1825 map also shows a *mauka-makai* (north-south) trail with two spurs that extend from the cross-*ahupua‘a* (east-west) trail to settlements at the southern coast, Kūalaka‘i and One‘ula. Figure 14 is a photo of the Kūalaka‘i Trail found within the Kalaeloa Heritage Park today.

3.3.4 Ka-lua-ōlohe (Caves) of Honouliuli

‘Ewa was famous for the many limestone caves that had formed in the uplifted coral. Some of these caves, called “*ka-lua-ōlohe*” were inhabited by the *ōlohe*, also known as Ha‘a people who are said to have arrived during the fifth period of the *Kumulipo* (origin, genesis) (Beckwith 1940:343). According to Beckwith,

> Olohe, or Ha‘a people, were hence a well-recognized class in old days, skilled in wrestling and bone breaking (lua) and with their hairless bodies. It is said that they used to pull out their hair and smear their bodies with oil in order to give no hold to an antagonist [Beckwith 1940:343]

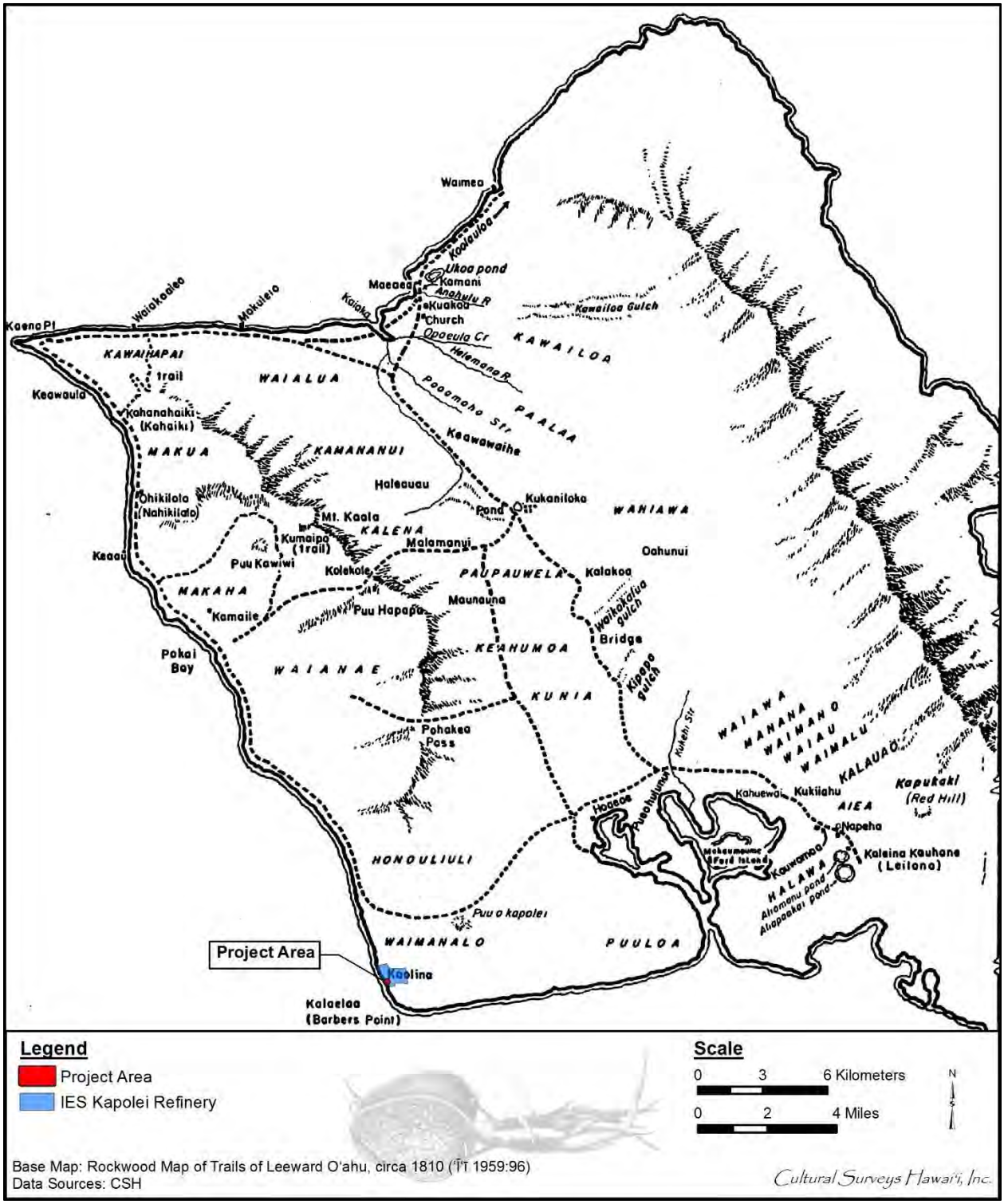

Figure 12. Portion of Rockwood map of trails of Leeward O‘ahu, ca. 1810, in relation to the current project area (‘Ī‘ī 1959:96)

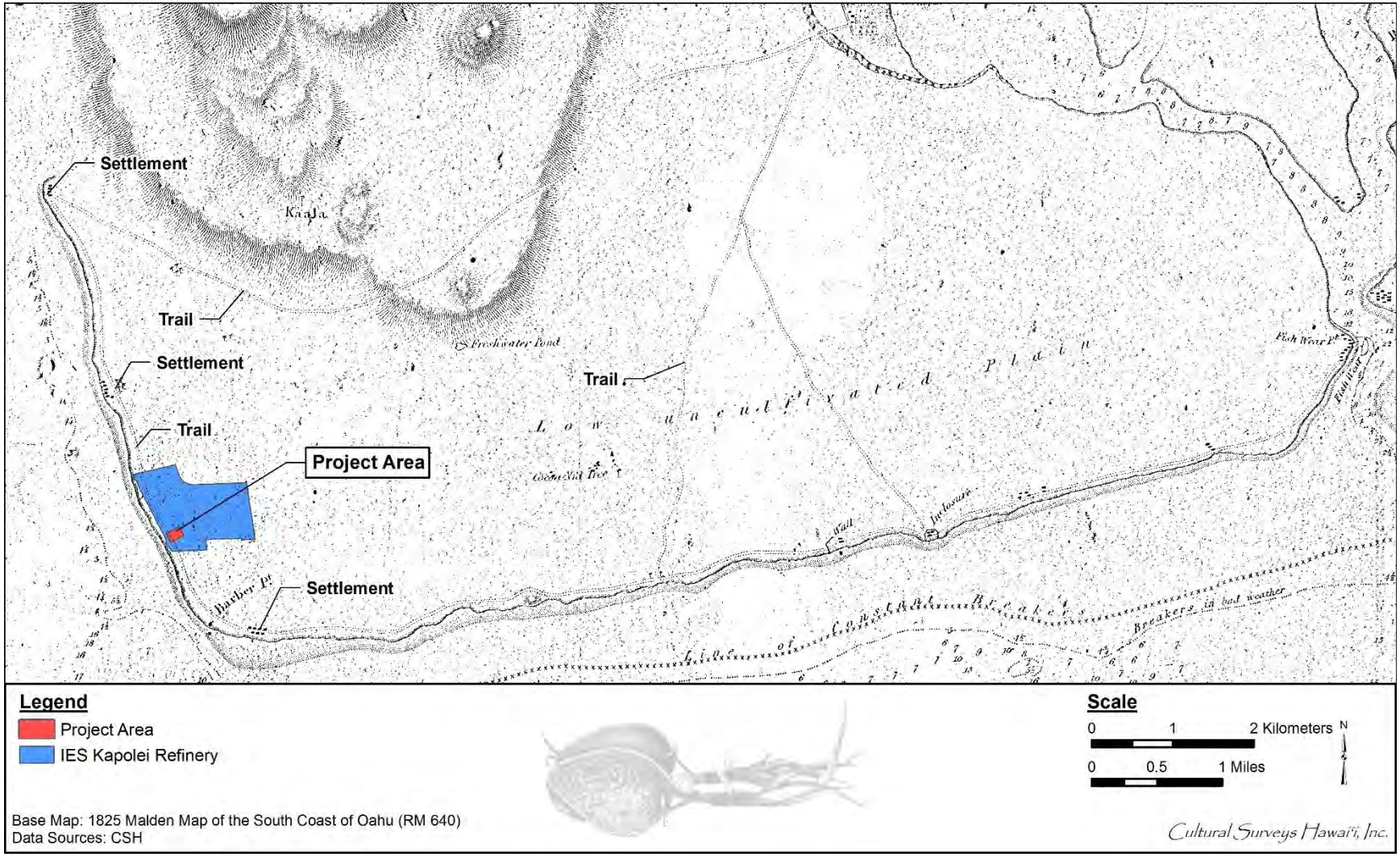

Figure 13. 1825 Malden map of the southern coast of O‘ahu with study area; note the faint lines from West Loch stretching northwest, west, and south depict ancient foot trails

Figure 14. Photo of a portion of the Kūalaka‘i Trail in the Kalaeloa Heritage Park (Liborio 2016)

The curious appearance of the *ōlohe* people and their prized fighting skills were also emphasized by Pukui's definition of *ōlohe*: "bare, naked, barren, hairless as a dog" and "skilled, especially in lua fighting" (Pukui et al. 1986:285–286). In addition to their fierce reputation as skilled fighters, *ōlohe* also referred to hula experts (Pukui et al. 1986:286) and in legends, to "professional robbers" with "man-eating habits" who stationed themselves along narrow passes to wait for their victims (Beckwith 1940:343–344). Kaupe was one of the most well-known *ōlohe* in oral tradition, and he lived in Līhu‘e in upland Honouliuli (Beckwith 1940:344–345).

The caves of Pu‘uloa were sometimes also used as burial caves. In 1849, Keali‘iahonui, son of Kaua‘i's last king, Kaumuali‘i, died. He had once been married to the chiefess Kekau‘ōnohi, who had stayed with him until 1849. She wanted to bury her ex-husband at sea. According to Alexander,

> It seems that by Kekauonohi's orders, the coffin containing her late husband's remains was removed to Pu‘uloa, ‘Ewa, with the view of having it afterwards taken out to sea and there sunk. It was temporarily deposited in a cavern in the coral limestone back of Pu‘uloa, which has long been used for a burial place, and has lately been closed up. [Alexander 1907:27]

After some initial objections by the niece of Keali‘iahonui, the body was removed from the outer coffin, the rest was sunk, and the coffin was later buried somewhere in Pu‘uloa.

3.3.5 *Heiau*

Heiau were pre-Christian places of worship. Human-made structures utilized for religious purposes were also considered sacred sites or *wahi kapu*. Construction of some *heiau* were elaborate, consisting of large communal structures while others were simple earth terraces or shrines (McAllister 1933:8). *Heiau* are most commonly known to be where important ceremoies took place, and are large structures with platforms or altars comprised of one or more terraces (McAllister 1933:8). McAllister reports on two known *heiau* in the *ahupua‘a* of Honouliuli as well as two other sites that could have possibly been *heiau*. These *heiau* were located on Pu‘u Kuua, Pu‘u o Kapolei, at the foot of Pu‘u Kanehoa, and at the foot of Mauna Kapu (McAllister 1933).

3.3.5.1 Pu‘u o Kapolei Heiau

McAllister writes that the stones from the *heiau* supplied the rock crusher located on the side of this elevation, about 100 ft away on the sea side. There was once a large rock shelter on the *makai* side said to have been the residence of Kamapua‘a and his grandmother (McAllister 1933:108). After conquering the majority of O‘ahu, he established his grandmother as queen of this *wahi* (place) (Pukui 1974:203).

3.3.5.2 Pu‘u Ku‘ua Heiau

Pu‘u Ku‘ua Heiau located in Palikea, Honouliuli, overlooks both Honouliuli and Nānākuli, and is at the height of approximately 1,800 ft. Most of the stones from the *heiau* were used for a cattle pen located on the *makai* side of the site. The part of the *heiau* that hadn't been cleared for pineapples has been planted in ironwoods (McAllister 1933:108)

3.3.5.3 Unidentified *Heiau* at the Foot of Pu‘u Kanehoa

Located at the foot of Pu‘u Kanehoa is a small inclosure thought to have possibly been a *heiau*. McAllister writes,

> My informant, Reiney, recalls the respect the old Hawaiians had for the place when he was punching cattle with them in his youth. It is a walled inclosure 2 by 3 feet. On the inside the walls are between 2 and 3 feet high, and on the outside they range from 2 to 5 feet, depending upon the slope of the land. On three sides the walls are 2 feet wide, but the fourth is 3 feet wide. The walls are evenly faced with a fill of smaller stones. At present the site is surrounded with a heavy growth of Lantana; but only a thick growth of grass and two small guava bushes are in the interior, which is most unusual unless human hands keep the interior clear. Possibly this is not a heiau but a small inclosure considered sacred for some reason. [McAllister 1933:107]

3.3.5.4 Unidentified *Heiau* at the Foot of Pu‘u Kuina

Located in Aikukai, Honouliuli, at the foot of Pu‘u Kuina what looked to be a terrace is all that remained when McAllister cataloged site 134. He notes the inability to determine the size of the *heiau* or the number of terraces that once stood (McAllister 1933:107).

3.4 *‘Ōlelo No‘eau (Proverbs)*

Hawaiian knowledge was shared by way of oral histories. Indeed, one’s *leo* (voice) is oftentimes presented as *ho‘okupu* (“to cause growth,” a gift given to convey appreciation, to strengthen bonds); the high valuation of the spoken word underscores the importance of the oral tradition (in this case, Hawaiian sayings or expressions), and its ability to impart traditional Hawaiian “aesthetic, historic, and educational values” (Pukui 1983:vii). Thus, in many ways these expressions may be understood as inspiring growth within reader or between speaker and listener:

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

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

3.4.1 *Concerning Sharks*

The eastern coast of Honouliuli Ahupua‘a lies adjacent to Pu‘uloa which has many *mo‘olelo* about sharks, particularly Ka‘ahupāhau, the queen shark of O‘ahu and the most famous guardian shark who lived in Pu‘uloa. Thus, Honouliuli is closely associated with shark *‘aumākua*. According to *mo‘olelo*, the *kama‘āina* of ‘Ewa were said to be protected by sharks. The shark was one of the many animal forms (*kinolau*) that *‘aumākua*, or ancestor gods, could take. The *‘aumākua* was a revered intercessor, providing the "closest man-with-god relationship" (Pukui et al. 1972:123). As Pukui (1972) also notes,

> For these deities had once been living beings; they were long departed ancestors become gods. From the long corridors of time the *‘aumākua* watched their descendants. And though they judged and punished, they were also special advocates and protectors. For *‘ohana* (family) loyalty continued into eternity. [Pukui et al. 1972:123]

The following *‘ōlelo no‘eau* are associated with sharks.

3.4.1.1 ***‘Ōlelo No‘eau* #105**

Alahula Pu‘uloa he alahele na Ka‘ahupāhau.

Everywhere in Pu‘uloa is the trail of Ka‘ahupāhau.

Said of a person who goes everywhere, looking, peering, seeing all, or of a person familiar with every nook and corner of a place. Ka‘ahupāhau is the shark goddess of Pu‘uloa (Pearl Harbor) who guarded the people from being molested by sharks. She moved about, constantly watching. [Pukui 1983:14]

3.4.1.2 ***‘Ōlelo No‘eau* #1014**

Ho‘ahewa na niuhi ia Ka‘ahupāhau.

The man-eating sharks blamed Ka‘ahupāhau

Evil-doers blame the person who safeguards the rights of others. Ka‘ahupāhau was the guardian shark goddess of Pu‘uloa (Pearl Harbor) who drove out or destroyed all the man-eating sharks. [Pukui 1983:108]

3.4.1.3 ***‘Ōlelo No‘eau* #2152**

Mehameha wale no o Pu‘uloa i ka hele a Ka‘ahupāhau.

Pu‘uloa became lonely when Ka‘ahupāhau went away

The home is lonely when a loved one has gone. Ka‘ahupāhau, guardian shark of Pu‘uloa (Pearl Harbor), was dearly loved by the people. [Pukui 1983:234]

3.4.1.4 ***‘Ōlelo No‘eau* #2111**

Make o Mikololou a ola i ke ale lo.

Mikololou died and came to life again through his tongue

Said of one who talks himself out of a predicament. [Pukui 1983:229]

3.4.2 *Concerning the Pipi of Pu‘uloa*

Pearl Harbor or Pu‘uloa, derived from the name Waimomi, or "water of the pearl," an alternate name for the Pearl River. The harbor was thus named after the *pipi* or pearl oysters of the family *Pteriidae* (mainly *Pinctada radiata*), which were once abundant on the harbor reefs and after which many *‘ōlelo no‘eau* were generated.

3.4.2.1 ***‘Ōlelo No‘eau* #1331**

Ka i‘a hāmau leo o ‘Ewa.

The fish of ‘Ewa that silences the voice.

The pearl oyster, which has to be gathered in silence. [Pukui 1983:144]

Handy and Handy (1972) offer a different interpretation:

> The pipi was sometimes called ‘the silent fish,’ or, *‘i‘a hamau leo o ‘Ewa*,’ ‘Ewa’s silent sea creature since the collectors were supposed to stay quiet while harvesting the shells. [Handy and Handy 1972:471]

3.4.2.2 ***‘Ōlelo No‘eau* #493**

Haunāele ‘Ewa i ka Moa‘e.

‘Ewa is disturbed by the Moa‘e wind.

Used about something disturbing, like a violent argument. When the people of ‘Ewa went to gather the *pipi*, they did so in silence, for if they spoke, a Moa‘e breeze would suddenly blow across the water, rippling it, and the oysters would disappear. [Pukui 1983:59]

3.4.2.3 ***‘Ōlelo No‘eau* #274**

E hāmau o makani mai auane‘i

Hush, lest the wind rise

Hold your silence or trouble will come to us. When the people went to gather pearl oysters at Pu‘uloa, they did so in silence, for they believed that if they spoke, a gust of wind would ripple the water and the oysters would vanish. [Pukui 1983:34]

3.4.2.4 ***‘Ōlelo No‘eau* #1357**

Ka i‘a kuhi lima o ‘Ewa.

The gesturing fish of ‘Ewa.

The *pipi*, or pearl oyster. Fishermen did not speak when fishing for them but gestured to each other like deaf-mutes. [Pukui 1983:148]

3.4.3 *Concerning the ‘Anaeholo of Honouliuli*

The *‘anaeholo* of Honouliuli is described in the following excerpt from which the *‘ōlelo no‘eau* below derives:

> The home of the ‘anae-holo is at Honouliuli, Pearl Harbor, at a place called Ihuopala‘ai. They make periodical journeys around to the opposite side of the island, starting from Pu‘uloa and going to windward, passing successively Kumumanu, Kalihi, Kou, Kālia, Waikīkī, Ka‘alāwai, and so on, around to the Ko‘olau side, ending at Lā‘ie, and then returning by the same course to their starting point. [Nakuina 1998:271]

3.4.3.1 ***‘Ōlelo No‘eau* #1330**

> *Ka i‘a hali a ka makani*
>
> The fish fetched by the wind
>
> The *‘anaeholo*, a fish that travels from Honouliuli, where it breeds, to Kaipāpa‘u, on the windward side of O‘ahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong. [Pukui 1983:145]

3.4.4 *Concerning Kalo*

A rare *kalo* called the “Kāī o ‘Ewa,” was grown in mounds in marshy locations in ‘Ewa (Handy and Handy 1972:471). The cultivation of this prized and delicious taro inspired the following saying.

3.4.4.1 ***‘Ōlelo No‘eau* #2770**

> *Ua ‘ai i ke kāī-koi o ‘Ewa.*
>
> He has eaten the *kāī-koi* taro of ‘Ewa
>
> *Kāī* is O‘ahu’s best eating taro; one who has eaten it will always like it. Said of a youth or a maiden of ‘Ewa, who, like the *kāī* taro, is not easily forgotten. [Pukui 1983:305]

3.5 *Oli (Chant)*

Oli, according to Mary Kawena Pukui (Pukui 1995:xvi–xvii), are often grouped according to content. Chants often were imbued with *mana* (spiritual power); such *mana* was made manifest through the use of themes and *kaona*. According to Pukui, chants for the gods (prayers) came first, and chants for the *ali‘i*, “the descendants of the gods,” came second in significance. Chants “concerning the activities of the earth peopled by common humans,” were last in this hierarchy (Pukui 1995:xvi–xvii). Emerson conversely states,

> In its most familiar form the Hawaiians—many of whom [were lyrical masters]—used the oli not only for the songful expression of joy and affection, but as the vehicle of humorous or sarcastic narrative in the entertainment of their comrades. The dividing line, then, between the oli and those other weightier forms of the mele, the inoa, the kanikau (threnody), the pule, and that unnamed variety of mele in which the poet dealt with historic or mythologic subjects, is to be found almost wholly in the mood of the singer. [Emerson 1965:254]

While *oli* may vary thematically, subject to the perspective of the *ho‘opa‘a* (chanter), it was undoubtedly a valued art form used to preserve oral histories, genealogies, and traditions, to recall

special places and events, and to offer prayers to *akua* and *‘aumākua* alike. Perhaps most importantly, as Alameida (1993:26) writes, “chants . . . created a mystic beauty . . . confirming the special feeling for the environment among Hawaiians: their *one hānau* (birthplace), their *kula iwi* (land of their ancestors).”

3.5.1 *Oli for Kūali‘i*

A chant for the chief Kūali‘i, an ancient chief of O‘ahu, mentions the *ahupua‘a* names of the ‘Ewa District including Honouliuli Ahupua‘a. Each phrase usually contains a play on words, as the place name and one meaning of the word, or portion of the word, appears on each line, for example, “*kele*” in Waikele means “slippery.” However, these word plays are not necessarily related to the actual place name meanings of the *ahupua‘a*.

Uliuli ka poi e piha nei—o Honouliuli;	Blue is the *poi* [pounded taro] which appeases [the hunger] of Honouliuli;
Aeae ka paakai o Kahuaiki—Hoaeae;	Fine the salt of Kahuaike—Hoaeae;
Pikele ka ia e Waikele—o Waikele;	Slippery the fish of Waikele—Waikele;
Ka hale pio i Kauamoa—o Waipio;	The arched house at Kauamoa—Waipio;
E kuu kaua i ka loko awa—o Waiawa;	Let us cast the net in the *awa*-pond—of Waiawa;
Mai hoomanana ia oe—o Manana.	Do not stretch yourself at—Manana.
He kini kahawai,	Many are the ravines,
He lau kamano—o Waimano;	Numerous the sharks, at Waimano;
Ko ia kaua e ke au—o Waiau;	We are drawn by the current of Waiau;
Kukui malumalu kaua—Waimalu;	In the *kukui* grove we are sheltered—in Waimalu;
E ala kaua ua ao-e—o Kalauao;	Let us arise, it is daylight—at Kalauao;
E kipi kaua e ai-o Aiea;	Let us enter and dine-at Aiea;
Mai hoohalawa ia oe—O Halawa.	Do not pass by—Halawa.

[Fornander 1917:400–401]

A chant for the Kaua‘i chief of Kaumuali‘i, a rival of Kamehameha I, also mentions place names of the ‘Ewa District. In a portion of this chant, the wind that blows from one end of ‘Ewa to the other is compared to love.

3.5.2 *The Splendor of Kānehoa*

Pu‘u Kānehoa (see Figure 11) is mentioned in the following *hula* chant.

Mele Ku-pe‘e	Anklet Song
Aala kupukupu ka uka o Kane-hoa	Fragrant the grasses of high Kanehoa.
E ho-a!	Bind on the anklets, bind!
Hoa na lima o ka makani, he Wai- kaloa.	Bind with finger deft as the wind
He Wai-kaloa ka makani anu Lihue.	That cools the air of this bower.
Alina lehua i kau ka opua-	Lehua blooms pale at my flower,
Ku‘u pua,	O sweet heart of mine,
Ku‘u puai‘ini e ku-i a lei.	Bud that I'd pluck and wear in my wreath.
Ina ia oe ke lei ‘a mai la.	If thou wert but a flower!

[Emerson 1965:49]

A similar chant is found in the Legend of Pamano, which mentions the *kupukupu* (sword fern; *Nephrolepis exaltata*), a fragrant flowering shrub.

Aala kupukupu ka uka o Kanehoa la!	The uplands of Kanehoa are scented with kupukupu.
Hoa! Hoa na lima o ka makani Waikoloa,	Bind on, the hands of the Waikoloa wind are binding,
He Waikoloa ka makani anu, o Lihue,	The Waikoloa wind is the cold wind of Lihue [Honouliuli],
Weli no loha ka uka o Waiopua la,	Withering the branches in the uplands of Waiopua,
Kuu pua i i ai e kui e lei,	My flower I said I would string into garlands.
I na ia oe ke lei ia ala	If you have it, you would have worn it.

[Fornander 1919:5(2):310–311]

3.5.3 *Paupauwela and Līhu‘e*

Paupauwela (also spelled Popouwela) is the name of the land area in the extreme *mauka* section of Honouliuli Ahupua‘a. The land area of Līhu‘e is just *makai* of this land, and extends into the *ahupua‘a* of Waipi‘o (adjacent to the eastern border of Honouliuli). Both place names are mentioned in a chant recorded by Abraham Fornander (1917), which was composed as a *mele* for the O‘ahu king, Kūali‘i, as he was preparing to battle Kuiaia, the chief of Wai‘anae:

Ihea, ihea la ke kahua,	Where? Where is the battle field
Paio ai o ke koa-a?	Where the warrior is to fight?

I kai i kahua i Kalena,	On the field of Kalena,
I Manini, i Hanini	At Manini, at Hanini,
I ninia i ka wai akua,	Where was poured the water of the god
I ko hana i Malamanui	By your work at Malamanui;
Ka luna o Kapapa, i Paupauwela,	On the heights of Kapapa, at Paupauwela,
I ka hilinai i ke kalele,	Where they lean and rest;
Ka hala o Halahalanui maauea,	At the *hala* trees of indolent Halahalanui,
E kula ohia ke Pule-e,	At the *ohia* grove of Pule-e
Ke ‘kua o Lono o Makalii	The god of Lono, of Makalii
Ka lala aalao Ukulonoku,	The fragrant branch of the Ukulonoku,
No Kona paha, no Lihue.	Mayhap from Kona, from Lihue,
No ka la i Maunauna,	For the day at Maunauna

[Fornander 1917:384–385]

3.6 *Mele* (Song)

There exist a few *mele* that concern or mention Honouliuli. These particular *mele* may also be classified as *mele wahi pana* (songs for legendary or historic places). *Mele wahi pana* such as those presented here may or may not be accompanied by *hula* (dance) or *hula wahi pana* (dance for legendary or historic places). As the Hula Preservation Society notes,

> Hula Wahi Pana comprise a large class of dances that honor places of such emotional, spiritual, historical, or cultural significance that chants were composed for them. Only the composers of the chants could know the deepest meanings, as they would be reflections of their feelings and experiences . . . Since the subjects of Wahi Pana compositions are extremely varied, their implementation through hula are as well. Coupled with the differences from one hula style and tradition to the next, Hula Wahi Pana can be exceptionally diverse. They can be done sitting or standing, with limited body movement or wide free movement; with or without the use of implements or instruments; with the dancers themselves chanting and/or playing an implement or being accompanied by the *ho‘opa‘a* [drummer and *hula* chanter (memorizer)]. Beyond the particular hula tradition, what ultimately determines the manner in which a Hula Wahi Pana is performed are the specific place involved, why it is significant, the story being shared about it, and its importance in the composer’s view. [Hula Preservation Society 2014]

3.6.1 *Mele for Kūali‘i*

The icy winds of Honouliuli are also noted in a *mele* for the high king Kūali‘i. In this *mele*, the cold winds of Kumomoku and Leleiwe, near Pu‘uloa in Honouliuli are compared unfavorably to the god Kū:

Aole i like Ku.	Not like these are thou, Ku
Ia ua hoohali kehau,	[Nor] the rain that brings the land breeze,
Mehe ipu wai ninia la,	Like a vessel of water poured out.
Na hau o Kumomoku;	Nor to the mountain breeze of Kumomoku,
Kekee na hau o Leleiwi,	[The] land breeze coming round to Leleiwi.
Oi ole ka oe i ike	Truly, have you not known?
I ka hau kuapuu	The mountain breezes, that double up your back,
Kekee noho kee, o Kaimohala,	[That make you] sit crooked and cramped at Kaimohala,
O Kahili i Kaupea-la	The Kahili at Kaupea?
Aole i like Ku	Not like these are thou, Ku

[Fornander 1917:4(2):390–391]

3.6.2 *Eia mai Au ‘o Makalapua*

This particular *mele* pays homage to the royal train called *Lanakila*. In paying homage to this train, the *mele* also pays homage to its most honored and well-known passenger, Queen Lili‘uokalani. This *mele* may also be understood as a protest song.

In analyzing this *mele*, cultural historian Kīhei de Silva notes that “Eia mai Au ‘o Makalapua” is the second of three chants that make up *hō‘alo i ka ihu o ka Lanakila* (Three Train Chants for Lili‘uokalani). He adds that these songs, “when considered in chronological succession . . . add a Hawaiian dimension to the story of B.F. Dillingham’s Oahu Railway and Land Company (OR&L), a story that otherwise reads far too much like an early script of *How the West was Won*” (de Silva 2003). De Silva provides a chronology of Benjamin Franklin (B.F.) Dillingham’s rise to influence within Hawaiian political spheres, and his eventual founding and construction of the OR&L line. Dillingham also figures prominently within Honouliuli Ahupua‘a (see Section 4.3). Dillingham’s personal history is described by de Silva as follows:

- Arrived in Honolulu in 1865 as first mate of the *Whistler*.
- He promptly fell off a horse and broke his leg. When his ship left without him, he took a job as a clerk in a hardware store.
- 20 years later, in 1885, he had become Hawai‘i’s first big-time land speculator, buying and leasing vast tracts of property in West O‘ahu in hopes of reselling it to housing and ag. interests.

- When no one, in fact, took interest in his largely inaccessible property, he decided to build a railroad through it.
- In 1888, Dillingham convinced Kalākaua to sign a franchise giving him three years to build a line running from Honolulu to the far end of Pearl River Lagoon. His critics called it ‘Dillingham’s Folly,’ but Dillingham boasted that he would put his railroad into operation by Sept. 4, 1889, his 45th birthday.
- Things did not go well in the early months of construction, and in order to fulfill this boast, Dillingham had to fire up a miniscule saddle-tank engine named *Kauila*, hitch it to a flatcar that carried his passengers on jury-rigged seats, and send it bucking, wheezing, and spewing greasy foam down a mile-and-a-half of track that ended in the rice paddies of Pālama.
- Despite this farcical beginning, the construction of Dillingham’s railroad then proceeded in rather impressive fashion: the line was opened to ‘Aiea in November 1889, to Mānana in January 1890, to Honouliuli and ‘Ewa Mill in June and July 1890, to Wai‘anae in July 1895, to Waialua in June, 1898, and to Kahuku in January 1899. [de Silva 2003]

In 1890, as construction of the railway moved forward, B.F. Dillingham bought and shipped to Hawai‘i a passenger coach named *The Pearl* and a locomotive named *General Valleho.* According to de Silva (2003), the *Pearl* was built in San Francisco and was “paneled in rich woods and outfitted with plush chairs, velvet drapes, electric lights, a kitchen, a lānai with a striped canvas awning, and a new-fangled contraption called a flush toilet.” The *General Valleho* was renamed the *Lanakila* by Dillingham:

> … [He] gave it the number 45, a tribute to his 45th birthday boast and erstwhile victory in the rice paddies of Pālama. The Lanakila became Dillingham’s 4th locomotive—after the Kauila, Leahi, and Ka‘ala—and for many years it was regarded as the most attractive engine in the OR&L stable. Dillingham apparently wasted no time in hitching the Pearl to the Lanakila and using the pair as his wine-‘em and dine-‘em celebrity train, the vehicle in which he wooed financial and political support for his business ventures. [de Silva 2003]

As part of Dillingham’s plans to woo the influential, he invited King Kalākaua on the inaugural ride on the *Lanakila*. Dillingham also insisted the luxury coach *Pearl* serve as the king’s own royal car. De Silva (2003) notes it is “safe for us to assume that Queen Lili‘u[okalani] rode in the Pearl when the *Lanakila* took her on the train rides.” With the opening of the Ewa Mill station, Queen Lili‘uokalani once again embarked on a journey on the *Lanakila*; this particular journey took her through “the lowlands of Honouliuli, and finally to the exposed coral plain of Pōlea on which the ‘Ewa Mill Station was located” (de Silva 2003).

Eia mai au ‘o Makalapua	Here I am, Makalapua
Hō‘alo i ka ihu o ka Lanakila.	Traveling where the *Lanakila* goes.
‘O ke ku‘e a ka hao a i Kūwili	The piston works at Kūwili
Ka hiona ‘olu a‘o Hālawa.	And down the pleasant descent of Hālawa.

Ua lawa ka ‘ikena i ke awalau	Satisfying is the view of the lochs
Iā ‘Ewa ka i‘a hāmau leo.	Of ‘Ewa, ‘land of the silent fish.’
Ua piha ka uahi a i Mānana	The smoke rises at Mānana
Aweawe i ke kula o Waipi‘o.	And streams along at Waipi‘o.
I kai ho‘i au a Honouliuli	Then I reached the lowlands of Honouliuli
Ahuwale ke ko‘a o Pōlea.	Where the corals of Pōlea lie exposed.
Ha‘ina ‘ia mai ana ka puana	This is the conclusion of the song
Hō‘alo i ka ihu a ka Lanakila.	Of traveling where the *Lanakila* goes.

[de Silva 2003]

De Silva (2003) provides a remarkable breakdown of this *mele*, delving into the subtext to reveal another layer of understanding, of *kaona*:

> ‘Makalapua’ shares . . . the sense of awesome efficiency and harmony . . . These are apparent in ‘Makalapua’s’ description of the working of the train’s piston at Kūwili, in the rising and billowing of steam at Mānana and Waipi‘o, and especially in the sense of speed with which the mele whisks us from Honolulu to Pōlea in the space of its six, two-line verses. Efficiency and harmony, however, are not at the heart of ‘Makalapua;’ it is inspired and driven, instead, by *aloha ‘āina*—love for the land—and by *kū‘ē ho‘ohui ‘āina*—resistance to annexation. In my reading of the mele, the dominant imagery is that of flower-stringing. The train and track serve as the contemporary equivalent of lei needle and thread; with them, Lili‘u sews a series of beloved place-names and place-associations into a lei of adornment and protection for Ke-awalau-o-Pu‘uloa. Keawalauopu‘uloa, the many-harbored sea of Pu‘uloa, is the old name for Pearl Harbor. The cession of Pearl Harbor to America in return for sugar reciprocity was one of the hottest political issues of ‘Makalapua’s’ day. Lili‘u was absolutely opposed to any Keawalau deals; her brother, on the other hand, had regularly waved this bait at the American nose; he was even rumored, on his Nov. 1890 departure to San Francisco, to have harbored a hidden Pearl Harbor agenda. The key lines of ‘Makalapua’ are ‘Ua lawa ka ‘ikena i ke awalau / Iā ‘Ewa ka i‘ā hāmau leo . . . I kai ho‘i au a Honouliuli / Ahuwale ke ko‘a o Pōlea.’ In my reading, these lines say: ‘We hold to our knowledge of Keawalau, we are like its closed-mouthed pipi, its oysters; we will never give up the pearl that we contain; here at the shoreline of Honouliuli we normally silent fish reveal this deeply held conviction.’ [de Silva 2003]

Section 4 Traditional and Historical Accounts of Honouliuli

Various legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once heavily populated by pre-Contact Hawaiians. This substantial settlement is attributable for the most part to the plentiful marine and estuarine resources available at the coast, as well as lowlands fronting the west loch of Pearl Harbor (Kaihuopala‘ai) suitable for wetland taro cultivation. In addition, forest resources along the slopes of the Wai‘anae Range, as suggested by E.S. and E.G. Handy, probably acted as a viable subsistence alternative during times of famine and/or low rainfall:

> The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the wao, or upland jungle, than was the case on the windward coast. Yet the wao here was more extensive, giving greater opportunity to forage for wild foods during famine time. [Handy and Handy 1972:469–470]

Other early historical accounts of the general region typically refer to the more populated eastern portion of the ‘Ewa district, where missions and schools were established and subsistence resources were perceived to be greater. However, the presence of archaeological sites along the barren coral plains and coast of southwest Honouliuli Ahupua‘a indicate pre-Contact and early post-Contact populations also adapted to less inviting areas, despite the environmental hardships.

Previous archaeological study has sought to understand correlations between environmental hardship and war. Although warfare “is a choice made by peoples, not an inevitability forced upon them by external forces over which they have no control,” studies have shown (Ferguson 1984; Haas 1990) that “during times of environmental hardship wars erupt and when these ease, they stop” (Carman 2013). Oral traditions related to the ‘Ewa line of chiefs recall battles and chiefly claims upon valuable territories. The rich resources of Pu‘uloa—the fisheries in the lochs, the shoreline fishponds, the numerous springs, and the irrigated lands along the streams—made ‘Ewa a prize for competing chiefs. Battles were fought for the ‘Ewa lands, sometimes by competing O‘ahu chiefs and invading chiefs from other islands.

‘Ewa was a political center and home to many chiefs in its day. Oral accounts of *ali‘i* recorded by Hawaiian historian Samuel Kamakau date back to at least the twelfth century:

> The chiefs of Līhu‘e [upland area in ‘Ewa], Wahiawā, and Halemano on O‘ahu were called *lō ali‘i*. Because the chiefs at these places lived there continually and guarded their *kapu*, they were called *lō ali‘i* [from whom a ‘guaranteed’ chief might be obtained, loa‘a]. They were like gods, unseen, resembling men. [Kamakau 1991:40]

In the mid-eleventh century, Māweke, a direct lineal descendant of the illustrious Nanaulu, ancestor of Hawaiian royalty, was a chief of O‘ahu (Fornander 1996:47). Keaunui, the second of his three sons, became the head of the powerful ‘Ewa chiefs. Tradition tells of him cutting a navigable channel through the Pearl River using his canoe. Keaunui’s son, Lakona, became the progenitor of the ‘Ewa chiefs around 1400 (Fornander 1996:224–226). Chiefs within his line, the Māweke-Kumuhonua line, reigned until about 1520-1540, with their major royal center in Līhu‘e

in ‘Ewa (Cordy 2002:24). Haka was the last chief of the Māweke-Kumuhonua line. He was slain by his men at the fortress of Waewae near Līhu‘e (Fornander 1996:88; Kamakau 1991:54).

Mā‘ilikūkahi, who was born *ali‘i kapu* (sacred chief) at the birthing stones of Kūkaniloko (Kamakau 1991:53), became *mō‘ī* (king) of O‘ahu between 1520-1540 (Cordy 2002:19). Mā‘ilikūkahi was popular during his reign and was remembered for initiating land reforms that brought about peace, and for encouraging agricultural production, which brought about prosperity. He also prohibited the chiefs from plundering the *maka‘āinana*, a prohibition that was punishable by death (Kamakau 1991:55).

Upon consenting to become *mō‘ī* at the age of 29, Mā‘ilikūkahi was taken to Kapukapuākea Heiau at Pa‘ala‘akai in Waialua to be consecrated. Soon after becoming king, Mā‘ilikūkahi was taken by the chiefs to live at Waikīkī. He was probably one of the first chiefs to live there, as the chiefs had previously always lived at Waialua and ‘Ewa. Under his reign, the land divisions were reorganized and redefined (Pukui et al. 1974:113).

In reference to the productivity of the land and the population during Mā‘ilikūkahi’s reign, Kamakau writes,

> In the time of Mā‘ili-kūkahi, the land was full of people. From the brow, lae, of Kulihemo to the brow of Maunauna in ‘Ewa, from the brow of Maunauna to the brow of Pu‘ukea [Pu‘u Ku‘ua] the land was full of chiefs and people. From Kānewai to Halemano in Wai‘alua, from Halemano to Paupali, from Paupali to Hālawa in ‘Ewa the land was filled with chiefs and people. [Kamakau 1991:55]

Mā‘ilikūkahi’s peaceful reign was interrupted by an invasion which would change ‘Ewa forever. Fornander describes the Battle of Kīpapa (to be paved [with the corpses of the slain]) at Kīpapa Gulch in Waipi‘o Ahupua‘a:

> I have before referred to the expedition by some Hawaii chiefs, *Hilo-a-Lakapu*, *Hilo-a-Hilo-Kapuhi*, and *Punaluu*, joined by *Luakoa* of Maui, which invaded Oahu during the reign of *Mailikukahi*. It cannot be considered as a war between the two islands, but rather as a raid by some restless and turbulent Hawaii chiefs . . . The invading force landed at first at Waikiki, but for reasons not stated in the legend, altered their mind, and proceeded up the Ewa lagoon and marched inland. At Waikakalaua they met *Mailikukahi* with his forces, and a sanguinary battle ensued. The fight continued from there to the Kīpapa gulch. The invaders were thoroughly defeated, and the gulch is said to have been literally paved with the corpses of the slain, and received its name ‘Kīpapa,’ from this circumstance. *Punaluu* was slain on the plain which bears his name, the fugitives were pursued as far as Waimano, and the head of *Hilo* was cut off and carried in triumph to Honouliuli, and stuck up at a place still called *Poo-Hilo*. [Fornander 1996:89–90]

Power shifted between the chiefs of different districts from the 1500s until the early 1700s, when Kūali‘i achieved control of all of O‘ahu by defeating the Kona chiefs. He then defeated the ‘Ewa chiefs and expanded his control on windward Kaua‘i. Peleihōlani, the heir of Kūali‘i, gained control of O‘ahu about 1740, and later conquered parts of Moloka‘i. He ruled O‘ahu until his death in about 1778 when Kahahana, of the ‘Ewa line of chiefs, was selected as the ruler of O‘ahu (Cordy 2002:24–41). Somewhere between 1883 and 1885, Kahahana was killed by Kahekili of Maui. The

subsequent rebellion amongst the chiefs resulted in a near genocide of the monarchy line on O‘ahu. Oral reports also tell of the stream of Hō‘ai‘ai (Hō‘ae‘ae) in the *ahupua‘a* immediately north of Honouliuli, choked with the bodies of the slain (Fornander 1996:224–226). Kahekili and the Maui chiefs retained control of O‘ahu until the 1790s. Kahekili died at Waikīkī in 1794. His son, Kalanikūpule, was defeated the following year at the Battle of Nu‘uanu by Kamehameha (Kamakau 1992:376–377). Thus, the supremacy of the ‘Ewa chiefs came to a final end.

4.1 **Early Historic Period**

Captain James Cook arrived in the Hawaiian Islands in 1778, and ten years later the first published description of Pearl Harbor appeared. Captain Nathaniel Portlock, observing the coast of Honolulu for Great Britain, recorded the investigation of a “fine, deep bay running well to the northward” around the west point of “King George’s Bay” in his journal (Portlock 1789:74). Portlock’s description matches the entire crescent-shaped shoreline from Barbers Point to Diamond Head.

Captain George Vancouver made three voyages to the Hawaiian Islands between 1792 and 1794. In 1793, the British captain recorded the name of the harbor opening as “O-poo-ro-ah” (Pu‘uloa) and sent several boats across the sand bar to venture into the harbor proper (Vancouver 1798:884). The area known as “Pu‘u-loa” was comprised of the eastern bank at the entrance to Pearl River. George Vancouver anchored off the entrance to West Loch in 1793, and the Hawaiians told him of the area at “a little distance from the sea, [where] the soil is rich and all the necessaries of life are abundantly produced” (Vancouver 1798 in Sterling and Summers 1978:36). Mr. Whitbey, one of Vancouver’s crew, observed, “from the number of houses within the harbor it should seem to be very populous; but the very few inhabitants who made their appearance were an indication of the contrary” (Vancouver 1798 in Sterling and Summers 1978:36).

Captain Vancouver sailed by Kalaeloa (Barbers Point) in 1792, and recorded his impression of the small coastal village of Kualaka‘i and the arid Honouliuli coast:

> The point is low flat land, with a reef round it . . . Not far from the S.W. point is a small grove of shabby cocoa-nut trees, and along these shores are a few struggling fishermen’s huts. [Vancouver 1798:1:167]
>
> . . . from the commencement of the high land to the westward of Opooroah [Pu‘uloa], was composed of one very barren rocky waste, nearly destitute of verdure, cultivation or inhabitants, with little variation all the way to the west point of the island. [Vancouver 1798:2:217]
>
> This tract of land was of some extent but did not seem to be populous, nor to possess any great degree of fertility; although we were told that at a little distance from the sea, the soil is rich, and all necessaries of life are abundantly produced. [Vancouver 1798:3:361–363]

The first western ship recorded as wrecking in the Hawaiian Islands was the brig *Arthur* under the command of Captain Henry Barber that ran aground at Kalaeloa Point on the southwest corner of O‘ahu at 8:00 p.m. on 31 October 1796. Captain Barber was en route from Honolulu to Canton with a cargo of sea otter hides. Breakers broke up the ship on the rocks and six of the 22-man crew drowned. The point became known as Barber’s Point and in 1968 the apostrophe was officially

deleted from the name by the U.S. Board of Geographic Names (Dean 1991:17). One of the most interesting shipwrecks at the point occurred in 1804 when a demasted Japanese vessel drifted ashore at Waialua while being towed to Honolulu. In 1855, the French whaler *Marquis de Turenne* ran aground reportedly about a mile off the point and was a total loss.

Subsequent to Western Contact in the area, the landscape of the ‘Ewa plains and Wai‘anae slopes was adversely affected by the over-harvesting of the sandalwood forest, and particularly by the introduction of domesticated animals and exotic plant species. In the early 1790s, Captain George Vancouver brought to the Hawaiian Islands goats, sheep, and cattle, which were allowed to graze freely about the land for some time after. L.A. Henke reports the existence of a longhorn cattle ranch in Wai‘anae by ca. 1840 (Frierson 1972:10).

During this same time, perhaps as early as 1790, exotic plant species were introduced and flourished in the area. The following dates of specific vegetation introduced to Hawai‘i are given by R. Smith and outlined by Frierson (1972:10–11):

“early,” c. 1790:	Prickly pear cactus, Opuntia tuna
	Haole koa, Leucaena glauca
	Guava, Psidium guajava
1835-1840:	Burmuda [*sic*] grass, Cynodon dactylon
	Wire grass, Eleusine indica
1858:	Lantana, Lantana camara

> The kiawe tree came in about this same time, and there is some debate about whether the date was 1828 or 1837. . . [Frierson 1972:10–11]

Despite rapid change to both landscape and demographics, several western visitors described the ‘Ewa landscape near Pearl Harbor during the first decades of the nineteenth century. Archibald Campbell, an English sailor, spent some time in Hawai‘i during 1809-1810. He had endured a shipwreck off the island of Sannack on the northwest coast of America. As a result, both his feet became frostbitten and were amputated. He spent over a year recuperating in the Hawaiian Islands. His narrative is considered noteworthy because it describes life in the ‘Ewa District before the missionaries arrived. During part of his stay, he resided with King Kamehameha I, who granted him 60 acres in Waimano Ahupua‘a in 1809. Campbell described his land:

> In the month of November the king was pleased to grant me about sixty acres of land, situated upon the Wymummee [traditional Hawaiian name for Pearl River], or Pearl-water, an inlet of the sea about twelve miles to the west of Hanaroora [Honolulu]. I immediately removed thither; and it being Macaheite time [Makahiki], during which canoes are tabooed, I was carried on men’s shoulders. We passed by footpaths winding through an extensive and fertile plain, the whole of which is in the highest state of cultivation. Every stream was carefully embanked, to supply water for taro beds. Where there was no water, the land was under crops of yams and sweet potatoes. The roads and numerous houses are shaded by cocoa-nut trees, and the sides of the mountains are covered with wood to a great height. We halted two or three times, and were treated by the natives with the utmost

> hospitality. My farm, called Wymannoo [Waimano], was upon the east side of the river, four or five miles from its mouth. Fifteen people with their families resided upon it, who cultivated the ground as my servants. There were three houses upon the property; but I found it most agreeable to live with one of my neighbours, and get what I wanted from my own land. This person's name was William Stevenson a native of Borrowstouness. [Campbell 1967:103–104]

Of the Pearl River area, Campbell wrote,

> Wymumme, or Pearl River, lies about seven miles farther to the westward. This inlet extends ten or twelve miles up the country. The entrance is not more than a quarter of a mile wide, and is only navigable for small craft; the depth of water on the bar, at the highest tides, not exceeding seven feet; farther up it is nearly two miles across. There is an isle in it, belonging to Manina, the king's interpreter, in which he keeps a numerous flock of sheep and goats. [Campbell 1967:114]
>
> The flat land along shore is highly cultivated; taro root, yams, and sweet potatoes, are the most common crops; but taro forms the chief object of their husbandry, being the principal article of food amongst every class of inhabitants. [Campbell 1967:115]

Botanist F.J.F. Meyen visited Hawai‘i in 1831 and writes of the abundant vegetation described by Campbell in the vicinity of Pearl Harbor. His account of large stretches of cultivated land surrounding Pearl Harbor suggests the presence of a viable population settlement in the area.

> At the mouth of the Pearl River the ground has such a slight elevation that at high tide the ocean encroaches far into the river, helping to form small lakes which are so deep, that the long boats from the ocean can penetrate far upstream. All around these water basins the land is extraordinarily low but also exceedingly fertile and nowhere else on the whole island of Oahu are such large and continuous stretches of land cultivated. The taro fields, the banana plantations, the plantations of sugar cane are immeasurable. [Meyen 1981:63]

However, a contrasting picture of ‘Ewa is recorded by the missionary William Ellis in 1823-1824, of the ‘Ewa lands away from the coast:

> The plain of Eva is nearly twenty miles in length, from the Pearl River to Waiarua [Wailua], and in some parts nine or ten miles across. The soil is fertile, and watered by a number of rivulets, which wind their way along the deep water-courses that intersect its surface, and empty themselves into the sea. Though capable of a high state of improvement, a very small portion of it is enclosed or under any kind of culture, and in travelling across it, scarce a habitation is to be seen. [Ellis 1963:7]

The first company of Protestant missionaries from America, part of the American Board of Commissioners of Foreign Missions (ABCFM), arrived in Honolulu in 1820. They quickly established churches in Kona on Hawai‘i, Waimea on Kaua‘i, and Honolulu on O‘ahu. Although the missionaries were based in Honolulu, they traveled around the Islands intermittently to preach to rural Native Hawaiians and to check on the progress of English and Bible instruction schools set up by local converts.

In 1828, the missionary Levi Chamberlain (1956:39–40) made a circuit of O‘ahu, stopping wherever there was a large enough population to warrant a sermon or a school visit. In his trek through the ‘Ewa District from Wai‘ānae, he stopped at Waimānalo, an *‘ili* in Honouliuli, on the western border of ‘Ewa. At around eleven o’clock the next day, on a Saturday, Chamberlain and his companions set out toward the east, reaching Waikele at three or four o’clock. The group did not stop in Hō‘ae‘ae, suggesting that the population was too small for a school, but Waikele had two schools, an obviously larger population than Hō‘ae‘ae. In fact, Chamberlain decided to stay in Waikele until the next day, the Sabbath, and preach to the Native Hawaiians who lived there. A crowd of 150 to 200 gathered for the sermon. The next day at six o’clock they set out for the village of Waipi‘o, which had one school. They left Waipi‘o at about 8:30, and walked to Waiawa, where there were two schools. Around ten o’clock, they began their circuit again, stopping only in the *ahupua‘a* of Kalauao in the ‘Ewa District before they reached Moanalua Ahupua‘a in the Kona District. The account does not give much information on the surroundings, but does indicate the relatively populated areas of ‘Ewa, in western Honouliuli, Waikele, Waipi‘o, Waiawa, and Kalauao, and the time it took to travel by foot along the trail across the ‘Ewa District.

4.2 **The Māhele and the Kuleana Act**

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. On 27 January 1848, the Crown and the *ali‘i* began to receive their land titles as Konohiki (land manager) awards. For *konohiki* lands, a claim first had to be approved by the Land Commissioners. Upon confirmation of the claim, a certificate was awarded to the claimant. This certificate was called a Land Commission Award (LCA), which confirmed the claim of an individual for a parcel. The awardee could then obtain from the Minister of the Interior a Royal Patent (RP), which indicated the government’s interest in the land had been settled by the payment of a commutation fee. Commutation means “an exchange, or replacement.” The commutation fee was usually set at a maximum of one-third of the value of the unimproved land. The fee could be settled by the exchange of cash but was usually settled by the return of one-third of the lands (or cumulative value of the lands) originally awarded to the claimant (Chinen 1958:13).

On 19 October 1849, the Hawaiian Privy Council adopted resolutions to protect the rights of native tenants, the *maka‘āinana*, or the “common” people. The Kuleana Act of 1850 confirmed these rights. Under this act, the claimant was required to produce two witnesses who knew the claimant and the boundaries of the land, knew that the claimant had lived on the land for a minimum of two years, and knew that no one had challenged the claim. The land also had to be surveyed. Native tenants or naturalized foreigners who could prove occupancy on the parcels before 1845 could be awarded lands they occupied or that they cultivated as *kuleana* (land holding of a tenant or *hoa‘āina* residing in the *ahupua‘a*) awards. No commutation fee was necessary to apply for a Royal Patent for a *kuleana* award, as the commutation fee had presumably already been paid by the *ali‘i* / *konohiki* who had been awarded the entire *ahupua‘a*, or *‘ili* in which the native tenant claimed his own small parcels (Chinen 1958:29–30).

It is through records for Land Commission Awards generated during the Māhele that the first specific documentation of life in Hawai‘i as it had evolved up to the mid-nineteenth century comes to light. Although many Hawaiians did not submit or follow through on claims, or simply were not granted the claims for their lands, the distribution of LCAs can provide insight into patterns of

residence and agriculture; many of these patterns probably had existed for centuries past. Examination of the patterns of *kuleana* (commoner) LCA parcels in the vicinity of the project area can provide insight into the likely intensity and nature of Hawaiian activity in the area.

Following his conquest of the island of O‘ahu, Kamehameha gave the *ahupua‘a* of Honouliuli to Kalanimōkū, an early supporter, as part of the *panalā‘au*, or conquered lands, with the right to pass the land on to his heirs rather than having it revert to Kamehameha (Kame‘eleihiwa 1992:58, 112). Kalanimōkū subsequently gave the *ahupua‘a* to his sister, Wahinepi‘o.

In 1855 the Land Commission awarded all the unclaimed lands in Honouliuli, 43,250 acres, to Miriam Ke‘ahikuni Kekau‘ōnohi (LCA 11218), a granddaughter of Kamehameha I, and the heir of Kalanimōkū (Indices of Awards 1929; Kame‘eleihiwa 1992). Kekau‘ōnohi was one of Liholiho’s (Kamehameha II’s) wives and after his death, she lived with her half-brother, Luanu‘u Kahalai‘a, governor of Kaua‘i (Kelly 1985:21). Subsequently, Kekau‘ōnohi ran away with Queen Ka‘ahumanu’s stepson, Keli‘iahonui, and then became the wife of Chief Levi Ha‘alelea. Upon her death on 2 June 1851, all her property passed to her husband and his heirs. In 1863, the owners of the *kuleana* lands deeded their lands back to Ha‘alelea to pay off debts owed to him (Frierson 1972:12). When Levi Ha‘alelea died, the property went to his surviving wife, who in turn leased it to James Dowsett and John Meek in 1871 for stock running and grazing.

The project area appears to have been included in the largest award (Royal Patent 6071, LCA 11216, *‘Āpana* [lot] 8) granted in Honouliuli Ahupua‘a to Miriam Ke‘ahikuni Kekau‘ōnohi on January 1848 (Native Register). Kekau‘ōnohi acquired a deed to all unclaimed land within the *ahupua‘a*, totaling 17,503 ha (43,250 acres).

4.3 **Mid- to Late 1800s**

In 1877, James Campbell purchased most of Honouliuli Ahupua‘a—including the current project area—for a total of $95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek, and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva 1983:C-12). By 1881, the Campbell property of Honouliuli prospered as a cattle ranch with “abundant pasturage of various kinds” (Briggs in Haun and Kelly 1984:45).

In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway and Land Company (OR&L) as the result of a franchise granted by King Kalākaua in 1886. In 1889, Dillingham opened the first 9 miles of narrow gauge track on the King’s birthday. To attract business to his new railroad system, Dillingham subleased all land below 200 ft to William Castle who in turn sublet the area to the Ewa Plantation Company for sugarcane cultivation (Frierson 1972:15).

Ewa Plantation Company grew quickly and continued in full operation up into modern times. As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Company installed ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

In 1880, the surveyor general of the Hawaiian Kingdom, William Dewitt Alexander, selected a location at Barbers Point for an aid to navigation in what was then an undeveloped area and money was appropriated that same year. There were delays in obtaining the Fresnel lens, lamps, and

lantern from New York and by the time they arrived funds had been expended. In 1888, a lighthouse was constructed of stone and cement mortar “42 ft above mean tide” seemingly on a 6-ft-high coral shelf along with a small frame house and a water cistern (Dean 1991:19). It appears the light station site was originally 2 acres but was expanded to 5 acres with lands acquired by condemnation in 1910 (Dean 1991:207). Improvements were made to the residence, a storehouse, and a separate oil house in 1905 and 1915 and 3 ½ miles of water pipe was laid to the facility ca. 1915. A U.S. army transport ship, the *Sheridan,* arriving from Manila ran aground in 1906, but was successfully recovered. A 60-ft Japanese sampan smashed apart at Kalaeloa in 1919. In 1920, the *West Eldura,* also en route from Manila, ran aground but was also hauled off the reef.

To address continuing navigation concerns a new 72-ft-high tower (still extant) was built in 1933 adjacent to the old 40-ft tower and the old tower was toppled. The tower was automated in 1964 ending 76 years of lighthouse keeping. The Barbers Point lighthouse is located approximately 1.3 km (0.8 miles) southeast of the current project area.

4.4 **1900s**

Twentieth century land use in the vicinity of the project area included transportation along the former OR&L alignment that ran roughly parallel to the coast 500 m inland. Passenger totals on the OR&L line increased throughout the first half of the twentieth century. In 1908, 446,318 people rode on the line. This total rose to approximately 1,200,000 by 1922 and 1943 saw an all-time high of 2,642,516 passengers. Throughout World War II, the railway served a critical function in moving both personnel and equipment.

The development of a better road system and more cars on the island began to cut into passenger totals on the OR&L. According to the National Register of Historic Places Inventory forms on file at SHPD, on 12 December 1947, all operations outside Honolulu ceased. In 1950, the U.S. Navy purchased the track and right-of-way from Pearl Harbor to the Naval Ammunition Depot (NAD) access road in Nānākuli for $1.00 in the name of national defense. The NAD maintained this 25.5-mile stretch of track until the early 1950s when a 6.5-mile stretch from Pearl Harbor to Waipahu was ceded to the state of Hawai‘i. A further 6 miles reverted to the state in 1954 after a heavy flood. The final 13-mile stretch was in use until 1968 and was ceded to the state in 1980.

The 1919 fire control map (Figure 15) shows a road and structures in the Gilbert Station area 3 km northeast of the project area, the site of Gilbert Camp associated with the railway and Ewa Plantation. An unimproved loop access road extends from Gilbert Station down to Barbers Point, passing through the present project area and looping back to the OR&L alignment. These features also appear in the 1936 War Department terrain map (Figure 16), which also shows the relatively new tank and pipeline that provided water to the lighthouse compound. A 1939 Ewa Plantation Company field map (Figure 17) and a 1943 U.S. Army War Department map (Figure 18) show a number of new unimproved roads in the vicinity, one of which passes through the central portion of the present project area. A road corresponding to the modern Malakole Road is also shown along the northern boundary of the IES Kapolei Refinery property. The 1943 U.S. Army War Department map does not show the new Barbers Point Military Reservation infrastructure; however during the time of war, new military bases would not necessarily be shown on maps. It appears the Barbers Point Military Reservation was established in 1921. Between 1937 and 1942 there were two sets of two “Panama Mount” 155 mm guns. Batteries of up to four guns on Panama

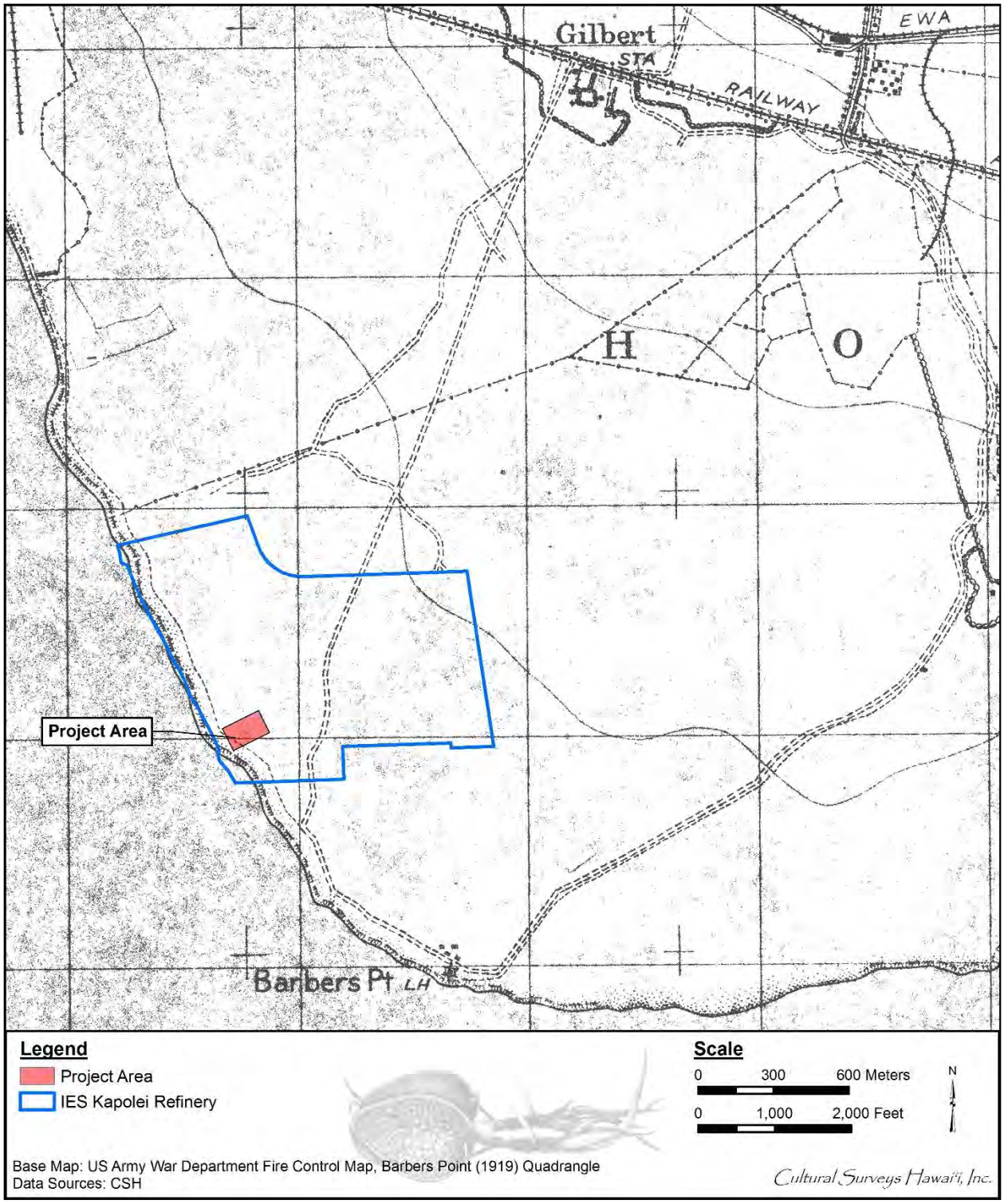

Figure 15. Portion of the 1919 U.S. Army War Department fire control map, Barbers Point Quadrangle, showing the location of the project area

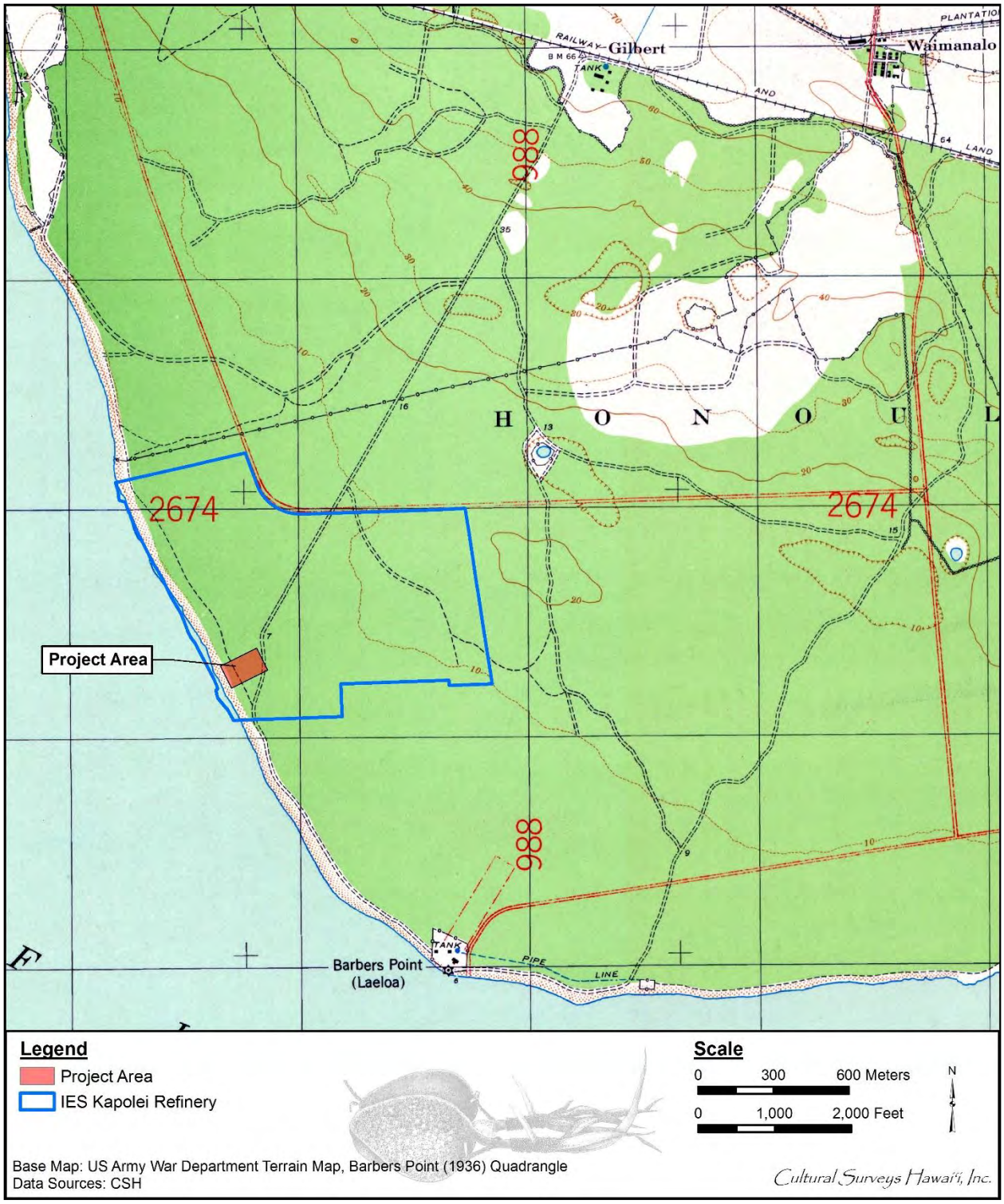

Figure 16. Portion of the 1936 U.S. Army War Department terrain map, Barbers Point Quadrangle, showing the location of the project area.

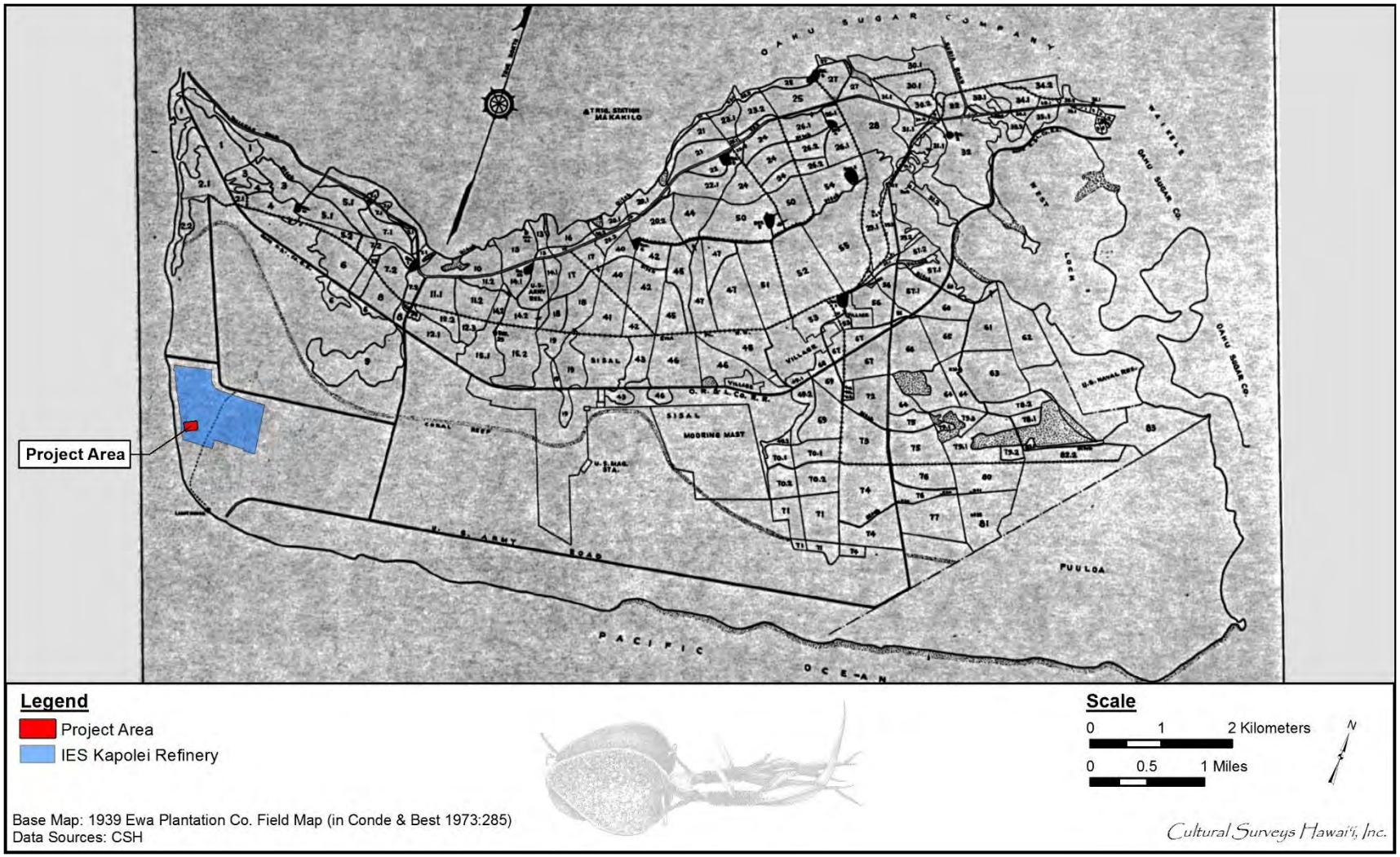

Figure 17. Portion of the 1939 Ewa Plantation Company field map (from Condé and Best 1973:285) showing the project area

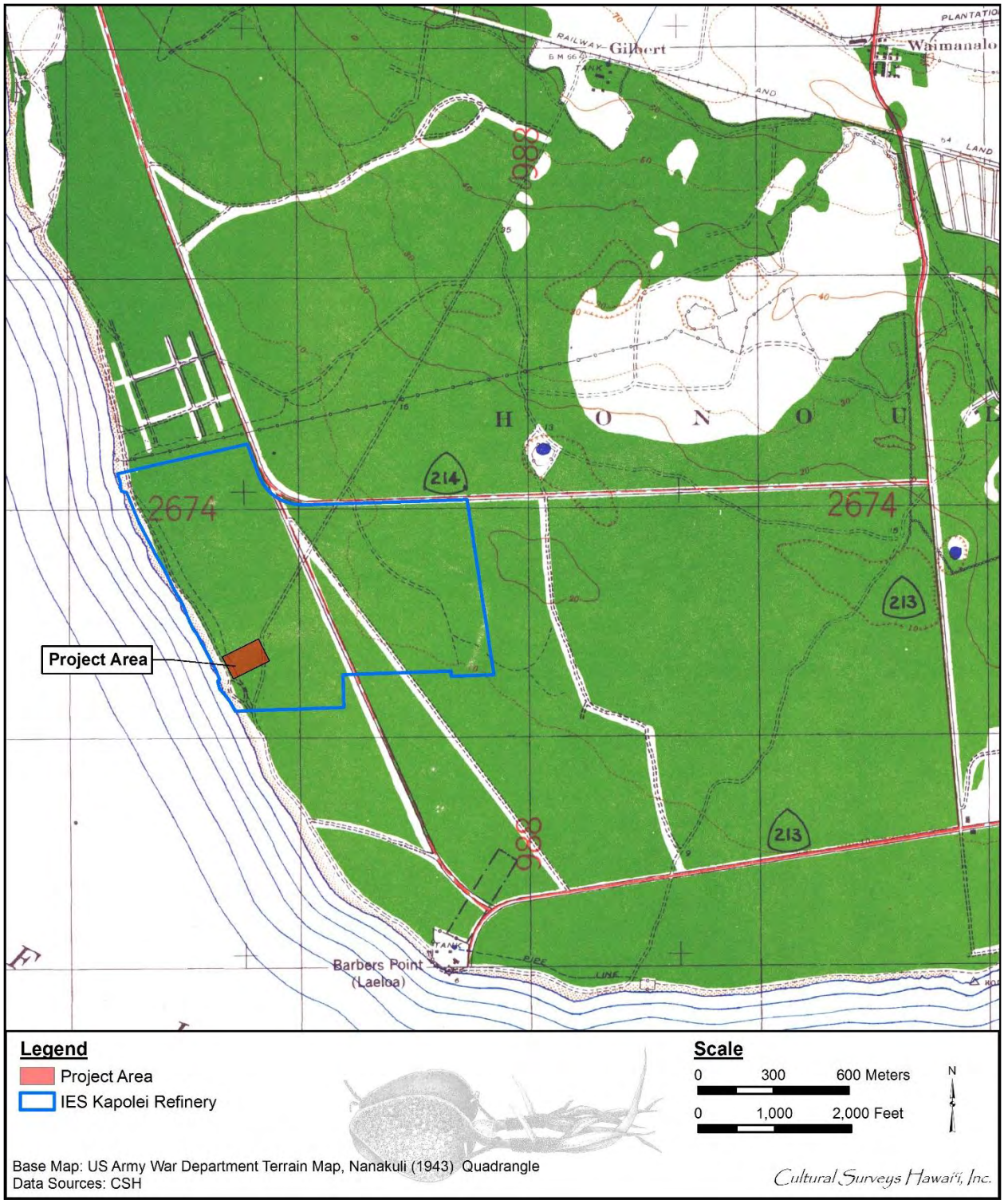

Figure 18. Portion of the 1943 U.S. Army War Department terrain map, Nanakuli Quadrangle, showing the location of the project area

mounts often served as temporary defenses while nearby permanent batteries awaited construction (Fort Wiki 2014). The two sets of 155 mm guns were separated by the Barbers Point lighthouse. “This site was an early training firing point for 155 mm guns” (North American Forts 2007). The military installations are shown on Figure 19.

The 1951 aerial photograph (Figure 20) and 1953 Army Map Service map (Figure 21) show little post-war development in the vicinity other than the relocation of a U.S. Coast and Geodetic Survey Observatory 500 m to the east on the north side of what is now Ōla‘i Street. The oil refinery and acid plant was built around 1959-1960. The 1961 aerial photograph (Figure 22), however, reflects the boom that accompanied statehood with the establishment of the Chevron oil refinery, a major cement plant south of the project area, and additional industrial development in the vicinity. The Camp Malakole Military Reservation and the Barbers Point Barge Harbor are also indicated north of the project area. The 1968 USGS map (Figure 23) shows the increased industrial development within the James Campbell Industrial Park, near the project area.

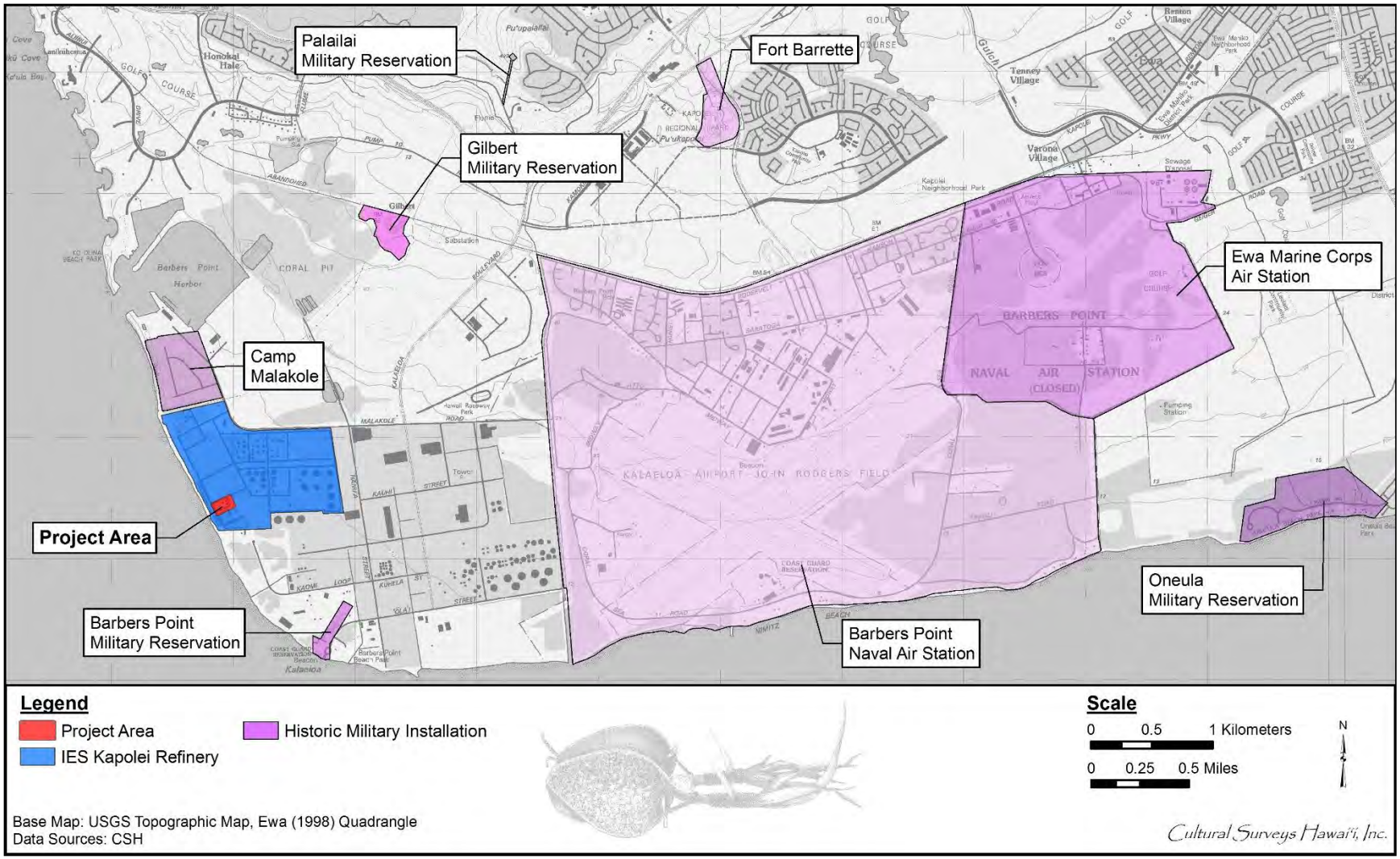

Figure 19. Portion of the 1998 Ewa USGS topographic quadrangle with overlay of historic military infrastructure in the vicinity of the project area

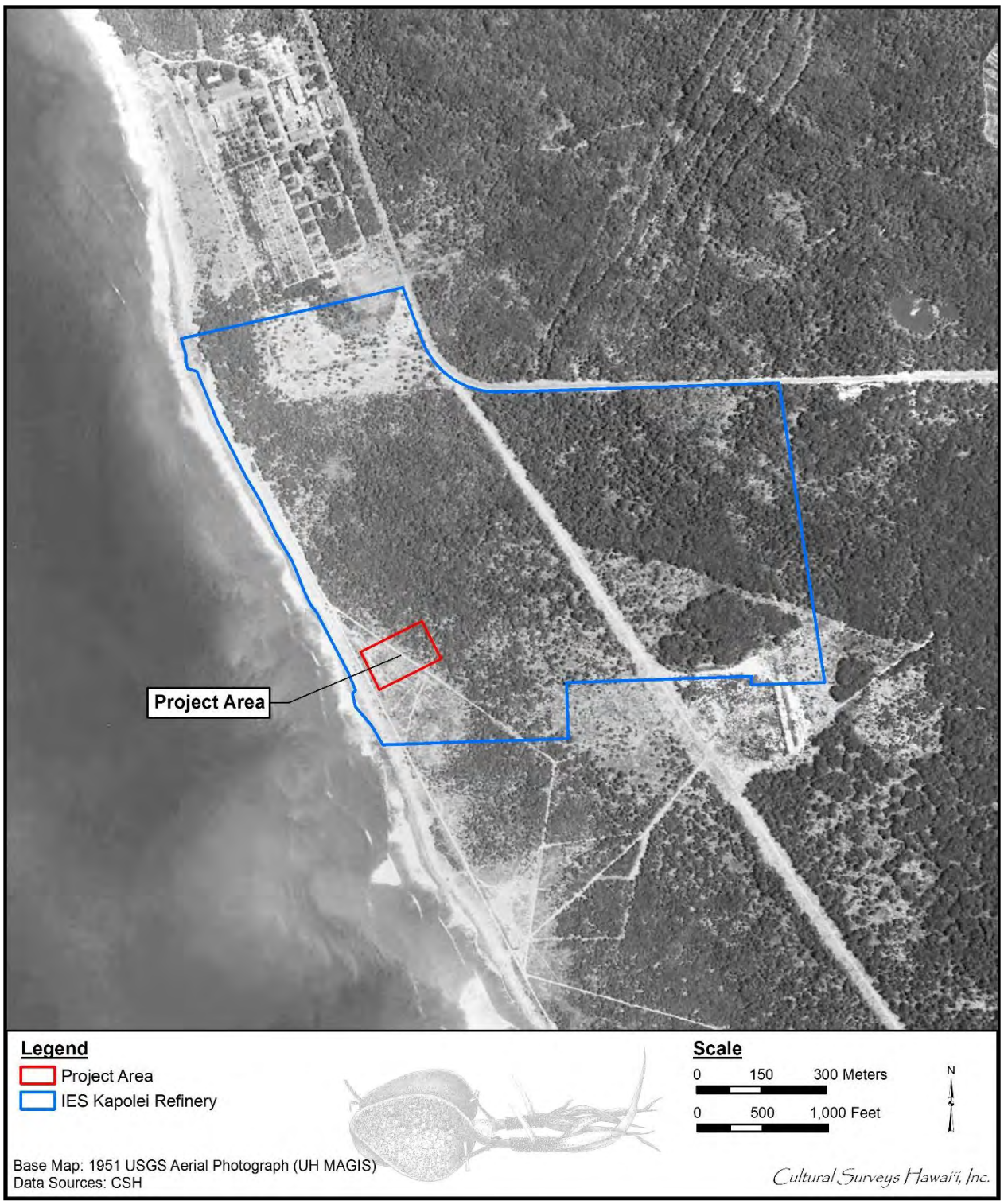

Figure 20. 1951 USGS aerial photograph (UH MAGIS) showing the project area

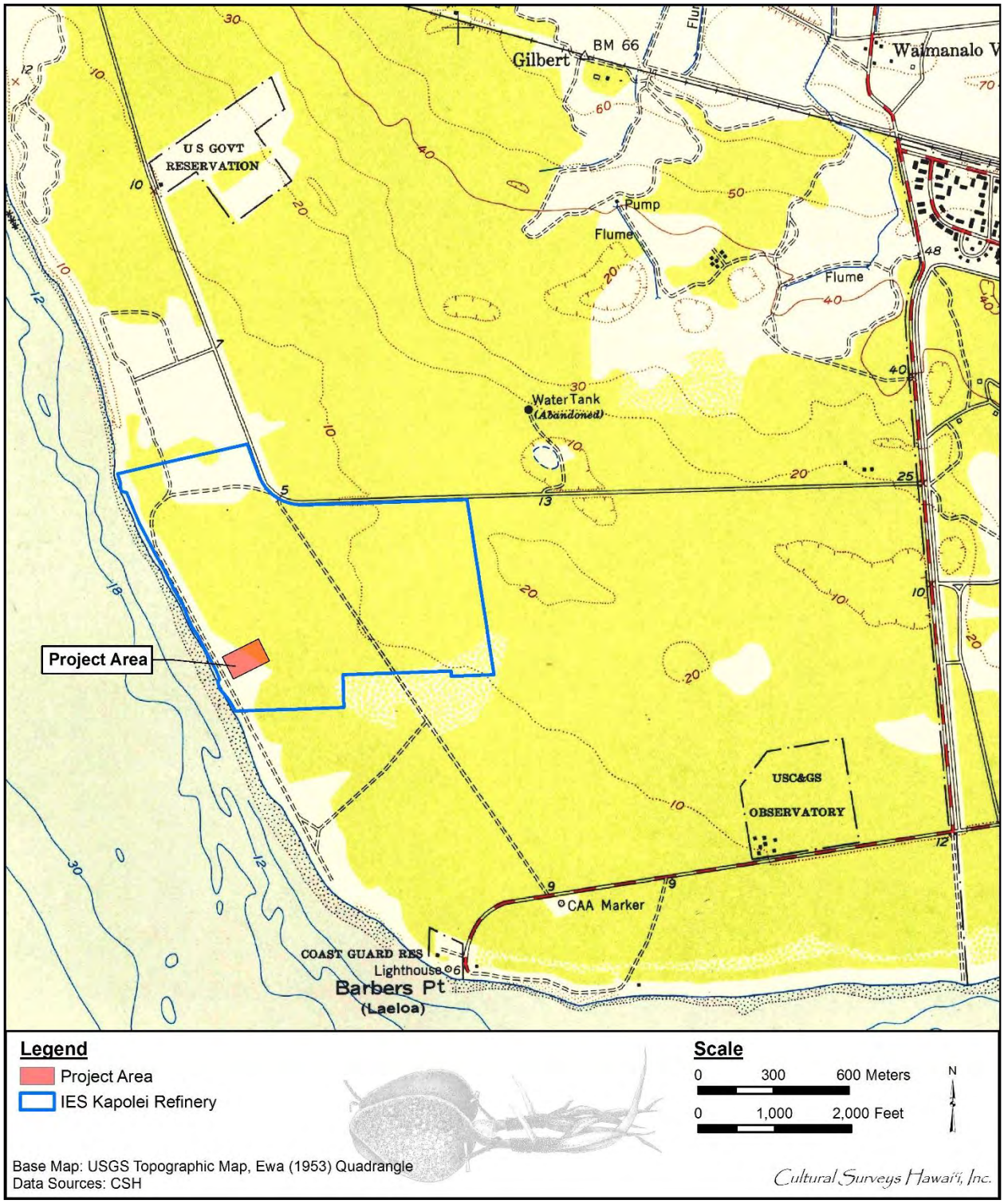

Figure 21. Portion of the 1953 Ewa USGS topographic quadrangle showing the location of the project area

Figure 22. 1961 aerial photograph (UH SOEST) showing the project area

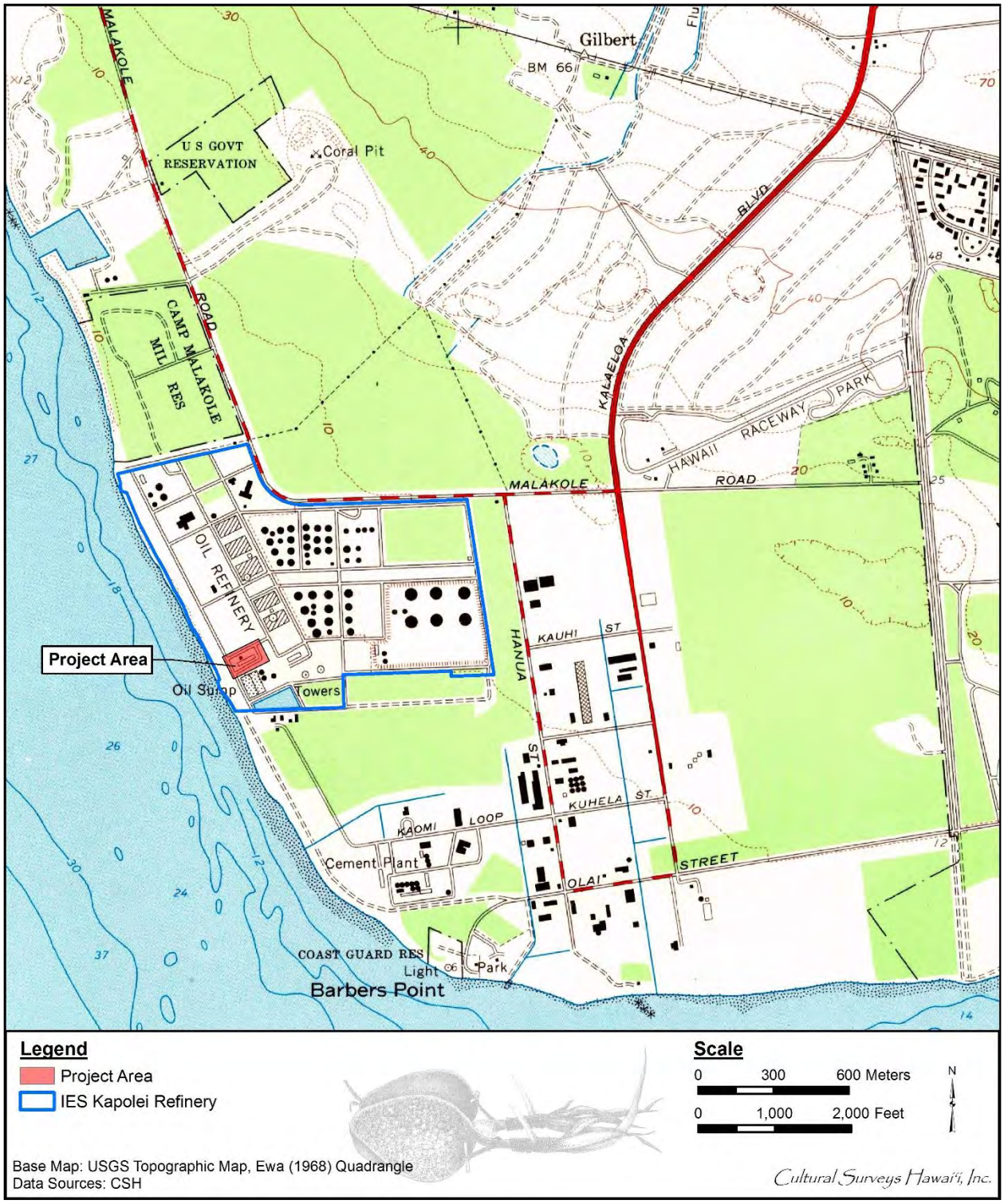

Figure 23. 1968 Ewa USGS topographic quadrangle showing the location of the project area

Section 5 Previous Archaeological/Paleontological Research

An overview of previously conducted archaeological and paleontological studies in the vicinity of the project area is summarized in Table 1, and depicted in Figure 24. Previously identified historic properties are shown in Figure 25. Relevant studies in the vicinity of the project area and findings germane to the project area are discussed below.

5.1 Early Archaeological Studies

The first effort to record archaeological sites in Honouliuli was by Thrum (1906:46), who references “a *heiau* on Kapolei hill, ‘Ewa—size and class unknown. Its walls thrown down for fencing.” The former *heiau* was on Pu‘u Kapolei, 5 km northeast of the present study area.

In his 1930 surface survey of the island of O‘ahu, archaeologist J. Gilbert McAllister recorded the specific locations of important archaeological and cultural sites, and the general locations of some sites of lesser importance. McAllister (1933:107–108) recorded seven specific sites at Honouliuli (numbered 133–139) and these became the first seven sites in the Bernice Pauahi Bishop Museum (BPBM) Site Numbering System (OA-B6-1 through OA-B6-7). The nearest of these specific sites to the present project area is McAllister Site 138, including the Pu‘u Kapolei *heiau* and an adjacent rock shelter. McAllister (1933:109), however, designated McAllister Site 146 to include archaeological features covering a large but poorly defined area along the coast. His impressions of Site 146 are recorded as follows:

> ‘Ewa coral plains, throughout which are remains of many sites. The great extent of old stone walls, particularly near the Pu‘uloa Salt Works belongs to the ranching period of about 75 years ago [ca. 1850s]. It is probable that the Hawaiians formerly used the holes and pits in the coral. Frequently the soil on the floor of larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here. [McAllister 1933:109]

These archaeological sites of the ‘Ewa coral plains would be the subject of some 40 or so archaeological reports in the 1970s and 1980s with approximately a hundred studies to date.

5.2 Recent Archaeological Studies

From the period between McAllister’s 1930 study and the flurry of work that began in 1969, there are only a few sporadic pieces of poorly documented research. “In 1933, Dr. Kenneth P. Emory examined a well-preserved house site and a possible *heiau* in the western part of the coral plain; these sites were later destroyed by sugar-cane planting” (Sinoto 1976:1). In 1959, William Kikuchi removed a number of burials from a burial cave site (BPBM Site OA-B6-10) at the Standard Oil Refinery, which was subsequently destroyed (Barrera 1975:1). Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road (Kikuchi 1959; Davis 1990a:146–147). Specific location data is not available but if this find was close to the big bend in Malakole Road then it would appear to have been within 400 m of the northeast end of the current project area.

Table 1. Archaeological and related studies in the vicinity of the project area

Reference	Type of Study	Location	Results
Kikuchi 1959	Burial removal and relocation	Standard Oil Refinery	Removed 12 to 16 incomplete primary and/or secondary burials (BPBM Site # 50-OA-B6-10; SIHP # 50-80-12-2315)
Lewis 1970	Campbell project preliminary investigation	Freshwater marsh near corner of Malakole and Kalaeloa Blvd	Two house compounds identified and excavated, 50-OA-B6-15 (SIHP # 50-80-12-9242) and 50-OA-B6-21 (SIHP # 50-80-12-9544); additional testing recommended
Barrera 1975	Archaeological reconnaissance survey	Barbers Point Harbor	Two excavations conducted in large, presently fenced, sinkhole SIHP # 50-80-12-9545, located north of barge harbor; large sinkhole yielded archaeological remains and a radiocarbon date from a hearth feature, as well as bones of extinct bird species
Sinoto 1976	Cultural resources survey	Barbers Point Area	Hundreds of sites documented and recorded (see Table 2); eventually became Barbers Point Archaeological District (SIHP # 50-80-12-2888)
Davis and Griffin 1978	Studies in natural history and human settlement	Deep Draft Harbor, Barbers Point	Recommended defined sample of all resources in area be salvaged
Sinoto 1979	Cultural resources survey	Deep Draft Harbor, Barbers Point	Additional sites documented and recorded (see Table 2); became Barbers Point Archaeological District (SIHP # 50-80-12-2888)
Hammatt and Folk 1981	Archaeological and paleontological investigation	Federal Study Areas 1a and 1b, and State of Hawai‘i Optional Area 1, Barbers Point	Of 148 sites known or documented, tested 88, and 26 subjected to excavation; radiocarbon dates yielded calibrated age of AD 550 ± 55 to 1760 ± 21
Ahlo and Hommon 1983	Archaeological reconnaissance survey	Proposed solid waste processing and resource recovery facility	Reported two sinkholes, three rectangular pits and a possible cultural deposit; finds discounted in Hommon and Ahlo 1984

Reference	Type of Study	Location	Results
Hommon and Ahlo 1984	Archaeological subsurface testing	Proposed solid waste processing and resource recovery facility	Discounted import of earlier reported finds
Davis 1988, 1989, 1990b	Reconnaissance survey, archaeological and paleontological investigation	Barbers Point (harbor area)	Some 15+ pit caves identified, 13 recorded and tested and extensive excavation undertaken; extinct bird bones identified in all tested pit caves; a human burial encountered in pit cave site Fea. 1; SIHP # 50-80-14-4099 identified
Cleghorn and Davis 1990	Archaeological and paleontological investigations	Deep Draft Harbor, Barbers Point	Survey concluded Native Hawaiians adapted to their environments and met needs of a growing population
Folk 1991	Archaeological reconnaissance	Proposed drainage canal in Kapolei Business Park	Additional subsurface testing recommended
Folk and Hammatt 1992	Archaeological subsurface testing	Proposed drainage canal in Kapolei Business Park	Additional testing called for in Folk 1991; excavated two trenches; one yielded a cultural layer (SIHP # 50-80-12-4526)
McIntosh and Cleghorn 1999	Archaeological archival research	Honouliuli Wastewater Treatment Plant	Noted possibility of finding subsurface archaeological sites including sinkholes that could contain cultural materials and possibly human burials
McDermott et al. 2006	Archaeological inventory survey	Kapolei Harborside Center, Barbers Point	Documented three previously identified historic properties (SIHP #s 50-80-12-6679 drainage channel, 50-80-12-2888 Barbers Point Harbor Archaeological District, and 50-80-12-9714 OR&L right-of-way [ROW]) and three newly recorded historic properties (SIHP #s 50-80-12-6876 and 50-80-12-6877, pre-Contact stacked stone enclosures, and 50-80-12-6878 sinkhole features)

Reference	Type of Study	Location	Results
Rasmussen and Tomonari-Tuggle 2006	Archaelogical monitoring	Waiau fuel pipeline	Adjacent portion of project area appears not to have been monitored; not perceived as an area of archaeological sensitivity
Hammatt et al. 2007	Archaeological literature review and field inspection	Chevron Refinery Fencing project, Kalaeloa, TMK: [1] 9-1-014:010 por.	No surface historic properties observed
Tulchin et al. 2007	Archaeological literature review and field inspection	Approx. 790-acre parcel at Pālehua, Honouliuli Ahupua‘a, TMKs: [1] 9-2-003:002 por. and 005 por.	Archaeological features include pre-Contact indigenous Hawaiian habitation and associated agricultural and ceremonial features (SIHP #s 50-80-08-2316; 50-80-12-2602); historic ranching and related features (SIHP # 50-80-12-2601); and historic quarrying and related features (SIHP # 50-80-12-6680) and various pre- and post-Contact features (designated with temporary site #s CSH1–CSH22)
Groza et al. 2008	Archaeological inventory survey (recorded as an archaeological assessment)	Kalaeloa, TMK: [1] 9-1-015:020 por.	No historic properties identified
Groza and Hammatt 2010	Archaeological monitoring	Kalaeloa City and County Beach Park (Barbers Point Beach Park), TMK: [1] 9-1-026:027	No historic properties identified
Condit and Allen 2011	Archaeological monitoring	Hawaiian Electric Co. generator and substation site, TMKs: [1] 9-1-014:014 and 9-1-026:038	No historic properties identified
Titchenal et al. 2011	Archaeological inventory survey	H-Power expansion	SIHP # 50-80-12-7417, pit cave with paleontological avifauna material

Reference	Type of Study	Location	Results
Hammatt and Shideler 2012	Archaeological inventory survey (recorded as an archaeological assessment)	Solar site within Chevron Refinery, Kalaeloa, TMK: [1] 9-1-014:010 por.	No surface historic properties observed within or in immediate vicinity of project area; no intact sinkholes larger than 60 cm in diameter, sand dune deposits, or cultural material observed within project area and none believed to be present
Runyon et al. 2012	Archaeological inventory survey (recorded as an archaeological assessment)	Chevron solar site at James Campbell Industrial Park, TMK: [1] 9-1-031:002 por.	No historic properties identified
McElroy et al. 2015	Archaeological inventory survey	Kalaeloa Barbers Point Harbor Fuel Pier, TMKs: [1] 9-1-014:008 por., 024 por., 025, 030, 031, 037, 038, 040; 9-1-074:037 por., and 038 por.	No historic properties identified
Medina and Hammatt 2015	Archaeological monitoring	James Campbell Industrial Park, TMK: [1] 9-1-026:026	One subsurface cultural layer, SIHP # 50-80-02-7402, which likely functioned as a temporary/short term occupation and subsistence procurement activity area
DeMaio Starr et al. 2016	Archaeological inventory survey	Western Kapolei Regional Drainage System, TMKs: [1] 9-1-014:002 (por.), 9-1-074:036, and 040 (por.)	SIHP # 50-80-12-2888, Barbers Point Archaeological District; SIHP # 50-80-12-4526, buried A horizon and cultural deposit layer; SIHP # 50-80-12-7672, a post-Contact historic fence and corral system; SIHP # 50-80-12-7673, sewage septic treatment system structure associated with former Army installation of Camp Malakole
Stark et al. 2016	Archaeological inventory survey	Kapolei Business Park Wastewater Pump Station, TMK: [1] 9-1-075:051	One new historic property identified, SIHP # 50-80-12-7763 a drainage culvert and wall feature

Reference	Type of Study	Location	Results
Belluomini et al. 2017	Archaeological inventory survey	Kapolei Corporation Yard, TMK: [1] 9-1-026:004	One historic property documented (SIHP # 50-80-12-6866), remnants of Barbers Point Military Reservation (three features including two 155 mm “Panama Mount” artillery bases and an associated cement slab); presence of areas of pit caves noted

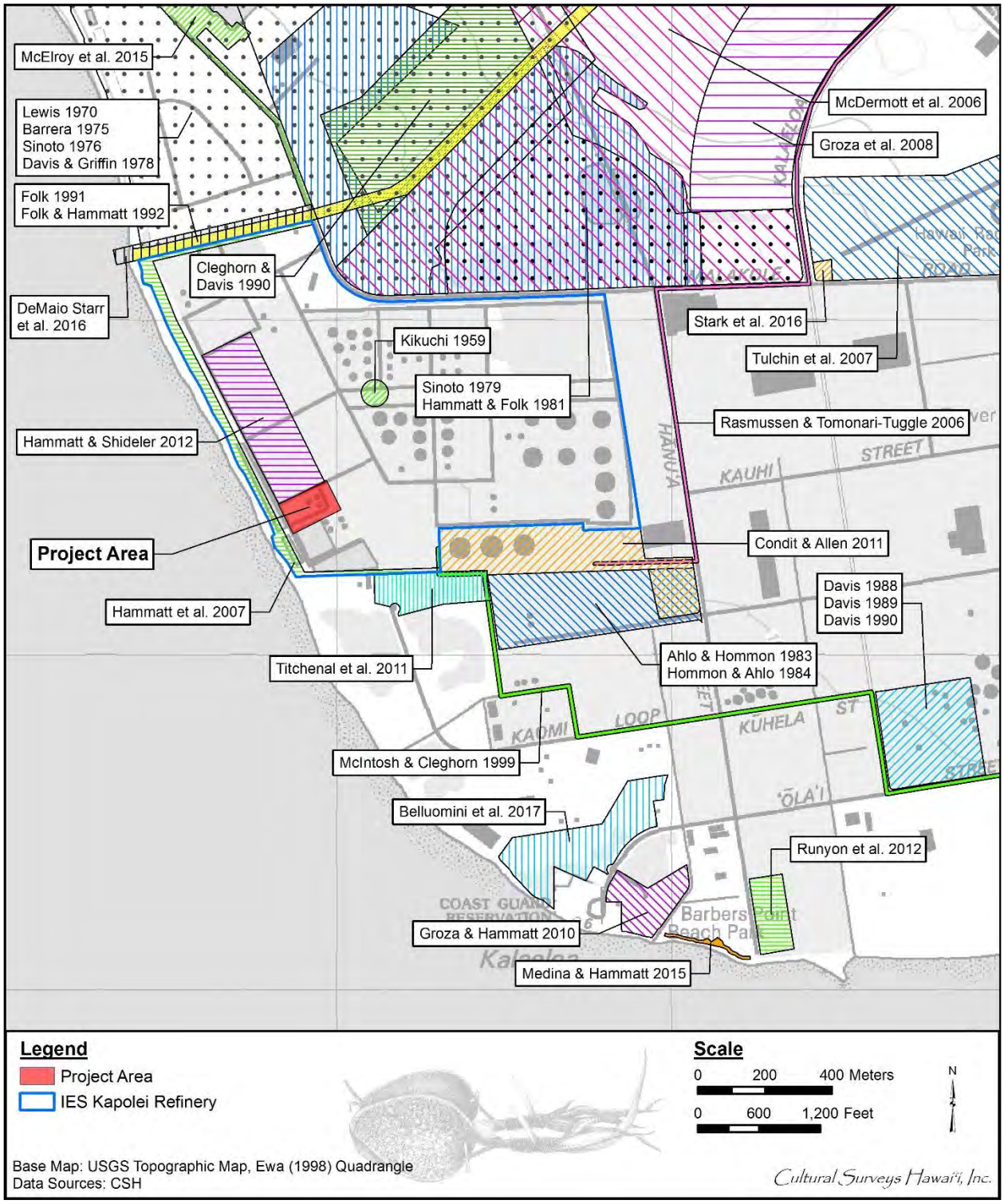

Figure 24. Portion of a 1998 Ewa USGS topographic quadrangle showing previously conducted archaeological and paleontological studies in the vicinity of the project area

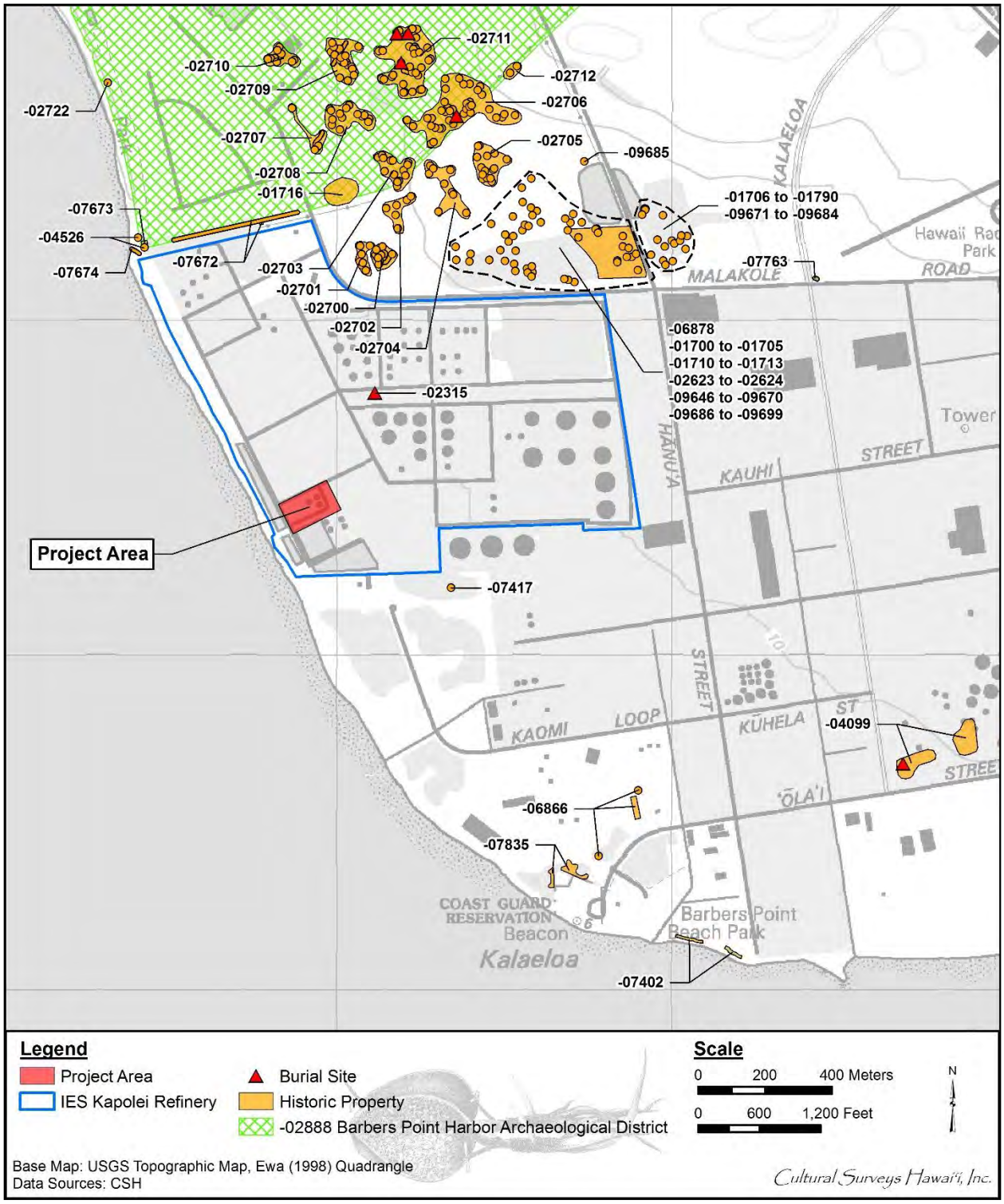

Figure 25. Portion of a 1998 Ewa USGS topographic quadrangle showing previously identified historic properties in the vicinity of the project area

5.2.1 Kikuchi 1959

In 1959, William Kikuchi removed a number of burials from a burial cave site (BPBM Site OA-B6-10) at the Standard Oil Refinery, which was subsequently destroyed (Barrera 1975:1). Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road (Kikuchi 1959; Davis 1990a:146–147). Specific location data is not available but if this find was close to the big bend in Malakole Road, it would appear to have been within 400 m of the northeast end of the current project area.

5.2.2 Lewis 1970

In 1970, Ernest Lewis conducted a brief survey around the intersection of Malakole Road and Kalaeloa Boulevard. This project was done as part of a seminar in archaeological methods at the University of Hawai‘i at Mānoa. Two house compounds were identified and excavated, 50-OA-B6-15 (State Inventory of Historic Places [SIHP] # 50-80-12-9242) and 50-OA-B6-21 (SIHP # 50-80-12-9544). The author noted there is great possibility for this area to yield information, and that excavations should be done to sample the house compounds further. The report does not make any additional recommendations (Lewis 1970).

5.2.3 Barrera 1975

In 1975, William Barrera of the BPBM, under contract with the U.S. Army Corps of Engineers (USACE), conducted an archaeological reconnaissance survey for the proposed Barbers Point Harbor. The USACE continued the archaeological research in 1976 by requesting another survey (Sinoto 1976) of the cultural remains in the area previously surveyed in 1970 (Lewis) and 1975 (Barrera). Sinoto’s work included mapping 68 new archaeological sites and more complete mapping of 30 previously recorded sites. In the course of this research, two excavations were conducted in the large, presently fenced, sinkhole Site 9545, located north of the barge harbor. This large sinkhole yielded archaeological remains and a radiocarbon date from a hearth feature, as well as bones of extinct bird species.

5.2.4 Sinoto 1976

In 1976, Aki Sinoto of the Bishop Museum conducted a survey for the Army Corps of Engineers for a preliminary survey of the Barbers Point Deep Draft Harbor. During the course of the survey, 92 sites were confirmed or documented (see Table 2). One site, 50-Oa-B6-58 (SIHP # 50-80-12-9554), was completely mitigated. Of the remaining sites, approximately half of them had test units placed within the site boundaries (Sinoto 1976). The author did not make any additional recommendations for any of the remaining sites. As a result of the survey, further work was recommended for the entire project area. The area surveyed eventually became the Barbers Point Archaeological District (SIHP # 50-80-12-2888).

5.2.5 Davis and Griffin 1978

In 1978, Davis and Griffin of the Archaeological Research Center Hawai‘i, Inc. (ARCH) conducted a survey for the proposed Deep Draft Harbor. This fieldwork was conducted at the request of the State of Hawai‘i as part of additional work called for in Sinoto (1976). The objectives of the research were to 1) develop an integrated research design stringing together all known research about the area, 2) determine the population and distribution of the endangered plant

species in the survey area, and 3) determine the presence and distribution of cultural and potential archaeological resources in the project area. The report recommended a defined sample of all the resources in the area should be salvaged (Davis and Griffin 1978).

5.2.6 Sinoto 1979

In 1979, Aki Sinoto of the Bishop Museum conducted a survey for new dredged material deposit sites at Barbers Point. Forty sites were located and recorded including seven stone mounds, six C-shapes, one enclosure, two filled-paved areas, two habitation sinkholes, one L-shape, one modified depression, eight modified sinks, three platforms, six wall remnants, and one U-shape (see Table 2). The author recommended further research for the entire project area (Sinoto 1979). The area surveyed eventually became the Barbers Point Archaeological District (SIHP # 50-80-12-2888).

5.2.7 Hammatt and Folk 1981

In 1981, Hammatt and Folk of ARCH conducted a survey of the Barbers Point Federal Study Areas 1a and 1b and State of Hawai‘i Optional Area 1. Of the 148 sites known or documented, 88 were tested and 26 were subjected to excavation. Most of the excavations were habitation sites, which gathered data to test a hypothesis of settlement systems. Radiocarbon dates yielded a calibrated age of AD 550 ± 55 to 1760 ± 21. This information, as well as the paleontological study done on the bones recovered from the sink holes, led to the hypothesis that this was the first area occupied by early Native Hawaiians (Hammatt and Folk 1981).

5.2.8 Ahlo and Hommon 1983 and Hommon and Ahlo 1984

Ahlo and Hommon (1983) and Hommon and Ahlo (1984) carried out two studies at a proposed solid waste processing and resource recovery facility project area 500 m (1,640 ft) southeast of the present study area extending west from Hanua Street. Examination of two sinkholes indicated no cultural material. Three rectangular pits were determined to be recent backhoe excavations. A possible cultural deposit was determined to be recent and the result of a brush fire and subsequent leveling of the area by a backhoe (Ahlo and Hommon 1983; Hommon and Ahlo 1984).

5.2.9 Davis 1988, 1989, and 1990

Bertell Davis (1988, 1989, 1990b) carried out three studies at the location of a 20-acre parcel proposed for a HECO generating station on the north side of Ōla‘i Street approximately 600 m east of the present study area. Some 15+ sinkholes were identified; 13 were recorded and tested and extensive excavation was undertaken at four of the sinkholes. Extinct bird bones were identified in all four of these sinkholes. A human burial was encountered in sinkhole SIHP # -4099-1 (Davis 1990b:33–37). This burial was of particular interest as it was dated to AD 1422-1664 and appeared to show signs of syphilis, which was understood to be a western introduced disease.

5.2.10 Cleghorn and Davis 1990

In 1990, an archaeological and paleontological study was done on the Barbers Point Deep Draft Harbor site. The research was used to determine if Native Hawaiians brought about ecological changes in the region. This was done by reinvestigating previously excavated sites and building on the

knowledge. Results of the survey showed Native Hawaiians adapted to their environments and met the needs of a growing population. By doing this they unintentionally altered the landscape.

5.2.11 Folk 1991

CSH prepared an archaeological reconnaissance report (Folk 1991) for a 30.5-m (100-ft)-wide proposed drainage channel extending from north of the OR&L ROW through the Kapolei Business/Industrial Park to the coast. The study (Folk 1991:3, 10) noted historic remains of former Camp Malakole, and solution sinks in the limestone bedrock corresponding to Rosendahl's (1988) designated Complex 1 with aluminum tag labels "52," "SH-53," and "54" just to the north of the drainage channel (see Figure 24). Because of the possibility of disturbing dune deposits containing cultural layers at the *makai* end of the channel, archaeological subsurface testing was recommended to determine the presence or absence of cultural material and to make evaluations of significance (Folk 1991:14).

5.2.12 Folk and Hammatt 1992

In keeping with the recommendations of the Folk (1991) reconnaissance study, Hammatt and Folk (1992) carried out two hand-dug excavation units for the drainage channel project. These test units were placed on the north side of the channel (Unit 1) and north of the drainage channel (Unit 2) "because of the absence of the beach ridge in the southern part of the 45.7 m (150 ft) wide drainage corridor."

Stratigraphy in Unit 1 was limited to a single layer of fine, well-sorted coralline sand with dark colored mottles and marbling extending from the surface to the reef-rock substrate and attributed to disturbance from modern pipe line trenching (Hammatt and Folk 1992:10). Unit 2 contained four basic strata described by Hammatt and Folk (1992) as follows:

> Stratum I: 0-75 centimeters depth. Pale brown fine sand with dark colored marbling, rusted metal, tin can fragments and other miscellaneous modern rubbish.
>
> Stratum IIA: 75-100 centimeters depth. Fine gray sand lenses from a few millimeters to 2 centimeters thick, interbedded with fine pale brown sand. No cultural material present.
>
> Stratum II: 100-120 centimeters depth. Fine dark gray sand with discontinuous very dark gray bands 1 to 2 centimeters thick. No cultural material present except for charcoal bits and a 5 centimeter thick black fire pit deposit. A Charcoal sample was collected.
>
> Stratum III: 120-170 centimeters depth. Fine pale brown sand. No cultural material present.
>
> Stratum IV: Emerged reef-rock substrate. [Hammatt and Folk 1992:10]

A remnant cultural layer with only charcoal was identified (SIHP # 50-80-12-4526) outside the proposed drainage corridor and a charcoal sample was collected and dated, yielding a radiocarbon age calibrated to AD 1260-1405 (Hammatt and Folk 1992:10). The study concluded that

> Previous 20th century activities in the area of the proposed drainage channel include the building and use of Camp Malakole during the 1940s, and development of the existing drainage way at that time or later followed by the laying of a major pipeline parallel to the shore within the beach ridge. This has resulted in the destruction of any prehistoric cultural layers that may have existed in the proposed 150 foot wide drainage channel corridor as evidenced by excavation Unit 1. North, a minimum of 18.3 m. (60 ft) beyond the boundaries of the proposed drainage, remnants of former land use in ancient times do exist and have been radiocarbon dated to A.D. 1260 to 1405 from charcoal in an apparently isolated firepit.
>
> The proposed construction project will probably involve down-cutting and grading, but no archaeological sites or deposits along the beach ridge will be impacted as none are present within the drainage corridor. [Hammatt and Folk 1992:15]

5.2.13 McIntosh and Cleghorn 1999

McIntosh and Cleghorn (1999) carried out archival research for the Honouliuli wastewater treatment plant including a 19.3-km (12-mile) pipeline. They concluded the likelihood of encountering surface archaeological sites is low but “there is the possibility of encountering subsurface resources in the form of sinkholes containing cultural materials and possibly human burials” (McIntosh and Cleghorn 1999:i).

5.2.14 McDermott et al. 2006

CSH carried out an archaeological inventory survey (AIS) for the proposed 345-acre Kapolei Harborside Center project. Three previously identified historic properties (SIHP #s 50-80-12-6679 drainage channel, 50-80-12-2888 Barbers Point Harbor Archaeological District, and 50-80-12-9714 OR&L ROW) and three newly recorded historic properties (SIHP #s 50-80-12-6876 and 50-80-12-6877, pre-Contact stacked stone enclosures, and 50-80-12-6878 sinkhole features) were identified (McDermott et al. 2006).

5.2.15 Rasmussen and Tomonari-Tuggle 2006

The International Archaeological Research Institute, Inc. (IARII) (Rasmussen and Tomonari-Tuggle 2006) carried out archaeological monitoring for a Waiau fuel pipeline project extending from a Barbers Point Tank Farm in Campbell Industrial Park to the Waiau Generating Station east of Pearl City Peninsula. No historic properties nor any data were present near the current project area which appears not to have been monitored as it was not perceived as an area of archaeological sensitivity (Rasmussen and Tomonari-Tuggle 2006:4).

5.2.16 Hammatt et al. 2007

CSH carried out an archaeological literature review and field inspection for a proposed Chevron Refinery fencing project (Hammatt et al. 2007). The project area had been almost entirely, if not entirely, previously graded raised reef limestone hard pan. No surface historic properties were observed within or in the immediate vicinity of the project area. No intact sinkholes, sand dune deposits, or cultural material were observed within the project area (Hammatt et al. 2007).

5.2.17 Tulchin et al. 2007

In 2007, an archaeological literature review and field inspection (Tulchin and Hammatt 2007) was done of an approximately 790-acre parcel at Pālehua, Makakilo. The inspection covered portions of Makaīwa Gulch, Awanui Gulch, and Kalo‘i Gulch. The southeastern boundary of the study area is adjacent to Pālehua Road. Twenty-six archaeological sites were identified during the field inspection. Four archaeological sites were identified during previous archaeological studies. SIHP # 50-80-08-2316 consists of a *ku‘ula* stone documented by the Bishop Museum (Kelly 1959). SIHP # 50-80-12-2601, a pre-Contact wall utilized as a water control feature, and SIHP # 50-80-12-2602, a pre-Contact wall possibly utilized for agriculture, were originally documented by Bordner in 1977 (Bordner 1977). SIHP # 50-80-12-6680, a complex of concrete and iron structures associated with industrial rock quarry operations was identified by CSH in 2004 (Tulchin and Hammatt 2004).

Additional identified archaeological sites (designated with temporary CSH site #s) included CSH 1, wall; CSH 2, mounds; CSH 3, large enclosure; CSH 4, platform; CSH 5, mounds; CSH 6, adze; CSH 7, platform; CSH 8, terraces; CSH 9, enclosure and two small caves; CSH 10, enclosure; CSH 11, mound; CSH 12, platform; CSH 13, enclosure; CSH 14 terrace; CSH 15, wall remnant, hearth, and military “foxhole”; CSH 16, terrace and *hau* thicket; CSH 17, level soil along ridge; CSH 18, enclosure; CSH 19, trail; CSH 20, water tunnel; CSH 21, large boulder with petroglyphs; and CSH 22, enclosure with stone uprights. These potential historic properties were not assigned SIHP #s.

5.2.18 Groza et al. 2008

In 2008, CSH conducted a survey on two parcels for future industrial development and a film studio plus associated infrastructure. The project area was subjected to pedestrian survey, which entailed walking parallel transects at 10-m (30-ft) intervals. No historic properties were recorded as a result of this survey and no additional recommendations were made (Groza et al. 2008).

5.2.19 Groza and Hammatt 2010

CSH carried out archaeological monitoring for wastewater improvements at Kalaeloa City and County Beach Park (also known as Barbers Point Beach Park) southeast of the present study area. No subsurface deposits, cultural material or sinkholes were identified as a result of the project’s monitoring program (Groza and Hammatt 2010).

5.2.20 Condit and Allen 2011

IARII carried out archaeological monitoring at the request of Hawaiian Electric Company for the excavation for the equipment foundation and storm water retention basin. No historic properties were observed (Condit and Allen 2011).

5.2.21 Titchenal et al. 2011

Titchenal et al. (2011) conducted an archaeological inventory assessment for the H-Power Expansion project. Several relatively small pit caves (<2.5 m in diameter) were identified and four were tested. All four pit caves contained paleontological avifauna and one contained medium mammal bone. The pit cave containing the medium mammal bone was deemed eligible for inclusion in the Hawai‘i Register of Historic Places and was designated SIHP # 50-80-12-7417.

5.2.22 Hammatt and Shideler 2012

CSH carried out an archaeological assessment (archaeological inventory survey with negative findings) for a proposed solar site project within the Chevron Refinery at Kalaeloa adjacent to the north of the present study area. That project area was observed to have been almost entirely, if not entirely, previously graded raised reef limestone hard pan. No surface historic properties were observed within or in the immediate vicinity of the project area. No intact sinkholes larger than 60 cm (23 inches) in diameter, sand dune deposits, or cultural material were observed within their project area and none were believed to be present (Hammatt and Shideler 2012).

5.2.23 Runyon et al. 2012

CSH carried out an archaeological assessment (archaeological inventory survey with negative findings) for a Chevron solar energy site at James Campbell Industrial Park 500 m (1,640 ft) east of the Kalaeloa (Barbers Point) Lighthouse. No historic properties were observed. It was concluded that due to extensive prior grading and the development and modern commercial use of the project area, it was unlikely undisturbed subsurface deposits will be affected by the proposed development (Runyon et al. 2012).

5.2.24 McElroy et al. 2015

Keala Pono Archaeological Consulting carried out an AIS for the Department of Transportation Harbors Division (DOT-H) development of a fuel pier at Kalaeloa Barbers Point Harbor, to include new facilities at the pier. No historic properties were identified (McElroy et al. 2015).

5.2.25 Medina and Hammatt 2015

CSH carried out an archaeological monitoring program for the Hanua Street Containment Cap and Barrier project, within the James Campbell Industrial Park. Archaeological monitoring identified SIHP # 50-80-02-7402, a pre-Contact buried cultural layer with six associated pit features of various functions and containing shell midden, fire-cracked rock (FCR), charcoal, fish and faunal bone, and volcanic glass. No human remains were encountered during the project (Medina and Hammatt 2015).

5.2.26 DeMaio Starr et al. 2016

CSH prepared an AIS report (DeMaio Starr et al. 2016) for the Western Kapolei Regional Drainage System project (TMKs: [1] 9-1-014:002 [por.], 9-1-074:036, and 040 [por.]). This project was located approximately 105 m (346.5 ft) south of the intersection of Malakole Street (HI-95) and Kaiholo Street, and approximately 1.6 km (1.0 miles) west of the intersection of Malakole Street and Kalaeloa Boulevard. Three previously unrecorded historic properties and two previously recorded historic properties were documented as a result of this survey. Four historic properties were identified within or directly adjacent to the DeMaio Starr et al. (2016) study area, including SIHP # 50-80-12-2888, the Barbers Point Archaeological District; SIHP # 50-80-12-4526, buried A horizon and cultural deposit layer; SIHP # 50-80-12-7672, a post-Contact historic fence and corral system; and SIHP # 50-80-12-7673, sewage septic treatment system structure associated with the former Army Installation of Camp Malakole.

5.2.27 Stark et al. 2016

CSH carried out an AIS for the Kapolei Business Park Wastewater Pump Station project. One new historic property, SIHP # 50-80-12-7763, is identified within the project area. SIHP # -7763 is a drainage culvert and wall feature built in 1961, which includes a wall dressing two drainage culvert openings in the southwest corner of the project area (Stark et al. 2016).

5.2.28 Belluomini et al. 2017

CSH carried out an AIS for the Kapolei Corporation Yard. One historic property was identified (SIHP # 50-80-12-6866) consisting of two “Panama Mount” 155-mm gun emplacements and an associated cement slab. SIHP # 50-80-12-7385 identifies 68 pit caves that were documented but no cultural materials and no deliberate modifications (such as a wall segment or cairn) were positively identified at any pit cave (Belluomini et al. 2017).

Section 6 Summary and Recommendations

CSH undertook this cultural assessment at the request of CH2MHill. The research broadly covered the entire *ahupua‘a* of Honouliuli, including the current project area.

6.1 Results of Background Research

Background research for this study yielded the following results:

1. The ‘Ewa plains, south of the Wai‘anae mountain range consist largely of limestone and alluvial deposits pockmarked with karsts formed by the dissolution of limestone by underground fresh water. The project area in pre-Contact Hawai‘i would have consisted of lowland dry shrub and grasslands.
2. Honouliuli is the largest *ahupua‘a* in the *moku* of ‘Ewa. One translation of the name for this district is given as “unequal” (*Saturday Press*, 11 August 1883). Others translate the word as “strayed” and associate it with the legends of the gods Kāne and Kanaloa.
3. Generally, Honouliuli was described as very hot and dry. Evidence for drought-like conditions are further supported by the relative lack of traditional rain names associated with Honouliuli Ahupua‘a. The Nāulu rain is the only known associated rain name for Honouliuli. Due to the lack of rainwater, freshwater resources were accessed via a karstic system.
4. In traditional Hawaiian times, the areas of exposed coral (Pleistocene limestone) outcrop were undoubtedly more extensive. According to McAllister (1933), holes and pits in the coral were generally accessed for water, while larger pits, often containing soil, were used for cultivation. McAllister additionally remarked that even “today” (McAllister began his survey work in 1930, and thus his comments are a reflection of the Honouliuli environment during the early twentieth century) *mai‘a* (banana; *Musaceae*) and *kō* (sugarcane; *Saccharum officinarum*) were being cultivated within the pit caves (sink holes) (McAllister 1933:109).
5. The traditional *ka‘ao* associated with the area speak of the *akua* brothers, Kāne and Kanaloa. It was their supernatural feat of hurling *pōhaku* across the island that determined the boundaries of land divisions (Sterling and Summers 1987:1). Additional *mo‘olelo* speak of Hi‘iaka and her travels across the plains of ‘Ewa. In particular, the *wahi pana* of Kaupe‘a (located northeast of the current project area) is described. Kamakau describes Kaupe‘a as a wide plain where a grove of *wiliwili* stands (Kamakau 1991:47). This plain is an *ao kuewa*, a realm belonging to homeless souls. In general, the *kama‘āina* of both Honouliuli Ahupua‘a and ‘Ewa District made a point to avoid this place.
6. Pu‘uokapolei is a prominent hill located on the ‘Ewa coastal plain that was the primary landmark for travelers on the trail running from Pearl Harbor to Wai‘anae. A *heiau* was once on the summit of the hill, however, by the time of McAllister’s survey of O‘ahu it had been destroyed (McAllister 1933:108). The hill was also used as a point of solar reference or as a place for celestial observations of the winter and summer solstice. A ceremony at a *heiau* on

Pu‘uokapolei provides a vantage point to capture the sun setting directly behind Pu‘ulailai, a peak farther west in the Wai‘anae range. A coinciding ceremony at Kūpalaha Heiau in Waikīkī captures the same essence as the sun sets behind Pu‘uokapolei.

7. Additional *heiau* located within Honouliuli included Pu‘u Ku‘ua located at Palikea, in addition to two unidentified *heiau*. These two unidentified *heiau* are located at the foot of Pu‘u Kanehoa and Pu‘u Kuina, respectively.
8. John Papa ‘Ī‘ī describes a network of Leeward O‘ahu trails, which in later historic times encircled and crossed the Wai‘anae Range, allowing passage from West Loch to the Honouliuli lowlands, past Pu‘uokapolei and Waimānalo Gulch to the Wai‘anae coast and onward, circumscribing the shoreline of O‘ahu (‘Ī‘ī 1959:96–98).
9. The rich resources of Pu‘uloa—the fisheries in the lochs, the shoreline fishponds, the numerous springs, and the irrigated lands along the streams—made ‘Ewa a prize for competing chiefs. ‘Ewa Moku was also a political center and home to many chiefs in its day. Oral accounts of *ali‘i* recorded by Hawaiian historian Samuel Kamakau date back to at least the twelfth century. *Ali‘i* associated with Honouliuli and greater ‘Ewa Moku included Kākuhihewa, Keaunui, Lakona, Mā‘ilikūkahi, and Kahahana.
10. Early foreign accounts describe the southwest coast of O‘ahu, including Honouliuli Ahupua‘a, as an area “a little distance from the sea, [where] the soil is rich and all the necessaries of life are abundantly produced” (Vancouver 1798 in Sterling and Summers 1978:36). A sailor among Vancouver’s crew observed, however, that “from the number of houses within the harbor it should seem to be very populous; but the very few inhabitants who made their appearance were an indication of the contrary” (Vancouver 1798 in Sterling and Summers 1978:36).
11. The first western ship recorded as wrecking in the Hawaiian Islands was the brig Arthur under the command of Captain Henry Barber that ran aground at Kalaeloa Point on the southwest corner of O‘ahu at 8:00 p.m. on 31 October 1796. The traditional name of Kaleloa was changed to Barber’s Point, and in 1968 the apostrophe was officially deleted from the name by the U.S. Board of Geographic Names (Dean 1991:17). The propensity for shipwrecks off the Honouliuli coast eventually led to the construction of a lighthouse at Barbers Point in 1888. However, shipwrecks continued to occur well into the early twentieth century. To respond to navigational concerns, a 72-ft-high tower was constructed; this Barbers Point lighthouse is located approximately 1.3 km (0.8 miles) southeast of the current project area.
12. Following the Māhele of 1848, 99 individual land claims in the ahupua‘a of Honouliuli were registered and awarded by King Kamehameha III. The project area appears to have been included in the largest award (Royal Patent 6071, LCA 11216, ‘Āpana 8) granted in Honouliuli Ahupua‘a to Miriam Ke‘ahikuni Kekau‘ōnohi on January 1848 (Native Register). Kekau‘ōnohi acquired a deed to all unclaimed land within the ahupua‘a, totaling 17,503 ha (43,250 acres).

13. With the growth of foreign interests on O‘ahu Island during the last half of the nineteenth century, an array of agricultural enterprises was attempted. In 1877, James Campbell purchased most of Honouliuli Ahupua‘a—including the current project area—for a total of $95,000.
14. By 1889, the Ewa Plantation Company was established, and lands throughout Honouliuli were designated for sugarcane cultivation. Sugar production exploded with the successful drilling of an artesian well by James Campbell on the ‘Ewa Plain. Campbell’s first well was named Waianiani (“crystal waters”) by the kama‘āina of Honouliuli (Nellist 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho‘okuleana 2014).
15. The early twentieth century saw the lands of Honouliuli heavily utilized by both civilians and the U.S. military for transportation. The nearby Barbers Point Military Reservation was established in 1921.
16. Following World War II, the Honouliuli and Kalaeloa area were largely devoid of industrial development. In around 1959-1960, the oil refinery and acid plant was constructed. Industrial development continued in earnest, and following Statehood, the James Campbell Industrial Park area was expanded.

6.2 **Impacts and Recommendations**

Based on the information gathered from the cultural and historic background detailed in this cultural assessment, the proposed project should not have any impacts to cultural resources. Although highly unlikely, in the event that any cultural resources are encountered during construction, we recommend the following:

1. Should burials, subsurface cultural deposits, or pit caves (sinkholes) with openings greater than 1 m in diameter be encountered during ground disturbance or via construction activities, all work should cease immediately and the appropriate agencies should be notified pursuant to applicable law, HRS §6E.
2. In the event that *iwi kūpuna* (ancestors) are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.
3. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and/or preservation plan.

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Appendix A Place Names of Honouliuli

Place	Type	Meaning	Source
Akupu	peak, spring		
Anianikū	cove		
Awanui	gulch	big harbor, or big kawa plant	Pukui and Elbert 1986
‘Ēkahanui	gulch	large bird’s nest fern	Pukui et al. 1974
Hāpapa, Pu‘u	peak	rock stratum hill; a shallow	Thrum 1922
Hoakalei	spring	lei reflection	Pukui et al. 1974
Honouliuli	stream, gulch	dark bay; blue harbor	Thrum 1922
Huliwai	gulch	water search	Pukui et al. 1974
Hunehune	gulch	Tiny	Pukui et al. 1974
Ka‘ākau	*‘ili ‘āina*	the right, or the north	Pukui and Elbert 1986
Ka‘aikukui	gulch	the candlenut root	Pukui et al. 1974
Ka‘aimanō	pond	possibly, the shark food	Pukui and Elbert 1986
Ka‘aumakua	*pu‘u* (peak), *‘ili ‘āina*	the family god	Pukui et al. 1974
Kahe	point	Flow	Pukui et al. 1974
Kahe, Pu‘u		Flow	Pukui et al. 1974
Kaihuopala‘ai	West Loch	the nose of Pala‘ai	Pukui et al. 1974
Kaihuopala‘ai	*‘ili ‘āina*	the nose of Pala‘ai	Pukui et al. 1974
Kā‘ilikahi	*‘ili ‘āina*	snatch once	Pukui et al. 1974
Kalaeloa	*‘ili ‘āina*	the long point	Pukui et al. 1974
Kalaeloa	point	the long point	Pukui et al. 1974
Kalahu	pond		
Kalo‘i	gulch	the taro patch	Pukui et al. 1974
Kalua‘a	gulch		
Kaluamo‘oiki	*‘ili ‘āina*		
Kama‘ipipipi	*‘ili ‘āina*		
Kamilomilo	*‘ili ‘āina*	to twist	Thrum 1922
Kamoku	*‘ili ‘āina*	the district, or the cut-off portion	Pukui et al. 1974
Kānehili	plain		
Kānehoa, Pu‘u	peak	a native shrub; Kāne’s friend	Thrum 1922
Kanukuopu‘uloa	point	the entrance of Pearl Harbor	
Kapākule	*loko* (pond)	the akule fish enclosure	Pukui et al. 1974

Place	Type	Meaning	Source
Kapāmuku	loko	the short wall	Pukui and Elbert 1986
Kapapapuhi	point, *‘ili ‘āina*	the numerous eels	Thrum 1922
Kapolei	gulch	beloved Kapo, a sister of Pele	Pukui et al. 1974
Kapolei, Pu‘u o	hill	beloved Kapo, a sister of Pele	Pukui et al. 1974
Kapuai, Pu‘u	*pu‘u*	footstep	Thrum 1922
Kaua, Pu‘u	*pu‘u*	war hill or fort hill	Pukui et al. 1974
Kaula	Bay		
Kaulaula	*‘ili ‘āina*	the red one	Thrum 1922
Kaupe‘a	plain		
Keahi	point	the fire	Pukui et al. 1974
Keka‘a	point	the rumble	Pukui et al. 1974
Keon‘ō‘io	gulch	the sandy place with bonefish (*‘ō‘io*)	Pukui et al. 1974
Kepoe	*‘ili ‘āina*		
Kīhewamakawalu	*loko*		
Kolekole	pass	raw, scarred	Pukui et al. 1974
Ko‘olina	village		
Kualaka‘i	village, *‘ili ‘āina*	*Tethys* sp.(“sea hare”)	Pukui et al. 1974
Ku‘ina, Pu‘u	*pu‘u, heiau* (pre-Christian place of worship)		
Kunia	*‘ili ‘āina*	burned	Pukui and Elbert 1986
Kupaka‘akahi	beach		
Ku‘ua, Pu‘u	*pu‘u, heiau*	relinquished hill	Pukui et al. 1974
Laulaunui	islet	large leaf package	Pukui et al. 1974
Līhe‘e	*‘ili ‘āina*	cold chill	Pukui et al. 1974
Limaloa	gulch	long arm	Pukui et al. 1974
Loloulu	*‘ili ‘āina*		
Makai‘i	*‘ili ‘āina*		
Makaīwa	gulch	mother of pearl eyes	Pukui et al. 1974
Makakilo, Pu‘u	*pu‘u*	observing eyes	Pukui et al. 1974
Makalapa	gulch	ridge features	Pukui et al. 1974
Manawahua, Pu‘u	*pu‘u*	great grief hill, or nausea hill	Pukui et al. 1974
Manawaiahu	gulch	bird water pool	Pukui et al. 1974
Manawai‘elelū	gulch	cockroach water branch	Pukui and Elbert 1986

Place	Type	Meaning	Source
Manuwaikealae	gulch		
Maui	*‘ili ‘āina*		
Maunakapu	peak	sacred mountain	Pukui et al. 1974
Maunauna	*pu‘u,* gulch	mountain sent on errands	Pukui et al. 1974
Ma‘ūakapua‘a	*‘ili ‘āina*		
Mo‘opunea Pu‘u	*pu‘u*	grandchild hill	
Nalowale	*heiau*	lost, forgotten	Pukui and Elbert 1986
Nāmo‘opuna	gulch	the grandchildren	Pukui and Elbert 1986
Nāpepeiao‘ōlelo	*‘ili ‘āina*		Pukui and Elbert 1986
Niuke‘e	*‘ili ‘āina*	bent coconut tree	
‘Oki‘okilepe	*loko*	cut strips	Pukui et al. 1974
One‘ula	village, beach	red sand	Pukui et al. 1974
Pālailai	gulch	young lai fish	Pukui et al. 1974
Pālailai, Pu‘u	*pu‘u*	young lai fish hill	Pukui et al. 1974
Pālāwai	gulch	kind of sea moss	Thrum 1922
Pālehua	*pu‘u*	*lehua* flower enclosure	Pukui et al. 1974
Palikea	*pu‘u*, ridge	white cliff	Pukui et al. 1974
Pāmoku	*loko*		
Paupauwela (Poupouwela)	*‘ili ‘āina*	an angry person	Thrum 1922
Pili o Kahe	point	clinging to Kahe	Pukui et al. 1974
Pilo o Koe	gulch		
Pōhākea	pass	white stone	Pukui et al. 1974
Pōhaku Palaha	*pōhaku*	broad rock	Thrum 1922
Pō‘aiwaikele	*‘ili ‘āina*	(spelling from Soehren 2009)	
Polapola	*‘ili ‘āina*	improved in health	Pukui et al. 1974
Poliwai	gulch	water bosom	Pukui et al. 1974
Po‘ohilo	*‘ili ‘āina*		
Poulihale	gulch	dark house	Pukui et al. 1974
Pouilihale, Pu‘u	*pu‘u*	dark house hill	Pukui et al. 1974
Puali‘i	gulch	small flower	Pukui and Elbert 1986
Pua‘alu‘u	*‘ili ‘āina*	diving pig	Pukui et al. 1974
Pu‘uloa	*‘ili ‘āina*, beach	long hill	Pukui et al. 1974
Pu‘umai‘alau	gulch	hill of many bananas, or many banana stalks	Pukui and Elbert 1986

Place	Type	Meaning	Source
Wai‘eli	gulch	dug water	Pukui et al. 1974
Waimānalo	gulch	potable water	Pukui et al. 1974
Waimanana	*‘ili ‘āina*	extended water	Pukui and Elbert 1986

Appendix C
Scoping Letter and Distribution List

ISLAND ENERGY

Marc Dexter
Health, Environmental &
Safety Manager

Headquarters and Refining
Island Energy Services, LLC
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
Marc.Dexter@islandenergyservices.co

August 22, 2017

Subject: Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Interested Party:

IES Downstream, LLC is proposing to install a sulfur dioxide (SO_2) scrubbing system and replace the existing karbate (graphite) gas cooling system within the spent acid regeneration plant (acid plant) at its Kapolei Refinery. The proposed project would involve work within the Special Management Area (SMA) and would require an SMA Use Permit. Pursuant to the Revised Ordinances of Honolulu (ROH) Chapter 25-3.3, projects that require an SMA Use Permit shall be subject to an assessment in accordance with the procedural steps set forth in Hawaii Revised Statutes (HRS) Chapter 343. As such, IES has contracted CH2M to assist with preparation of an environmental assessment (EA); the Draft EA expected to be available later this year.

As part of the EA preparation process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered as part of the environmental review. An overview and summary of the proposed project is enclosed for your review. We are requesting comments and input regarding environmental concerns in any relevant resource areas, as well as information that might help us to evaluate the proposed project.

Please provide any comments regarding the scope of the EA in writing via U.S. mail or e-mail to Lisa Kettley at CH2M (1132 Bishop Street, Suite 1100, Honolulu, Hawaii 96813 or lisa.kettley@ch2m.com). Comments must be postmarked by September 22, 2017 to be considered in the Draft EA.

Thank you for your participation in the environmental review process for the proposed project.

Sincerely,

aea

SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project
IES Downstream, LLC - Kapolei Refinery, Oahu, Hawaii

IES Downstream, LLC is proposing to install a sulfur dioxide (SO_2) scrubbing system and replace the existing karbate (graphite) gas cooling system within the spent acid regeneration plant (acid plant) at its Kapolei Refinery.

Location

The Kapolei Refinery (formerly Chevron Hawaii Refinery) is located within Campbell Industrial Park, in the Ewa district on the southwest side of Oahu (tax map key [TMK] 9-1-014:010). The entire refinery is within the State urban district and the City and County of Honolulu intensive industrial (I-2) zone. The location of the refinery is shown in Figure 1.

The proposed project area encompasses the existing acid plant, which is situated in the southwestern portion of the refinery. It is approximately 250 feet east of the shoreline and is entirely within the Special Management Area (SMA), as shown in Figure 2.

Existing Conditions

The Kapolei Refinery occupies approximately 250 acres, and has been continuously operated since the early 1960s. It is one of two petroleum refineries located in the state of Hawaii, and includes a full range of standard facilities and equipment used for the processing of crude oil into various consumer products. The refinery processes mainly sweet (low sulfur content) crudes and produces a variety of petroleum products such as fuel oil for power generation, motor gasoline, jet fuel, aviation fuel, propane, and diesel fuel. The proposed project would involve work within the acid plant, which functions to decompose spent sulfuric acid and regenerate fresh acid that can be reused in refinery processes.

Purpose and Need

The acid plant was designed in 1959 and although modifications have been made over the years, some of the equipment is aging and no longer offers the best available technology for minimizing SO_2 emissions. In addition, the acid plant is limited by the functionality of the existing gas cooling system, and as such is not able to operate at its' design capacity. As the karbate coolers are reaching the end of their design life and are deteriorating, the flow rates of the gas cooling system have been "turned down," which limits the heat transfer capacity and subsequent ability to maintain acid concentrations at optimal levels. Frequent shutdowns of the acid plant are also required to backflush and clean the coolers, which often become fouled due to buildup of silt and bioorganic materials.

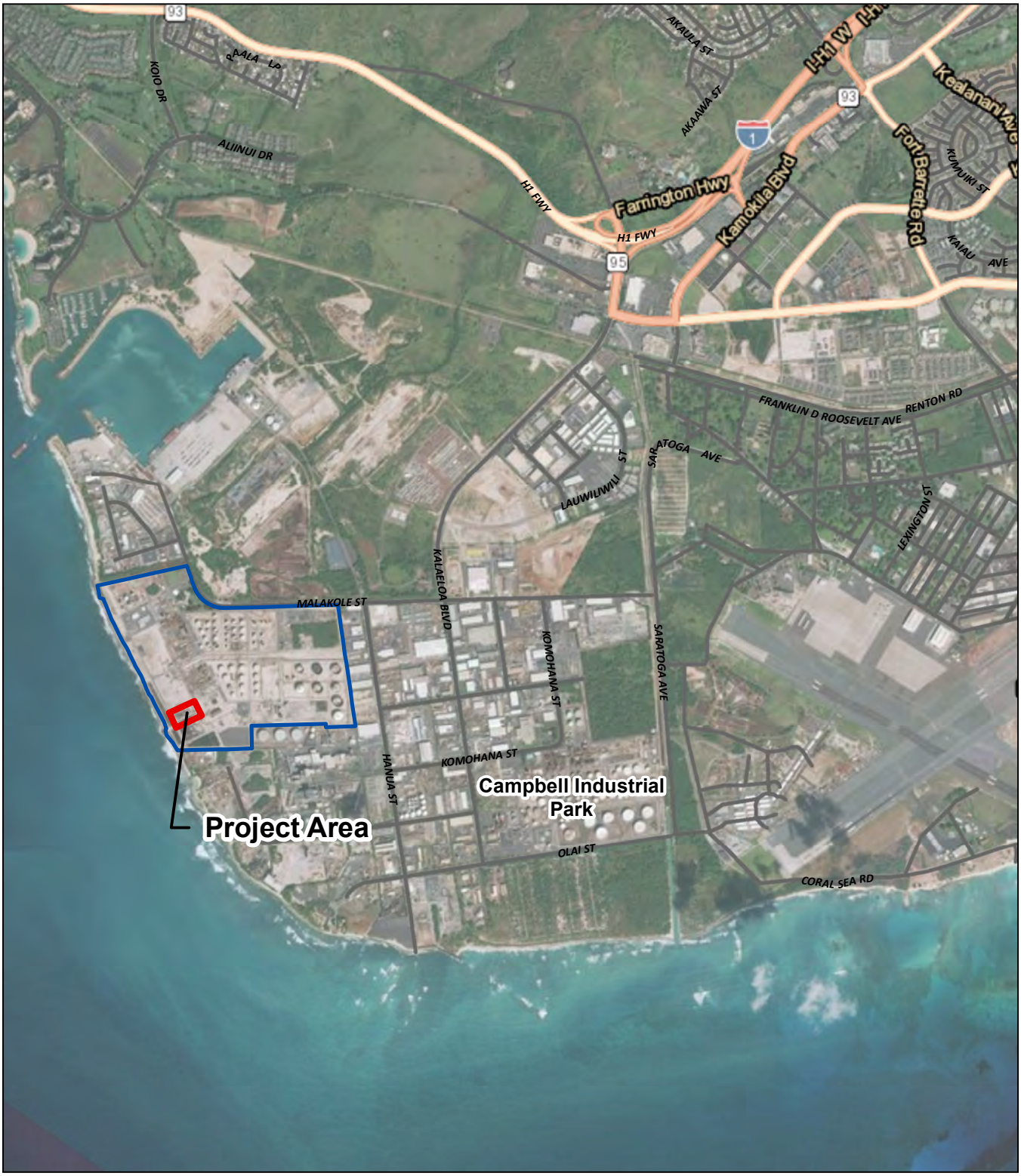
The purpose of the proposed project is to install an SO_2 scrubbing system and replace the karbate gas cooling system with new acid gas coolers. The new scrubbing system would control SO_2 emissions generated at the plant to meet best available control technology (BACT) requirements set by the Environmental Protection Agency (EPA) and regulated by the State of Hawaii Department of Health (DOH) Clean Air Branch. Replacement of the gas cooling system would improve equipment efficiency and allow the acid plant to operate at its design capacity.

Proposed Project Description

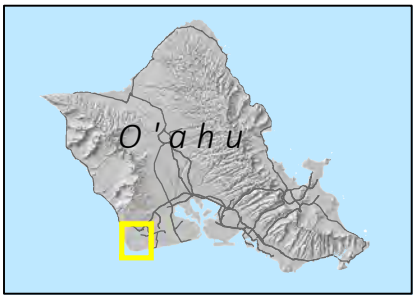
The proposed project would include the following components:

- **New SO_2 Scrubbing System**: The SO_2 scrubbing system would consist of a scrubbing tower and an acidulation tower. The scrubbing tower would include a vertical tower (approximately 4 feet in diameter and 57 feet tall) with a stack (approximately 24 inches in diameter and 18 feet tall), and would be encased within an 80-foot-tall steel support structure. The acidulation tower would also be a vertical tower (approximately 33 feet tall), and would be attached to the exterior of the steel support structure. The system would include a total of five associated pumps (at ground level) and a stripper air fan.
- **Replacement Gas Coolers**: The existing karbate gas coolers would be replaced with two new compact plate and frame heat exchangers (each approximately 4 feet long by 2 feet wide, with a height of approximately 6 feet). In addition, ceramic packing would be added to the existing humidification tower, two acid recirculating pumps would be replaced with higher capacity pumps, and piping modifications would be made to tie-in the new heat exchangers to the humidification tower and recirculating pumps.

All work would occur within the footprint of the existing acid plant.



VICINITY MAP



Legend

- Acid Plant
- IES Kapolei Refinery

N

0 1,800 3,600

Approximate scale in feet

FIGURE 1
Location of Kapolei Refinery
Karbate Cooler Replacement and SO_2 Scrubbing System Installation Project
IES Kapolei Refinery
Kapolei, Hawaii

ISLAND ENERGY

VICINITY MAP

Legend

- Acid Plant
- IES Kapolei Refinery
- Special Management Area (SMA)

N

0 600 1,200

Approximate scale in feet

FIGURE 2
Project Location
Karbate Cooler Replacement and SO_2 Scrubbing System Installation Project
IES Kapolei Refinery
Kapolei, Hawaii

ISLAND ENERGY

Distribution List for the Draft EA Scoping Letter

Federal Agencies	**Elected Officials**
U.S. Geological Survey	State Senator Mike Gabbard
U.S. Fish and Wildlife Service	State Senator Maile Shimabukuro
National Resources Conservation Service	State Representative Andria Tupola
Army Corps of Engineers	State Representative Sharon Har
Federal Aviation Administration	County Council District 1
Environmental Protection Agency	Neighborhood Board No. 34
State Agencies	**Neighboring Property Owners**
Dept. of Accounting and General Services (DAGS)	Amerigas Propane L P
Dept. of Business, Economic Development and Tourism (DBEDT)	Bering Sea Eccotech Inc.
	DC Asphalt Services Inc.
DBEDT, Office of Planning	Four C's Investments
Dept. of Health (DOH) Environmental Planning Office	Gerald Ryusaki LLC
DOH Env. Management Division, Clean Air Branch	Ground Transport Inc.
DOH Env. Management Division, Clean Water Branch	Hanua Property LLC
Department of Land and Natural Resources (DLNR)	Hawaii MMGD LLC
DLNR State Historic Preservation Division	Hawaii Phoenix Properties LLC
Department of Transportation (DOT)	Hawaiian Electric Company Inc.
UH Environmental Center	Horizon Waste Services of HI Inc.
Legislative Reference Bureau Library	Kapolei Infrastructure LLC
Office of Hawaiian Affairs	Kapolei Properties LLC
City and County of Honolulu	KIP LLC, c/o Damon Key Keong Kupchak Hastert
Board of Water Supply	KIP LOT 3 LLC
Department of Design and Construction	LC Investments LLC
Department of Environmental Services	PMLW PARTNERSHIP, c/o LNW Management Inc.
Department of Facility Maintenance	Queen Emma Land Co.
Fire Department	
Department of Planning and Permitting	
Police Department	
Department of Transportation Services	

NOTE: Neighboring property owners are those located within 300 feet of the refinery TMK.

Appendix D
Scoping Comments and Responses

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

RECEIVED
SEP 11 2017

KIRK CALDWELL
MAYOR

~~LOUIS M. KEALOHA~~
CHIEF

CARY OKIMOTO
~~JERRY INOUYE~~
DEPUTY CHIEFS

OUR REFERENCE MT-DK

September 6, 2017

Ms. Lisa Kettley
CH2M
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Kettley:

This is in response to a letter from Island Energy Services, LLC (dated August 22, 2017), requesting comments on a Pre-Assessment Consultation, Environmental Assessment, for the SO_2 Scrubbing System Installation and Gas Cooling System Replacement project at the Kapolei Refinery.

Based on the information provided, this project should have no significant impact on the services or operations of the Honolulu Police Department at this time.

If there are any questions, please call Major Sean Naito of District 8 (Kapolei) at 723-8403.

Thank you for the opportunity to review this project.

Sincerely,

CARY OKIMOTO
Acting Chief of Police

By
MARK TSUYEMURA
Management Analyst VI
Office of the Chief

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

October 24, 2017

Cary Okimoto, Acting Chief of Police
Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, Hawaii 96813

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Chief Okimoto,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 6, 2017. We acknowledge your comment that the project should have no significant impact on the services or operations of the Honolulu Police Department.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

aea

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROBERT J. KRONING, P.E.
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

RECEIVED
SEP 11 2017

September 7, 2017

CH2M
Attn: Lisa Kettley
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms.Kettley,

Subject: Pre-Assessment Consultation for Revised Ordinances of Honolulu Chapter 25 Environmental Assessment; SO2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii TMK: 9-1-014 :(010)

Thank you for the opportunity to review and comment. The Department of Design and Construction has no comments at this time.

Should you have any further questions, please contact me at 768-8480.

Sincerely,

Robert J. Kroning, P.E.
Director

RJK:ms(700606)

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Robert J. Kroning, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Director Kroning,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 7, 2017. We acknowledge that the Department of Design and Construction does not have any comments at this time.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

RECEIVED
SEP 19 2017

KIRK CALDWELL
MAYOR

WES FRYSZTACKI
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

TP8/17-700727R

September 14, 2017

Ms. Lisa Kettley
CH2M
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Kettley:

SUBJECT: Pre-Consultation Draft Environmental Assessment (DEA) for SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery, Oahu, Hawaii

This is in response to a letter that we received from Mr. Marc Dexter at Island Energy Services, LLC, dated August 22, 2017, requesting our review and comments on the subject project. We have the following comments:

1. The area Neighborhood Board, as well as the area businesses, emergency personnel (fire, ambulance and police), Oahu Transit Services, Inc. (TheBus and TheHandi-Van), etc., should be kept apprised of the details of the proposed project and the impacts that the project may have on the adjoining local street area network.

2. Construction materials and equipment should be transferred to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets.

3. Construction schedules should be coordinated with other nearby properties that have planned projects to ensure minimal impacts on City streets.

Thank you for the opportunity to review this matter. Should you have any questions, please contact Renee Yamasaki of my staff at 768-8383.

Very truly yours,

Wes Frysztacki
Director

cc: Marc Dexter, Island Energy Services, LLC

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Wes Fryszlacki, Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Director Fryszlacki,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 14, 2017. We acknowledge the recommendation to keep the Neighborhood Board, area businesses, emergency personnel, and Oahu Transit Services Inc. apprised of the proposed project and the potential impacts. We will include these parties on the distribution list for the notification of availability of the Draft Environmental Assessment. We also acknowledge the measures you suggest to minimize impacts to traffic and City streets, and will consider this information in preparation of the Draft Environmental Assessment.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

September 14, 2017

Mr. Marc Dexter
Island Energy Services, LLC
91-480 Malakole Street
Kapolei, Hawaii 96707

Dear Mr. Dexter:

Subject: Your Letter Dated August 22, 2017 Requesting Comments on the Pre-Assessment Consultation for an SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project for a Kapolei Refinery off Malakole Street - Tax Map Key: 9-1-014: 010

Thank you for the opportunity to comment on the proposed refinery project.

The existing water system is adequate to accommodate the proposed development. However, please be advised that this information is based upon current data, and therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of the building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.

When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission, and daily storage.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division at 748-5443.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Ernest Y.W. Lau, Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Mr. Lau,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 14, 2017. We appreciate the information regarding the adequacy of the existing water system to accommodate the proposed project, and your comment regarding payment of Water System Facilities Charges for resource development, transmission and daily storage. We also acknowledge the comment regarding coordination of the onsite fire requirements with the Fire Prevention Bureau of the Honolulu Fire Department.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

aea

DAVID Y. IGE
GOVERNOR

RODERICK K. BECKER
Comptroller

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1301.7

RECEIVED
SEP 18 2017

SEP 15 2017

Ms. Lisa Kettley
CH2M Hill Companies Ltd.
1132 Bishop Street, Suite 1100
Honolulu, HI 96813

Dear Ms. Kettley:

Subject: Pre-Assessment Consultation for Revised Ordinances of Honolulu Chapter 25 Environmental Assessment; SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii
TMK: (1) 9-1-014:010

Thank you for the opportunity to provide comments for the subject project. This project does not impact any of the Department of Accounting and General Services projects or existing facilities in this area, and we have no comments to offer at this time.

If you have any questions, please have your staff call Mr. Kimo Marion of the Planning Branch at 586-0491.

Sincerely,

KEITH S. KOGACHI
Acting Public Works Administrator

KM:mo

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Keith Kogachi, Acting Public Works Administrator
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96810

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Mr. Kogachi,

Thank you for letter in response to the pre-assessment consultation for the subject project transmitted by letter dated September 15, 2017. We appreciate the input that the proposed project does not impact any of the Department of Accounting and General Services projects or existing facilities, and acknowledge that you have no comments at this time.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EMD/CWB

09021PMHK.17

September 20, 2017

Ms. Lisa Kettley
CH2M
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Kettley:

SUBJECT: Comments on the Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; TMK: (1) 9-1-014:010 Ewa District, Kapolei, Island of Oahu, Hawaii

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated August 22, 2017, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/05/Clean-Water-Branch-Std-Comments.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and HAR, Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

5. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:

   a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces.

Any project planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g., minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

If you have any questions, please visit our website at: http://health.hawaii.gov/cwb, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

Alec Wong

ALEC WONG, P.E., CHIEF
Clean Water Branch

MHK

c: DOH-EPO [via e-mail Noella.Narimatsu@doh.hawaii.gov only]

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Alec Wong, Chief
Clean Water Branch
State of Hawaii, Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Mr. Wong,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 20, 2017. We appreciate the information regarding the State's water quality criteria and standards, the Clean Water Act and National Pollutant Discharge Elimination System (NPDES) permitting requirements, and approaches to addressing storm water. We will consider this information in preparation of the Draft Environmental Assessment and as the part of the permitting process for the proposed project.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

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

September 20, 2017

CH2M Hill
Attention: Ms. Lisa Kettley
1132 Bishop Street; Suite 1100
Honolulu, Hawaii 96813

via email: lisa.kettley@ch2m.com

Dear Ms. Kettley:

SUBJECT: Pre-Assessment Consultation for SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project at Kapolei Refinery

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

At this time, enclosed are comments from the (a) Engineering Division, (b) Land Division – Oahu District and (c) Division of Aquatic Resources on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 29, 2017

MEMORANDUM

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Assessment Consultation for SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project at Kapolei Refinery
LOCATION: Ewa District Island of Oahu; TMK: (1) 9-1-014:010
APPLICANT: IES Downstream, LLC

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **September 20, 2017.**

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

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

Signed: _____

Print Name: Carty S. Chang, Chief Engineer
Date: 9/1/17

cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Pre-Assessment Consultation for SO2 Scrubbing System Installation and Gas Cooling System Replacement Project at Kapolei Refinery, Ewa District, Island of Oahu; TMK: (1) 9-1-014:010

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 designated Flood Hazard.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zone designations can be found using the Flood Insurance Rate Map (FIRM), which can be accessed through the Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may take precedence over the NFIP standards as local designations prove to be more restrictive. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

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

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 9/1/17

DAVID Y. IGE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 29, 2017

MEMORANDUM

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Assessment Consultation for SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project at Kapolei Refinery
LOCATION: Ewa District Island of Oahu; TMK: (1) 9-1-014:010
APPLICANT: IES Downstream, LLC

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **September 20, 2017**.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

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

Signed: Darlene Bryant-Takamatsu

Print Name: Darlene Bryant-Takamatsu
Date: 9/1/17

cc: Central Files

5600

DAVID Y. IGE
GOVERNOR OF HAWAII

RECEIVED
AUG 30 2017
Division of Aquatic Resources
DAR 5680

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 29, 2017

MEMORANDUM

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Assessment Consultation for SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project at Kapolei Refinery
LOCATION: Ewa District Island of Oahu; TMK: (1) 9-1-014:010
APPLICANT: IES Downstream, LLC

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **September 20, 2017**.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

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

Signed: Bruce S. Anderson

Print Name: Bruce S. Anderson, Ph.D., DAR Administrator
Date: 9/12/17

cc: Central Files

DAVID Y. IGE
GOVERNOR OF
HAWAII

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

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813

Date: Sept. 11, 2017
DAR # 5600

MEMORANDUM

TO: Bruce S. Anderson, PhD
DAR Administrator

FROM: Annette Tagawa, Aquatic Biologist AT

SUBJECT: Pre-Assessment Comnsultation for SO2 Scrubbing System Installation and Gas Colling System Replacement Project at Kapolei Refinery

Request Submitted by: Russell Y. Tsuji

Location of Project: Ewa District Island of Oahu; TMK: (1) 9-1-014:010

Brief Description of Project:

The applicant, IES Downstream, LLC, is proposing to install a sulfur dioxide (SO2) scrubbing system and replace the existing karbate (graphite) gas cooling system within the spent acid regeneration plant (acid plant) at its Kapolei Refinery. The proposed project would involve work within the Special Management Area (SMA) and would require an SMA Use Permit.

Comments:
☐ No Comments ☒ Comments Attached

Thank you for providing DAR the opportunity to review and comment on the proposed project. Should there be any changes to the project plan, DAR requests the opportunity to review and comment on those changes.

Comments Approved: Bruce S. Anderson Date: 9/12/17
Bruce S. Anderson, PhD
DAR Administrator

DAR# 5600

Comments

The Division has no major objections to the proposed project since it is not expected to have significant adverse impact on aquatic resource values in this area provided that all Best Management Practices (BMPs) be addressed and adhered to. The Division has some concerns regarding potential impacts on aquatic resources found within the nearshore area as well as the subterranean aquatic habitat(s) found within the Ewa karst for the anchialine pool shrimps Halocaridina rubra, a.k.a opae 'ula, and Metabetaeus lohena. Installation and construction activities may have some potential impacts which should be addressed through BMPs by the applicant to minimize potential runoff and seepage from the project work site into the surrounding aquatic environments. In addition, site work should be scheduled during periods of minimal rainfall and lands denuded of vegetation should be replanted or covered as quickly as possible to control erosion.

We have no further comments to this project at this time since there are no design or construction plans for DAR to review. We request the opportunity to review and comment on the prepared EA for the proposed project resulting from this planning process when it becomes available.

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Carty S. Chang, Chief Engineer
Engineering Division
State of Hawaii, Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Mr. Chang,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 20, 2017. We appreciate the information regarding the National Flood Insurance Program (NFIP) and the resources for determining flood hazard zone designations. We will consider this information is preparing the Draft Environmental Assessment.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Russell Y. Tsuji, Administrator
Land Division
State of Hawaii, Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Mr. Tsuji,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 20, 2017. We acknowledge that the Land Division does not have any comments on the proposed project at this time.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Bruce S. Anderson, Administrator
Division of Aquatic Resources
State of Hawaii, Department of Land and Natural Resources
1151 Punchbowl Street, Room 330
Honolulu, Hawaii 96813

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Dr. Anderson,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 11, 2017. We appreciate your input that the proposed project is not expected to have significant adverse impacts on aquatic resource values provided that best management practices (BMPs) are implemented. We acknowledge your comment regarding the aquatic resources found in the nearshore area and within portions of the Ewa karst, and the need for BMPs to minimize impacts to these resources. We will consider this information in preparing the Draft Environmental Assessment.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

aea

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

EPO 17-221

September 20, 2017

Ms. Lisa Kettley
CH2M
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813
Email: lisa.kettley@ch2m.com

Dear Ms. Kettley:

SUBJECT: Pre-Assessment Consultation for Revised Ordinances of Honolulu (PAC ROH) for SO_2 Scrubbing System Installation and Gas Cooling System Replacement, Kapolei Refinery Ewa, Oahu TMK: 9-1-014:010

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your PAC ROH to our office on August 28, 2017.

We understand from the PAC ROH project summary that *"The purpose of the proposed project is to install an 502 scrubbing system and replace the karbate gas cooling system with new acid gas coolers. The new scrubbing system would control 502 emissions generated at the plant to meet best available control technology (BACT) requirements set by the Environmental Protection Agency (EPA) and regulated by the State of Hawaii Department of Health (DOH) Clean Air Branch. Replacement of the gas cooling system would improve equipment efficiency and allow the acid plant to operate at its design capacity."*

Hawaii's environmental review laws require Environmental Assessments (EAs) and Environmental Impact Statements (EISs) to consider health in the discussion and the mitigation measures to reduce negative impacts. In its definition of 'impacts,' §11-200-2, Hawaii Administrative Rules (HAR) includes health effects, whether primary (direct), secondary (indirect), or cumulative. Further, §11-200-12(b)(5), HAR, lists public health as one of the criteria for determining whether an action may have a significant impact on the environment.

In the development and implementation of all projects, EPO strongly recommends regular review of State and Federal environmental health land use guidance. State standard comments to support sustainable healthy design are provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments.

We suggest you review the requirements of the Clean Water Branch (Hawaii Administrative Rules {HAR}, Chapter 11-54-1.1, -3, 4-8) and/or the National Pollutant Discharge Elimination System (NPDES) permit (HAR, Chapter 11-55) at: http://health.hawaii.gov/cwb. If you have any questions, please contact the Clean Water Branch (CWB), Engineering Section at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov. If your project involves waters of the U.S., it is highly recommended that you contact the Army Corps of Engineers, Regulatory Branch at: (808) 835-4303.

Please note that all wastewater plans must conform to applicable provisions (HAR, Chapter 11-62, "Wastewater Systems"). We reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should

you have any questions, please review online guidance at: http://health.hawaii.gov/wastewater and contact the Planning and Design Section of the Wastewater Branch (WWB) at (808) 586-4294.

If temporary fugitive dust emissions could be emitted when the project site is prepared for construction and/or when construction activities occur, we recommend you review the need and/or requirements for a Clean Air Branch (CAB) permit (HAR, Chapter 11-60.1 "Air Pollution Control"). Effective air pollution control measures need to be provided to prevent or minimize any fugitive dust emissions caused by construction work from affecting the surrounding areas. This includes the off-site roadways used to enter/exit the project. The control measures could include, but are not limited to, the use of water wagons, sprinkler systems, and dust fences. For questions contact the Clean Air Branch via e-mail at: Cab.General@doh.hawaii.gov or call (808) 586-4200.

Any waste generated by the project (that is not a hazardous waste as defined in state hazardous waste laws and regulations), needs to be disposed of at a solid waste management facility that complies with the applicable provisions (HAR, Chapter 11-58.1 "Solid Waste Management Control"). The open burning of any of these wastes, on or off site, is strictly prohibited. You may wish you review the Minimizing Construction & Demolition Waste Management Guide at: http://health.hawaii.gov/shwb/files/2016/05/constdem16.pdf Additional information is accessible at: http://health.hawaii.gov/shwb. For specific questions call (808) 586-4226.

If noise created during the construction phase of the project may exceed the maximum allowable levels (HAR, Chapter 11-46, "Community Noise Control") then a noise permit may be required and needs to be obtained before the commencement of work. Relevant information is online at: http://health.hawaii.gov/irhb/noise EPO recommends you contact the Indoor and Radiological Health Branch (IRHB) at (808) 586-4700 with any specific questions.

EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https://eha-cloud.doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.

You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer. This viewer geographically shows where some previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared.

We hope this information is helpful. If you have any questions please contact us at DOH.epo@doh.hawaii.gov or call us at (808) 586-4337. Thank you for the opportunity to comment.

Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

LM:nn

c: DOH: CAB, IRH, CWB, WWB, SHWB {via email only}

Attachment: Office of Environmental Quality Control (OEQC) viewer (of some past EA's, EIS's in area)

Please be advised:
The Environmental Planning Office (EPO), along with the Clean Air, Clean Water, and Wastewater Branches will be moving in December 2017. The new address, for EPO, **as of January 1, 2018**, will be:
Environmental Planning Office, DOH, Hale Ola, 2827 Waimano Home Road #109, Pearl City, Hawaii 96782
Please feel free to come and visit our new offices anytime. Please note that there is a security guard at the bottom of the hill (before entering DOH property). Our office phone numbers, email and website will all remain the same.

Attachment: Office of Environmental Quality Control (OEQC) viewer (of some past EA's, EIS's in area)

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Laura Leialoha Phillips McIntyre, Program Manager
Environmental Planning Office
State of Hawaii, Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Ms. McIntyre,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 20, 2017. We appreciate the information regarding the State's land use guidance; water quality, solid waste and wastewater requirements; allowable noise levels; and the Environmental Health Portal. We will consider this information in preparing the Draft Environmental Assessment.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

September 21, 2017

Mr. Marc Dexter
Health, Environmental and Safety Manager
Island Energy Services, LLC
91-480 Malakole Street
Kapolei, Hawaii 96707

Dear Mr. Dexter:

Subject: Environmental Assessment Pre-Assessment Consultation
Sulfur Dioxide Scrubbing System Installation and Gas Cooling System Replacement Project
Kapolei Refinery
Ewa, Hawaii
Tax Map Key: 9-1-014: 010

In response to your letter dated August 22, 2017, regarding the abovementioned subject, the Honolulu Fire Department determined that there will be no significant impact to department services.

All work on this project and refinery operations shall be in compliance with National Fire Protection Association 1, 2012 Edition, fire code requirements for hazardous materials.

Should you have questions, please contact Battalion Chief Wayne Masuda of our Fire Prevention Bureau at 723-7151 or wmasuda@honolulu.gov.

Sincerely,

SOCRATES D. BRATAKOS
Assistant Chief

SDB/TC:ps

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Socrates D. Bratakos, Assistant Chief
Honolulu Fire Department
City and County of Honolulu
636 South Street
Honolulu, Hawaii 96813

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Assistant Chief Bratakos,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 21, 2017. We acknowledge your comment that the project should have no significant impact to fire department services. We also acknowledge that the project must be in compliance with National Fire Protection Association 1, 2012 Edition, fire code requirements.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

aea

DAVID Y. IGE
GOVERNOR

RECEIVED
SEP 27 2017

FORD N. FUCHIGAMI
DIRECTOR

Deputy Directors
JADE T. BUTAY
ROSS M. HIGASHI
EDWIN H. SNIFFEN
DARRELL T. YOUNG

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

IN REPLY REFER TO:
DIR 1087
STP 8.2228

September 21, 2017

Ms. Lisa Kettley
CH2M
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Kettley:

Subject: Sulfur Dioxide Scrubbing System Installation and Gas Cool System Replacement Project, Pre-Assessment Consultation
Ewa District, Oahu, Hawaii, TMK: (1) 9-1-014:010

Department of Transportation's (DOT) comments on the subject project are as follows:

Airports Division

1. The Island Energy Services site is located approximately 2.1 miles from the end of Runway 11 of the Kalaeloa Airport. The applicants need to be aware of the duties of the state and county agencies to implement the State of Hawaii Office of Planning Technical Assistance Memo related to this project and all projects within 5 miles of an airport: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf

2. Federal Aviation Administration (FAA) regulations require the submittal of FAA Form 7460-1, Notice of Proposed Construction or Alteration, in accordance with Code of Federal Regulations, Title 14, Part 77.9. Planned tower structure heights and any additional height of any cranes needed during construction need to be included in the submittal of a FAA Form 7460-1. This form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp

If there are any questions, please contact Mr. Norren Kato of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Sincerely,

FORD N. FUCHIGAMI
Director of Transportation

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Ford N. Fuchigami, Director
State of Hawaii, Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Director Fuchigami,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 21, 2017. We acknowledge your comments regarding the State of Hawaii Office of Planning Technical Assistance Memo related to projects within 5 miles of an airport, and the requirement for submittal of Federal Aviation Administration (FAA) Form 7460-1, Notice of Proposed Construction or Alteration. We will consider this information in preparing the Draft Environmental Assessment and the permitting process for the proposed project.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

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OFFICE OF PLANNING
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
DIRECTOR
OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Ref. No. P-15752

RECEIVED

SEP 26 2017

September 25, 2017

Ms. Lisa Kettley
Project Manager
CH2M
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Kettley:

Subject: Pre-Assessment Consultation for a Draft Environmental Assessment – SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii
TMK: (1) 9-1-014: 010

Thank you for the opportunity to provide comments on the pre-consultation request for the preparation of a Draft Environmental Assessment (Draft EA) on the Sulfur Dioxide (SO_2) Scrubbing System Installation and Gas Cooling System Replacement project, proposed by IES Downstream, LLC (IES). The pre-consultation review material was transmitted to our office via letter dated August 22, 2017.

It is our understanding that this proposed project calls for the installation of a SO_2 scrubbing system and replacement of the existing karbate gas cooling system with a new acid gas cooler system at IES's Kapolei Refinery at Barbers Point Harbor, Oahu. The new scrubbing system would control SO_2 emissions generated at the plant to meet requirements set by the U.S. Environmental Protection Agency and regulated by the State Department of Health, Clean Air Branch.

The Office of Planning (OP) has reviewed the transmitted material and has the following comments to offer:

1. Pursuant to Hawaii Administrative Rules (HAR) § 11-200-10(4) – general description of the action's technical, economic, social, and environmental characteristics, this project must demonstrate that it is consistent with a number of state environmental, social, economic goals, and policies. Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Planning Act, provides goals, objectives, policies, planning coordination and implementation, and priority guidelines for growth, development, and the allocation of resources throughout the state.

   The Draft EA should include a discussion on the project's ability to meet all parts of HRS Chapter 226. The analysis should examine consistency with these statutes or clarify

where it is in conflict with them. If any of these statutes are not applicable to the project, the analysis should affirmatively state such determination, followed by discussion paragraphs.

2. The coastal zone management (CZM) area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" (HRS § 205A-1).

   HRS Chapter 205A-5(b) requires all state and county agencies to enforce the CZM objectives and policies. The Draft EA should include an assessment as to how the proposed action conforms to each of the goals and objectives as listed in HRS § 205A-2. Compliance with HRS § 205A-2 is an important component for satisfying the requirements of HRS Chapter 343.

3. As acknowledged in the review material, the proposed project is located within the special management area (SMA) designated by the City and County of Honolulu. Please consult with the Department of Planning and Permitting (DPP), City and County of Honolulu, on the policies and procedures for SMA permits.

   As a supporting document for a SMA permit application, the Draft EA should specifically discuss the requirements of the SMA use in accordance with the SMA guidelines pursuant to HRS § 205A-26, and City and County of Honolulu SMA ordinances.

4. Pursuant to HAR § 11-200-10(6) – identification and summary of impacts and alternatives considered. In order to ensure that surface water and marine resources along the Leeward Coast remain protected, the preferred action and its alternatives proposed in the Draft EA should be evaluated for the potential of polluted runoff, the increase of volume and velocity of storm runoff, and the risk of erosion caused by stormwater inundation, land disturbing activity, and the increase of impervious surfaces.

   Issues that may be examined include, but are not limited to, project site characteristics in relation to flood and erosion prone areas, open spaces, the potential vulnerability of surface water resources, drainage infrastructure currently in place, soil absorption characteristics of the area, and examining the amount of permeable versus impervious surfaces in the project area. These items should be considered when developing mitigation measures for the protection for surface water resources and the coastal ecosystem, pursuant to HAR § 11-200-10(7).

   Based on the information provided in the review material, due to the project's location and parcel size, the proposed action may be subject to the City and County of Honolulu,

Department of Planning and Permitting (DPP) rules for onsite stormwater management and post-construction low impact development (LID). Please contact DPP on the application and necessity of these drainage standards as they pertain to this project.

To assist in onsite stormwater management OP and the application of LID design features, OP has developed a number of resources on this subject. OP recommends consulting these guidance documents and stormwater evaluative tools when developing strategies to address polluted runoff. They offer useful techniques to keep land-based pollutants and sediment in place and prevent nearshore water contamination while considering the best management practices (BMP) suited for the project and the types of contaminants affecting the project area. The evaluative tools that should be used during the design process include:

- Stormwater Impact Assessments can be used to identify and analyze information on hydrology, sensitivity of coastal and riparian resources, and management measures to control runoff, as well as consider secondary and cumulative impacts to the area.
  http://files.hawaii.gov/dbedt/op/czm/initiative/stomwater_imapct/final_stormwater_impact_assessments_guidance.pdf

- Low Impact Development (LID). A Practitioners Guide covers a range of structural BMP's for stormwater control management, onsite infiltration techniques, water reuse methods, and building layout designs that minimize negative environmental impacts.
  http://files.hawaii.gov/dbedt/op/czm/initiative/lid/lid_guide_2006.pdf

If you have any questions regarding this comment letter, please contact Joshua Hekekia of our office at (808) 587-2845.

Sincerely,

Leo R. Asuncion
Director

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Leo Asuncion, Director
State of Hawaii, Office of Planning
235 South Beretania Street, 6th Floor
Honolulu, Hawaii 96813

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Mr. Asuncion,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 25, 2017. We acknowledge your comments regarding the need to address consistency of the project with Hawaii Revised Statutes (HRS) Chapter 226, Chapter 205A-2, Chapter 205A-26, and the City and County of Honolulu Special Management Area (SMA) ordinances. We also acknowledge your comment regarding evaluation for the potential of polluted runoff, increased volume and velocity of storm runoff, erosion related to stormwater inundation, and increased impervious surfaces, and appreciate the relevant resources provided in your letter. We will consider this input in preparing the Draft Environmental Assessment.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

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DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu'ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

RECEIVED

SEP 28 2017

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 17-536

September 26, 2017

Ms. Lisa Kettley
CH2M
1132 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Kettley:

Subject: Pre-Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment; SO Scrubbing System Installation and Gas Cooling System Replacement Project, Kapiolani Refinery; Ewa District, Oahu
TMK: 9-1-014:010

This is in response to your letter dated August 22, 2017, requesting for comments on the subject project.

We have no comments at this time, as we do not have any facilities or easements on the subject property.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross S. Sasamura, P.E.
Director and Chief Engineer

Marc Dexter
HES Manager

Headquarters and Refining
Island Energy Services, LLC
Attn: Environmental Department
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 3145
Fax 808 682 2214
marc.dexter@islandenergyservices.com

ISLAND ENERGY

October 24, 2017

Ross Sasamura, Director and Chief Engineer
Department of Facility Maintenance
City and County of Honolulu
1000 Ulu'ohia Street, Suite 215
Kapolei, Hawaii 96707

RE: Response to Comments on Pre-Assessment Consultation for Revised Ordinances of Honolulu (ROH) Chapter 25 Environmental Assessment (EA); SO_2 Scrubbing System Installation and Gas Cooling System Replacement Project, Kapolei Refinery; Ewa District, Oahu, Hawaii (Tax Map Key [TMK] 9-1-014:010)

Dear Director Sasamura,

Thank you for comments in response to the pre-assessment consultation for the subject project transmitted by letter dated September 26, 2017. We understand that you do not have any facilities or easements on the subject property and that you do not have any comments at this time.

We appreciate your participation in the environmental review process. Notice of availability of the Draft Environmental Assessment will be sent to your office when it is available for public review and comment. If you have any questions, please contact Lisa Kettley at CH2M (lisa.kettley@ch2m.com).

Sincerely,

Marc Dexter

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Appendix E
Draft EA Distribution List

Distribution List for the Draft EA

Federal Agencies	**Libraries**
U.S. Geological Survey	Hawaii State Library, Hawaii Documents Center
U.S. Fish and Wildlife Service	Kapolei Public Library
National Resources Conservation Service	University of Hawaii, West Oahu Library
Army Corps of Engineers	**Elected Officials**
Federal Aviation Administration	State Senator Mike Gabbard
Environmental Protection Agency	State Senator Maile Shimabukuro
State Agencies	State Representative Andria Tupola
Dept. of Accounting and General Services (DAGS)	State Representative Sharon Har
Dept. of Business, Economic Development and Tourism (DBEDT)	County Council District 1
	Neighborhood Board No. 34
DBEDT, Office of Planning	**Neighboring Property Owners**
Dept. of Health (DOH) Environmental Planning Office	Amerigas Propane L P
DOH Env. Management Division, Clean Air Branch	Bering Sea Eccotech Inc.
DOH Env. Management Division, Clean Water Branch	DC Asphalt Services Inc.
Department of Land and Natural Resources (DLNR)	Four C's Investments
DLNR State Historic Preservation Division	Gerald Ryusaki LLC
Department of Transportation (DOT)	Ground Transport Inc.
UH Environmental Center	Hanua Property LLC
Legislative Reference Bureau Library	Hawaii MMGD LLC
Office of Hawaiian Affairs	Hawaii Phoenix Properties LLC
City and County of Honolulu	Hawaiian Electric Company Inc.
Board of Water Supply	Horizon Waste Services of HI Inc.
Department of Design and Construction	Kapolei Infrastructure LLC
Department of Environmental Services	Kapolei Properties LLC
Department of Facility Maintenance	KIP LLC, c/o Damon Key Keong Kupchak Hastert
Fire Department	KIP LOT 3 LLC
Department of Planning and Permitting	LC Investments LLC
Police Department	PMLW PARTNERSHIP, c/o LNW Management Inc.
Department of Transportation Services	Queen Emma Land Co.

NOTE: Neighboring property owners are those located within 300 feet of the refinery TMK.