BOARD OF WATER SUPPLY

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

April 10, 2023

Acting Director
Office of Planning and Sustainable Development
Environmental Review Program
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

Dear Acting Director:

Subject: Draft Environmental Assessment and Anticipated Findings of No Significant Impact for the East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project, Kapolei, Ewa District, Oahu, Hawaii, Tax Map Keys: (1) 9-1-018: 007, 008, and 012 (Por.), (1) 9-1-017: 096 Kūalaka'i Parkway Right-of-Way, and Farrington Highway and Kapolei Parkway Right-of-Way (No Tax Map Key)

The City and County of Honolulu Board of Water Supply hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the proposed East Kapolei 215 R-1 3.0 million gallon Reservoir and 16-Inch Transmission Main Project, situated on Tax Map Key (TMK) parcels [1] 9-1-018: 007, 008, and 012, Kūalaka'i Parkway Right-of-Way (ROW) (TMK [1] 9-1-017: 096), and Farrington Highway and Kapolei Parkway ROWs (no TMK assigned), on the island of O'ahu, for publication in the next available edition of *The Environmental Notice*.

We have uploaded an electronic copy of this letter, the publication form, and the DEA-AFONSI to your online submittal site.

If you have any questions, please contact Lorna Heller, Water Conservation Branch of our Water Resources Division, at (808) 748-5944 or email at lheller@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Brian Takeda, R. M. Towill Corporation (email to BrianT@rmtowill.com)

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Thursday, April 6, 2023 9:06:18 AM

Action Name

East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main

Type of Document/Determination

Draft environmental assessment and anticipated finding of no significant impact (DEA-AFNSI)

HRS §343-5(a) Trigger(s)

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

Judicial district

ʻEwa, Oʻahu

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

[1] 9-1-018: 007, 008, and 012; Farrington Highway Right-of-Way (ROW) (no TMK assigned); Kūalakaʻi Parkway ROW (TMK [1] 9-1-017: 096); Kapolei Parkway ROW (no TMK assigned)

Action type

Agency

Other required permits and approvals

See Section 8 of the Draft EA

Proposing/determining agency

City and County of Honolulu Board of Water Supply

Agency contact name

Lorna Heller

Agency contact email (for info about the action)

lheller@hbws.org

Email address or URL for receiving comments

lheller@hbws.org

Agency contact phone

(808) 748-5944

Agency address

City and County of Honolulu Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843
United States
Map It

Was this submittal prepared by a consultant?

Yes

Consultant

R.M. Towill Corporation

Consultant contact name

Brian Takeda

Consultant contact email

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(808) 843-1133

Consultant address

R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819
United States
Map It

Action summary

The City and County of Honolulu Board of Water Supply is undertaking the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project for the use of R-1 (recycled) water in Kapolei, ʻEwa District, Island of Oʻahu, Hawaiʻi. The project involves the construction of a new East Kapolei 215 R-1 3.0 MG reservoir; control (operations) building; and 16-inch transmission main extending along the East Kapolei 215 Reservoir site access road with a proposed bulb-out easement within TMK: 9-1-018:012 (Hoʻopili Gateway Development), Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway. The proposed project will be conducted on State, County, and Private lands. Funds for the project will be from the Environmental Protection Agency Clean Water State Revolving Fund loan program and the City and County of Honolulu. The project has been assigned Project Priority List number C150051-77.

Reasons supporting determination

Refer to Section 10.3 of the Draft EA for the Significance Criteria Assessment

Attached documents (signed agency letter & EA/EIS)

- Draft-EA_BWS-E-Kapolei-215-R-1-3-MG-DEA_April-2023.pdf
- BWS-DEA-Transmittal-East-Kapolei-215-R1-Res-033023.pdf

Action location map

- BWS-E-Kapolei-215-R-1-Shapefiles.zip

Authorized individual

Kelly Staples

Authorization

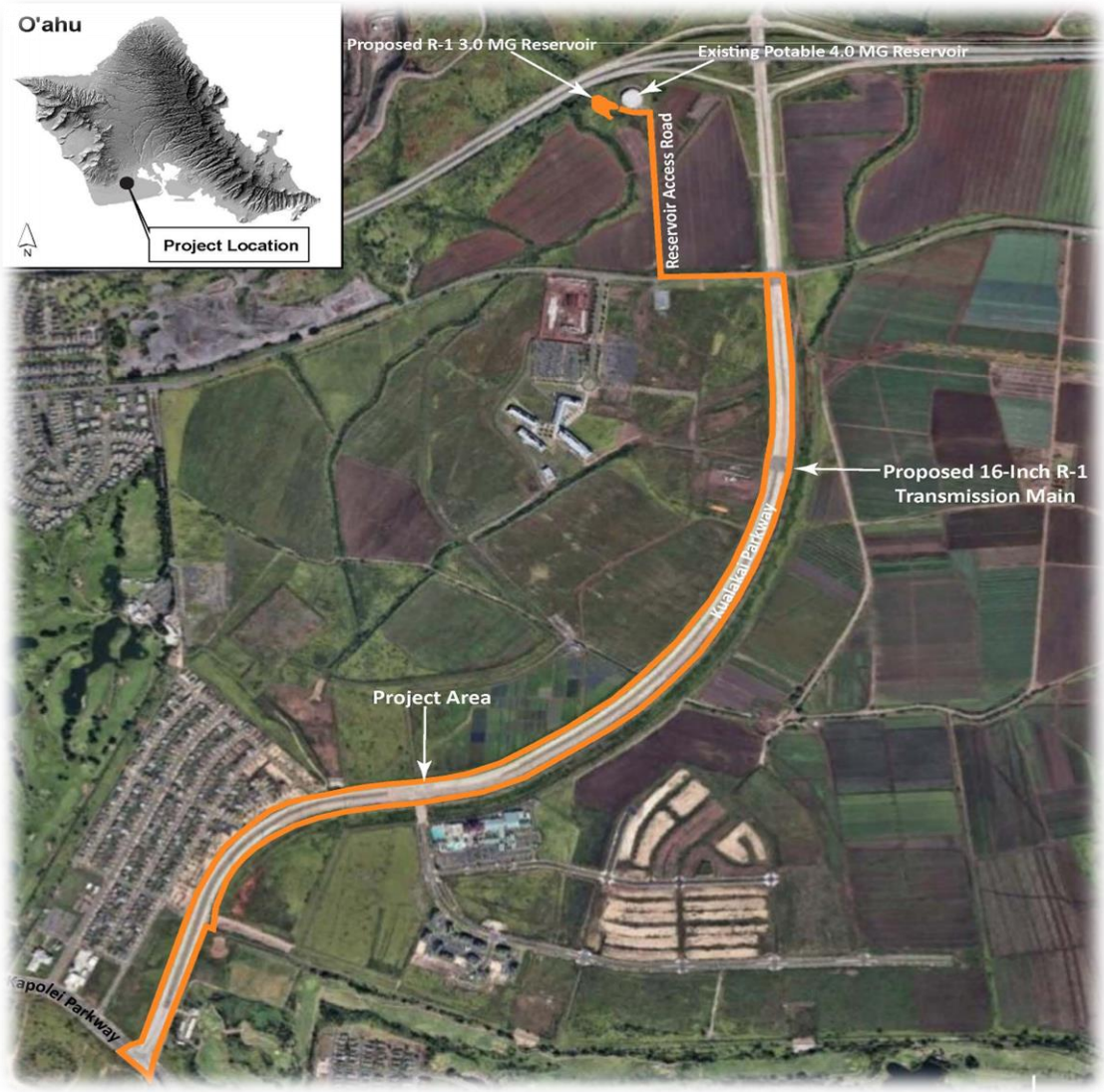
- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Draft Environmental Assessment

Prepared in Accordance with Hawaii Revised Statutes,
Chapter 343, and Hawaii Administrative Rules, Title 11, Chapter 200.1

East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main

Kapolei, Island of O‘ahu, Hawai‘i



April 2023

Proposing/Determining Agency:
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawai‘i 96843

Draft Environmental Assessment

East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main

Kapolei, Island of Oʻahu, Hawaiʻi

April 2023

Prepared For:
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaiʻi 96843

Prepared By:
R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaiʻi 96819-3494

Project No. 1-23029-00P

Table of Contents

Figures

Tables

Appendices

Appendix A Draft Archaeological Literature Review and Field Inspection Report for the Kūalakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, TMKs: [1] 9-1-017:096 Kūalakaʻi Parkway ROW, Farrington Highway ROW, and [1] 9-1-018:008. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Thomas Martel III, B.A., and Hallet H. Hammatt, Ph.D. February 2018.

AND

Addendum to an Archaeological Literature Review and Field Inspection Report for the Kualakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, Addressing a Small Southern Extension within the TMK: [1] 9-1-017:096 Kualakaʻi Parkway ROW. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Scott A. Belluomini, B.A., and David W. Shideler, M.A. October 2020.

Appendix B Final Cultural Impact Assessment for the Proposed East Kapolei R-1 Reservoir and Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, TMKs: [1] 9-1-017:096 Kūalakaʻi Parkway Right-of-Way, Farrington Highway Right-of-Way, and [1] 9-1-018:008. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Liʻi Bitler, B.A., Brittany Beauchan, M.A., and Hallet H. Hammatt, Ph.D. February 2018.

Appendix C Draft Biological surveys for a proposed BWS East Kapolei reservoir and transmission line, Kapolei, Oʻahu. AECOS No. 1518. Prepared by Eric Guinther and Susan Burr. September 2017.

Appendix D Correspondence for Transfer of Land in Tax Map Key: (1) 9-1-018: Por. 008 from the Board of Land and Natural Resources to the BWS for Construction and Operation of the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main Project.

Appendix E Pre-Assessment Consultation Letters for Hawaiʻi Revised Statutes, Chapter 343.

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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AHPA	Archeological and Historic Preservation Act
BLNR	Board of Land and Natural Resources, State of Hawaiʻi
BMPs	Best Management Practices
CAB	Clean Air Branch
CFR	Code of Federal Regulations
cm	centimeter
CWA	Clean Water Act
CWB	Clean Water Branch
CWRM	Commission on Water Resource Management, DLNR, State of Hawaiʻi
CWSRF	Clean Water State Revolving Fund
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dBA	Decibels
DBEDT	Department of Business, Economic Development, and Tourism, State of Hawaiʻi
DEA	Draft Environmental Assessment
DLNR	Department of Land and Natural Resources, State of Hawaiʻi
DOFAW	Department of Forestry and Wildlife, State of Hawaiʻi
DOH	Department of Health, State of Hawaiʻi
DP	Development Plan
DPP	Department of Planning and Permitting, CCH
DTS	Department of Transportation Services, CCH
EA	Environmental Assessment
ECP	Erosion Control Plan
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FEA	Final Environmental Assessment
FEIS	Final Environmental Impact Statement

Acronyms and Abbreviations

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
ft	Feet
FWCA	Fish and Wildlife Coordination Act
FY	Fiscal Year
GP	General Plan
GPM	Gallons per Minute
HAR	Hawaiʻi Administrative Rules
HART	Honolulu Authority for Rapid Transportation, CCH
HDOT	Department of Transportation, State of Hawaiʻi
HRS	Hawaiʻi Revised Statutes
HSTP	Hawaiʻi State Transportation Plan
IBC	International Building Code
lf	Linear Feet
MBTA	Migratory Bird Treaty Act
MGD	Million Gallons per Day
MP	Master Plan
NAAQS	National Ambient Air Quality Standards
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OEQC	Office of Environmental Quality Control
O&M	Operation and Maintenance
POLs	Petroleum, Oils, and Lubricants
PM	Particulate Matter
PPL	Project Priority List
ppt	parts per thousand
psi	pounds per square inch
PVC	Polyvinyl Chloride
RHA	Rivers and Harbors Act

Acronyms and Abbreviations

SCS	Soil Conservation Service, U. S. Department of Agriculture
SDWA	Safe Drinking Water Act
SHPD	State Historic Preservation Division
SHPO	State Historic Preservation Officer
SMA	Special Management Area
SO_2	Sulfur Dioxide
SOEST	School of Ocean and Earth Science and Technology, University of Hawaiʻi
sy	Square Yard
TGC	The Gas Company, LLC, DBA Hawaiʻi Gas
TMD	Transportation Mobility Division, DTS, CCH
TMK	Tax Map Keys
USACE	U. S. Army Corps of Engineers
USC	United States Code
USDA	U. S. Department of Agriculture
USFWS	U. S. Fish and Wildlife Service
USGS	U. S. Geological Survey
WOUS	Waters of the United States
WPRFMC	Western Pacific Regional Fishery Management Council
WQS	Water Quality Standards
WRF	Water Recycling Facility
WWTP	Wastewater Treatment Plant

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Section 1
Project Summary

Project:	East Kapolei 215 R-1 3.0 million gallon (MG) Reservoir and 16-Inch Transmission Main
Proposing/Determining Agency:	City and County of Honolulu (CCH) Board of Water Supply (BWS)
Agent:	R. M. Towill Corporation
Location:	Kapolei, ʻEwa District, Island of Oʻahu, Hawaiʻi 96707
Proposed Action:	The BWS is undertaking the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project for the use of R-1 (recycled) water in Kapolei, ʻEwa District, Island of Oʻahu, Hawaiʻi. The project involves the construction of a new East Kapolei 215 R-1 3.0 MG reservoir; control (operations) building; and 16-inch transmission main extending along the East Kapolei 215 Reservoir site access road with a proposed bulb-out easement within TMK: 9-1-018:012 Hoʻopili Gateway Development, Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway. The proposed project will be conducted on State, County, and Private lands. Funds for the project will be from the Environmental Protection Agency (EPA) Clean Water State Revolving Fund (CWSRF) and CCH. The project has been assigned Project Priority List (PPL) number C150051-77.
Present Use:	BWS East Kapolei 215 Reservoir site, fallow fields, existing ROW
Tax Map Keys (TMKs) and Land Owner:	[1] 9-1-018: 007 and 008 (State Board of Land and Natural Resources [BLNR]) [1] 9-1-018: 012 (D.R. Horton – Schuler Division Hoʻopili Gateway Development) Farrington Highway Right-of-Way (ROW) (no TMK assigned) (CCH) Kūalakaʻi Parkway ROW (TMK [1] 9-1-017: 096) (State) Kapolei Parkway ROW (no TMK assigned) (State)
Land Area:	Approximately 77.8 acres
Flood Zones:	Zones D, X, and AE
State Land Use District:	Urban and Agricultural
Special Management Area (SMA):	N/A
CCH Zoning:	Restricted Agriculture (AG-1)
Permits That May be Required:	FEDERAL: Section 7, Endangered Species Act (ESA) Consultation; and Section 106, National Historic Preservation Act (NHPA) Consultation; Federal Aviation Administration (FAA) Form 7460-1 Notice of Proposed Construction or Alteration STATE: Environmental Assessment (EA) under Hawaiʻi Revised Statutes (HRS), Chapter 343; Section 402, Clean Water Act (CWA), National Pollutant Discharge Elimination System (NPDES) permit for construction storm water; Lease Agreement by the BLNR; Easement Agreement to be Resolved between BWS and BLNR CCH: Building, Grubbing, Grading, Stockpiling, Trenching, and Street Usage Permits; and Traffic Control Plans
Anticipated Determination	Finding of No Significant Impact (FONSI)

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Section 2
Project Purpose and Location

2.1 Background

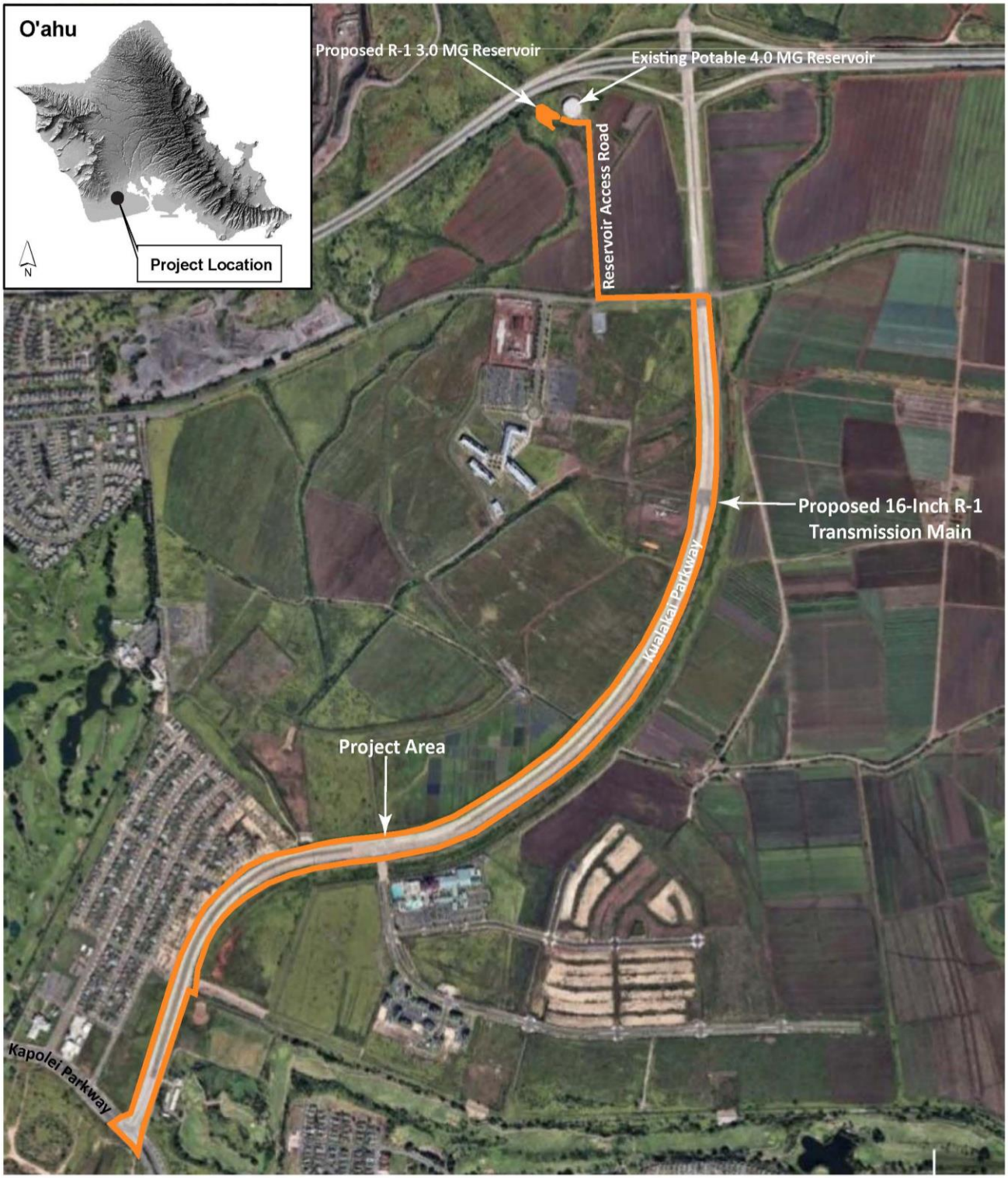
The BWS is undertaking the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project for the use of R-1 (recycled) water in Kapolei, ʻEwa District, Island of Oʻahu, Hawaiʻi, TMKs (1) 9-1-018:007, 008, and 012, (1) 9-1-017:096 Kūalakaʻi Parkway ROW, and Farrington Highway and Kapolei Parkway ROWs (no TMKs assigned). The proposed project involves the construction of a new East Kapolei 215 3.0 MG R-1 reservoir, control (operations) building, approximately 1,900 linear feet (lf) 16-inch intake main along the existing BWS East Kapolei 215 Reservoir access road with a proposed bulb-out easement into TMK: 9-1-018:012 (Hoʻopili Gateway Development) on the east side of reservoir access road, for connection to Farrington Highway, and approximately 12,000 lf 16-inch transmission main extending along Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway. The project area consists of a total of 77.8 acres. See **Figure 2-1, Project Location**.

The new R-1 reservoir would provide needed storage for R-1 non-potable water from the BWS's Honouliuli Water Recycling Facility (WRF). There is currently no elevated, off-site R-1 storage tank servicing the existing BWS R-1 water system. The new R-1 reservoir is projected to be 3.0 MGs in capacity, will stabilize water pressures in the water system, and will provide continuous R-1 water on a 24/7 basis instead of direct pumping on a 11-hour schedule (10 pm – 9 am). The new 16-inch transmission main will extend from the existing BWS R-1 system to Kapolei Parkway as part of the R-1 West Pump System to supply the new East Kapolei 215 3.0 MG R-1 reservoir.

Designated as the highest level of non-potable water treatment regulated by the Hawaiʻi Department of Health (DOH), R-1 water is currently being used for irrigation of golf courses, schools, and green spaces. Although R-1 water is not currently being used for any agriculture, it is permittable for irrigation of all agricultural types, including vegetable crops (DOH, 2002). R-1 is recycled water that is at all times oxidized, then filtered, and then exposed, after the filtration process, to provide:

A. A disinfection process that, when combined with the filtration process, to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. A virus that is at least resistant to disinfection as polio virus may be used for purposes of demonstration; and
B. A disinfection process that limits the concentration of fecal coliform bacteria to the following criteria:
   (1) The median density measure in the disinfected effluent does not exceed 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed;
   (2) The density does exceed 23 per 100 milliliters in more than one sample in any 30-day period; and
   (3) No sample shall exceed 200 per 100 milliliters.

Figure 2-1. Project Location



The project comprises the proposed 3.0 MG R-1 reservoir, control (operations) building, and 16-inch transmission main extending from East Kapolei 215 Reservoir site access road, TMK: 9-1-018:012 Hoʻopili Gateway Development on the east side of reservoir access road, Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway for the R-1 non-potable water reservoir.

The R-1 reservoir tank site will require grading and will be located adjacent to the existing East Kapolei 215 4.0 MG potable water reservoir. The site of the proposed R-1 3.0 MG non-potable water reservoir is presently unused land directly adjacent (makai) to the H-1 Queen Liliʻuokalani Freeway and Farrington Highway. The control building will be located to the northeast of the new 3.0 MG non-potable R-1 reservoir. Land bordering the new R-1 reservoir site on the west and south is (or has been recently) in agricultural (cropland) use. A narrow channel (Hunehune Gulch) separates the west side of the new R-1 reservoir site from a crop field.

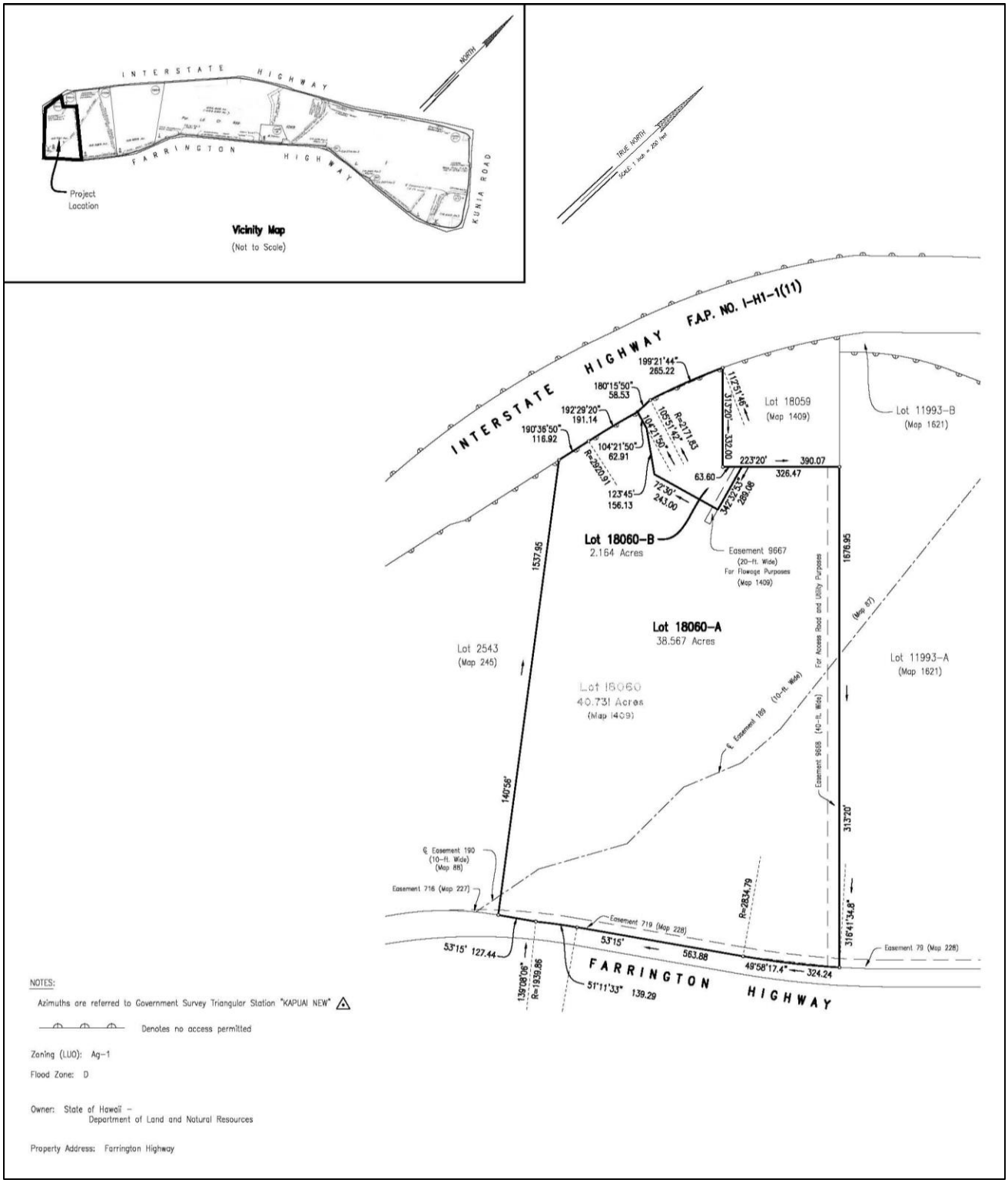
The project parcel, TMK [1] 9-1-018: 008, comprising both the proposed BWS R-1 Reservoir site and surrounding land, is owned by the State of Hawaiʻi, BLNR. The portion of the parcel to be used by BWS is shown in **Figure 2-2, Preliminary Subdivision Map**. See **Appendix D** for the record of correspondence between the BWS and BLNR, including discussion on the transfer of land to BWS for the use of the site.

The new BWS R-1 3.0 MG non-potable water will also require a connection between the proposed reservoir site (land transfer area) and the existing 40-foot-wide easement 9668, designated for access road and utility purposes (see **Figure 3-1** and **Figure 3-10**). The additional easement area is proposed to run parallel to the southern limits of the existing BWS East Kapolei 215 4.0 MG potable water reservoir site; however, BLNR has requested that the connection be accomplished within the existing limits of the BWS East Kapolei 215 site. While BWS is evaluating an alternative to the use of the additional easement area, the additional area may be necessary due to severely limited space between existing structures and utilities in the area that make it problematic to site the new main within the existing BWS East Kapolei 215 4.0 MG potable water reservoir site. Accordingly, BWS intends to work with BLNR for any requirements for the connection of the new BWS R-1 3.0 MG non-potable water reservoir site to easement 9668 comprising the access road. This may include further negotiation to discuss terms and conditions as may be required by the BLNR.

Additionally, along the reservoir access road (easement 9668), BWS will require an easement for a small pipeline bulb-out for the 16-inch transmission main within TMK: 9-1-018:012, Hoʻopili Gateway Development, on the east side of the reservoir access road to avoid existing utilities. D.R. Horton – Schuler Division published a Final Environmental Impact Statement (FEIS) for the Hoʻopili Project in July 2008, which included TMK: 9-1-018:012. Accordingly, BWS intends to work with D.R. Horton – Schuler Division for any requirements for the connection.

A new underground approximately 1,900 lf 16-inch intake main is proposed to be constructed via trenching south of the existing BWS East Kapolei 4.0 MG potable water reservoir site, along the reservoir access road (easement 9668), and within TMK: 9-1-018:012 for connection to Farrington Highway. The new 16-inch transmission main will continue approximately 12,000 lf along Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway to interconnect with an existing 16-inch R-1 main that is part of the existing BWS R-1 West Pump System.

Figure 2-2. Preliminary Subdivision Map



In 2005, the BWS published a Revised Final EA for the Expansion of the 'Ewa Non-potable Water System to address the development of a reuse water system to increase the delivery of DOH regulated R-1 non-potable water. The system included 44 miles of distribution and transmission mains, 4 to 36 inches in diameter, located primarily within existing state and county road ROWs providing approximately 15 MG in additional reservoir capacity.

The Revised Final EA (2005) noted that separate EA documents will be prepared for the separate project reservoirs, such as the subject project. In addition, the 215-foot (ft) reservoir site was moved from its original location, mauka of the H-1 Freeway, to its current location, makai of the freeway. According to the Revised Final EA, *"Due to the fact that this expansion will require the use of state or county lands and funds, environmental review is mandated under Chapter 343 of the Hawai'i Revised Statutes; however, separate environmental assessments (EAs) will be prepared for the various reservoir and booster pump station sites following the completion of site-specific feasibility studies.*" This EA for the subject project has been prepared based on this understanding.

2.2 Purpose and Need for Project

The BWS provides safe, dependable, and affordable water now and into the future. The BWS ensures reliable and sufficient water availability through management of the watershed and groundwater supply, long-range planning, and possible development of alternative sources of water.

The unprecedented growth facilitated by the CCH 'Ewa Development Plan (DP) with focus on the steady urbanization in the Secondary Urban Center, and redevelopment of Kalaeloa have resulted in an increased demand for both potable and non-potable water in the 'Ewa district. According to the 'Ewa Non-Potable Water Master Plan (WMP) (R. M. Towill Corporation, 2004), the decline in the sustainable yield in the 'Ewa caprock aquifer has limited the approval of new well permits and existing permit renewals by the Department of Land and Natural Resources (DLNR). Additionally, the permitted uses from the 'Ewa-Kunia Aquifer is close to its sustainable yield of 16 million gallons per day (MGD). Potable water is limited in 'Ewa and while additional potable sources of water are being pursued such as the 'Ewa Shaft and Kalaeloa seawater desalination facilities, R-1 water needs to be maximized. Thus, there is warranted concern over the availability of water to accommodate projected demands of the 'Ewa district's urban developments.

The Board of Water Supply Strategic Plan 2018-2022, adopted in October 2016, emphasizes the objective of this project in terms of water conservation by way of its capital improvements program action plan:

- Appropriate up to 4% of annual Capital Improvement Program funding for conservation to reduce per capita demand toward 2040 goal of 145 gallons per capita daily.
- Reduce water loss to less than 10%.
- Increase use of non-potable/recycled water.

- Establish mandatory and incentive-based rules for conservation/recycled water for all customers.
- Continue consumer education and expand partnerships with government agencies and private entities.

The proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project would provide elevated gravity flows to the BWS West R-1 pump system serving lands along Kūalakaʻi Parkway, including the Department of Hawaiian Home Lands (DHHL), University of Hawaiʻi West Oʻahu Campus and west to the City of Kapolei, Kapolei Business Park, West Kapolei, Campbell Industrial Park, and Kalaeloa (see **Figure 3-9**). This project would also help BWS continue to meet its mission in the conservation of limited potable water by better serving non-potable water needs in the Kapolei area. The project would at the same time support the development of employment opportunities in the Secondary Urban Center with nearby affordable housing in planned communities, and the reduction of wastewater disposed of through the Barbers Point Deep Ocean Outfall.

The proposed project is also critically necessary for BWS to provide its first elevated R-1 water storage site. The new R-1 reservoir and 16-inch transmission main system will serve to stabilize the problem of fluctuating water pressure levels in the water system and help to reliably meet peak water demand periods in the City of Kapolei and the surrounding region by providing continuous 24/7 R-1 water rather than direct pumping on a 11-hour schedule (10 pm – 9 am).

The proposed project will involve the construction of a new 3.0 MG R-1 reservoir and improvements to the BWS infrastructure for the use of R-1 (recycled) water in the ʻEwa District of Oʻahu. The new R-1 reservoir would provide needed storage for R-1 non-potable water from the BWS's Honouliuli WRF, which was expanded in 2019, adding 2.0 MGD of R-1 treatment capacity for a total of 12 MGD of R-1 capacity. In addition, the WRF which was originally designed to meet the 1993 DOH reuse guidelines, now meets the 2002 DOH reuse guidelines, which expanded the available uses of R-1 water. The additional 2002 UV disinfection requirements allowed for the use of unrestricted R-1 water for all agricultural crops, including vegetable crops. According to the Department of Health (2002), Guidelines for the Treatment and Use of Recycled Water, R-1 water can be used for irrigation and other purposes where non-potable water can be useful. The use of R-1 water can also help preserve the limited drinking water supply when it is appropriate to use non-drinking water.

Consent Decree. In 1993, the U.S. Environmental Protection Agency (EPA) and the State of Hawaiʻi brought enforcement action against the CCH alleging violations of the Clean Water Act stemming from pretreatment program deficiencies. The parties agreed to a settlement resulting in a Consent Decree without further litigation and trial. Pursuant to the terms of the Consent Decree, the City was required to pay a substantial initial fine with the possibility of additional fines that would be waived if the City agreed to implement Supplemental Environmental Projects (SEP). One of these projects involved the reuse of treated wastewater (or effluent) from the Honouliuli Wastewater Treatment Plant (WWTP) for beneficial uses such as irrigating parks and golf courses and cooling industrial processes.

To meet the need for additional water resources in the ʻEwa Plain, the City proceeded with the effluent reuse SEP. A proposal for this SEP submitted by US Filter Corporation was selected and awarded by the City. The contract included design, construction and operation of a new wastewater reclamation facility that would treat wastewater effluent from the Honouliuli WWTP.

In addition, since 1993, permits have been issued with limited duration as a result of looming uncertainties in the caprock sustainable yield (Belt Collins Hawaiʻi, 1999). Thus, the BWS does not foresee the development new brackish wells or well fields in the ʻEwa-Kapolei area as a significant source of non-potable water. It was determined that any additional supply will be developed in the form of R-1 water and is contingent on the expansion of both the R-1 process at Honouliuli WRF and the secondary treatment process at Honouliuli WWTP. Funding for the expansion of both these facilities has been programmed in the CCH's 6-year capital improvement program (CIP) budget and separate EAs, such as this subject project, are being prepared for each of these projects. Existing brackish supplies may serve as backup non-potable water sources, which can be blended with R-1 water on an as needed basis during periods of high demand. Brackish wells are located in Kapolei Villages and the City of Kapolei. Blended water will be classified and regulated as R-1 water if/when brackish water is mixed with R-1 water.

The ʻEwa Non-Potable Water Master Plan (R. M. Towill Corporation, 2004) explains that DLNR, Commission on Water Resource Management (CWRM) well permittees in the Kapolei Sector of the ʻEwa Caprock Groundwater Management Area are potential customers of R-1 water, because historically they have been allowed to pump only 6.0 MGD, but in fact have applied for 16.8 MGD in their permit applications (ibid). Golf courses and parks are typical land uses in this area, which are suitable R-1 uses.

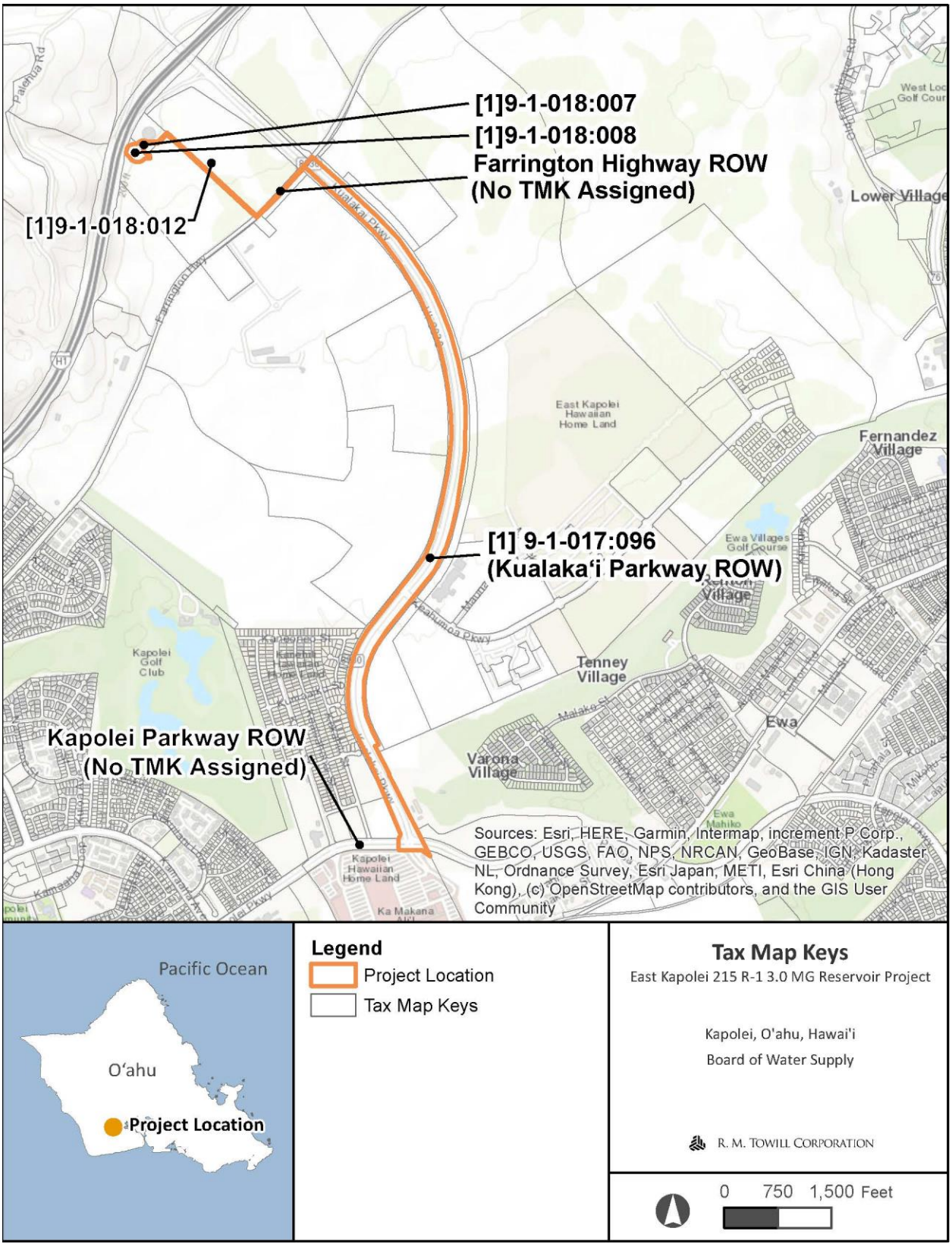
2.3 Purpose of Environmental Assessment

The purpose of this EA is to address the requirements of HRS, Chapter 343, and Hawaiʻi Administrative Rules (HAR), Chapter 11-200.1. The specific action that requires the preparation of this EA includes the use of state or county land, funds for the proposed action, and relocation of the East Kapolei 215-ft reservoir from mauka to makai of the H-1 Freeway. This EA provides information and evaluation of the potential for adverse environmental impacts on the natural and built environment associated with the proposed project. This EA will also inform interested parties of the proposed project and seek public comment on relevant environmental issues that should be addressed during preparation of the Final EA.

2.4 Project Location

The project site is located in East Kapolei, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, TMKs (1) 9-1-018:007, 008, and 012, (1) 9-1-017:096 Kūalakaʻi Parkway ROW, and Farrington Highway and Kapolei Parkway ROWs (no TMK assigned). See **Figure 2-3, Tax Map Keys**.

Figure 2-3. Tax Map Keys



The proposed East Kapolei 3.0 MG R-1 reservoir site will be located adjacent to the existing BWS 4.0 MG potable water reservoir. The site of the proposed R-1 3.0 MG non-potable water reservoir is presently unused land directly adjacent (makai) to the H-1 Queen Liliʻuokalani Freeway and Farrington Highway. The new control building will be located to the northeast of the new 3.0 MG non-potable R-1 reservoir. Land bordering the new R-1 reservoir site on the west and south is (or has been recently) in agricultural (cropland) use. A narrow channel (Hunehune Gulch) separates the west side of the new R-1 reservoir site from a crop field.

The project parcel, TMK (1) 9-1-018: 008, comprising both the proposed BWS R-1 Reservoir site and surrounding land, is owned by the State of Hawaiʻi, BLNR. The portion of the parcel to be used by BWS is shown in **Figure 2-2, Preliminary Subdivision Map**. See **Appendix D** for the record of correspondence between the BWS and BLNR for the land transfer.

The new BWS R-1 3.0 MG non-potable water will also require a connection between the proposed reservoir site (land transfer area) and the existing 40-foot-wide easement 9668, designated for access road and utility purposes (see **Figure 3-1** and **Figure 3-10**). The additional easement area is proposed to run parallel to the southern limits of the existing BWS East Kapolei 215 4.0 MG potable water reservoir site; however, BLNR has requested that the connection be accomplished within the existing limits of the BWS East Kapolei 215 site. While BWS is evaluating an alternative to the use of the additional easement area, the additional area may be necessary due to severely limited space between existing structures and utilities in the area that make it problematic to site the new main within the existing BWS East Kapolei 215 4.0 MG potable water reservoir site. Accordingly, BWS intends to work with BLNR for any requirements for the connection of the new BWS R-1 3.0 MG non-potable water reservoir site to easement 9668. This may include further negotiation to discuss terms and conditions as may be required by the BLNR.

Additionally, along the BWS East Kapolei 215 Reservoir access road (easement 9668), BWS will require an easement for a small pipeline bulb-out within TMK: 9-1-018:012, Hoʻopili Gateway Development, on the east side of the reservoir access road to avoid existing utilities. Accordingly, BWS intends to work with D.R. Horton – Schuler Division for any requirements for the connection.

The proposed 16-inch R-1 transmission main will be located along the southern limits of the existing BWS East Kapolei 215 4.0 MG potable water reservoir site, along the existing BWS East Kapolei 215 Reservoir site access road (easement 9668), within TMK: 9-1-018:012 Hoʻopili Gateway Development, and within the existing Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway ROWs. The proposed 16-inch intake main located between the proposed reservoir and Farrington Highway will be approximately 1,900 lf. From Farrington Highway, the 16-inch transmission main would turn east to the intersection of Farrington Highway and Kūalakaʻi Parkway (formerly North-South Road), then turn south and proceed within the west side of the Kūalakaʻi Parkway ROW to the vicinity of the University of Hawaiʻi West Oʻahu, Honolulu Authority for Rapid Transportation (HART) station. From the vicinity of the HART station, the line would proceed south to an existing 16-inch west pump system main south of Kapolei Parkway ROW. From Farrington Highway to Kūalakaʻi Parkway and from

Kūalakaʻi Parkway to Kapolei Parkway the 16-inch R-1 transmission main would be approximately 12,000 lf.

Lands bordering the 16-inch transmission main location along Farrington Highway and Kūalakaʻi Parkway are (or have been recently) in agricultural (cropland) use. Kūalakaʻi Parkway runs parallel to the eastern boundary of the existing adjacent BWS 4.0 MG potable reservoir site. The University of Hawaiʻi West Oʻahu campus is located to the west of Kūalakaʻi Parkway. Further south, Kūalakaʻi Parkway dead-ends at Kapolei Parkway.

Section 3
Project Description, Estimated Construction Cost and Schedule

3.1 Description of Proposed Project

The proposed project involves the construction of a 3.0 MG R-1 reservoir, control (operations) building, and 16-inch transmission main for the distribution of the R-1 non-potable water. The project area consists of a total of 77.8 acres.

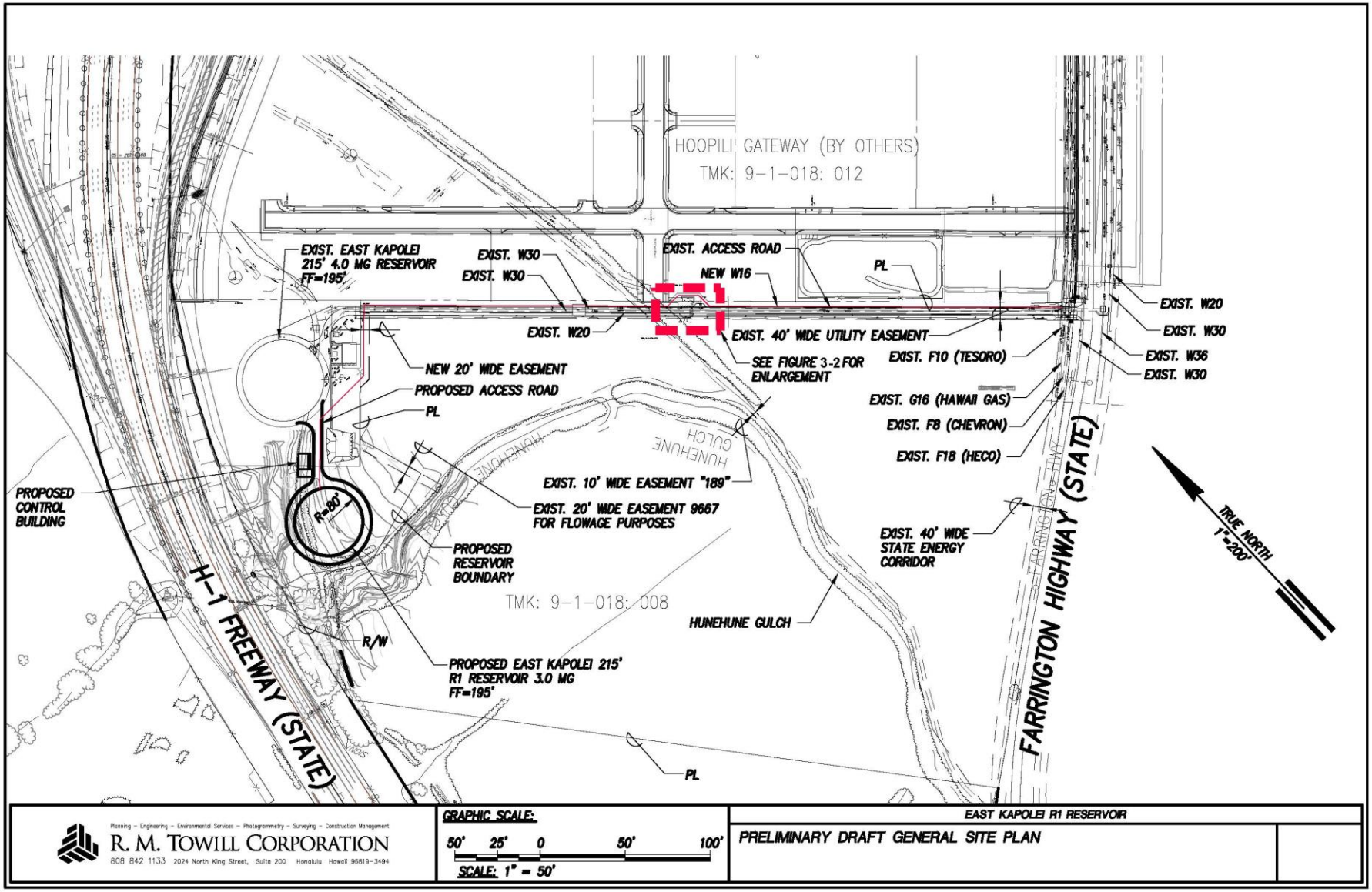
The new 3.0 MG R-1 reservoir will facilitate stabilizing water pressures in the non-potable water system and provide continuous 24/7 elevated gravity water, essentially matching the potable 215-ft reservoir system. The primary service area for the reservoir will be the City of Kapolei. The proposed reservoir will improve service at higher elevations, including mauka areas of East Kapolei. The 3.0 MG R-1 reservoir will be connected to a proposed 16-inch R-1 transmission main extending along the East Kapolei 215 Reservoir site access road, TMK: 9-1-018:012 Hoʻopili Gateway Development, Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway.

R-1 is the highest level of treatment for non-potable water as regulated by the Hawaiʻi Department of Health. R-1 water is currently used for irrigation of golf courses, schools, green spaces, and crops such as bananas, papayas, ornamental plants and seed corn. According to the Department of Health (2002), Guidelines for the Treatment and Use of Recycled Water, R-1 water can be used for irrigation and other purposes where non-potable water can be useful. The use of R-1 water can also help preserve the drinking water supply when it is appropriate to use non-drinking water for other useful purposes.

The new R-1 reservoir tank site will require grading to establish the appropriate elevation and location for the tank adjacent to the existing East Kapolei 215 4.0 MG potable water reservoir. A new control building will be located to the northeast of the new R-1 reservoir. Screening trees and/or berms will be planted along the makai side of the 3.0 MG R-1 reservoir site to mitigate visual impacts from the makai view planes along Farrington Highway.

The new BWS R-1 3.0 MG non-potable water will also require a connection between the proposed reservoir site (land transfer area) and the existing 40-foot-wide easement 9668, designated for access road and utility purposes (see **Figure 3-1** and **Figure 3-10**). The additional easement area is proposed to run parallel to the southern limits of the existing BWS East Kapolei 215 4.0 MG potable water reservoir site; however, BLNR has requested that the connection be accomplished within the existing limits of the BWS East Kapolei 215 site. While BWS is evaluating an alternative to the use of the additional easement area, the additional area may be necessary due to severely limited space between existing structures and utilities in the area that make it problematic to site the new main within the existing BWS East Kapolei 215 4.0 MG potable water reservoir site. Accordingly, BWS intends to work with BLNR for any requirements for the connection of the new BWS R-1 3.0 MG non-potable water reservoir site to easement 9668. This may include further negotiation to discuss terms and conditions as may be required by the BLNR.

Figure 3-1. East Kapolei R-1 Reservoir: Preliminary Draft General Site Plan



Additionally, along the BWS East Kapolei 215 Reservoir access road (easement 9668), BWS will require an easement for a small pipeline bulb-out within TMK: 9-1-018:012, Hoʻopili Gateway Development, on the east side of the reservoir access road to avoid existing utilities (**Figure 3-1, East Kapolei R-1 Reservoir Site: Preliminary Draft General Site Plan** and **Figure 3-2, 16-inch R-1 Transmission Main Crossing at Hoʻopili Gateway Development**). Accordingly, BWS intends to work with D.R. Horton – Schuler Division for any requirements for the connection.

A new 1,900 lf long 16-inch intake main will be constructed via trenching to connect the proposed East Kapolei 3.0 MG R-1 reservoir to the end of the existing BWS East Kapolei 215 Reservoir site access road at Farrington Highway. See **Figure 3-1, East Kapolei R-1 Reservoir Site: Preliminary Draft General Site Plan** and **Figure 3-2, 16-inch R-1 Transmission Main Crossing at Hoʻopili Gateway Development**. The 16-inch transmission main will then extend for a distance of approximately 12,000 lf along Farrington Highway to Kūalakaʻi Parkway, and from Kūalakaʻi Parkway to just south of Kapolei Parkway, to connect with an existing 16-inch R-1 west pump system main. See **Figures 3-3 to 3-8, 16-inch R-1 Transmission Main: General Site Plan Maps**.

R-1 consists of a West and East system. The West system is 215-ft and East system is operated at less than 180-ft of head or 30 to 40 pounds per square inch (psi). Since the East R-1 system services primarily golf courses that have receiving ponds and pump systems, the East system can be operated at lower pressures reducing pumping energy costs and reducing carbon emissions and greenhouse gases. The West R-1 system is currently an on-demand pump system on a 11-hour schedule (10 pm – 9 am). The West system serves smaller parcels that do not have the space for receiving tanks and thus it is better served by an elevated gravity system. Upon conversion to a 215-ft reservoir system, BWS anticipates R-1 use to increase significantly because it will be more convenient to use.

The West system currently provides water to Coral Creek Golf Course, Barber's Point Golf Course, and the City of Kapolei. The remaining users are on the East system. Golf courses have ponds that act as storage tanks for surrounding properties. There are pressure transducer sensors in each pond that allow water to fill based on the size of the reservoir and the user's water level preference. As explained in the "Operation Controls for West System," the East system ponds also contain back pressure sustaining valves that equalize flow between different facilities, meaning the pumps are constantly running depending on reservoir pond levels.

3.1.1 Existing Non-potable Water Resources

The ʻEwa district is supplied by three major non-potable water sources that are described in greater detail below - recycled water from the CCH BWS Honouliuli WRF, brackish water from the ʻEwa Caprock Aquifer, and brackish water from the Barber's Point 215-ft non-potable system currently serving the Ko ʻOlina Resort. The brackish water from the ʻEwa Caprock Aquifer was used as the long-standing source for irrigation of sugarcane from the late 1800s. However, due to concerns about declining caprock capacity and basal water quality, the ʻEwa Caprock is not considered as a reliable future non-potable water source.

Figure 3-2. 16-inch R-1 Transmission Main Crossing at Hoʻopili Gateway Development

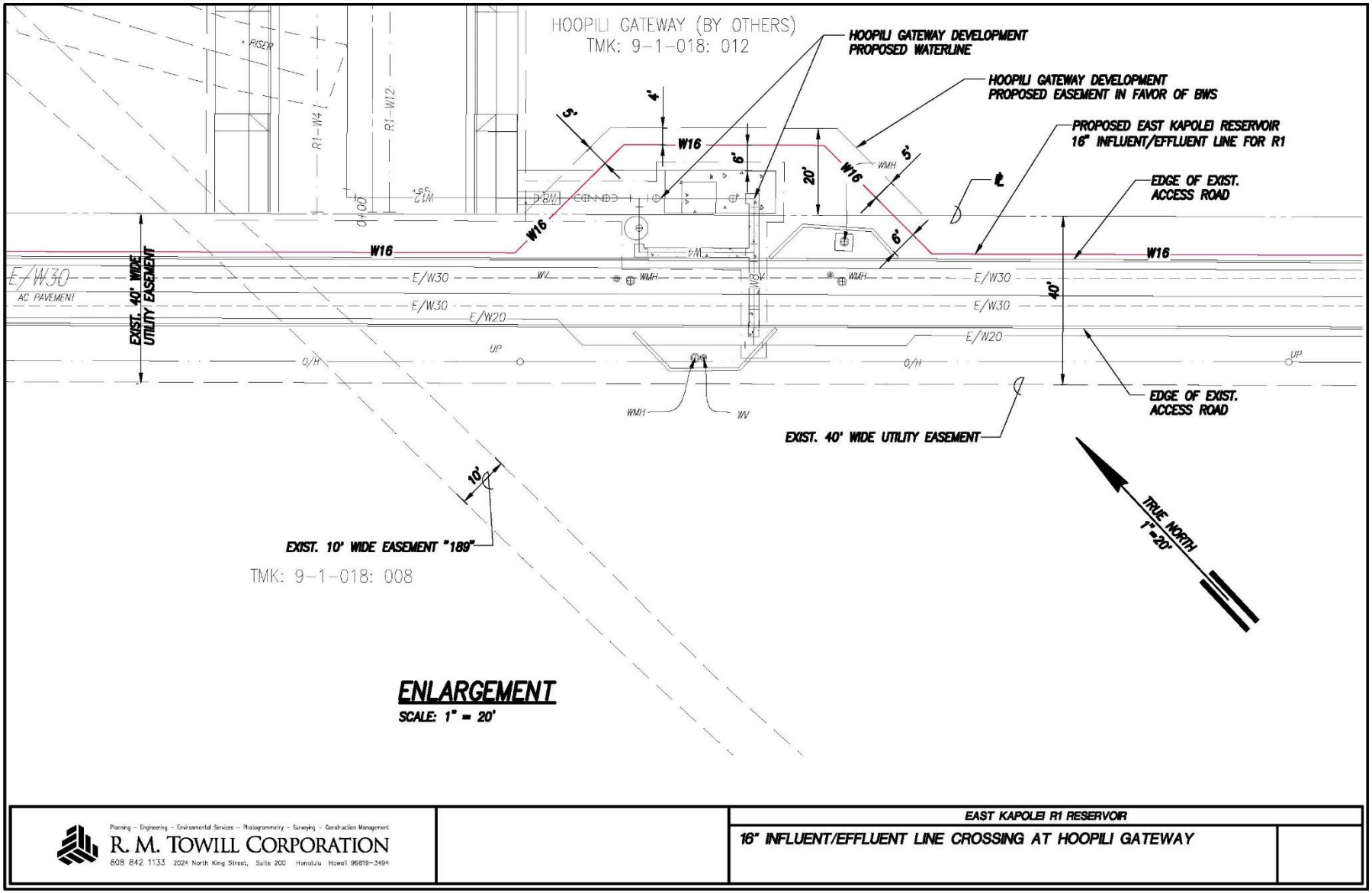


Figure 3-3. 16-inch R-1 Transmission Main: General Site Plan Map 1 (Source: BWS)

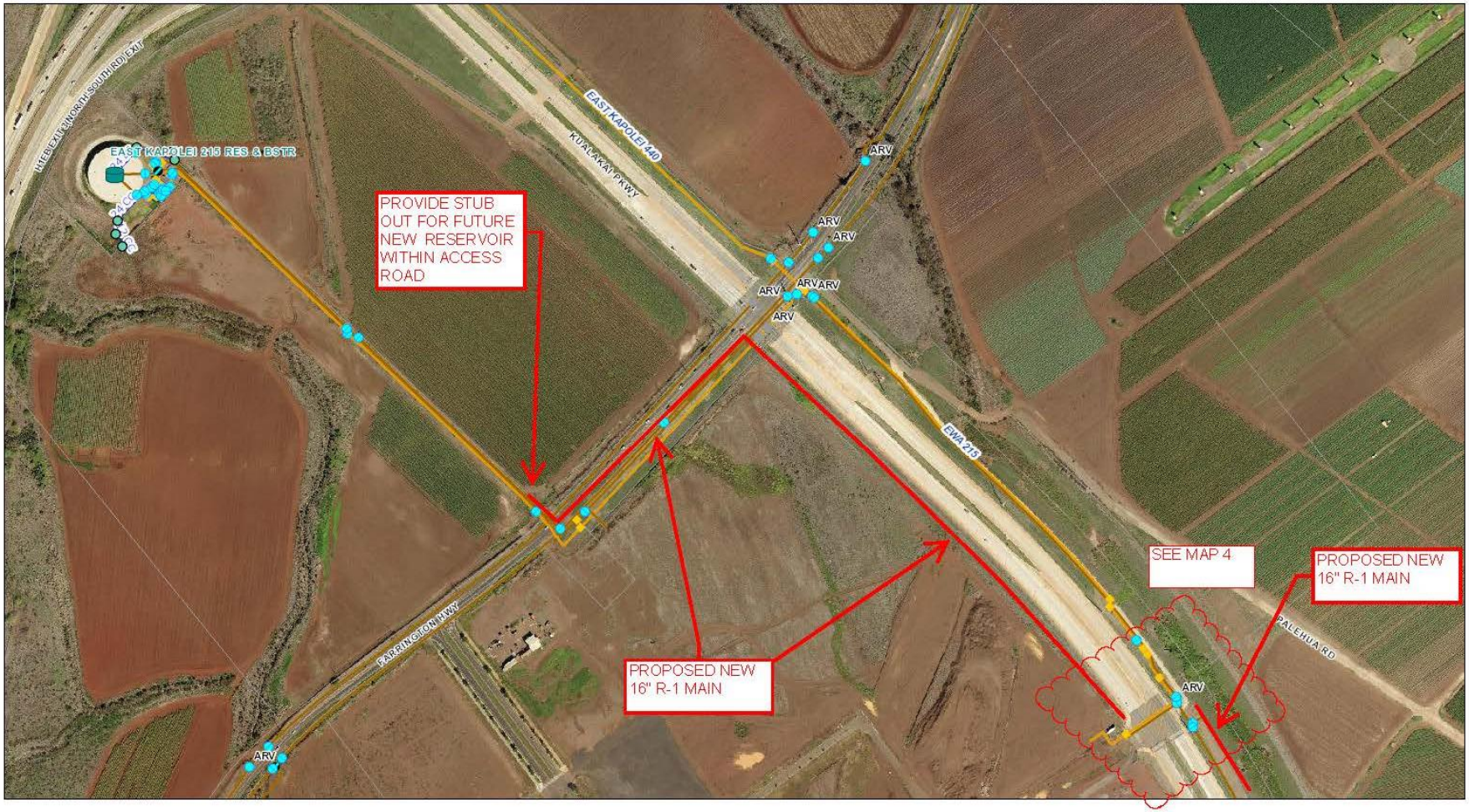


Figure 3-4. 16-inch R-1 Transmission Main: General Site Plan Map 2 (Source: BWS)

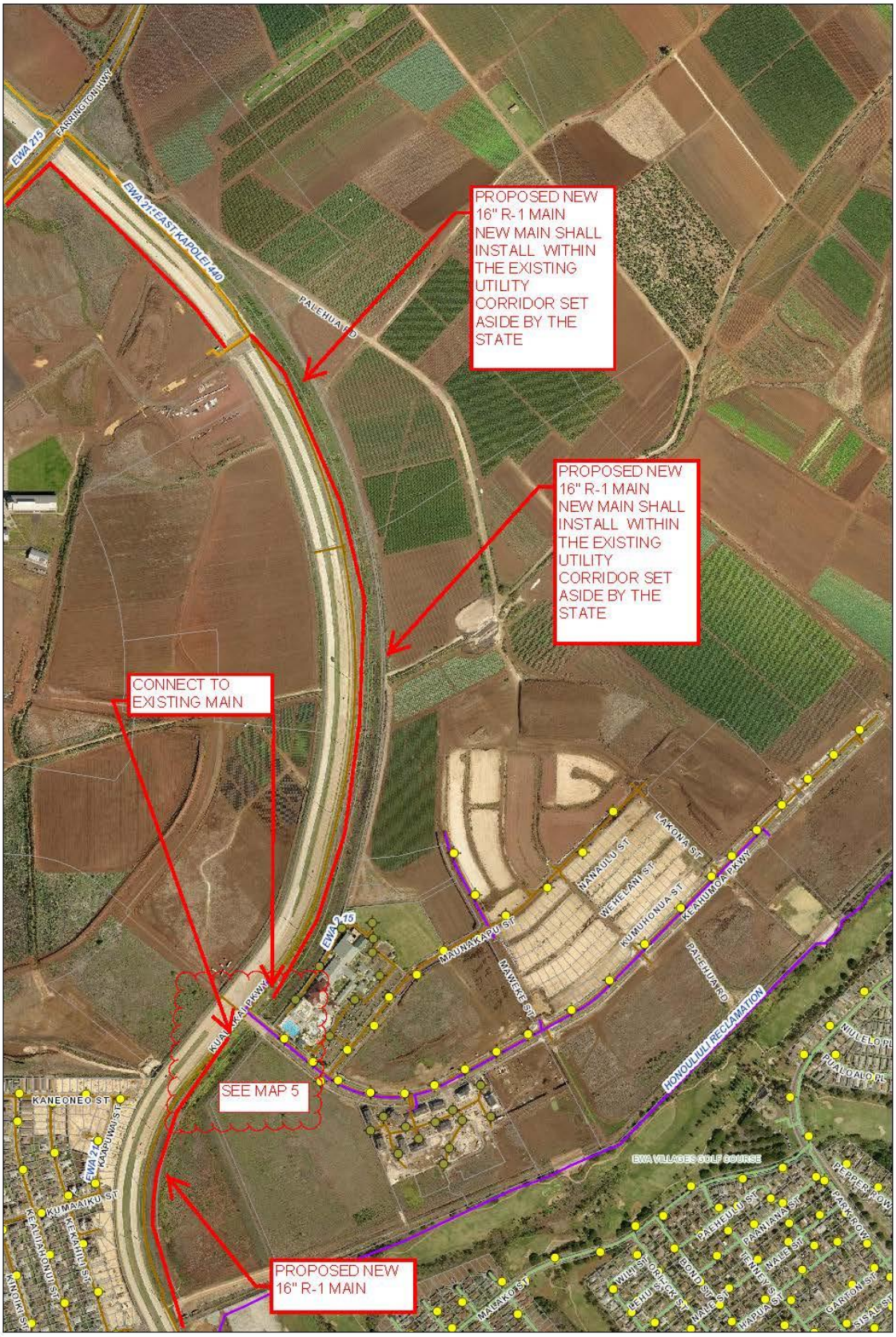


Figure 3-5. 16-inch R-1 Transmission Main: General Site Plan Map 3 (Source: BWS)

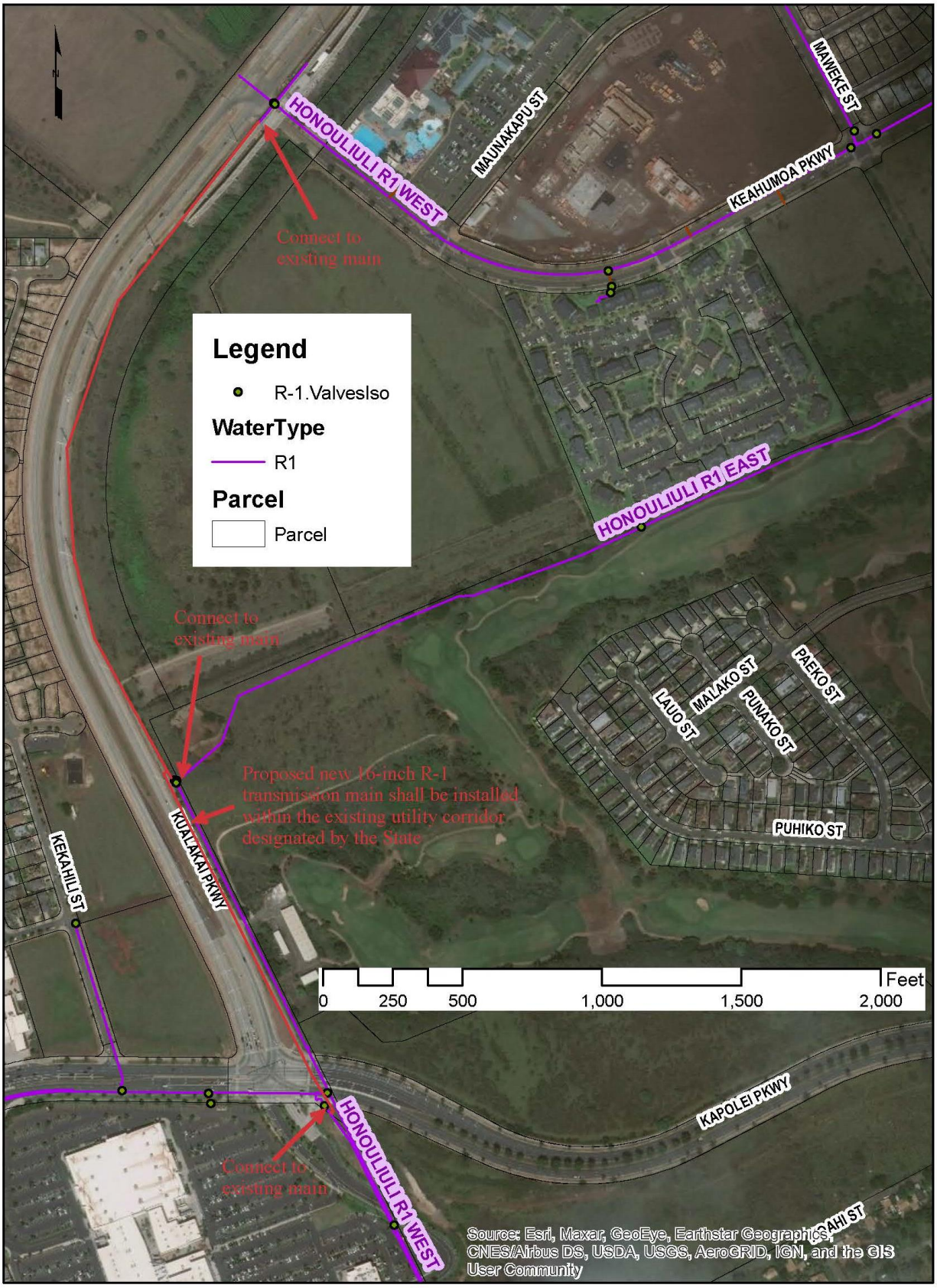


Figure 3-6. 16-inch R-1 Transmission Main: General Site Plan Map 4 (Source: BWS)

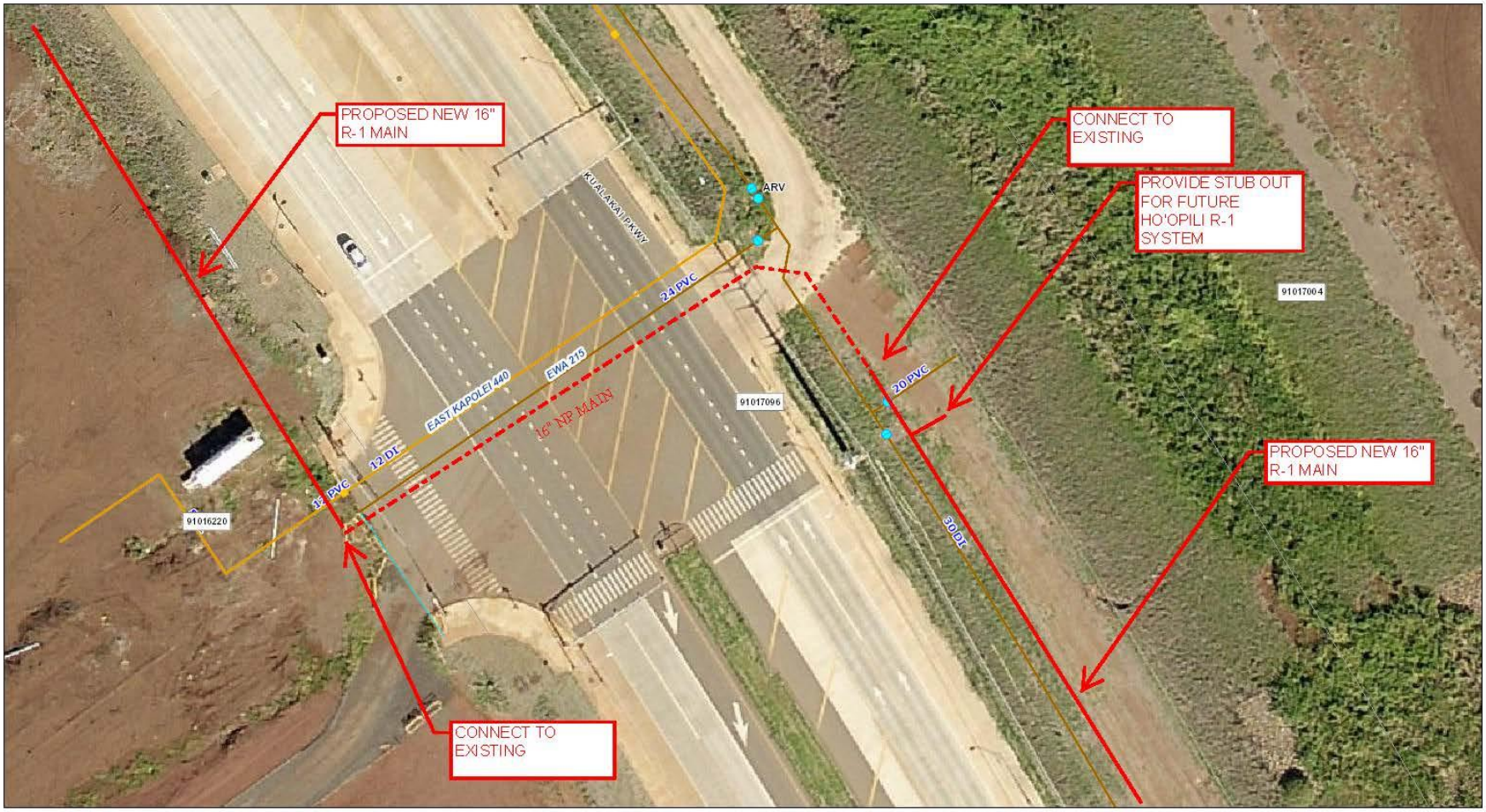


Figure 3-7. 16-inch R-1 Transmission Main: General Site Plan Map 5 (Source: BWS)

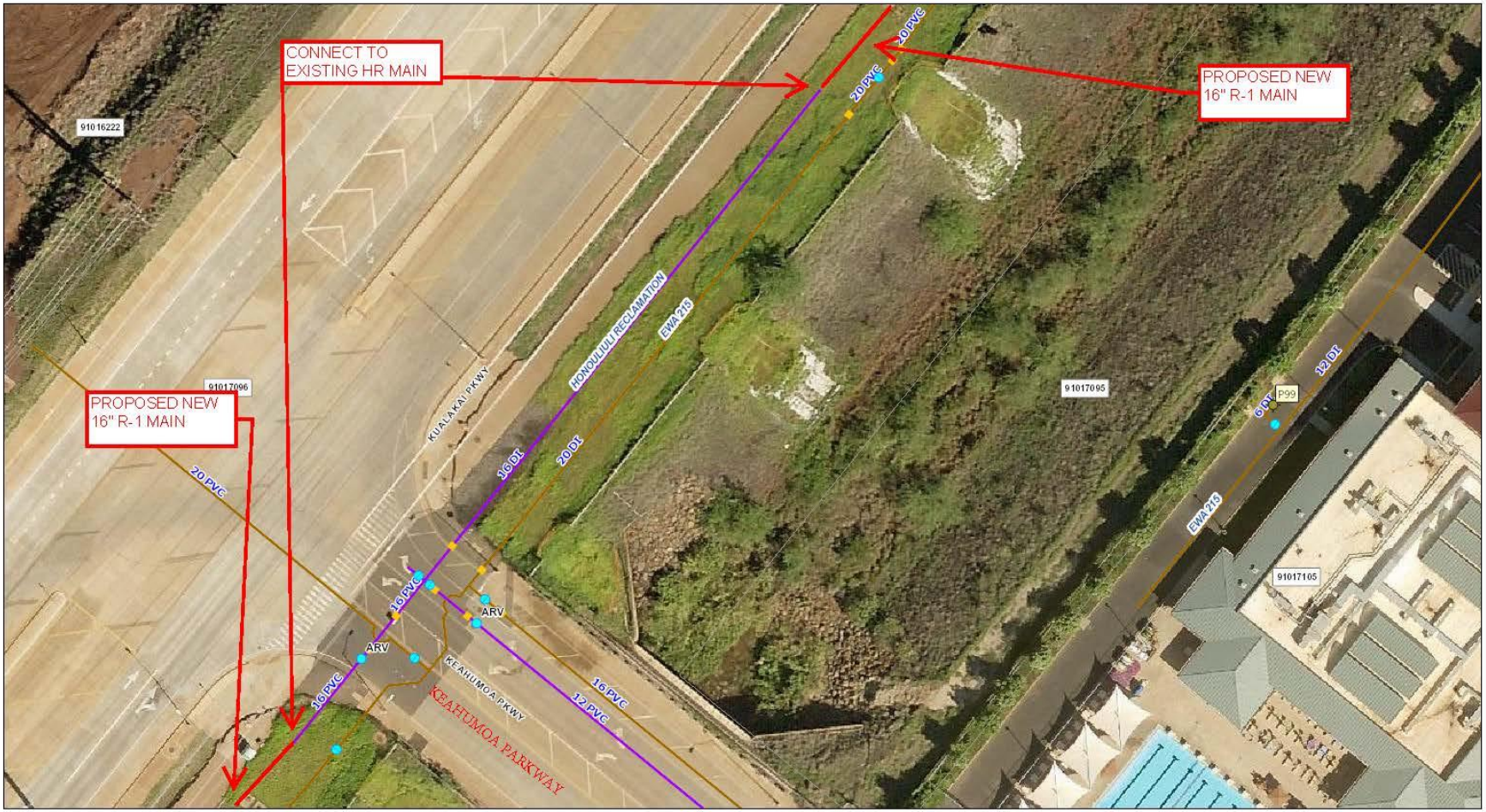
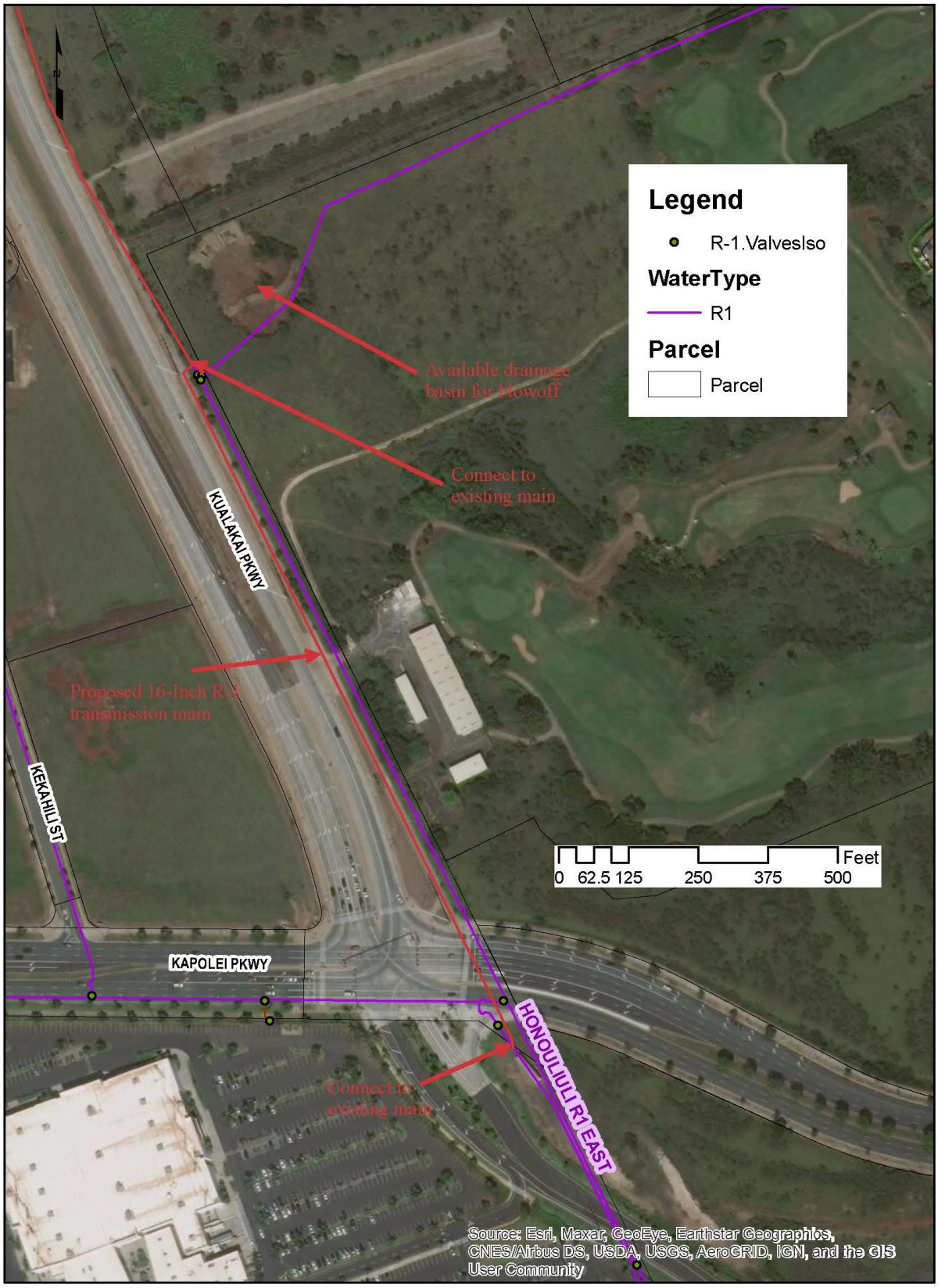


Figure 3-8. 16-inch R-1 Transmission Main: General Site Plan Map 6 (Source: BWS)



3.1.2 Recycled Water from the BWS Honouliuli Water Recycling Facility

Non-potable water that is recycled wastewater effluent begins as a by-product from the CCH's Honouliuli WWTP. This effluent receives secondary treatment at the plant before it is piped to the WRF. The BWS Honouliuli WRF is located next to the Honouliuli WWTP where R-1 water is processed to the quality acceptable for use in the proposed new R-1 reservoir. The Honouliuli WWTP is being upgraded to secondary treatment which is planned to be completed in 2024.

Essentially, the secondary treated effluent from the WWTP is the WRF's influent. At the WRF the wastewater receives tertiary treatment so that it can be reused as non-potable water for non-drinking uses such as irrigation and industrial processing. The wastewater effluent that is intended for recycling at the WRF must receive secondary treatment at the WWTP in order to remove solids and organic matter in the wastewater. The remainder of the effluent that is not treated at the WRF is discharged through the 78-inch diameter Barbers Point Deep Ocean Outfall.

The BWS's Honouliuli WRF was expanded in 2019, adding 2.0 MGD of R-1 treatment capacity for a total of 12 MGD of R-1 capacity. In addition, the WRF which was originally designed to meet the 1993 DOH reuse guidelines, now meets the 2002 DOH reuse guidelines, which expanded the available uses of R-1 water. To meet the State of Hawaiʻi DOH Guidelines for the Treatment and Use of Recycled Water (2002), the wastewater effluent undergoes a rigorous purification process. The ʻEwa WRF produces R-1 water for irrigation of golf courses, parks, and landscaping for the City of Kapolei. The recycled water will not be used for drinking or potable uses.

3.1.3 Brackish Water from the ʻEwa Caprock Aquifer

In a 1989 report prepared for the State of Hawaiʻi DLNR CWRM, George A.L. Yuen and Associates (1996) divided the ʻEwa caprock resource into three management sectors based on geography, hydrogeology, and land use. These three sectors and their estimated future yields were identified as follows:

- Honouliuli/Puʻuloa - < 10 MGD
- Kapolei/Barbers Point Naval Air Station - < 5 MGD
- Malakole - < 1 MGD

As the entity that is delegated authority for the administration of the State Water Code, CWRM has overseen groundwater management issues pertaining to land-based surface waters and ground waters, such as the ʻEwa Caprock Groundwater Management Area. Consequently, the withdrawal of groundwater within the management area may be made only in accordance with the following types of permits issued by CWRM:

- Well Construction Permit - construction and testing of any well.
- Pump Installation Permit - installation of a pump and pumping equipment in any well.

- Water Use Permit - use of water in any Groundwater Management Area.

Because of its moderate salinity, 'Ewa Caprock water had been a long-standing source of irrigation for sugarcane in the 'Ewa Plain from the late 1800s. The caprock aquifer was considered fully exploited in the 1930s when 'Ewa Plantation drilled approximately 70 artesian wells (Analytical Planning Consultants, 1999). Though it is effectively separated from contact with the basal aquifer, the 'Ewa Caprock Aquifer receives fresh groundwater from leakage of the underlying basal aquifer. It is recharged through infiltration of rainfall and/or excess irrigation water (Visher and Mink. 1964).

Based on the DLNR groundwater database (obtained April 2002), major permit holders in the 'Ewa caprock region include the Estate of James Campbell, the U.S. Navy, Coral Creek Golf Course, Kalaeloa LP, Chevron USA, Seibu Hawai'i (Prince Golf Course), and Gentry Properties. The database indicates that primary uses of the 160 wells in this region are under the classifications of irrigation and industrial. Roughly one-third of the wells are reported as unused and sealed.

Cutbacks in the region's agricultural operations and the lack of new sources of irrigation recharge have relinquished the 'Ewa Caprock Aquifer as a significant future source of non-potable water. Due to concerns about declining caprock and basal water quality, there has been a restriction in the number of well drilling permits and amount of groundwater withdrawn from the caprock aquifer (Belt Collins Hawai'i, 1999).

In addition, since 1993, permits have been issued with limited duration as a result of looming uncertainties in the caprock sustainable yield (Belt Collins Hawai'i, 1999, and Expansion of the Ewa Non-potable Water System, Final Environmental Assessment, 2005). The BWS does not anticipate the development of major new brackish wells or well fields in the 'Ewa-Kapolei area as a significant source of non-potable water. Any additional supply will be in the form of developing new R-1 water sources such as the expansion of both the R-1 process at BWS Honouliuli WRF and the secondary treatment process at Honouliuli WWTP.

3.1.4 Barber's Point 215-ft Brackish Non-Potable Irrigation System

The Barber's Point 215-ft brackish non-potable irrigation system consists of a 1.0 MG 215-ft reservoir and two 1.5 MGD brackish water pumps with a State permitted use of a 1.0 MGD from the 'Ewa Kunia Aquifer. This system currently serves the Ko 'Olina Resort and the future Kapolei West and Harborside Developments. Ko 'Olina Properties is proposing a third brackish well of a 900 gallon per minute (GPM) capacity to meet the increasing demand in the resort. The ultimate plan is the interconnection of the two 215-ft non-potable water systems for redundancy and operational flexibility. The blending of the R-1 and brackish groundwater will require approval from the Hawai'i DOH.

3.2 Existing and Projected Non-Potable Water Demands

Prior to projecting non-potable water demands, potential users were identified and located. According to the 'Ewa Non-Potable Water Master Plan (R. M. Towill Corporation, 2004) the

geographical areas under consideration for reuse were based on the following concerns raised by the Department of Wastewater Management (1995), now known as Department of Environmental Services:

a. The proximity of the area to the Honouliuli WRF.

b. The general scarcity of potable and/or non-potable water within the area.

c. The determination that reclaimed effluent can be used to satisfy non-potable water demands in the area.

d. The reuse site location in relation to the 'Ewa Caprock which overlays and protects the potable basal aquifer.

e. Irrigation for parks, golf courses and roadway landscaping, and other common area will have priority for effluent reuse. The BWS, however, will continue to explore other non-irrigation uses, such as toilet flushing in new commercial projects approved by the DOH and at such time that the CCH has adopted provisions in the plumbing code pertaining to dual water plumbing in buildings. (Note: The 2016 DOH update of their reuse guidelines created maps of unrestricted, restricted and conditional reuse zones. The 'Ewa district is in the unrestricted R-1 reuse zone.)

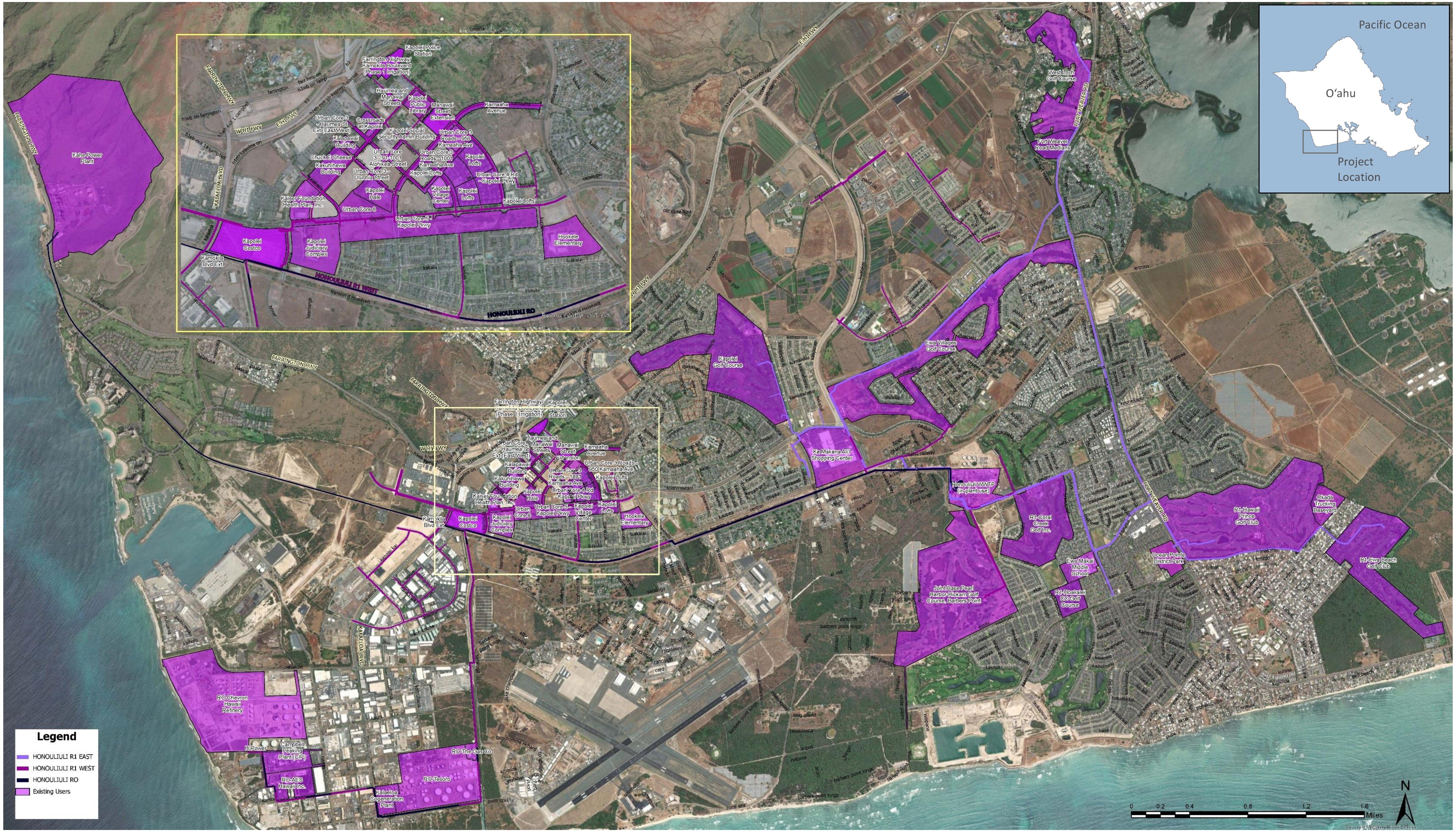
The water master plan explains that CWRM well permittees in the Pu'uloa and Kapolei Sectors of the 'Ewa Caprock Groundwater Management Area are potential customers of R-1 water. Historically they were allowed to pump only 6.0 MGD, but in fact have applied for 16.8 MGD in their permit applications (R. M. Towill Corporation, 2004). Golf courses and parks are typical land uses in this area and are suitable R-1 users. Moreover, groundwater at the 'Ewa and One'ula Beach parks are too saline for landscape irrigation and can benefit from other non-potable sources (George A.L. Yuen and Associates. 1996). Thus, R-1 water could satisfy future needs.

On the other hand, the permittees in the Malakole Sector, which are located primarily in the vicinity of Campbell Industrial Park, are presently using non-potable water for different purposes. The power plants and refineries within the Campbell Industrial Park and at Kahe Power Plant currently use reverse osmosis (RO) demineralized recycled water for boiler feed and refining fuel. An existing R-1 pipeline extends to Campbell Industrial Park but has remained unused because of limited system pressures of which the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project will alleviate.

3.2.1 Existing Average Daily Demand

Figure 3-9 BWS R-1 Recycled Water Map provides an overview of some of the current and future Kapolei area customers who are in the application process. Kapolei Regional Park, adjacent to the City of Kapolei, is not currently using R-1 for irrigation, but the additional storage tank would be able to accommodate the size of the park.

Figure 3-9. BWS R-1 Recycled Water Map



The ʻEwa Non-Potable Water Master Plan, R. M. Towill Corporation (2004) has generally followed average daily water demand factors and peaking factors established in the preceding ʻEwa Water Master Plan (Belt Collins and Associates. 1987). BWS regularly monitors the demand for non-potable water and in 2018 updated its demand projection as provided in **Table 3-1**. This table summarizes a list of users that constitute current non-potable water average daily demand in the ʻEwa region as found in the ʻEwa Non-Potable Water Master Plan (BWS, 2018):

Table 3-1. Existing Non-Potable Water Demand (R-1 Regulated)

User	Average Daily Demand (MGD)
Coral Creek Golf Course	0.56
ʻEwa Villages Golf Course	1.30
Hawaiʻi Prince Golf Course	0.91
Kapolei Golf Course	0.30
West Loch Golf Course	0.46
Fort Weaver Road Irrigation	0.01
Honouliuli WWTP	2.95
ʻEwa Mahiko Community Park	0.16
Subtotal- R-1 Demand	6.65

Source: BWS 2018

3.2.2 Projected Demands

The BWS's ʻEwa Non-Potable Water Master Plan (R. M. Towill Corporation, 2004) planned for the development of the East Kapolei 215 R-1 3.0 MG Reservoir as part of its long-range, multi-year non-potable water expansion plans which are dependent upon expansion of both Honouliuli WWTP and Honouliuli WRF.

Increases in future non-potable water demand will be exclusively R-1 water, with the majority of the new demand to be used for irrigation of golf courses, parks, schools (including University of Hawaiʻi West Oʻahu), and roadway landscaping. According to BWS, the proposed project would provide an important new R-1 storage facility and transmission system that would support current plans to address R-1 water demand requirements.

3.3 Infrastructural Components

3.3.1 Proposed Infrastructure

The project involves the construction of a new East Kapolei 215 R-1 3.0 MG reservoir, a control (operations) building, and an associated 16-inch transmission main extending along the East Kapolei 215 Reservoir site access road, TMK: 9-1-018:012 Hoʻopili Gateway Development, Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway.

East Kapolei 215 R-1 3.0 MG reservoir site will be graded and the new R-1 reservoir constructed adjacent to the existing East Kapolei 215 4.0 MG potable water reservoir. The proposed reservoir

will be a circular reinforced concrete tank; about 160 ft in diameter and 25 ft in overall height. A concrete roof will be installed to protect the water from contamination and deterioration by algal growth stimulated by sunlight. Water depth within the tank will be 20 ft, extending from the finished floor elevation at 195 ft to the spillway elevation of 215 ft above mean sea level (MSL). The tank will be structurally designed to meet current codes for earthquake forces and wind loads. The R-1 reservoir piping will include a 24-inch diameter overflow/washout line to permit tank drainage during cleaning. See **Figure 3-10, East Kapolei R-1 Reservoir Preliminary Draft Pipe Layout Plan**.

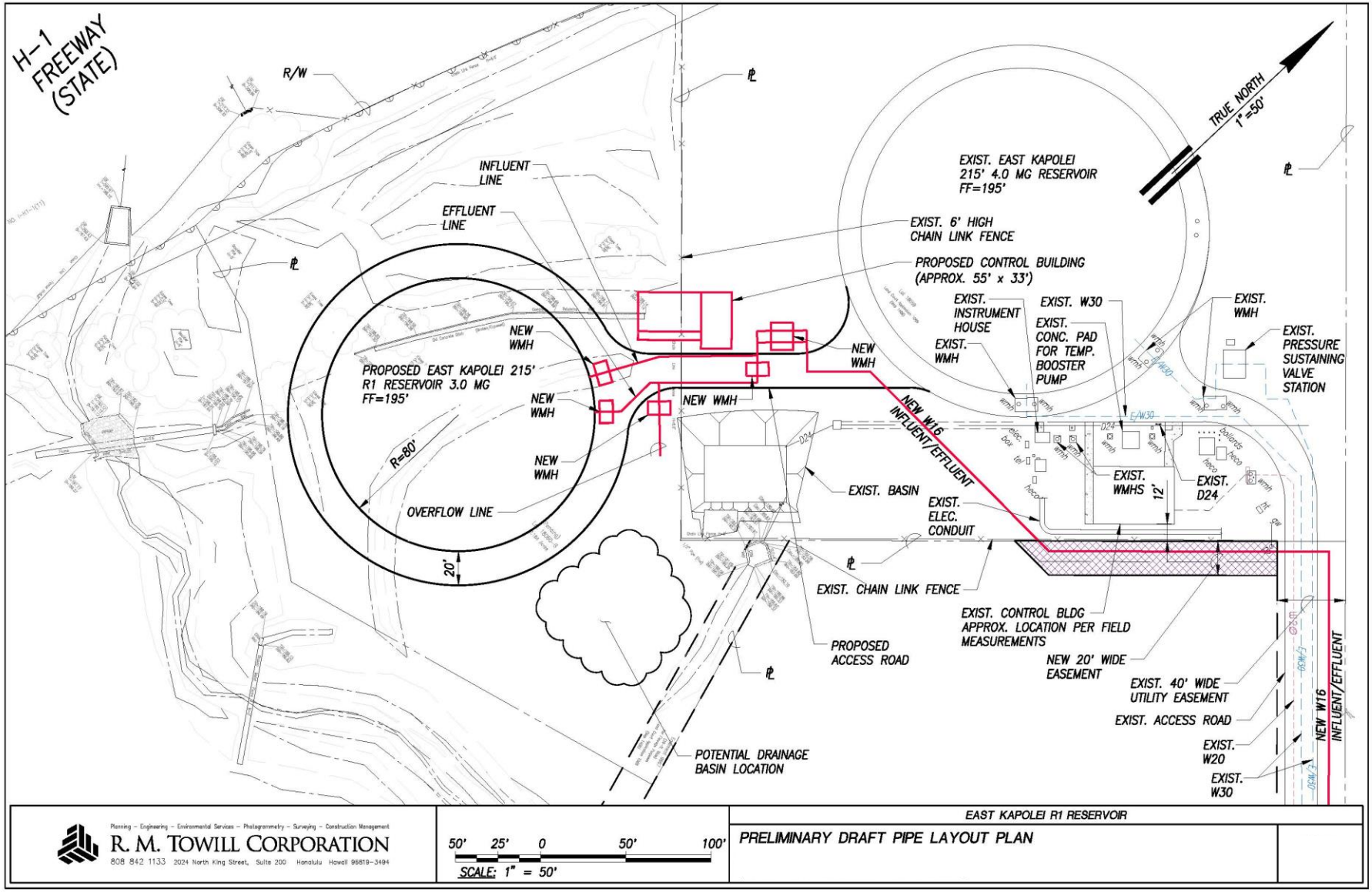
A 20-ft wide perimeter road will encircle the R-1 reservoir to allow operations personnel to inspect, maintain and repair the structure and ancillary equipment. The perimeter road will be paved with asphalt concrete, providing an all-weather surface. The pavement will slope away from the tank, for the conveyance of storm runoff to the onsite drainage system. A control (operations) building will be located to the northeast of the new R-1 reservoir (**Figure 3-10**). Screening trees and/or berms will be planted along the makai side of the 3.0 MG R-1 reservoir site to mitigate visual impacts from the makai view planes along Farrington Highway.

The new BWS R-1 3.0 MG non-potable water will also require a connection between the proposed reservoir site (land transfer area) and the existing 40-foot-wide easement 9668, designated for access road and utility purposes (see **Figure 3-1** and **Figure 3-10**). The additional easement area is proposed to run parallel to the southern limits of the existing BWS East Kapolei 215 4.0 MG potable water reservoir site; however, BLNR has requested that the connection be accomplished within the existing limits of the BWS East Kapolei 215 site. While BWS is evaluating an alternative to the use of the additional easement area, the additional area may be necessary due to severely limited space between existing structures and utilities in the area that make it problematic to site the new main within the existing BWS East Kapolei 215 4.0 MG potable water reservoir site. Accordingly, BWS intends to work with BLNR for any requirements for the connection of the new BWS R-1 3.0 MG non-potable water reservoir site to easement 9668. This may include further negotiation to discuss terms and conditions as may be required by the BLNR.

Additionally, along the BWS East Kapolei 215 Reservoir access road (easement 9668), BWS will require an easement for a small pipeline bulb-out within TMK: 9-1-018:012, Hoʻopili Gateway Development, on the east side of the reservoir access road to avoid existing utilities (**Figure 3-1, East Kapolei R-1 Reservoir Site: Preliminary Draft General Site Plan** and **Figure 3-2, 16-inch R-1 Transmission Main Crossing at Hoʻopili Gateway Development**). Accordingly, BWS intends to work with D.R. Horton – Schuler Division for any requirements for the connection.

A new approximately 1,900 lf long 16-inch intake main will be constructed via trenching to connect the proposed East Kapolei 3.0 MG R-1 reservoir to the end of the existing BWS East Kapolei 215 Reservoir site access road at Farrington Highway (**Figure 3-10**). The 16-inch R-1 transmission main will then travel a distance of approximately 12,000 lf along Farrington Highway to Kūalakaʻi Parkway, and from Kūalakaʻi Parkway to a location just south of Kapolei Parkway to interconnect with an existing 16-inch R-1 main. See **Figures 3-3 to 3-8**.

Figure 3-10. East Kapolei R-1 Reservoir: Preliminary Draft Pipe Layout Plan



The major elements of the proposed project are listed below:

- 3.0 MG capacity reinforced concrete reservoir or tank
- 20-ft wide, asphalt concrete-paved access road from the eastern boundary to the reservoir
- Existing 6-ft tall chain link fence
- Influent and Effluent lines
- 1,900 lf intake main to connect proposed reservoir to end of the existing access road at Farrington Highway
- 12,000 lf 16-inch R-1 transmission main (Farrington Highway to Kūalakaʻi Parkway, and from Kūalakaʻi Parkway to Kapolei Parkway)
- 55-ft x 33-ft control (operations) building
- 5 new water manholes
- Approximately 24-inch diameter reservoir overflow/washout line
- Existing onsite drainage system improvements, including 3-ft wide concrete swale, graveled cut-off swale, and grated drain inlets
- Onsite instrumentation piping improvements for operation of the new reservoir, as required
- Screening trees and/or berms planted along the makai side of the reservoir site to mitigate visual impacts from the makai view planes along Farrington Highway and Kūalakaʻi Parkway
- Temporary erosion control measures, including installation of silt fencing around existing drain inlets, as required

The proposed non-potable water reservoir site will receive R-1 water from the Honouliuli WRF through the proposed 16-inch waterline in the existing access road. R-1 treatment consists of a direct filtration process in which polyaluminium chloride is used as a coagulant added to the rapid mix tanks and vigorously mixed using vertical shaft mixers. The wastewater then flows into flocculation tanks which brings particles into contact so that they will collide, stick together as floe and reach a size that will readily settle. The coagulated material is then removed in a sand filter. The filtered water is then taken to the ultraviolet disinfection system which inactivates potential disease-causing pathogenic bacteria. Following this process, the disinfected water would be stored onsite in the proposed 3.0 MG R-1 reservoir before being pumped into the R-1 distribution system.

The proposed R-1 treatment meets the Hawaiʻi DOH's Guidelines for the Treatment and Use of Recycled Water (2002), also known as the "reuse guidelines" for R-1 water, which is being used primarily for irrigation.

3.3.2 Onsite Drainage Improvements

Modification of the existing onsite drainage patterns will be required to accommodate the proposed tank. A drainage system will be designed to safely convey both storm water runoff and tank overflow/washout drainage to a new 24-inch diameter storm drain for offsite disposal. Storm water runoff will be collected in grated drain inlets, a graveled cut-off swale, and concrete swale for conveyance to the existing drainage system. A potential drainage basin location has been designated in the southeast corner of the proposed reservoir site. See **Figure 3-10, East Kapolei R-1 Reservoir Preliminary Draft Pipe Layout Plan**; **Figure 3-11, East Kapolei R-1 Reservoir Preliminary Draft Site and Grading Plan**, and **Figure 3-12, Proposed East Kapolei R1 Reservoir Section)**.

To the extent possible, the proposed distribution system will be identified and designed in accordance with the Water System Standards (BWS, 2002) to address the use of potable water. However, while the water system standards are intended for potable use the use of R-1 recycled water allows for the following exceptions: (1) maximum velocity in water mains without fire flow can be increased to a level higher than 6 feet per second (FPS) to reduce residence time in the non-potable lines; (2) peak drawdown can be adjusted because non-potable water is commonly drawn during specified blocks of time and is not subject to continuous withdrawal as is the case with potable water; and, (3) peak hourly flow pressures can be reduced below 40 psi as determined by the BWS Manager and Chief Engineer. This is because non-potable users are permitted to install a private booster pump to provide sufficient on-site water pressure if needed.

3.3.3 Storage Capacity of Non-potable Reservoirs

The total non-potable water minimum storage requirement is planned to be 26.3 MG with the fully developed Secondary Urban Center. This requirement is based on the average daily water demand for the entire 'Ewa region (R. M. Towill Corporation. 2004). At present five (5) non-potable reservoirs serve the 'Ewa system: a brackish water 1.5 MG reservoir at Barbers Point; a reverse osmosis 1.25 MG reservoir at the Honouliuli WRF; a reverse osmosis 0.75 MG reservoir at Campbell; and two (2) R-1 2.5 MG reservoirs at the Honouliuli WRF.

Additional reservoir storage capacity will be needed based on the pending non-potable water user development schedules. Site specific feasibility studies will be conducted as each new non potable reservoir site is planned.

Figure 3-11. East Kapolei R-1 Reservoir Preliminary Draft Site and Grading Plan

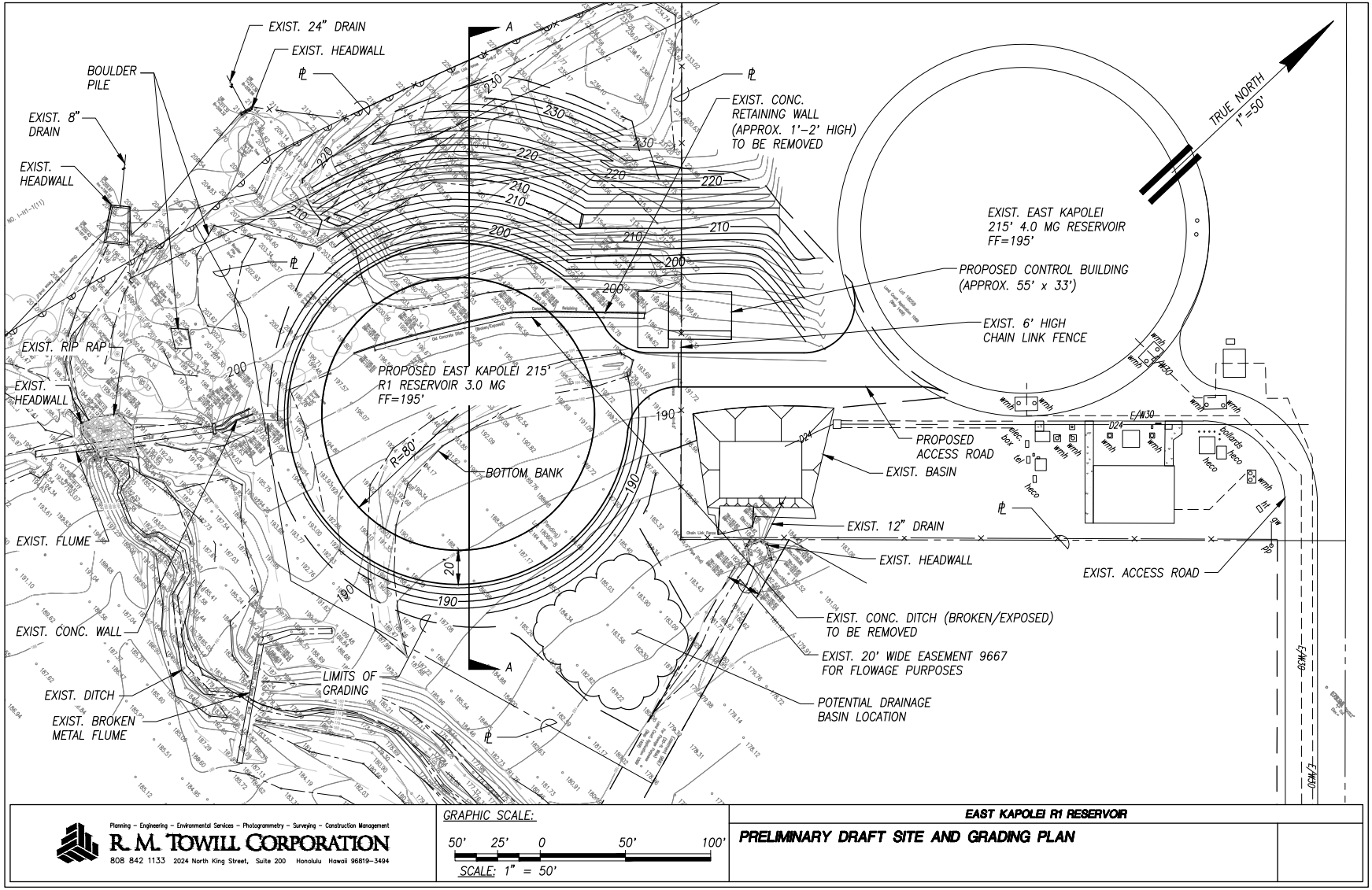
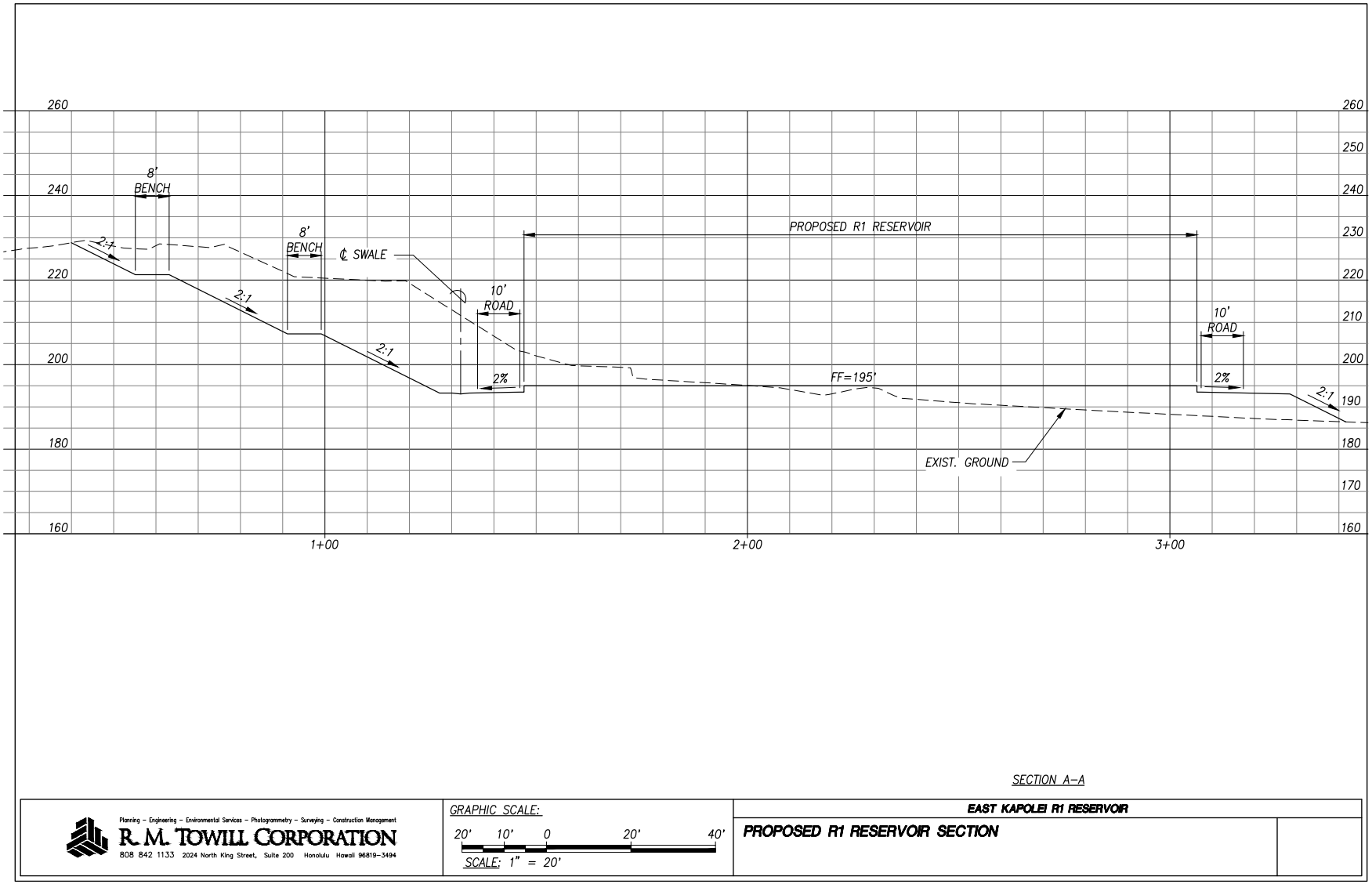


Figure 3-12. Proposed East Kapolei R1 Reservoir Section



3.4 Property Ownership

The East Kapolei 215 R-1 reservoir project site is located within TMK parcel no. (1) 9-1-018: 007, 008, and 012. Parcel 007 is owned by the BLNR but was set aside for use by the BWS per Governor's Executive Order No. 4307 in 2010. Access to Parcel 007 and ultimately to the East Kapolei 215 R-1 reservoir lot from Farrington Highway will be provided via a 40-ft wide access and utility easement -- Easement 9668 -- that was granted to BWS under Executive Order 4307. Parcel 008, comprising both the proposed BWS R-1 Reservoir site and surrounding land, is owned by the State of Hawaiʻi, BLNR. The portion of the parcel to be used by BWS is shown in **Figure 2-2, Preliminary Subdivision Map**. See **Appendix D** for the record of correspondence between the BWS and BLNR for the land transfer. Parcel 012 is owned by D.R. Horton – Schuler Division and the site of the Hoʻopili Gateway Development. The portion of the parcel to be used by BWS is shown in **Figure 3-2, 16-inch R-1 Transmission Main Crossing at Hoʻopili Gateway Development**.

The new BWS R-1 3.0 MG non-potable water will also require a connection between the proposed reservoir site (land transfer area) and the existing 40-foot-wide easement 9668, designated for access road and utility purposes (see **Figure 3-1**). The additional easement area is proposed to run parallel to the southern limits of the existing BWS East Kapolei 215 4.0 MG potable water reservoir site; however, BLNR has requested that the connection be accomplished within the existing limits of the BWS East Kapolei 215 site. While BWS is evaluating an alternative to the use of the additional easement area, the additional area may be necessary due to severely limited space between existing structures and utilities in the area that make it problematic to site the new main within the existing BWS East Kapolei 215 4.0 MG potable water reservoir site. Accordingly, BWS intends to work with BLNR for any requirements for the connection of the new BWS R-1 3.0 MG non-potable water reservoir site to easement 9668. This may include further negotiation to discuss terms and conditions as may be required by the BLNR.

Additionally, along the BWS East Kapolei 215 Reservoir access road (easement 9668), BWS will require an easement for a small pipeline bulb-out within TMK: 9-1-018:012, Hoʻopili Gateway Development, on the east side of the reservoir access road to avoid existing utilities (**Figure 3-1** and **Figure 3-2**). Accordingly, BWS intends to work with D.R. Horton – Schuler Division for any requirements for the connection.

The route of the East Kapolei 215 R-1 transmission main is located within the Kūalakaʻi Parkway ROW (TMK (1) 9-1-017: 096), and Kapolei Parkway ROW (no TMK assigned) which are owned and maintained by the State of Hawaiʻi, Department of Transportation (HDOT), Highways Division. The route of the East Kapolei 215 R-1 transmission main is also located within the Farrington Highway ROW to the west of Kualakaʻi Parkway (no TMK assigned) and is owned and maintained by the CCH.

3.5 Estimated Construction Cost and Schedule

The preliminary estimated construction cost of the proposed East Kapolei 215 R-1 3.0 MG Reservoir ($4.8 million) and 16-Inch Transmission Main project ($10.5 million) is approximately $15.3 million based on the use of Polyvinyl chloride (PVC) for the transmission main. These costs are preliminary and subject to change based on the use of materials for the transmission main (i.e., use of PVC or ductile iron pipe). The proposed project will be funded through the EPA CWSRF loan program and CCH. An application for the CWSRF program has been submitted and accepted by the State DOH, and the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project assigned PPL number C150051-77.

The operation and maintenance (O&M) cost for the project will be covered by the CCH, BWS. The rough order of magnitude for the annual O&M costs for the project will be approximately $9,000. The O&M costs were estimated based on the groundskeeping and valve maintenance on mains costs for the year 2021, as provided below, and may be subject to change.

Annual O&M to maintain one reservoir facility:

Assumptions:

(1) Based only on Groundskeeping work. O&M for the pumps, boosters, etc. would fall under Water System Operations.
(2) Based on Groundskeeping crew of 3 people
(3) Based on work during regular hours
(4) Based on work (grass, hedge and tree trimming) taking 1 full day
(5) Based on grounds maintenance work done at facility once every three weeks

Cost Estimation:

- Total cost per day, 3 people, 1 facility = approximately $500 every three weeks
- Approximately 17 cycles of 3 weeks per 52-week year
- Total annual groundskeeping O&M cost = 17 cycles x $500 = $8,500

Annual O&M to maintain 10,000 linear feet of water main:

Assumptions:

(1) Based on maintaining valves only
(2) Based on 2002 Water System Standards, approx. 1 valve per 2,000 linear feet = 5 valves to maintain total
(3) Based on maintenance frequency of once per year (maintenance usually done by zones, no real set return frequency for a length of main)
(4) Based on two-person work crew
(5) Based on regular working hours

Cost Estimation:

- 7 hours/person with two-person crew to maintain 20 valves
- 3.5 hours/person with two-person crew to maintain 10 valves
- 1.75 hours/person with two-person crew to maintain 5 valves
- Hourly rate of BC-14, BU01, Jan 1, 2021, salary schedule = $34.32
- Total annual valve maintenance cost for 10,000 linear foot main with 5 valves total =

1.75 hours x $34.32 per hour = $60.06 x 2 people = $120.12

Total estimated annual O&M:

- Total annual groundskeeping O&M cost = $8,500
- Total annual valve O&M cost for 10,000 linear foot main with 5 valves total = $120.12
- Total estimated annual O&M cost = $8,500 + $120.12 = $8,620.12 = Approximately $9,000 (rounded)

The EA and design for the project are anticipated to be completed in Fiscal Year (FY) 2023, with construction expected to commence in FY 2024. The duration of construction for the reservoir and transmission main is to be determined by the BWS and contractor during the construction bid process. The duration of construction is preliminarily estimated at 24 to 36 months and is subject to change due to funding, permitting, and related conditions.

Short-term labor costs will provide a positive but limited economic impact on the construction industry. The expansion of the non-potable R-1 water system will support planned long-term economic growth and development in the 'Ewa district, reserving potable water for drinking water requirements and allocating non-potable water to irrigation and industrial needs.

Section 4
Project Alternatives and Preferred Alternative

4.1 Alternatives to the Proposed Action

Alternatives to the proposed project include: (1) the No Action Alternative; (2) the Delayed Action Alternative; and (3) The Preferred Action Alternative. A description of each is provided below.

4.2 No Action Alternative

The No Action Alternative preserves the status quo. In this scenario, development of the non-potable water system for Kapolei will essentially be left to the discretion of developers. There would be no planned and coordinated effort to expand the existing non-potable water system which would further deplete potable water resources. This would also result in the possibility of some users waiting indefinitely for non-potable water to become available.

In the long run, the No Action Alternative would severely impact the Secondary Urban Center development plans as described in the CCH's General Plan (CCH. 1992/Amended in 2002) and the `Ewa DP (CCH, 2013). Forecasts of continued growth in the district through the year 2025 and beyond will be impacted due to increased demand for potable water.

In addition, the continued growth of the Secondary Urban Center is expected to be the focus of significant economic activity and major housing development as well as a core location for government services. It will entail a myriad of developments: master planned residential developments, heavy and light industrial areas in the vicinity of the Barbers Point Harbor, offices and commercial and retail centers in the City of Kapolei, resort developments at Ko 'Olina and 'Ewa recreational facilities such as golf courses and park complexes, and the University of Hawai'i West O'ahu campus.

Because the No Action alternative would fail to address the anticipated demand for R-1 non-potable water to meet growing requirements of the 'Ewa region, it is removed from further consideration.

4.2.1 Reservoir Alternatives

Storage requirements and potential reservoir sites have been identified in the `Ewa Non Potable Water Master Plan (R. M. Towill Corporation, 2004). As noted, separate project specific EAs will be prepared for each reservoir site. The sites will be finalized by the BWS following appropriate site location and feasibility studies. At such time, various storage alternatives will be evaluated, including but not limited to consideration for elevated reservoirs, underground reservoirs, and ground level reservoirs.

4.2.2 Expansion of Additional Non-potable Water Uses

As the distribution system is expanded and greater supplies of non-potable water supply become available, other DOH approved uses of R-1 water would be explored. Examples include the irrigation of private residential yards or use for toilet flushing in new commercial facilities as approved by the DOH contingent on adopting plumbing code requirements for dual water supply in buildings.

4.3 Delayed Action

The Delayed Action alternative involves the construction of the project, but at a later date. Delaying the project would temporarily avoid the potential for adverse environmental effects and the need for the expenditure of funds for planning, design, development, and construction activities. However, because the potential for environmental impacts and project costs would only be delayed, impacts and costs associated with the project would eventually be borne when the project is implemented.

Delaying the project to a later time is expected to have virtually the same effect as the No Action alternative:

- Construction costs would be averted in the short-term, but are expected to ultimately be higher due to inflation and other factors while resulting in environmental outcomes similar to the Preferred Alternative of proceeding with the proposed project.
- Delayed Action would also delay the BWS schedule for improvements to existing non-potable water system sites, and construction of non-potable water delivery systems. This delay would fail to address current and expected near-term water supply shortfalls to provide non-potable water irrigation and industrial operations requirements in Kapolei.

Because the Delayed Action alternative would fail to accomplish the project objective to provide non-potable water system improvements according to a planned schedule of implementation, it is also rejected from further consideration.

4.4 Preferred Alternative

Based on the above, the Preferred Alternative is to develop the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project as described in **Section 3, Project Description, Estimated Construction Cost and Schedule**, of this document. The Preferred Alternative is the only alternative that (1) meets the BWS 'Ewa Non-Potable Water Master Plan for non-potable water infrastructure expansion to support the CCH's General Plan and `Ewa DP with respect to the Secondary Urban Center; and (2) is consistent with the Kapolei Urban Design Plan and BWS Water Strategic Plan 2018-2022 within the 'Ewa region of O'ahu, promoting improved conditions conducive to more environmental sustainability while contributing to healthy, livable communities within Kapolei, the 'Ewa region, and O'ahu.

Section 5
Description of Existing Site Conditions, Potential Impacts, and Proposed Mitigation

This section summarizes the existing environmental setting, potential short and long-term, secondary, and cumulative effects of the proposed project, and mitigation measures. Short-term effects are from construction and infrastructure repair activities, while long-term effects continue or occur after the project is completed. Although the subject EA document does not require an assessment of impacts according to NEPA requirements, the definition of impacts, according to NEPA, provides guidance toward understanding potential environmental impacts and applicability to this project. Secondary impacts are generally defined as those induced or caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 Code of Federal Regulations [CFR] §§ 1500-1508). Potential cumulative effects may result from the incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions (40 C.F.R. §1508.7).

5.1 Existing Site Conditions

5.1.1 Description

The R-1 reservoir portion of the project site is located to the west and adjacent to an existing BWS East Kapolei 215 4.0 MG potable water reservoir enclosed by a six-ft high chain link fence, an existing access road, and at the 195-ft elevation. An existing drainage basin is situated between the two reservoir sites. The reservoir site is located approximately 300 ft south of the H-1 freeway and approximately 1,160 ft west of the H-1/Pālehua Road intersection. Adjacent to the proposed reservoir site are an existing basin approximately 60 ft by 75 ft in dimension and an existing 4.0 MG BWS Reservoir measuring approximately 95 ft in radius. A 16-inch diameter water transmission line approximately 1,900 lf long would be connected to the R-1 reservoir along the southern limits of the existing BWS East Kapolei 215 4.0 MG potable water reservoir site and the existing East Kapolei 215 Reservoir access road (easement 9668) and D.R. Horton – Schuler Division Hoʻopili Gateway Development to connect with Farrington Highway. The 16-inch R-1 transmission main will then continue along Farrington Highway to Kūalakaʻi Parkway, and from Kūalakaʻi Parkway to the south of Kapolei Parkway to interconnect with an existing 16-inch R-1 main, a distance of approximately 12,000 lf.

The portion of the project area that encompasses the BWS East Kapolei 215 reservoir site includes a fallow field at the location of the planned R-1 reservoir, an existing 4.0 MG potable water reservoir tank, a BWS access road, and the location of the D.R. Horton – Schuler Division Hoʻopili Gateway Development. The proposed R-1 reservoir site is located in an undeveloped parcel of land that was heavily overgrown with tall grasses, shrubs, and Kiawe trees (*Prosopis pallida*). Land bordering the new R-1 reservoir site on the west and south are (or have been recently) in agricultural (cropland) use. These site conditions continue along the Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway portion of the project, largely surrounded by undeveloped former agricultural land.

5.1.2 Potential Impacts and Proposed Mitigation

The proposed project would have the potential for adverse environmental impacts from short term construction including grubbing, grading, and trenching at the R-1 reservoir site and along and within the ROWs of Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway.

As provided by the CCH, Department of Community Services, in a letter dated November 25, 2022, during early consultation for the project, the proposed project is located approximately one mile from several properties in ʻEwa Villages that the Department of Community Services leases out for the provision of special needs housing. The Department of Community Services asked that the proposed project take into consideration the health, safety, accessibility, and long-term wellbeing of people living nearby and/or involved with activities in the surrounding neighborhood (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**).

As provided by the DHHL, in a letter dated December 14, 2022, during early consultation for the project, the following was also noted (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

- After reviewing the project description for the planned construction and improvements, we note that these upgrades will help to provide service to DHHL's homestead communities and commercial properties in the Kapolei Region. However, we request that our ʻEwa Moku homestead lessees and commercial lessees be given adequate notification about the project, anticipated construction-related traffic, noise and air quality disturbances, and impact to their daily needs such as water service.

- The DHHL currently has about 8,154 acres of land on Oʻahu and anticipates adding to our land inventory. The DHHL's Oʻahu Island Plan notes that unconstrained lands will be used to fulfill our top priority for homestead development for native Hawaiian beneficiaries. We ask that the Board of Water Supply continue to engage the Department about projects that could affect DHHL's near- and long-term developments.

A traffic control plan would be prepared and implemented by the contractor to ensure unimpeded traffic flow through the east Kapolei neighborhood and along Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway to minimize traffic circulation problems during the period of construction for delivery of construction materials, access in and out of the site by vehicles, and removal of debris. Given the relatively undeveloped nature of the surrounding land, no adverse effects are expected.

Upon completion of construction, all equipment and personnel will be removed and the site will be permitted to return to existing conditions with no permanent intrusion to the site. Because the direct impacts from the proposed action would be only short-term and other past, present, and reasonably foreseeable future actions are expected to be consistent with the existing development and use of the area, the project would make no persistent contribution to secondary impacts.

The proposed project represents part of the BWS plan for development of a master recycled water system serving the region. The project itself therefore has been contemplated to reduce potable water use which would facilitate the BWS goal of water conservation for the ʻEwa region. The cumulative impact of this and related R-1 associated projects can be considered as a positive contribution that would benefit water users in the region as well as the immediate area served by this facility. No negative adverse cumulative effects are expected.

5.2 Climate

5.2.1 Description

The climate in the Kapolei region has monthly mean temperatures ranging from 62 to 88 degrees Fahrenheit (Western Regional Climate Center 2017) with an average annual rainfall of approximately 21.49 inches per year. The ʻEwa Plain is hot and dry, with an average annual rainfall of 25 inches (Giambelluca et al. 2013).

The prevailing wind direction is from the east and northeast. Northeasterly trade winds prevail over Oʻahu approximately 80% of the time, with average wind speeds ranging from 10 to 15 miles per hour. The trade winds blow most strongly and consistently from April through November. Southerly or "Kona" winds occur roughly less than half the time during December through March.

5.2.2 Potential Impacts and Proposed Mitigation

The BWS East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project is not expected to have an impact on the region's climate; therefore, no mitigation measures are warranted. **Section 5.7 Natural Hazards** address issues related to climate change.

5.3 Geology and Topography

5.3.1 Description

Geology. The Hawaiian Islands represent the southernmost portion of the Hawaiian Archipelago, a series of northwest-trending ridges produced by a succession of volcanic eruptions during the Pliocene Epoch. The Island of Oʻahu was formed by two shield volcanoes; Koʻolau to the east and the older Waiʻanae, to the west. The volcanoes are believed to have formed during the late tertiary to early Pleistocene periods (MacDonald, Abbott, & Peterson, 1983). The Waiʻanae Volcano erupted between 3.9 and 2.5 million years ago and the Koʻolau Volcano erupted between 2.5 and 1.7 million years ago. The volcanoes are separated by the Schofield Plateau of central Oʻahu which was formed by lavas of the Koʻolau Range banking against the older Waiʻanae Range.

The island of Oʻahu is of volcanic origin and was built by the Waiʻanae and the Koʻolau Volcanoes, which are now deeply eroded (MacDonald et al. 1983). The Waiʻanae Range rises 1.2 kilometers above sea level, making it higher than the younger, adjacent Koʻolau Range

(MacDonald et al. 1983). The Wai'anae and Ko'olau Volcanic Shields were built during the late Pliocene and early Pleistocene by thin-bedded lava flows. The main shield building activities ceased approximately 3.5 to 2.5 million years ago (Stearns 1985).

The site is situated on the 'Ewa Coastal Plain which extends seaward off the southeastern flank of Wai'anae Volcano and the southwestern flank of the Ko'olau Volcano. This plain was formed by the accumulation of a thick wedge of sediments and coral reef formations on the flanks of the two volcanoes. The project corridor extends across the 'Ewa Plain, a Pleistocene reef platform overlain by alluvium from the southern end of the Wai'anae Mountain Range.

The near surface geology consists of Older Alluvium (QTao), with basalt lava flows from the Wai'anae Volcano (Tapl) and Kolekole Volcano (Talel) in the vicinity of the proposed reservoir site.

Topography. The R-1 reservoir site is at the 195-ft elevation overlooking the 'Ewa plain. The site gently slopes to the east, with approximately 2H: 1V existing slopes and benches on the north side probably resulting from previous site grading. An approximately 80-ft-long, 1- to 2-ft-high existing concrete retaining wall fronted by an existing concrete ditch traverses along the toe of the northern lower slope. The portion of the project along Farrington Highway is at the approximately 150-ft elevation. Along Kūalaka'i Parkway the project site elevation gradually slopes south (seaward) with an elevation of approximately 150-ft at the intersection of Kūalaka'i Parkway and Farrington Highway to 50-ft near the intersection of Kūalaka'i Parkway and Kapolei Parkway.

5.3.2 Potential Impacts and Proposed Mitigation

The proposed reservoir site and transmission line improvements are not expected to adversely impact the geology or topographic nature of the sites because the sites are relatively level having been previously developed. Any grading required will be minimal. To mitigate any potential impacts, construction activities will comply with all applicable federal, state and county regulations for erosion control. Contractors will use Best Management Practices (BMPs) such as employee training, silt fences, and dust control, to minimize erosion during construction and landscaping.

5.4 Water Resources and Hydrology

5.4.1 Surface Water

5.4.1.1 Description

Despite the aridity, the area is prone to flooding. Floods of 1916, 1917, 1923, and 1927 have been well documented by archival photographs, some of which show standing water as far as the eye can see. Honouliuli Stream is the only major stream in the area, although it is located well outside the project area. Hunehune Gulch is a normally dry ditch that conveys run-off between agricultural fields from a small watershed draining the east slope of Pu'u Makakilo (mauka of the H-1) (AECOS, 2005b). Hunehune Gulch traverses the western ('Ewa) portion of the proposed R-1 reservoir parcel (TMK (1) 9-1-018:008), however, it is located outside of the

proposed reservoir project site. Hunehune Gulch then flows southward then southeastward where it joins the lower remnant of Kaloʻi Gulch; and these combined drainageways feed into a drainage basin on the west side of Kūalakaʻi Parkway. Runoff from the drainage basin then flows under Kūalakaʻi Parkway through a concrete-lined culvert and enters into a series of two drainage basins on the east side of Kūalakaʻi Parkway, mauka and makai of Mango Tree Road. The proposed 16-inch transmission main will be installed above the concrete-lined culvert crossing Kūalakaʻi Parkway. The upper part of Kaloʻi Gulch is diverted into a large drainage feature (i.e., Kaloʻi Drainage Channel) that parallels the east side of Kūalakaʻi Parkway, terminating in the drainage basin on the east side of Kūalakaʻi Parkway, mauka of Mango Tree Road. Kaloʻi Gulch is an intermittent non-perennial stream, and is a part of the drainage network that emanates from the Waiʻanae Mountain Range. Kaloʻi Gulch and Kaloʻi Drainage Channel are located outside the project site. Runoff exceeding the capabilities of the drainage basins enter the ʻEwa Villages Golf Course drainage system.

There are no surface waters in the form of perennial stream flows throughout the proposed project site. In addition, the project area is not subject to contact with a proposed or approved water body segment designated on the State of Hawaiʻi 303(d) List of Water Quality Limited Waters. The ʻEwa Plain does serve as a natural drainage way for runoff originating in the mountains of the Waiʻanae Range during rainstorms. This runoff proceeds downgradient through normally dry gulches located mauka of the H-1 Freeway. See **Figure 5-1, Surface Waters.**

According to the U. S. Fish and Wildlife Services (USFWS) National Wetlands Inventory, the property does not contain any lands designated as wetlands.

General policies of the Hawaiʻi DOH Clean Water Branch are outlined below:

- It is the State's position that all projects must reduce, reuse and recycle water to protect, restore and sustain water quality and beneficial uses of State waters.
- State policy encourages stormwater infiltration through Low Impact Development (LID) practices, and discourages the treatment of stormwater as a waste product off impervious surfaces.

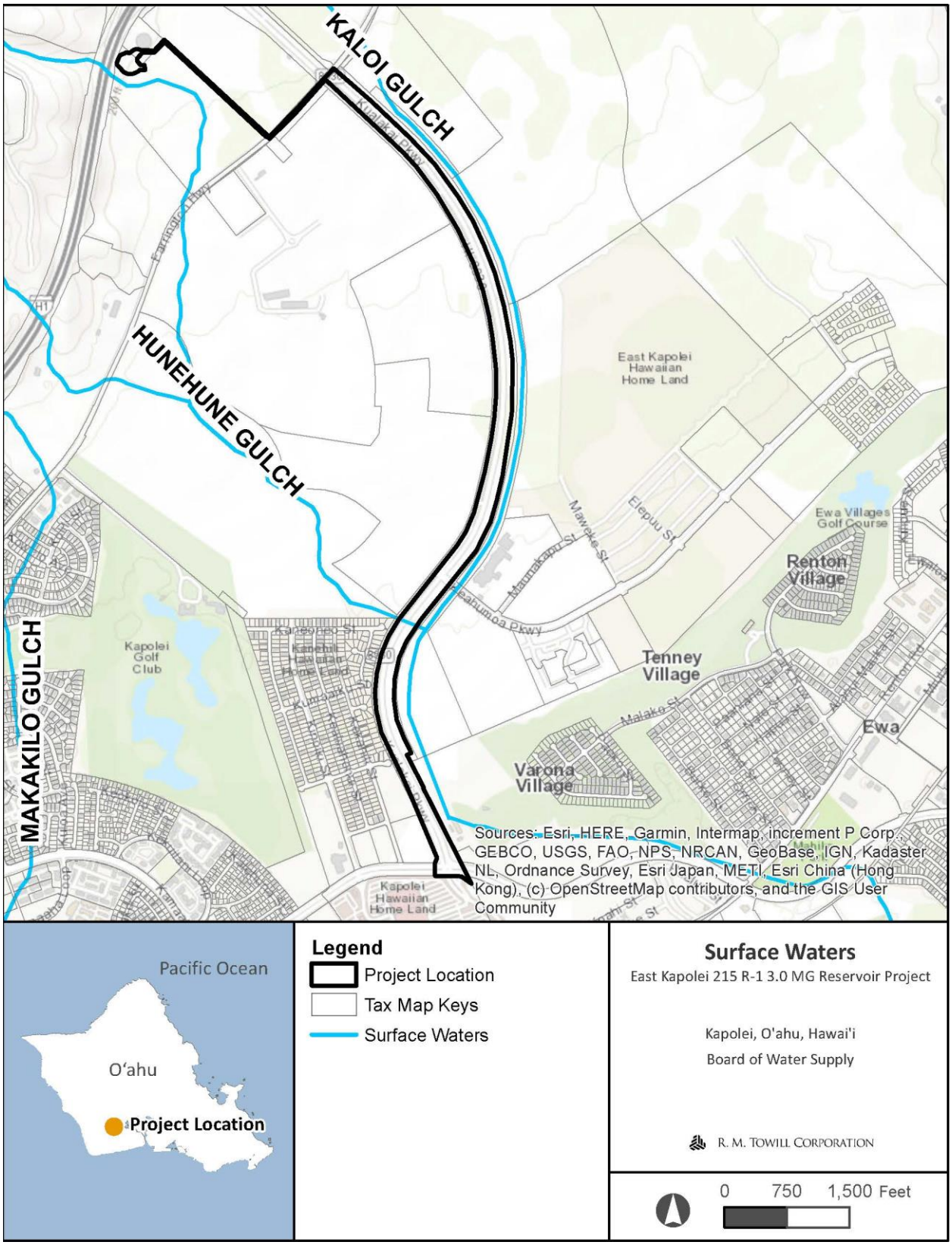
This EA recognizes stormwater as a potential source of irrigation, as a source of groundwater recharge and stream base flow, and an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters.

In addition, the State has a general policy of water quality anti-degradation (HAR, §11-54- 1.1), which states that existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected. In the case that water quality exceeds levels necessary to protect aquatic habitats, water quality may not be degraded without the approval of the director.

The revised CCH, Rules Relating to Storm Drainage Standards, effective June 1, 2013, specifies that regulated new development and redevelopment projects include LID Site Design Strategies, Source Control BMPs and Post-Construction Treatment Control BMPs to meet water quality criteria (CCH DPP, 2000, Amended 2012).

There are no drainage outfalls or other point sources of discharge in the project sites.

Figure 5-1. Surface Waters



5.4.1.2 Potential Impacts and Proposed Mitigation

The proposed project will not impact any perennial stream flows or channels. In addition, the proposed infrastructure will not come into contact with any 303(d) Water Quality Limited Waters, thus will not burden waters that are already impaired. Positive long-term cumulative effects would result from the proposed action in conjunction with ongoing projects in the watershed to improve water quality.

During construction, pollution control measures will be implemented and included in the filing of a National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit, in accordance with CWA regulations. As required a Site-Specific Construction Storm Water BMP will be prepared and followed by the project contractor to handle the treatment of storm water runoff, erosion, and sediment control.

Potential short-term impacts to surface water resources can be avoided. To mitigate construction-related, short-term impacts to Hunehune Gulch, Kaloʻi Gulch, Kaloʻi Drainage Channel, and other surface water resources, BMPs will be incorporated during construction to prevent stormwater discharges and contaminants such as sediment, pollutants, petroleum products, and debris from affecting coastal water quality. This is enforced through compliance with the NPDES. An NPDES permit will be required for construction.

Impacts to wetlands are not anticipated as the property does not contain any wetlands. Hunehune Gulch, a normally dry ditch that conveys run-off between agricultural fields, crosses the 16-inch transmission main project site and Kūalakaʻi Parkway via a concrete lined culvert and would not be disturbed by the proposed project. All work for the construction of the 16-inch transmission main would be installed above the concrete lined culvert. The upper part of Kaloʻi Gulch is an intermittent non-perennial stream that has been diverted into a large drainage feature (i.e., Kaloʻi Drainage Channel) that parallels the east side of Kūalakaʻi Parkway and the transmission main extents and terminates in a drainage basin on the east side of Kūalakaʻi Parkway, mauka of Mango Tree Road. No work is proposed in Kaloʻi Gulch or Kaloʻi Drainage Channel. Runoff from the R-1 reservoir site and reservoir overflow will be directed towards an on-site drainage basin which will discharge to Hunehune Gulch via an existing flowage easement -- Easement 9667 -granted to BWS under Executive Order 4307. No impacts to surface water bodies is expected.

No jurisdictional “Waters of the United States (WOUS)” are located in the project area, therefore a U. S. Army Corps of Engineers (USACE) Department of the Army Permit under CWA, Section 404, and Rivers and Harbors Act (RHA), Section 10, and DOH Water Quality Certification (WQC) under CWA, Section 401, will not be required.

Indirect (non-point), secondary, and cumulative impacts will be avoided with proper management of waste and wastewater, compliance with applicable stormwater regulations, and bioretention through landscaping.

Site plans include the following stormwater BMPs:

1) Site Design Strategies
   a) Direct storm water runoff to vegetated and/or landscaped areas.
2) Source Control BMPs
   a) Vegetated and/or landscaped areas shall be incorporated into the drainage design.
   b) Use of automatic irrigation system designed to minimize runoff of excess irrigation water.
   c) Outdoor trash storage area graded and paved to prevent or control storm water run- on and runoff.
   d) Dumpsters shall be lidded to prevent the entry of stormwater.

Where applicable and feasible, BWS will follow State guidance on Stormwater Impact Assessments (State of Hawai'i Office of Planning, State Coastal Zone Management Program, 2013), Hawai'i Watershed Guidance (State Hawai'i Office of Planning, State Coastal Zone Management Program, 2010), and Low Impact Development (State of Hawai'i Office of Planning, State Coastal Zone Management Program, 2006), including some of the measures discussed above to mitigate impacts to surface water resources.

5.4.2 Groundwater

5.4.2.1 Description

Underlying the property are two aquifers, the 'Ewa Caprock aquifer and the 'Ewa- Kunia basal aquifer. Both aquifers are designated as Groundwater Management Areas by the State CWRM. The aquifer directly beneath the site is the 'Ewa Caprock aquifer. The project site overlies the boundary between the aquifer's Malakole and Kapolei Areas. The 'Ewa Caprock Aquifer is considered to be a non-potable water resource being of moderate salinity (1,000 to 1,500 milligram per liter chloride [mg/L Cl-]) and vulnerable to contamination. It is an unconfined, brackish basal sedimentary aquifer composed of non-volcanic material, corals and sediments and is approximately 200 ft thick under the site.

Near the southern coast, the caprock thickens to 1,000 ft thick. The direction of groundwater flow below the BWS property is thought to flow seaward in a south, south-west direction. The lower basal aquifer, 'Ewa-Kunia, is considered an irreplaceable water resource. It is protected from contamination by the overlying caprock. It is a confined, basal flank aquifer defined by horizontally extensive lava formations. The 'Ewa-Kunia basal aquifer is used as a drinking water resource. It has a low salinity (250-1000 mg/L Cl-) and has low vulnerability to contamination (State of Hawai'i Department of Health, 2011).

According to the State CWRM coding system, the BWS property overlies the 'Ewa-Kunia Aquifer System (30204) of the Pearl Harbor Aquifer Sector. The 'Ewa-Kunia Aquifer System is one of four aquifer systems that make up the Pearl Harbor Groundwater Management Area. Water development and groundwater use within the Pearl Harbor Groundwater Management Area is regulated by the CWRM through the issuance of water use permits, well construction permits, and pump installation permits. The 'Ewa-Kunia Aquifer has a sustainable yield of 16

MGD and an area of about 101 square kilometers (State of Hawaiʻi Office of Planning, 2010). The brackish basal well State Well No. 1905-04 has two water use permits, 075 and 165 of 0.5 MGD each for a total of 1.0 MGD, held by State DLNR and BWS, respectively.

5.4.2.2 Potential Impacts and Proposed Mitigation

No short- or long-term, secondary, or cumulative adverse impacts to groundwater resources are anticipated during construction or operation of the proposed project, or during the implementation of other past, present, and reasonably foreseeable future actions.

No impacts to groundwater resources are anticipated and EPA and DOH rules and guidelines for project development will be followed.

The protection of the state's underground sources of drinking water and coastal waters will continue to be regulated through HAR, Title 11, establishing the administrative rules for the State DOH. The regulations govern programs and activities including those associated with the location and operation of wastewater disposal systems. HAR, Chapter 11-62, Wastewater Systems, offers the most extensive coverage of wastewater systems involving both wastewater treatment works and individual wastewater systems.

5.5 Soils and Potential for Hazardous Materials

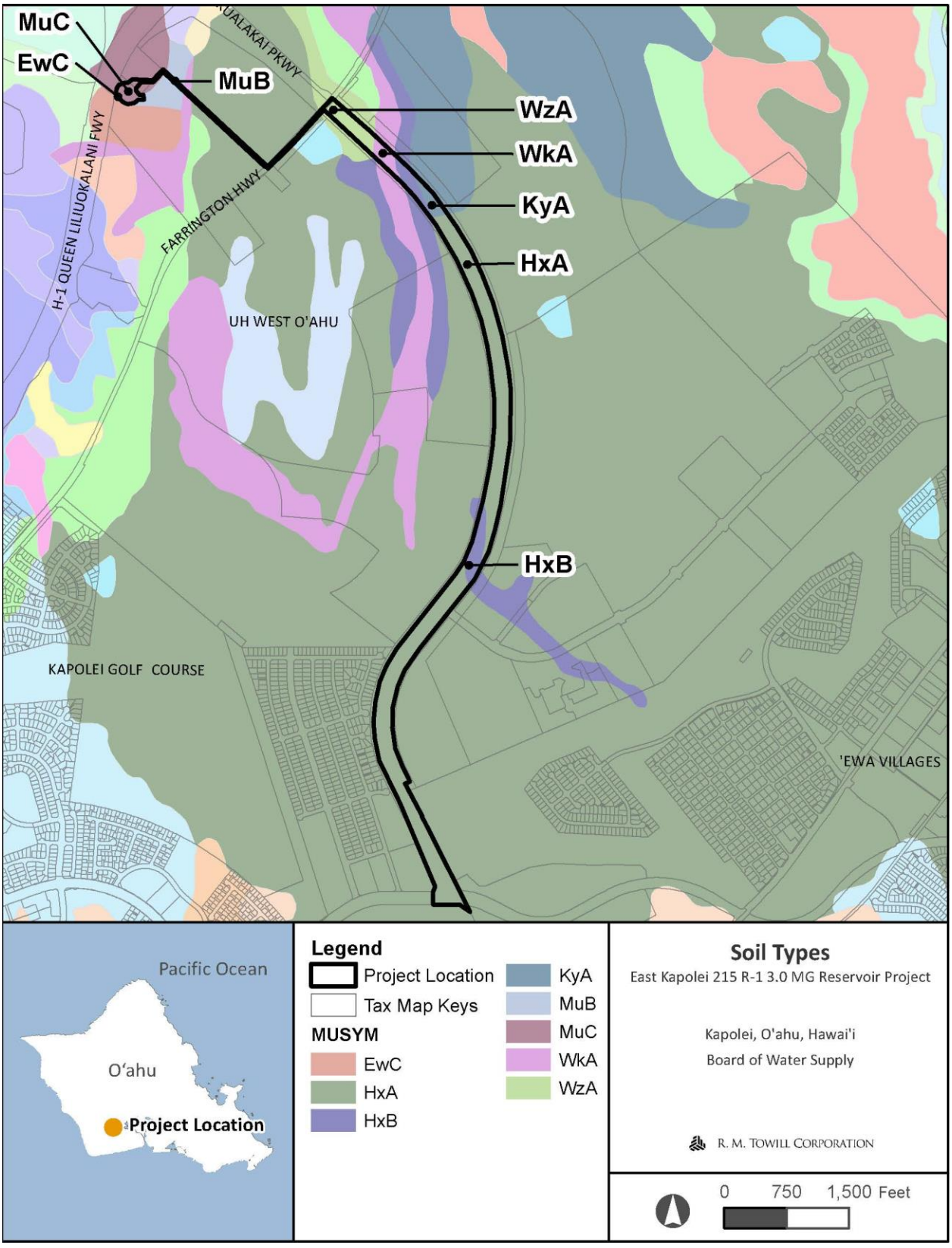
5.5.1 Description

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), project area soils consist primarily of the Honouliuli series of clays (HxA, HxB) with smaller patches in the Molokai (MuB, MuC), Waialua (WkA), Waipahu (WzA), and Kunia (KyA) series of silty clays and the ʻEwa (EwC) series of stony silty clays. Honouliuli Clay is described as "dark reddish-brown, very sticky and very plastic clay throughout" (Foote et al. 1972). See **Figure 5-2, Soil Types**.

Soils of the Honouliuli Series are described as follows:

> This series consists of well-drained soils on coastal plains on the island of Oʻahu in the ʻEwa area. These soils developed in alluvium derived from basic igneous material. They are nearly level and gently sloping. Elevations range from 15 to 125 ft. The annual rainfall amounts to 18 to 30 inches and occurs mainly between November and April. The mean annual soil temperature is 74° F. Honouliuli soils are geographically associated with ʻEwa, Lualualei, Māmala, and Waialua soils. These soils are used for sugar cane, truck crops, orchards, and pasture. Natural vegetation consists of kiawe, koa haole (*Leucaena leucocephala*), finger grass (*Limnophila aromatica*), bristly foxtail (*Setaria parviflora*), and Bermuda grass (*Cynodon dactylon*). [Foote et al. 1972:43]

Figure 5-2. Soil Types



Soils of the Molokai Series are described as follows:

> This series consists of well-drained soils on uplands on the islands of Maui, Lānaʻi, Molokaʻi, and Oʻahu. These soils formed in material weathered from basic igneous rock. They are nearly level to moderately steep. Elevations range mainly from nearly sea level to 1,000 ft but are as much as 1,500 ft on Lānaʻi. The annual rainfall amounts to 20 to 25 inches, most of which occurs between November and April. The summers are hot and dry. The mean annual soil temperature is 73° F. Molokaʻi soils are geographically associated with Holomua, Keahua, Lahaina, and Uwala soils.

These soils are used for sugarcane, pineapple, pasture, wildlife habitat, and home sites. The natural vegetation consists of kiawe, ʻilima (*Sida fallax*), uhaloa (*Waltheria indica*), feather finger grass (*Chloris virgata*), and buffalo grass (*Bouteloua dactyloides*). [Foote et al. 1972:96]

Soils of the Waialua Series are described as follows:

> This series consists of moderately well drained soils on alluvial fans; these soils developed in alluvium weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 100 ft. The annual rainfall amounts to 25 to 50 inches; most of it occurs between November and April. The mean annual soil temperature is 73° F. Waialua soils are geographically associated with Honouliuli, Kaʻena, and Kawaihāpai soils.
>
> These soils are used for sugarcane, truck crops, orchards, and pasture. The natural vegetation is swollen finger grass, koa haole, and uhaloa. [Foote et al. 1972:128]

Soils of the Waipahu Series are described as follows:

> This series consists of well-drained soils on marine terraces on the island of Oʻahu. These soils developed in old alluvium derived from basic igneous rock. They are nearly level to moderately sloping. Elevations range from nearly sea level to 125 ft. Rainfall amounts to 25 to 35 inches annually; most of it occurs between November and April. The mean annual soil temperature is 75° F. Waipahu soils are geographically associated with Hanalei, Honouliuli, and Waialua soils. [Foote et al. 1972:134]

Soils of the Kunia Series are described as follows:

> This series consists of well-drained soils on upland terraces and fans on the island of Oʻahu. These soils developed in old alluvium. They are nearly level to moderately sloping. Elevations range from 700 to 1,000 ft. The mean annual rainfall amounts to 30 to 40 inches, most of which occurs from November to April. The mean annual soil temperature is 71° F. Kunia soils occur on the foot slopes of the Waiʻanae Range, near Schofield Barracks. They are geographically associated with Kolekole, Lahaina, and Wahiawā soils.

> These soils are used for sugarcane, pineapple, home sites, and military reservations. Most areas are cultivated, and the natural vegetation is not significant. [Foote et al. 1972:77]

The project corridor extends across the ʻEwa Plain, a Pleistocene reef platform overlain by alluvium from the southern end of the Waiʻanae Mountain Range. This alluvium supported commercial sugarcane cultivation for over a century. The ʻEwa Plain is hot and dry with an average annual rainfall of 25 inches (Giambelluca et al. 2013) and an average annual temperature of 74 F (23 C) (Giambelluca et al. 2014). Despite the aridity, the area is prone to flooding. Floods of 1916, 1917, 1923, and 1927 have been well documented by archival photographs, some of which show standing water as far as the eye can see. Honouliuli Stream is the only major stream in the area, although it is located well outside the project area. Hunehune Gulch, a normally dry ditch that conveys run-off between agricultural fields, traverses the western (ʻEwa) portion of the proposed R-1 reservoir parcel (TMK (1) 9-1-018:008), however, it is located outside of the proposed reservoir project site. Hunehune Gulch then flows southward then southeastward where it joins the lower remnant of Kaloʻi Gulch; and these combined drainageways feed into a drainage basin on the west side of Kūalakaʻi Parkway. Runoff from the drainage basin then flows under Kūalakaʻi Parkway through a concrete-lined culvert and enters into a series of two drainage basins on the east side of Kūalakaʻi Parkway, mauka and makai of Mango Tree Road. The upper part of Kaloʻi Gulch is diverted into a large drainage feature (i.e., Kaloʻi Drainage Channel) that parallels the east side of Kūalakaʻi Parkway, terminating in the drainage basin on the east side of Kūalakaʻi Parkway, mauka of Mango Tree Road. Kaloʻi Gulch is an intermittent non-perennial stream. Kaloʻi Gulch and Kaloʻi Drainage Channel are located outside the project site.

Potential Hazardous Materials

Potential hazardous materials are not expected to be within the project area and the project is not expected to use hazardous materials. According to the State of Hawai'i, DOH, Leaking Underground Storage Tank (LUST) list, there are no identified LUST facilities within the project area or in the immediate surroundings. All grading materials will be appropriately disposed of in accordance with State and CCH regulations or may be re-used as fill. The contractor will adhere to the DOH, Hazard Evaluation and Emergency Response (HEER) guidelines for any potential encountered hazardous contaminants or spills.

5.5.2 Potential Impacts and Proposed Mitigation

The project site and surrounding area was previously sugar cane lands owned by the ʻEwa and Oʻahu Sugar Plantations and with the closing of sugar cane activities, the large tracts of land, such as the University of Hawaiʻi West Oʻahu campus have been urbanized as part of the City's Secondary Urban Center. The site was modified with the construction of the 4.0 MG potable water reservoir facility several years ago, and therefore, construction of the proposed R-1 non-potable water reservoir facility and transmission system is not anticipated to have a negative impact on the soils of the project site.

Impacts to the soils include the potential for soil erosion and the generation of dust during grading and construction. Clearing and grubbing activities will temporarily disturb the soil

retention values of the existing vegetation and expose soils to erosional forces. Some wind erosion of soils could occur without a proper watering and re-grassing program. Heavy rainfall could also cause erosion of soils within disturbed areas of land. BMPs to minimize impacts may include the following:

- Minimizing the time of construction.
- Retaining existing ground cover as long as possible.
- Constructing drainage control features early.
- Using temporary area sprinklers in non-active construction areas when ground cover is removed.
- Providing a water truck on-site during the construction period to provide for immediate sprinkling, as needed.
- Using temporary berms and cut-off ditches, where needed, for control of erosion.
- Watering graded areas when construction activity for each day has ceased.
- Grassing or planting all cut and fill slopes immediately after grading work has been completed.
- Installing silt fences, sediment traps, and diversion swales, where appropriate.
- Employee training on proper use of BMPs.

After construction, the new improvements will provide long-term erosion control.

Construction activities will comply with all applicable Federal, State, and County regulations and rules for erosion control. A grading permit will be procured from the County. Compliance with NPDES permitting requirements will be required.

5.6 Wetlands

5.6.1 Description

Wetlands play an integral role in the environment. They prevent erosion in the surrounding area through the presence of wetland associated plants with root systems that hold soil in place. The plants also serve as a physical barrier and absorb energy from waves. Wetlands also provide a natural filtration system for runoff. Nutrients swept into the wetland from runoff are absorbed by plant roots and microorganisms that live in the soil, or stick to the soil particles themselves. Through this process, most of the nutrients and pollution in the water are absorbed and retained and are prevented from entering the ocean (EPA, 2016). Executive Order 11990, Protection of Wetlands, directs federal agencies to take action to minimize the destruction, loss, or degradation of wetlands on their properties and mandates the review of the impact of proposed actions on wetlands through NEPA.

No wetlands or perennial streams occur in the project area. Hunehune Gulch conveys run-off between agricultural fields from a small watershed draining the east slope of Puʻu Makakilo (mauka of the H-1; AECOS, 2005b). The normally dry ditch traverses the western (ʻEwa)

portion of the proposed R-1 reservoir parcel (TMK (1) 9-1-018:008) and would not be disturbed by the proposed reservoir construction. Hunehune Gulch then flows southward then southeastward where it joins the lower remnant of Kaloʻi Gulch; and these combined drainageways feed into a drainage basin on the west side of Kūalakaʻi Parkway. Runoff from the drainage basin then flows under Kūalakaʻi Parkway through a concrete-lined culvert and enters into a series of two drainage basins on the east side of Kūalakaʻi Parkway, mauka and makai of Mango Tree Road. Flows beneath Kūalakaʻi Parkway would not be disturbed by the proposed transmission main construction as it would be installed above the concrete lined culvert. The upper part of Kaloʻi Gulch is classified as an intermittent non-perennial stream and is diverted into a large drainage feature (i.e., Kaloʻi Drainage Channel) that parallels the east side of Kūalakaʻi Parkway, terminating in the drainage basin on the east side of Kūalakaʻi Parkway, mauka of Mango Tree Road. Kaloʻi Gulch and Kaloʻi Drainage Channel are located outside the project site and would not be disturbed by the proposed transmission main construction.

5.6.2 Potential Impacts and Proposed Mitigation

There would be no impact to wetlands because none exist in the project area. If water is encountered and removed while digging foundations for the proposed reservoir facility and transmission line, any such discharged water must comply with federal NPDES requirements. During the operation of the proposed project, a BMPs plan and an Erosion Control Plan (ECP) will be implemented to protect against inadvertent spills or releases of contaminants. **Section 5.4.1.2** addresses preventive measures to be taken by the construction contractor to avoid spills into Hunehune Gulch, Kaloʻi Gulch, and Kaloʻi Drainage Channel, which are the nearest groundwater resources.

No direct, secondary, or cumulative adverse impacts to the area wetlands are anticipated and no further mitigation is anticipated to be required. All work proposed would adhere to regulatory requirements.

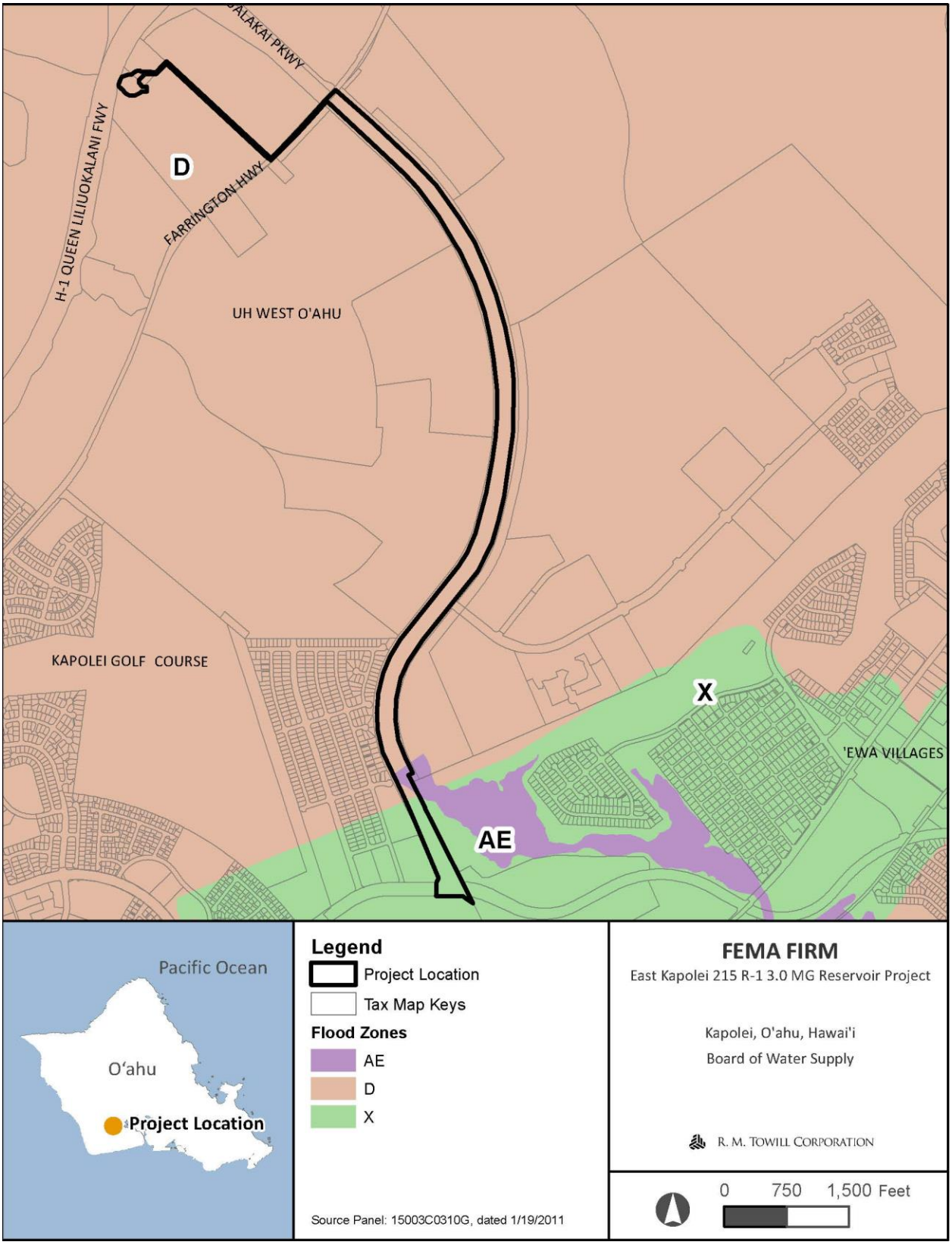
5.7 Natural Hazards

5.7.1 Description

Hawai'i is susceptible to potential natural hazards, such as flooding, hurricanes, earthquakes, and tsunamis. This section provides an analysis of the Site's vulnerability to such hazards.

Floods. According to the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA), National Flood Insurance Program, the proposed project is primarily located in flood hazard Zone D, which is defined as areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted in Zone D. A small portion of the project is also located in flood hazard Zone AE, which is defined as areas subject to inundation by the 1 % annual flood, and Zone X, which is defined as areas determined to be outside the 100-year flood plain. This is reflected in FEMA-FIRM map 15003C0310G (HI-NFIP, 2011). See also **Figure 5-3, FEMA FIRM**.

Figure 5-3. FEMA FIRM



Hurricanes. Hawai'i's hurricane season is between June and November, when the sun can heat the ocean enough to produce strong storms (University of Hawai'i at Hilo, 2013). Hurricanes are not very common in Hawai'i (as opposed to, for example, the Caribbean). This is because the ocean around the islands is relatively cool and the wind patterns are more likely to create shear, which tears storms apart. However, since 1950, when reliable recordkeeping on hurricanes began, five hurricanes have caused major damage to Hawai'i. In four of those five storms, Kaua'i sustained the costliest damage to both lives and property. Causing an estimated $2.3 billion in damages, Hurricane 'Iniki (1992) is the worst storm to have hit Hawai'i (Williams, 2013). No hurricanes or tropical storms have caused damage as significant as 'Iniki to date.

Seismic Hazard. In Hawai'i, most earthquakes are linked to volcanic activity, unlike other areas where a shift in tectonic plates is the cause of an earthquake. Each year, thousands of earthquakes occur in Hawai'i, the vast majority of which are so small they are detectable only with highly sensitive instruments. However, moderate and disastrous earthquakes have occurred in the islands.

Tsunami Hazard. The project site is well outside the tsunami evacuation zone designated by the Hawai'i State Civil Defense.

Climate Change. According to recent findings by researchers at the University of Hawai'i (IPRC, 2013, var.), the effects of climate change are increasingly evident in Hawai'i: air temperature has risen; stream flows have decreased; sea surface temperatures and sea levels have increased; the ocean is becoming more acidic; and rain intensity has increased while total rainfall has decreased (SB No. 2745, 2012). Climate change is expected to reduce rainfall in leeward O'ahu with an associated decrease in aquifer sustainable yields, especially in the Wai'anae and 'Ewa Kunia aquifers. Increased R-1 recycled water availability will benefit natural water sustainable yields by replacing irrigation water from potable to recycled water. Elevated R-1 storage will increase R-1 use through its accessibility and functionality. An increase in reuse will benefit limited natural water resources which would otherwise be used if R-1 were unavailable due to limited pumping schedules.

Research is also in agreement that greenhouse gas emissions, including carbon dioxide, methane, nitrous oxide, and fluorinated gases, are a key contributor to the unprecedented increases in global atmospheric warming over the past century (EPA, 2011 and IPRC, 2013). These trends are projected to continue to increase in the future posing unique and considerable challenges to Hawai'i. Research at the University of Hawai'i, School of Ocean and Earth Science and Technology (SOEST) indicates that sea level has risen in Hawai'i by approximately 0.6 inches per decade (1.5 mm per year) over the past century (SOEST, 2012). The estimates point to a potential aggregate rise of 1.3 ft (40 cm) by the year 2060 and a rise of 3.3 ft (100 cm) by 2110.

According to the Intergovernmental Panel on Climate Change's Fifth Assessment Report, Climate Change 2013, Chapter 13, Sea Level Change, released in 2014, it is estimated that at most, a global sea-level rise of approximately 0.45 -0.82 meters (1.48 – 2.70 ft) is likely to occur for the period of 2081-2100. There will be deviations of local and regional sea level change from the global change – it is estimated that about 70% of coastlines are projected to experience a relative sea level change within 20% of the global mean sea level change.

The Hawaiʻi Sea Level Rise Vulnerability and Adaptation Report that was mandated by Act 83, Session Laws of Hawaiʻi 2014 and Act 32, Session Laws of Hawaiʻi 2017. The Hawaiʻi Sea Level Viewer is intended to provide map data depicting projections for future hazard exposure and assessing economic and other vulnerabilities due to rising sea levels. The 3.2-ft scenario sea level rise exposure area in the vicinity of the proposed project is shown on **Figure 5-4, Sea Level Rise Map**. No intrusion of sea water into the project site is expected under this scenario.

The reservoir project site elevation is approximately 195-ft above sea level, the portion of the project along Farrington Highway is approximately 150-ft above sea level, and the portion of the project along Kūalakaʻi Parkway slopes south (seaward) with an elevation of approximately 150-ft above sea level at the intersection of Kūalakaʻi Parkway and Farrington Highway to 50-ft above sea level near the intersection of Kūalakaʻi Parkway and Kapolei Parkway. Therefore, direct inundation due to sea level rise is not anticipated in the context of 21st century sea level rise projections.

The Center for Island Climate Adaptation and Policy and the University of Hawaiʻi Sea Grant note that sea level is expected to rise one foot by 2050 and three feet by 2100, and recommends that state and local governments plan accordingly (Center for Island Climate Adaptation and Policy, 2011). While an accelerating rise in local sea level should be planned for, specific water levels should not be anticipated because sea level rise models are inherently uncertain. Sources of this uncertainty include sparse local data, intrinsic uncertainty in climate warming and ice melt models, and prospective shifts in human behavior to curb green-house gas emissions.

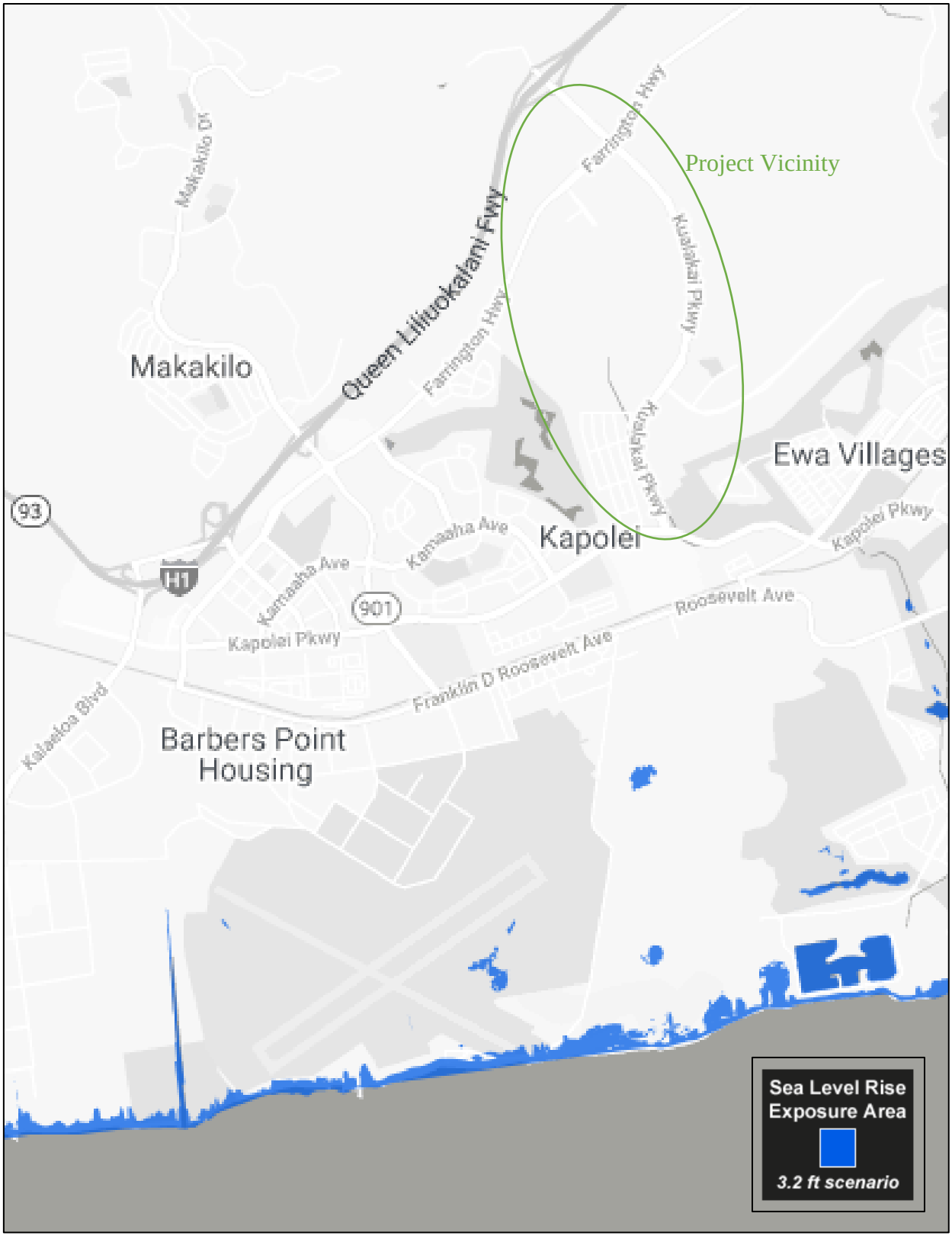
5.7.2 Potential Impacts and Proposed Mitigation

The proposed project will have beneficial impacts for the community when considering natural hazards. The R-1 non-potable water reservoir site will be a hardened public infrastructure system from which the developer and CCH can respond to non-potable water system service needs during natural hazard events. Further, the development of a water source through well designed, processed and stored use of brackish water will provide additional supply to an area that may experience increased drought in the future.

The occurrence of a natural disaster cannot be predicted, and should one occur, it could pose a risk of life and property at the site. Because the R-1 non-potable water reservoir project will provide efficient access to services related to the water security of the East Kapolei community, it is important that the system be protected from natural disasters so that its resources are available to assist in impacted areas.

To protect against natural hazards (particularly hurricanes and earthquakes), the proposed new R-1 non-potable water reservoir facility and transmission system will be constructed in compliance with requirements of the Uniform and International Building Codes and other county, state, and federal standards.

Figure 5-4. Sea Level Rise Map (Source: PacIOOS)



Construction activities that require the use of heavy machinery would present increase in greenhouse gases, however this would only be short-term and cease with construction. Energy that is used will be in the form of fossil fueled internal combustion equipment, machinery, and vehicles, and electricity supplied to the site by either an existing Hawaiian Electric Company-power connection or by the use of portable generator(s). The use of these forms of energy is not expected to be greater or significantly greater than that used for the development of similar projects.

5.8 Flora and Fauna

The biological communities of potential concern in the project area are floral and faunal organisms. A biological survey to ascertain resources present at the project site and vicinity was undertaken by AECOS, Inc., in September 2017 and is provided in **Appendix C**.

At the time the biological survey was completed, the transmission main was planned to stop approximately 1,200 ft north of Kapolei Parkway. However, subsequent to the report it was determined that the 16-inch transmission main needed to extend to a location just south of Kapolei Parkway for connection to an existing main. Thus, the extended portion of the transmission main was not evaluated in the biological survey. Based on the transmission main extension area being located in the existing Kūalakaʻi Parkway and Kapolei Parkway ROWs and considered to be previously disturbed by extensive grading for the construction of the roadways.

5.8.1 Terrestrial Flora

5.8.1.1 Description

The proposed R-1 reservoir site is mostly low to moderately sloping open field covered by grasses and other herbaceous plants and scattered small shrubs. A fallow crop field adjacent on the south of the BWS East Kapolei 215 Reservoir site supports a mix of mostly ruderal shrubs, dominated by Russian thistle (*Salsola tragus*) and marked by extensive areas of bare ground. A moderately dense growth of *koa haole* (*Leucaena leucocephala*) scrub borders the banks of dry Hunehune Gulch. This scrub growth extends across the steeper north side of the property, mixed into an open-canopy forest of *kiawe* (*Prosopus pallida*). The reservoir site rises steeply in the northeast corner up to a small knoll over-looking the H-1 freeway.

Nearly all of the ROW proposed for the 16-inch transmission line is regularly maintained (mowed) ground up to any fence bordering the roadways. Only along the BWS access road does any substantial amount of vegetation occur. In July 2008 D.R. Horton – Schuler Division published a FEIS for the Hoʻopili Project involving the project parcel located at TMK: 9-1-018:012 where the small pipeline bulb-out for the 16-inch transmission main along the reservoir access road would occur. A botanical resource assessment for TMK: 9-1-018:012, located between H-1 Freeway and Farrington Highway west of Palehua Road, was completed in 2006 for the project. The majority of parcel 012 was found to be either in cleared land/or active corn (*Zea mays*) cultivation. The edges of parcel 012 were dominated by weedy species such as castor bean (*Ricinus communis*), lion's ear (*Leonotis nepetifolia*), partridge pea (*Chamaecrista nictitans*), and kikania (*Xanthium strumarium* var. *canadense*). In addition, a small distribution of kiawe (*Prosopis pallida*) and

opiuma (*Pithecelobium dulce*) trees were scattered along the top of Hunehune Gulch. Parcel 012 is proposed for the construction of the Hoʻopili Gateway Development.

The east side of Kūalakaʻi Parkway borders the HART guideway and an especially broad and leveled verge extends between the parkway pavement and a security fence bordering a large drainage canal (i.e., Kaloʻi Drainage Channel) beyond. Plants all along the transmission line route here are decidedly ruderal in character.

A total of 49 species of plants were identified from the survey area, 28 of which were recorded as present on the R-1 reservoir site; 41 species were observed along the proposed transmission route. Twenty-one species were common to both areas. All of the plants, with the exception of three species, are common, naturalized (non-native) species. Three indigenous species (plants native to Hawaiʻi and elsewhere) occur in the survey areas: ʻuhaloa (*Waltheria indica*) is common throughout the area; ʻilima (*Sida fallax*) and kīpūkai (*Heliotropum curassavicum*) were represented in this survey by single plants seen along the transmission route. Although the existing fenced 215 Reservoir site was not accessed, plants observed from outside the fence were the same as those in the open areas of the survey site, with the exception of a border of ornamental oleander (*Nerium oleander*) planted along the fence in the southwest corner of the site.

No plants of any particular concern were noted at either the proposed reservoir site or along the transmission line route. With the exception of the ubiquitous ʻ*uhaloa*, no other native plants were observed on the reservoir site, and only two other very common native species were recorded as rare along the transmission line route. These results reflect the highly disturbed nature of the entire area with respect to remnant native vegetation.

As provided by the USFWS, in a letter dated December 16, 2022, during early consultation for the project, the following was noted (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

- Our data indicate the following federally listed species may occur or transit through the vicinity of the proposed project area: the endangered plant *Abutilon menziesii* (ko oloa ula, red ilima).

- *Abutilon menziesii* likely occurred within lowland dry grassland, shrubland, and forest. However, it currently persists within highly degraded communities dominated by alien plants. On Oʻahu *A. menziesii* occurs on substrate composed of limestone characterized by sinkholes and coralline rubble with thin soils and pockets of humus.

- The proposed activities of the East Kapolei MG Reservoir and 16-Inch Transmission Main Project were occupied by a population of *Abutilon menziesii*. The State of Hawaiʻi Habitat Conservation Plan for *A. menziesii* at Kapolei of March 2004, and the USFWS Biological Opinion issued by our office on August 5, 2004 (1-2-2004- F-123), outlines conservation measures for *A. menziesii*. The development of the property has been considered in the USFWS's Biological Opinion. However, the BWS will have to obtain

the Certificate of Inclusion from the Hawai'i Department of Transportation. The BWS (and any subsequent landowners who agree to accept transfer of the Certificate of Inclusion) must agree to and implement the terms of the Habitat Conservation Plan.

The BWS will comply with the USFWS requirements above. According to the biological survey undertaken by AECOS, Inc. in September 2017 (**Appendix C**) at one time, the endangered plant, *ko'oloa'ula* (*Abutilon menziesii*) was reported over an area where the proposed transmission line is proposed to cross (Char, 1997a,b; HFDC, 1998; *AECOS*, 2010a,b, 2011). However, as a consequence of the construction of Kūalaka'i Parkway and Kapolei Parkway in the area, the *ko'oloa'ula* in that area were moved to a nearby fenced and signed DLNR preserve located to the east of the two parkways. No floral species listed as state or federally endangered or threatened (HDLNR, 1998; USFWS, 2017) are present in the project area.

5.8.1.2 Potential Impacts and Proposed Mitigation

Development of the proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project will not impact any endangered, threatened, or otherwise protected plant species as none are known to be present within the majority of the site. However, for the portion of the project that was extended including the approximately 1,200 lf segment of transmission main located along the Kūalaka'i Parkway ROW, from its intersection with Kūalaka'i Parkway and Kapolei Parkway, a survey was not completed. Therefore to ensure no impact to these species the following is recommended:

- Prior to the start of grubbing/grading of the project site, a qualified biologist should complete a survey of the area to be disturbed to be sure that no *Abutilon menziesii* are present. In the event that *Abutilon menziesii* is located, BWS must contact USFWS for instructions before starting any clearing work. Additionally, BWS will obtain a Certificate of Inclusion from the Hawai'i Department of Transportation as necessary.

With the inclusion of the above recommendation, the project is not anticipated to result in adverse impacts to flora resources.

5.8.2 Terrestrial Fauna

5.8.2.1 Description

Avian Resources. The findings of the avian survey completed for the project are consistent with what would be expected in a highly disturbed area at this elevation on the 'Ewa Plain (AECOS, 2005a, 2013; Bruner, 2005). The majority of birds observed in the project area are naturalized, urban-dwelling birds. Of the ten species observed (including incidental observations), six (Mourning Dove (*Zenaida macroura*), Spotted Dove (*Spilopelia chinensis*), Zebra Dove (*Geopelia striata*), Red- vented Bulbul (*Pycnonotus cafer*), Common Myna (*Acridotheres tristis*), and Japanese White-eye (*Zosterops japonicas*) are listed as injurious species—animals known to be harmful to agriculture, aquaculture, indigenous wildlife or plants, or constitute a nuisance or health hazard (DLNR, 2015). Gray Francolin is an introduced game bird. No species

listed as state or federally endangered or threatened (DLNR, 2015; USFWS, 2017) are present. The project is not expected to adversely impact avian resources recorded from the project area.

In July 2008 D.R. Horton – Schuler Division published a FEIS for the Hoʻopili Project involving the project parcel located at TMK: 9-1-018:012 where the small pipeline bulb-out for the 16-inch transmission main along the reservoir access road would occur. Faunal resources surveys of TMK: 9-1-018:012, and the larger Hoʻopili project area were completed in 2006. During the surveys, twenty-four avian species were recorded, including two indigenous migratory shorebird species, the Pacific Golden Plover (*Pluvialis fulva*) and Ruddy Turnstone (*Arenaria interpres*). The remaining 22 species are alien and include pheasants, partridges, herons, pigeons and doves, bulbuls, larks, starlings, sparrows, mockingbirds and finches. While not observed during the survey, the Short-eared Owl, or Pueo (*Asio fammeus sandwichensis*) is known to exist in the ʻEwa region, and may be present in the area. The State of Hawaiʻi lists the Oʻahu population of the Pueo as an endangered species, while the federal statute does not.

The Migratory Bird Treaty Act (MBTA) offers protection to several species of birds that occur on Oʻahu, including seabirds and shorebirds. No known nesting colonies of any of the Oʻahu resident seabird species occur on, or within close proximity of, the project area. Several species of seabirds might over-fly the area, but there are no resources present in the project area that would be utilized by seabirds.

Pacific Golden Plover or kōlea (*Pluvialis fulva*), an indigenous migratory shorebird, might regularly visit the tank location. Pacific Golden Plover is not a listed species, but an indigenous migratory shorebird species that nests in the high Arctic during the late spring and summer months, and spends winter months in Hawaiʻi and elsewhere in the tropical Pacific. In Hawaiʻi, these birds tend to associate with open areas, particularly lawns and fields with short or sparse vegetation. Broad verges adjacent to the east side of Kūalakaʻi Parkway may provide suitable loafing and feeding habitat for this species.

The pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) is an endangered (state-listed only, on Oʻahu), endemic sub-species and known from undeveloped lands mauka (upland) of the project site (David & Guinther, 2013). This native owl might nest in grassy fields and hunt over the proposed reservoir site.

As provided by the USFWS, in a letter dated December 16, 2022, during early consultation for the project, the following was noted (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

- Our data indicate the following federally listed species may occur or transit through the vicinity of the proposed project area: the endangered ʻuaʻu (Hawaiian petrel, *Pterodroma sandwichensis*), endangered Hawaiʻi distinct population segment of ʻakeʻake (band-rumped storm-petrel, *Hydrobates castro*), and threatened ʻaʻo (Newell s shearwater, *Puffinus auricularis newelli*) (hereafter collectively referred to as Hawaiian seabirds).

- Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.

- To avoid and minimize potential project impacts to seabirds we recommend you incorporate the following applicable measures into your project design:
  - Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
  - Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
  - Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

The BWS will comply with the USFWS requirements above.

Mammalian Resources. With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or ʻōpeʻapeʻa as it is known locally, all terrestrial mammals currently found on the Island of Oʻahu are alien species, and most are ubiquitous. The Hawaiian hoary bat is the only Endangered Species Act -listed terrestrial mammal in Hawaiʻi.

The findings of the mammalian survey are consistent with the location of the property and the habitats present on or adjacent to the site. Although no rodents were recorded in the survey, some, if not all, of the four established Muridae found in Hawaiʻi – black rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), Polynesian rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus musculus domesticus*) – could use various resources within the project area. All of these introduced rodents are deleterious to native ecosystems and native species. No mammalian species currently protected or proposed for protection under either the federal or State of Hawaiʻi endangered species programs were detected during the course of the project surveys (DLNR, 2015; USFWS, 2015).

In July 2008 D.R. Horton – Schuler Division published a FEIS for the Hoʻopili Project involving the project parcel located at TMK: 9-1-018:012 where the small pipeline bulb-out for the 16-inch transmission main along the reservoir access road would occur. Mammalian surveys of TMK: 9-1-018:012, and the larger Hoʻopili project area were completed in 2006. Mammalian surveys revealed only alien species present in the area, including house mouse (*Mus musculus domesticus*), dog (*Canis f. familiaris*), mongoose (*Herpestes a. auropunctatus*), horse (*Equus c. caballus*) and cat (*Felis catus*). The lone listed terrestrial mammalian species, Hawaiian hoary bat (*Lasiurus cinereus semotus*) was not detected during the course of the 2006 faunal surveys.

As provided by the USFWS, in a letter dated December 16, 2022, during early consultation for the project, the following was noted (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

- Our data indicate the following federally listed species may occur or transit through the vicinity of the proposed project area: the endangered ʻōpeʻapeʻa (Hawaiian hoary bat, *Lasiurus cinereus semotus*).

- The Hawaiian hoary bat roosts in both exotic and native woody vegetation across all islands and will leave young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet or taller are cleared during the pupping season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. Hawaiian hoary bats forage for insects from as low as 3 feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing.

- To avoid and minimize impacts to the endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project design:
  - Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15).
  - Do not use barbed wire for fencing.

The BWS will comply with the USFWS requirements above.

Given the paucity of documented records of the Hawaiian hoary bat species from the ʻEwa Plain, the chance that bats would use resources in the project area are extremely low. Additionally, very few suitable roosting sites (trees in excess of 4.6 m or 15 ft) for Hawaiian Hoary bat are present on the property. A few modest kiawe trees are present, but these spiny trees are unlikely to be of interest to the Hawaiian hoary bat.

Critical Habitat. No federal critical habitat exists for any species at the project site. Thus, modification of habitats on all or any part of the site will not result in an impact to federally designated critical habitat. There is no equivalent statute under state law.

5.8.2.2 Potential Impacts and Proposed Mitigation

Development of the proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project is expected to have no negative adverse impacts on native fauna species or their habitat, as the site does not currently provide desirable habitat to native, threatened or endangered species. To ensure all prudent and precautionary measures are observed, the following steps are recommended:

- Prior to the start of grubbing/grading of the reservoir site, a qualified biologist should complete a survey of the area to be disturbed to be sure that no nesting pueo are present. In the event that a nest is located, BWS must contact DLNR, Division of Forestry and Wildlife for instructions before starting any clearing work.

- If construction activity is to be undertaken after sunset, all associated lights should be well-shielded, and where large flood/work lights are used, these should be placed on poles that are high enough to allow the lights to be pointed directly downward. Avoiding night-time work during the peak of seabird fallout between September 15 and December 15 can minimize adverse impacts to listed seabird species that might overfly the project vicinity.

- Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15) and do not use barbed wire for fencing.

5.9 Noise Conditions

5.9.1 Description

Existing sound levels in the vicinity of the 215 R-1 water reservoir and 16-inch transmission main site are fairly high due to traffic generated by the H-1 Freeway and equipment used at the Makakilo Quarry located to the north and west of the site. Farrington Highway is located south of the BWS 215 reservoir site, and Kūalakaʻi Parkway southeast of the reservoir site. The University of Hawaiʻi West Oʻahu campus is south of the reservoir site and west of Kūalakaʻi Parkway. The Hunehune Gulch, located on the immediate western edge of the proposed R-1 reservoir site, forms a natural barrier between the reservoir site and the surrounding land.

5.9.2 Potential Impacts and Proposed Mitigation

Construction activities will temporarily affect sound levels, and therefore may have an impact on neighboring properties. These impacts are unavoidable but will be temporary. Surrounding property uses in the area include educational institutions with expansive lawn areas or undeveloped land or are industrial, and therefore construction noise should not have an impact on their activities or services. However, if necessary, contractors will employ mitigation measures to minimize temporary impacts associated with noise including the use of mufflers and implementing construction curfew periods.

Pursuant to HAR, Chapter 11-46, all construction activities must comply with all community noise controls. The DOH Community Noise Rule specifies that industrial areas may not exceed the “maximum permissible” noise level of 70 A-weighted decibels (dBA) during both day and night. In cases where the construction sound level exceeds or is expected to exceed the DOH’s “maximum permissible” noise levels at the property line, the contractor will obtain a noise permit from the DOH to operate vehicles, construction equipment, and power tools that emit noise levels in excess of “maximum permissible” levels.

Further, the contractor shall obtain a community noise variance from the DOH should construction be required during the variance hours defined as starting at 6:00 pm and ending on weekdays at 6:59 am, and on Saturdays at 8:59 am. The use of any hours on Sunday will require a noise variance. The community noise variance will be granted based on: (1) whether the allowance of work during the variance hours is in the public interest; (2) the variance shall not substantially endanger human health or safety; and (3) that denying the variance would produce serious hardships to the BWS without equal or greater benefit to the public and community. The contractor shall also provide plans, procedures, and specifications for the attenuation and/or abatement of construction related noise, as required by the DOH.

5.10 Air Quality

5.10.1 Description

The DOH, Clean Air Branch (CAB) has identified the following four potential sources of air pollution in the vicinity of the proposed project: (1) industrial sources, such as power plants and refineries, (2) mobile sources, such as motor vehicles, (3) agricultural sources, such as cane burning (no longer practiced with the demise of the sugar industry on O'ahu), and (4) natural sources, such as wind-generated dust and volcanic activity (DOH, 2013, 2014b, 2015b).

Air quality at and surrounding the project site is generally excellent year-round. The prevailing northeasterly trade winds tend to push any human-made or natural pollutants out to sea. During intermittent periods Kona winds can carry "vog" (volcano associated gasses) toward O'ahu and the surrounding islands leading to an increase in volcanic air pollutants and a decrease in visibility.

The DOH Air Quality Monitoring Kapolei Station is located in the vicinity of the site. According to the State of Hawai'i Annual Summary 2015 Air Quality Data, levels of ozone, PM2.5, PM10, carbon monoxide (CO), sulfur dioxide (SO_2), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb) at the Kapolei Station remain below state and federal ambient air quality standards, indicating generally good air quality.

5.10.2 Potential Impacts and Proposed Mitigation

No long-term impacts to air quality are anticipated. Short-term impacts from emission of fugitive dust will likely occur during site preparation and construction. An effective dust control plan will be implemented, as necessary. All construction activities will comply with the provisions of HAR, Section 11-60.1-33, related to Fugitive Dust.

Measures to control dust during various phases of construction may include:

- Providing an adequate water source at the Site prior to start-up construction activities;
- Irrigating the construction site during periods of drought or high winds;

- Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;
- Disturbing only the areas of construction that are in the immediate zone of construction to limit the amount of time that the areas will be subject to erosion;
- Providing adequate dust control measures during weekends, after hours, and before daily start-up of construction activities; and
- Installing dust screening in the areas of disturbance.

5.11 Visual Resources

5.11.1 Description

The East Kapolei 215 reservoir site is surrounded by the H-1 Freeway to the north, Farrington Highway to the south, Kūalakaʻi Parkway to the east, and Hunehune Gulch to the west. An existing potable water reservoir is situated adjacent to the project site at an elevation of 185 ft above MSL with a top of tank elevation of approximately 210 ft. The existing potable water reservoir is located on a virtually flat pad that will accommodate the adjacent construction of the proposed non-potable R-1 reservoir. This feature restricts views of the existing tank from the surrounding area to the east (specifically views extending from the northeast direction), as well as to the northwest due to its location adjacent to and immediately makai of the H-1 Freeway. The existing reservoir is primarily visible from the south (makai of H-1 Freeway) along Farrington Highway fronting the reservoir site and along portions of Kūalakaʻi Parkway. Screening trees are planted on the makai side of the reservoir site to mitigate visual impacts.

Significant views and vistas in the project vicinity identified in the ʻEwa DP include the following:

- Distant vistas of the shoreline from the H-1 Freeway above the ʻEwa Plain;
- Views of the ocean from Farrington Highway between Kahe Point and the boundary of the Waiʻanae Development Plan Area;
- Views of the Waiʻanae Range from H-1 Freeway between Kunia Road and Kaloʻi Gulch and from Kunia Road;
- Views of Na Puʻu at Kapolei, Palailai, and Makakilo;
- Mauka and makai views; and
- Views of central Honolulu and Diamond Head, particularly from Puʻu O Kapolei, Puʻu Palailai, and Puʻu Makakilo.

The East Kapolei 215 R-1 3.0 MG reservoir project site is not currently situated in an area that would obstruct any panoramic views identified in the ʻEwa DP. The proposed reservoir would not be visible from the H-1 Freeway and would not block makai views of the shoreline. While the proposed reservoir would be visible from the portion of Farrington Highway fronting the proposed reservoir site and portions of Kūalakaʻi Parkway it would not obstruct mauka views of the Waiʻanae Range and would be similar in construction to the existing potable water reservoir. Screening trees would be planted on the makai side of the reservoir site to mitigate visual

impacts from Farrington Highway and Kūalakaʻi Parkway. In the future, the ʻEwa DP will bring development up to the proposed reservoir site by rezoning current agricultural land makai of the reservoir site to urban. Panoramic views from this future development are not expected to be impacted by the project. Additionally, the project will serve to minimize negative environmental impacts associated with planned growth and development in the region by promoting the use of R-1 water and ensuring that limited potable water resources are available for current and future generations. This is consistent with the ʻEwa DP's principles of sustainability.

The proposed transmission line would follow the East Kapolei 215 reservoir site access road (with a small pipeline bulb-out into the D.R. Horton – Schuler Division Hoʻopili Gateway Development) to Farrington Highway, turn east to the intersection of Farrington Highway and Kūalakaʻi Parkway, turn south and proceed within the west side of the Kūalakaʻi Parkway ROW to the vicinity of the University of Hawaiʻi West Oʻahu HART station, at which point it would cross Kūalakaʻi Parkway to the east side of the ROW. From the vicinity of the HART station, the line would proceed south to an existing 16-inch west pump system main south of Kapolei Parkway ROW. The proposed 16-inch transmission main would be installed below grade and would not degrade scenic values.

5.11.2 Potential Impacts and Proposed Mitigation

The proposed R-1 reservoir will be smaller in size and appearance in comparison to the existing potable water reservoir. Construction of the R-1 reservoir on TMK (1) 9-1-018:008 will not significantly impact the viewplane from those vantage points where the existing tank is presently visible. Screening trees will be planted on the makai side of the reservoir site to mitigate visual impacts from along Farrington Highway and Kūalakaʻi Parkway. To avoid attracting endangered, night-flying seabirds, lighting used during construction would be shielded and downward facing, which will also serve to minimize any visual obtrusiveness of the site to surrounding properties. The proposed transmission main will be constructed below grade. No structures would be built along Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway in order to maintain open space and visual resources of the area. No significant visual impacts are expected to result from this project.

5.12 Socio-Economic Environment and Demographics

5.12.1 Description

Population. According to the U.S. Census, the population of Oʻahu Island had increased by 8.79% between the years 2000 and 2010, from 876,156 persons to 953,207 persons. The 2014 American Community Survey estimated Oʻahu's population at 991,778 persons—a 4.05% increase from 2010. In 2010, the population of census tract (Tract 85.02) which includes the area of the proposed project was 2,136, whereas it was estimated at 2,729 in 2014.

The DHHL with 997 acres has also commenced planning for the development of approximately 2,400 new single family dwellings. DHHL planning efforts include research into available infrastructure. The agency's Kapolei Regional Plan, identifies water infrastructure development as a priority.

Economy. The project site is part of the ‘Ewa District. According to the O‘ahu General Plan, ‘Ewa and the Primary Urban Center are the two areas of O‘ahu where population growth and development activity will be directed through 2025. ‘Ewa is intended to accommodate 13% of the island’s population as O‘ahu’s Second City, the focus of major economic activity, housing development, and government services (CCH DPP, 2013).

Tourism is the primary economic engine of O‘ahu, but the public sector also plays a major role in the Island’s economy. According to the Hawai‘i Tourism Authority, in 2012, the number of visitors to O‘ahu was 5,065,645, an 11.9 percent increase from 2011. This is 62.3 percent of all the visitors to the state in 2012. Visitors that year expended $7.7 billion on O‘ahu.

According to the U.S. Census American Community Survey, median household income in the site census tract was estimated at $86,085 (in 2014) and per capita income was $22,235 (in 2014). Median household income in Honolulu County was $91,139 and per capita income was $30,735.

5.12.2 Potential Impacts and Proposed Mitigation

The proposed project will provide beneficial impacts to the rapidly growing population of ‘Ewa by: (1) improving non-potable water service response times for the repair of main breaks and maintenance of water sources and distribution system facilities; (2) providing a hardened centralized facility for natural disaster response; and (3) developing an additional non-potable water resource.

In the short term, construction expenditures associated with the proposed project will have a beneficial impact on the local construction industry, and construction activities will benefit the community indirectly through the creation of jobs.

In the long term, improving non-potable water storage in the City of Kapolei will provide for more efficient water services in a vibrant growing community with environmentally sustainable amenities including landscaping and services. In turn, this is expected to stimulate direct service-related expenditures.

Implementation of the proposed project will result in potential secondary impacts by stimulating local business enterprises and increasing local employment. The combined increased business activities will result in increased state revenues, in the form of excise, individual, and corporate taxes. Combined with other past, present, and reasonably foreseeable future actions the proposed project would support the local economy and anticipated increased area population. Because population growth on O‘ahu is anticipated to occur with or without the implementation of the proposed project no significant adverse cumulative impacts to the socio-economic environment are anticipated.

5.13 Public Facilities and Services

5.13.1 Roads and Transportation

5.13.1.1 Description

Access to the site within the Kapolei region is provided primarily by Farrington Highway, a major arterial roadway connecting the freeway to the greater Kapolei area.

BWS service vehicles are the only vehicles that are expected to require access to the project site. The reservoir site is located at the end of the existing East Kapolei 215 Reservoir access road that connects to Farrington Highway which connects to Kūalakaʻi Parkway. Bike paths are not present on any of these streets and must share the road with motor vehicles, though both bike and pedestrian volumes are low in the area.

Public Transit is available along Kalaeloa Boulevard, which services TheBus route 413. This route makes stops between Kapolei Transit Center, Campbell Industrial Park, and its end at Kalaeloa Harbor, which provide service to other major routes. Route 413 runs only during weekday morning and afternoon peak periods of traffic; the schedule is approximately every 30 minutes from 5:30 AM to 8:05 AM and then from 3:00 PM to 5:30 PM.

A transit hub has been created to the north of Kalaeloa in Kapolei. The transit hub in Kapolei is connected by TheBus to the transit hub in ʻEwa, with a limited number of transit stops along Roosevelt Road in Kalaeloa.

Kalaeloa Airport (JRF) is located within 5 miles and 20,000 feet of the project site.

5.13.1.2 Potential Impacts and Proposed Mitigation

As provided by the HDOT-Highways Division, in a letter dated December 14, 2022, during early consultation for the project, the following was noted (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

1. A full evaluation in the Draft EA should be provided on whether the expanded facility (new and existing), drainage concerns or daily operations will have any local impacts to the State highway facilities.
2. The HDOT-HWY, Right-of-Way Branch should be consulted on any permits required for work along the State right-of-way.
3. The Applicant should coordinate with HDOT-Highways Division on the project construction schedule to minimize possible conflicts with our scheduled highway and maintenance projects in the area.

The BWS will comply with the HDOT-Highways Division requirements above. The major source of disturbance to traffic is anticipated from delivery of construction materials and the

transit of vehicles carrying workers to and from the job site. Occasional increases in construction traffic may result from the periodic movement of vehicles to and from the job site for the disposal of demolition debris. Temporary closure of Kapolei Parkway (State) may be required to accommodate the transmission main crossing. These impacts however will be short term in duration, of relatively low scope and scale, and will cease with the completion of the project. The BWS will consult the HDOT Right-of-Way Branch for any permits required for work along the State ROW and coordinate with the HDOT-Highways Division to minimize possible conflicts with scheduled highway and maintenance projects in the vicinity. No impacts to drainage are expected as the project installation along State roadways will be for underground water lines. Any impact to the State highway facility as a result of the proposed project would be corrected to preconstruction conditions.

As provided by the Department of Transportation Services (DTS), in a letter dated December 16, 2022, during early consultation for the project, the proposed project requires that the following be complied with (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

1. Draft EA. The applicant shall submit the completed Draft EA to the DTS for review.
2. Rail Stations. Applicant shall coordinate the construction activities/installed underground utilities with the HART in the vicinity of the University of Hawaiʻi West Oʻahu Rail Transit Station, on both sides of Kualakai Parkway.
3. Street Usage Permit. A street usage permit from the DTS shall be obtained for any construction-related work that may require the temporary closure of any traffic lane, sidewalk, bicycle lane, or pedestrian mall on a City street. Impact mitigation to transit operations shall be included in the permit application/plan.
4. Bus Stops. The project site is in the immediate vicinity of bus stops. Please coordinate roadway improvements with DTS – Transportation Mobility Division (TMD). Contact DTS-TMD at TheBusStop@honolulu.gov
5. AM/PM Peak Periods. The applicant shall minimize disruption to the AM and PM peak hour traffic on Farrington Highway.
6. Pedestrian and Bicycle Access. The project site is in the immediate vicinity of sidewalks and bikeways. The applicant shall minimize disruption to these pedestrian and bicycle facilities.

The BWS will comply with the DTS requirements above and any additional requirements as determined by other agencies. Following construction, the project is not expected to have long-term adverse effects on public roadways or transportation.

No other significant vehicular traffic impacts are expected from the development of the BWS East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project. The site is located in a relatively isolated area with the closest land use at the University of Hawaiʻi West Oʻahu campus and other proposed projects such as the Kapolei Harbor side and Kapolei Studios, which are expected to be major new developments.

Mitigative measures will include the planning of construction activities during the daytime hours with no night work anticipated to be required, and the use of flagmen and/or traffic controls to maintain accessibility for businesses and residents who may use the surrounding area roads.

As provided by the HDOT-Airports Division, in a letter dated December 14, 2022, during early consultation for the project, the following was noted (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

1. The proposed transmission line and reservoir are approximately 1.2 miles and 3.0 miles, respectively, from the property boundary of Kalaeloa Airport (JRF). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAMFAA-DOT-Airports_08-01-2016.pdf.
2. FAA regulation requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.
3. Standing water has the potential to become a wildlife attractant, which can become a hazard to aircraft operations. The HDOT-A recommends the project incorporate measures to minimize hazardous attractants in compliance with the FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On Or Near Airports. If the project results in a wildlife attractant, these hazards shall be immediately mitigated by the developer upon notification by the HDOT-A and/or FAA.

The BWS will comply with the HDOT-Airports Division's requirements above. No significant impacts to airports or operations are expected from the development of the BWS East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project.

5.13.2 Utilities

5.13.2.1 Description

Electrical Supply and Communications. Hawaiian Electric Company (HECO) provides power to the Kalaeloa area through an electrical grounding system for electrical service. Distribution and telephone service in the area is by Hawaiian Telcom with underground and aerial infrastructure and cables along the entirety of the proposed project alignment. Electrical power to the R-1 reservoir site would be provided via a 40-ft wide non-exclusive access and utility easement -- Easement 9668 -- that was granted to HECO by the State in 2010. Broadband Internet access within the area is provided by Spectrum (formerly Oceanic Time Warner Cable).

Water Supply. The BWS provides water service to the site and surrounding area. The Kapolei Business Park is served by a dual water system. Potable water supply for the site will come from an existing BWS water main. Irrigation water as required by the project is planned to be supplied by the non-potable water system.

Wastewater. Wastewater service to the site is provided by the CCH Department of Environmental Services.

5.13.2.2 Potential Impacts and Proposed Mitigation

No significant impact to the existing electrical, water, and wastewater system is anticipated. Contractors will be required to verify existing infrastructure locations prior to the start of construction. In general, the relocation or modifications of any existing infrastructure is not expected. During construction, contractors will also be required to protect existing infrastructure and ensure against interruption of services within the project area. As provided by Hawaiian Telcom, in a letter dated December 7, 2022, during early consultation for the project, underground and aerial infrastructure and cables are positioned along the entirety of the work area (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project. The full record of pre-assessment consultations is located in **Appendix E**). The use of the Hawaii One Call Center would be used by the contractor prior to the commencement of digging in order to locate utilities including Hawaiian Telcom and other providers to ensure no effect to utilities during construction.

Access to fire apparatus will be maintained throughout the construction site. Any major changes to access or access to water for firefighting purposes will be reported to the Fire Communication Center at 523-4111.

Electrical demands during construction and operation of the proposed project are not expected to exceed existing power, water and communication capability. Essentially, the long-term operation of the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main system will require similar power, water, wastewater, and communication demand that would otherwise have been used to provide these services to the existing potable water system reservoir.

5.13.3 Solid Waste

5.13.3.1 Description

Most residential and general commercial trash from Honolulu is hauled to the Campbell Industrial Park H-POWER (Honolulu Program of Waste Energy Recovery) Plant. This waste-to-energy plant processes over 600,000 tons of waste per year and produces up to 10 percent of this island's electricity. Residual ash and non-combustible construction and demolition debris, as well as industrial waste, is disposed of in a landfill. The two landfills on Oʻahu are the Waimanalo Gulch Sanitary Landfill and the landfill in Nānākuli currently administered by PVT Land Company (CCH Department of Environmental Services, 2005).

5.13.3.2 Potential Impacts and Proposed Mitigation

The construction of the proposed project is not expected to have long-term impacts to solid waste facilities based on the limited scope and scale of work. Short-term impacts are anticipated in the form of construction debris that will be generated requiring disposal. The construction contractor shall be responsible for the disposal of construction debris at a CCH-approved disposal site.

The proposed project is not anticipated to generate a significant quantity of solid waste during planned construction activities. Solid waste that is generated will be disposed of in accordance with HAR, Chapter 11-58.1, Solid Waste Management Control. No secondary or cumulative impacts to solid waste facilities would occur from the implementation of the proposed project.

5.13.4 Police Protection

5.13.4.1 Description

The Honolulu Police Department (HPD)'s Kapolei police station is located at 1100 Kamokila Boulevard. The project site is in Patrol District 8, Sector 2. As of May 2012, HPD had 1,933 sworn officers (HPD, n.d.). In pre-assessment consultation comments dated January 22, 2016, HPD expressed concern that an increase in personal and commercial vehicles would result in increased traffic congestion on Kalaeloa Boulevard and Interstate H-1 on-ramps and off-ramps.

5.13.4.2 Potential Impacts and Proposed Mitigation

The proposed construction of the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project would not result in an increase in demand for police protection services. No direct, secondary, or cumulative impacts to police protection are anticipated or expected, and no mitigation measures are necessary or recommended.

5.13.5 Fire Protection

5.13.5.1 Description

Fire prevention, suppression, and protection services for all of Oʻahu are provided by the Honolulu Fire Department (HFD). The project site is located nearby to East Kapolei Fire Station 43, located at 91-1211 Kinoiki Street, Kapolei, and Makakilo Fire Station 35, located on 92-885 Makakilo Drive, Kapolei. In 2013, the HFD employed over 1,100 firefighters (Honolulu Fire Department, n.d.).

5.13.5.2 Potential Impacts and Proposed Mitigation

As provided by HFD, in a letter dated December 5, 2022, during early consultation for the project, the proposed project requires that the following be complied with (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project; the full record of pre-assessment consultations is located in **Appendix E**):

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2018 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1, as amended.)

   A fire department access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2018 Edition, Section 18.2.3.2.1.)

2. Fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3.

3. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Sections 18.3 and 18.4.

4. Submit civil drawings to the City and County of Honolulu's Department of Planning and Permitting (DPP) and route them to the HFD for review and approval.

5. The abovementioned provisions are required by the HFD. This project may necessitate that additional requirements be met as determined by other agencies.

The BWS will comply with the HFD requirements above and any additional requirements as determined by other related agencies.

Overall, the proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project would not increase demand for fire protection services. No direct, secondary, or cumulative impacts on fire protection are anticipated or expected, and no mitigation measures are necessary or recommended.

5.13.6 Health Care and Emergency Services

5.13.6.1 Description

The nearest major medical facility is the Queen’s Medical Center West Oʻahu, a 7.2-mile drive from the project site. Emergency medical service is provided by the CCH Emergency Services Department, Emergency Medical Services Division. This facility provides emergency care as well as clinic specialty services, generally excluding General Medicine and Family Practice. The largest hospital on the island is The Queen’s Medical Center on Punchbowl Street, with 505 small care beds and 28 sub-acute beds. Queen’s at Punchbowl is the only Level II trauma center in the Pacific Region and provides emergency, primary, and specialized care. Any trauma patients are transferred to Queen’s, approximately six miles from the project site (The Queen's Medical Center, 2013). In addition, numerous privately operated medical/dental clinics and offices are located in the proposed project area to serve the local population.

5.13.6.2 Potential Impacts and Proposed Mitigation

The proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project would not result in an increase in demand for health and emergency services. Post construction and upon completion of the proposed roadways, improvements would have the capacity to facilitate more efficient access to existing medical facilities in the region. No direct, secondary, or cumulative impacts on emergency services are anticipated or expected, and no mitigation measures are necessary or recommended.

5.13.7 Schools and Libraries

5.13.7.1 Description

The project site is located adjacent to two educational institutions which are the Hawaiʻi Tokai International College and the University of Hawaiʻi West Oʻahu campus. Both institutes are located south of the project area near Farrington Highway.

There are no known libraries within the immediate project vicinity. The nearest library is the Kapolei Public Library located approximately 2.27 miles southwest of the project area.

5.13.7.2 Potential Impacts and Proposed Mitigation

Because the proposal is to construct the East Kapolei 215 R-1 3.0 MG reservoir facility and associated transmission main system, the project is not anticipated to impact any schools or libraries. As provided by State of Hawaiʻi, Department of Education, in a letter dated December 6, 2022, during early consultation for the project, the proposed project will not impact Hawaiʻi State Department of Education facilities (see **Section 9.5**, **Table 9-1**, for a record of pre-assessment comments received for the project. The full record of pre-assessment consultations is located in **Appendix E**).

During construction, the project may result in short-term disruptions of vehicle traffic along roadways within the near vicinity or periphery of the project. However, the project is not anticipated to obstruct or hinder access to nearby educational facilities.

The proposed project would not increase nor decrease the provision of educational services to the community, and would not directly, secondarily, or cumulatively result in an increase in the area population, which would otherwise generate the need for school services.

5.13.8 Recreational Resources

5.13.8.1 Description

Diverse recreational opportunities are available in the surrounding region. The following recreational facilities are within two miles of the project site:

- Kahiwelo Neighborhood Park
- Kapolei Community Park

- Kapolei Regional Park
- Makakilo Neighborhood Park

5.13.8.2 Potential Impacts and Proposed Mitigation

During construction, the project may result in short-term disruption of vehicle traffic along roadways within the near vicinity or periphery of the project. However, the project is not anticipated to obstruct or hinder access to nearby recreational facilities.

5.14 Archeological and Cultural Resources

5.14.1 Description

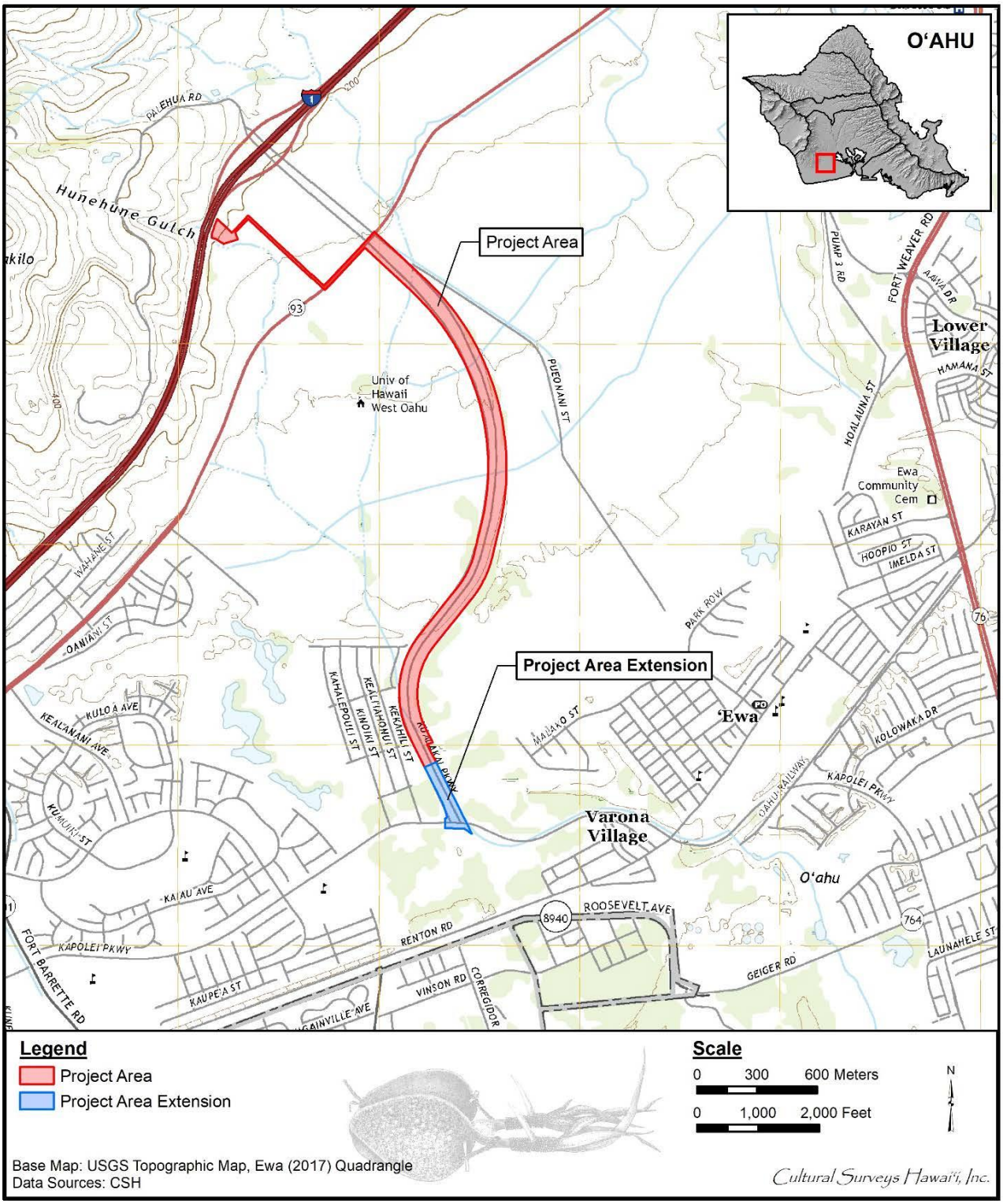
The area of potential effect (APE) for the project is considered to be approximately 77.8 acres (see **Figure 5-5, Area of Potential Effect**).

An archaeological literature review and field inspection (LRFI) was conducted in 2018 for approximately 71.7 acres of the project site by Cultural Surveys Hawaiʻi, Inc., and is provided as **Appendix A**. The LRFI investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that cultural resources and/or historic properties may be affected by the project and, based on findings, considers cultural resource management recommendations. The LRFI is intended to facilitate the project's planning and support the project's historic preservation and environmental review compliance. Fieldwork was conducted on August 15, 2017.

At the time, the LRFI was completed, the transmission main was planned to stop approximately 1,200 ft north of Kapolei Parkway. However, subsequent to the report it was determined that the 16-inch transmission main needed to extend to a location just south of the Kualakaʻi Parkway and Kapolei Parkway intersection for connection to an existing main. Thus, an Addendum to the LRFI was conducted by Cultural Surveys Hawaiʻi, Inc. in 2020 for the extended portion of the transmission main, and is provided as **Appendix A**. The addendum project area spanning the Kualakaʻi Parkway, is approximately 6.1 acres. Fieldwork was conducted on October 19, 2020.

In July 2008 D.R. Horton – Schuler Division published a FEIS for the Hoʻopili Project involving the project parcel TMK: 9-1-018:012 where the small pipeline bulb-out for the 16-inch transmission main along the reservoir access road would occur. For TMK: 9-1-018:012, and the larger Hoʻopili project area, an archaeological inventory survey report was conducted in February 2006 by Cultural Surveys Hawaiʻi Inc. Five historic properties (State Inventory of Historic Places (SIHP) Nos. 50-80-12-4344, 4345, 4346, 4347, and 4348) were documented during Cultural Surveys Hawaii's 2006 archaeological inventory survey of the larger Hoʻopili project area. All five sites are located near Old Fort Weaver Road and well outside of TMK: 9-1-018:012 and the remainder of the proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project area.

Figure 5-5. Area of Potential Effect



5.14.2 Findings

The results of the Cultural Surveys Hawaiʻi, Inc. 2006, 2018, and 2020 field inspections were consistent with what was expected based on background research and the previous archaeological studies conducted in the vicinity. One previously identified historic property, State Inventory of Historic Places (SIHP) # 50-80-12-4664 (plantation era irrigation infrastructure), was identified within the northeast portion of the proposed East Kapolei 215 R-1 3.0 MG reservoir site (see **Figure 5-6, Historic Properties near the Area of Potential Effect**).

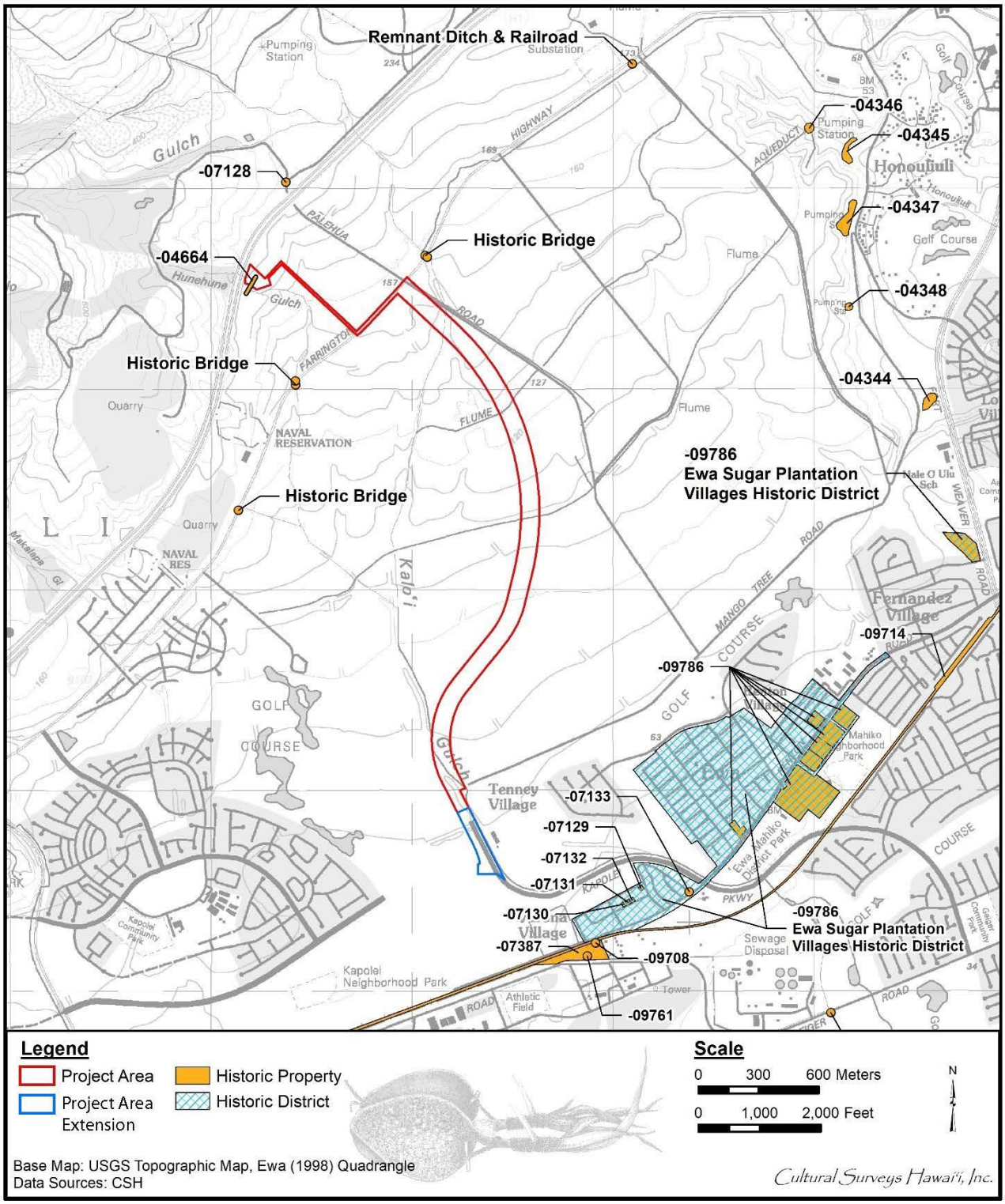
5.14.3 Potential Impacts and Proposed Mitigation

Within the proposed R-1 reservoir project area, portions of SIHP # 50-80-12-4664 (plantation era irrigation infrastructure [Runyon et al. 2011]) are present, including newly identified portions of the site.

Based on the field inspection and background research, the portion of SIHP #50-80-12-4664 within the project area was evaluated as lacking historical integrity for the following reasons:

- Integrity of location of remnants of plantation infrastructure within the project area is mixed. Some of the plantation infrastructure has remained place while other remnants have been displaced.
- Integrity of design has largely been lost. The design of the sugarcane plantation infrastructure is not apparent, as there are few segments of plantation infrastructure remaining.
- Integrity of setting has been lost. The remnants of sugarcane infrastructure have completely lost their setting within the former commercial sugar cane fields. The former vast sugarcane fields once associated with ʻEwa have since been displaced with modern residential and commercial buildings and structures associated with ʻEwa, Kapolei and Makakilo.
- Integrity of materials is mixed. Some remnants of the plantation infrastructure retain integrity of materials but other remnants have lost the integrity of materials through demolition and erosion.
- Integrity of workmanship has been compromised with loss of the integrity of the sugarcane infrastructure to demolition and erosion. The remnant of the historic property present does not illustrate the aesthetic principles of a historic period, or reveal individual, local, regional, or national applications of either technological practices or aesthetic principles.
- Integrity of feeling has been lost. The historic property does not evoke the aesthetic or historic sense of a past period of time.
- Integrity of association is lacking because of the general lack of integrity of setting, location, design, workmanship, materials, and feeling

Figure 5-6. Historic Properties near the Area of Potential Effect



Thus SIHP # 50-80-12-4664 is likely significant only under HAR §13-284-6 Criterion "d", for its information potential regarding sugar cane cultivation in the area; however, it lacks integrity and is not expected to be eligible for listing in the National Register of Historic Places (NRHP). With the present documentation, no further archaeological work for this remnant of sugar cane cultivation irrigation infrastructure within the project area is expected. A "no historic properties affected" determination was recommended in conjunction with the report of findings and recommendations in the LRFI (February 2018). In a letter dated April 6, 2018, the State Historic Preservation Division (SHPD) concurred with the determination of no historic properties affected (see **Appendix A**). While no subsurface historic properties are expected, project plans will include provisions stating that "In the event that historic resources, including structural remains, subsurface cultural deposits, or human skeletal remains, are identified during the construction project, cease all work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the SHPD at (808) 692-8015."

Section 6
Cultural Impact Assessment

A Cultural Impact Assessment was conducted by Cultural Surveys Hawaiʻi, Inc., for this project to comply with the State of Hawaiʻi's environmental review process under HRS §343, which requires consideration of the proposed project's potential effect on cultural beliefs, practices, and resources. Findings and recommendations of this study are summarized in this section. See **Appendix B** for further detail.

The ʻEwa plains, south of the Waiʻanae mountain range consists largely of limestone and alluvial deposits pockmarked with karsts formed by the dissolution of limestone by underground fresh water. Honouliuli is the largest ahupuaʻa (land division usually extending from the uplands to the sea) in the moku (district) of ʻEwa. One translation of the name for this district is given as "unequal" (Cultural Surveys Hawaiʻi, December 2017). Others translate the word as "strayed" and associate it with the legends of the gods Kāne and Kanaloa.

Historically, the area in and around the project area was traversed by Native Hawaiians through a series of mauka-makai (mountains-to-sea) and cross-ahupuaʻa trails. The current project area currently crosses over portions of these ancient trails. Despite documentary evidence of ancient Hawaiian activity in the area, previous archaeological studies have yielded no significant findings. Previous archaeological studies in the vicinity of the project area have identified historic properties associated with historic-era sugarcane operations. Despite relatively few findings in the vicinity of the project area, there is always the possibility that intact cultural deposits, including iwi kūpuna (ancestral human remains), may be encountered during ground disturbance. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. As provided above in **Section 5.14.3**, in the event that historic resources are inadvertently discovered the SHPD will be notified and construction in the area will cease until such time that work activities may be resumed as allowed by the SHPD.

Section 7
Relationship to Land Use Policies, Plans, and Controls

Federal, State of Hawai‘i, and CCH policies, plans, and land use controls are established to guide development in a manner that enhances the environment and quality of life. The establishment of policies, plans, and land use controls at all levels of government are further promulgated to help ensure that the long-term social, economic, environmental, and land use needs of the community and region can be met. The proposed project's relationship to land use policies, plans, and controls for the region and proposed activity are as follows.

7.1 Federal Government

7.1.1 Clean Air Act

Ambient air quality, which refers to the purity of the general outdoor atmosphere, is regulated under the Clean Air Act and the EPA National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50). The DOH also regulates air quality and established ambient air quality standards (HAR Title 11, Chapter 59-4) that are as strict as or, in some cases, stricter than the NAAQS. The State of Hawai`i has also established standards for fugitive dust emissions emanating from construction activities (HAR Title 11, Chapter 60.1-33). These standards prohibit any visible release of fugitive dust from construction sources without taking reasonable precautions. **Section 5.10** discusses the BWS's efforts to maintain air quality during construction and operations of the proposed project.

7.1.2 Section 404, Clean Water Act, and Section 10, Rivers and Harbors Act

The Federal Water Pollution Control Act was enacted in 1948, and later reorganized and expanded in 1972 with the passage of the CWA (33 U.S.C. Section 1251, et seq.) and its amendments. The purpose of the CWA is to protect surface water quality in the United States. The Act does not directly address groundwater or water quality issues (addressed by the Safe Drinking Water Act). The CWA establishes the basic structure for regulating discharges of pollutants into waters of the United States and provides for the regulation of quality standards for surface waters.

Section 402 of the CWA is applicable to this project. This section makes it unlawful to discharge any pollutant from a point source into navigable waters, unless a NPDES permit is obtained. Point sources are discrete conveyances such as pipes or manmade ditches. The CWA is administered in Hawai‘i through the CWB under HAR, Chapter 11-55, Water Pollution Control.

No jurisdictional "WOUS" are located in the project area, therefore a USACE Department of the Army Permit under CWA, Section 404, and RHA, Section 10, and DOH WQC under CWA, Section 401, will not be required.

7.1.3 Section 7, Endangered Species Act of 1973

The purpose of Section 7, ESA, is to protect and conserve ecosystems upon which endangered and threatened species are dependent, and to provide for the conservation of endangered and threatened species. The ESA is administered by the U. S. Department of the Interior through the USFWS, and the U. S. Department of Commerce through the National Oceanic and Atmospheric Administration (NOAA).

The proposed project is not expected to impact sensitive plants or animals, marine mammals, or migratory birds and is anticipated to be considered consistent with the policies of the ESA. Botanical and faunal resources occurring within the project extents were evaluated. Based on the highly urbanized and developed nature of the project site no adverse effects on threatened or endangered plants, or plant or animal habitats or specific communities is expected. See **Section 5.8** for a discussion of the flora and fauna identified in the project area.

During interagency consultation, pursuant to Section 7 of the ESA, the USFWS would be consulted. Any mitigation measures developed through the consultation process would be implemented during the construction of this project.

7.1.4 Section 106, National Historic Preservation Act

The NHPA requires that Federal agencies consider the effect of their actions on any district, site, building, structure, or object that is included or eligible for inclusion in the NRHP. Such resources are called "historic properties." Under Section 106, a Federal action (or undertaking) may involve Federally funded projects, activities, or programs, including those carried out with Federal financial assistance. Federal actions also include projects requiring a Federal permit, license, or approval, including those where Federal authority has been delegated to a State or local agency.

The Section 106 review refers to the Federal review process designed to ensure that historic properties are considered during Federal project planning and implementation. The goal of the process is to identify historic properties potentially affected by the proposed project, assess the impacts, and seek ways to minimize or mitigate adverse effects. The U. S. Department of Interior, National Park Service, and the Advisory Council on Historic Preservation (ACHP) administer the NHPA. At the State level, the State Historic Preservation Officer (SHPO) implements the NHPA. As necessary, during interagency consultation, pursuant to Section 106 of the NHPA, the SHPD, DLNR will be consulted.

An LRFI was conducted for the project site. The APE is delineated as the entire approximately 77.8-acre project site. Within the proposed East Kapolei 215 R-1 3.0 MG reservoir site, portions of SIHP # 50-80-12-4664 (plantation era irrigation infrastructure [Runyon et al. 2011]) were identified, as well as newly identified portions (CSH 2017). Based on the field inspection and background research for this report, the portion of SIHP #50-80-12-4664 within the present project area is evaluated as lacking integrity. Thus SIHP #50-80-12-4664 is suggested as likely significant only under HAR §13-284-6 Criterion "d", for its information potential regarding sugar cane cultivation in the area, and is not expected to be eligible for listing in the NRHP. A

"no historic properties affected" determination was recommended in conjunction with the report of findings and recommendations in the LRFI (February 2018). In a letter dated April 6, 2018, the SHPD concurred with the determination of no historic properties affected (see Appendix A).

While no subsurface historic properties are expected, project plans will include provisions stating that "In the event that historic resources, including structural remains, subsurface cultural deposits, 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 contact the SHPD.

A Cultural Impact Assessment was prepared to support the proposed project's historic preservation review under Section 106, NHPA; HRS Chapter 6E-42; and HAR Chapter 13-284. The Cultural Impact Assessment also supports project-related historic preservation consultation among stake-holding State agencies, interested NHOs, groups and individuals, and community groups.

During interagency consultation, pursuant to Section 106 of the NHPA, the SHPD and interested NHOs, groups and individuals, and community groups would be consulted. Any mitigation measures developed through the consultation process would be implemented during the construction of this project.

7.1.5 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act (16 USC §1801 et seq.), as amended by the Sustainable Fisheries Act, PL 104-297, calls for action to stop or reverse the loss of marine fish habitat. The waters out to 200 miles around the Hawaiian Islands are under the jurisdiction of the Western Pacific Regional Fishery Management Council (WPRFMC). The WPRFMC has approved a Fisheries Management Plans for the State of Hawaiʻi that designates all the ocean waters surrounding Oʻahu, from the shore to depths of over 100 ft, including the area that would be affected by the proposed project as Essential Fish Habitat (EFH).

The WPRFMC has also identified "Habitat Areas of Particular Concern." As defined in the 1996 amendments to the Act, these habitats are a subset of EFH that are *"rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area."*

No work is proposed in any streams or the ocean and no impacts to surface water bodies are expected. The proposed project would not impact EFH or areas of particular concern and is considered to be consistent with the policies of the Magnuson-Stevens Fishery Conservation and Management Act. See **Section 5.4.1** for further discussion of surface water bodies occurring in the project area.

7.1.6 Fish and Wildlife Coordination Act

The U.S. Fish and Wildlife Coordination Act (FWCA) of 1934, as amended (16 U.S.C. 661 et seq.), requires federal agencies to first consult with the USFWS whenever the waters or the

channel of a water body are to be modified. The Act further requires that the federal agency also consults with the head of the state agency that administers wildlife resources of the state where the construction is proposed. The goal of the Act is to conserve wildlife by preventing the loss and damage to resources. No impacts to surface water bodies are expected. The proposed project would not modify waters or channels and is considered to be consistent with the policies of the FWCA. See **Section 5.4.1** for further discussion of surface water bodies occurring in the project area.

7.1.7 Migratory Bird Treaty Act

The MBTA of 1918, as amended (16 U.S.C. 703-712) makes it unlawful to, among other things, pursue, hunt, take, capture, kill, transport, or import any species listed under the Act. The MBTA implements conventions between the U.S and Great Britain, Mexico, Japan, and the Soviet Union.

EO 13186 was issued to assist federal agencies with their efforts to comply with the MBTA. It should be noted that the EO does not constitute any legal authorization that in any way supersedes the requirements outlined in the MBTA. The EO directs federal agencies undertaking actions that have or are likely to have a measurable adverse impact on migratory bird populations to develop and implement a Memorandum of Agreement with the USFWS addressing the conservation of these populations.

The MBTA offers protection to several species of birds that occur on Oʻahu, including seabirds and shorebirds. No known nesting colonies of any of the Oʻahu resident seabird species occur on, or within close proximity of, the project area. Several species of seabirds might over-fly the area, but there are no resources present in the project area that would be utilized by seabirds. The proposed project would not impact migratory birds and is anticipated to be considered consistent with the policies of the MBTA. See **Section 5.8.2** for further discussion of avian species occurring in the project area.

7.1.8 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) (42 U.S.C. Section 300f, et seq.) was established in 1974 to protect the quality of drinking water in the United States. The SDWA covers all waters actually or potentially designed for drinking use, whether from aboveground (surface) or underground sources.

Under SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers that implement its standards. Under the SDWA, the CCH must demonstrate that the development and operation the project would not result in adverse effects to drinking water sources on the island of Oʻahu. In Hawaiʻi, oversight for the provisions of the SDWA are delegated from the EPA to the DOH Safe Drinking Water Branch. No impacts to groundwater resources are anticipated and EPA and DOH rules and guidelines for project development will be followed. **Section 5.4.2** discusses the CCH's efforts to maintain groundwater quality during construction and operations of the proposed project.

7.1.9 Wild and Scenic Rivers Act

There are no wild and scenic rivers in the State of Hawaiʻi according to the National Park Service. No impacts are expected and no mitigation is therefore proposed.

7.1.10 Environmental Justice

Environmental Justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. On 11 February 1994, President Clinton issued EO 12898 entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. EO 12898 requires federal agencies to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities may have on minority and low-income populations.

A Presidential memorandum that accompanied EO 12898 specified that federal agencies "shall analyze the environmental effects, including human health, economic and social effects, of federal actions, including effects on minority communities, when such analysis is required by the National Environmental Policy Act of 1969, 42 U.S. Code Section 4321 et seq." The memorandum further stated that federal agencies "shall provide opportunities for community input in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of meetings, crucial documents, and notices."

On April 20, 1997, EO 13045 entitled *Protection of Children from Environmental Health Risks and Safety Risks* was issued. EO 13045 requires that federal agencies make it a priority to identify and assess environmental health and safety risks that may disproportionately affect children. It also requires that agencies ensure that their policies, programs, activities, and standards address such risks.

The proposed project would have no impact related to EJ or environmental health risks and safety to children. The reservoir site would be located adjacent to an existing BWS 4.0 MG potable water reservoir and the underground transmission main would be within and along the existing Kapolei Parkway, Kūalakaʻi Parkway, and Farrington Highway ROWs. See **Section 5.12** for a discussion of the socio-economic environment and demographics of the project area. The proposed project would benefit the area's population, regardless of race, ethnicity, or socioeconomic status by providing for R-1 storage which affords for the preservation of drinking water supply when it is appropriate to use non-drinking water. The proposed project was not biased by race or income, but is the result of an objective evaluation that indicates the need for the project to address potable and non-potable water needs in the Kapolei area. All of the potential impacts resulting from the proposed project would be temporary and limited in severity (i.e., less than significant) and most would be limited to the immediate vicinity of the project. Therefore, the proposed project would have no environmental or safety risks to children or affect EJ populations, much less have any disproportionate effects on these special groups.

7.2 State of Hawai'i

7.2.1 Hawai'i State Plan

The Hawai'i State Plan, adopted in 1978, and promulgated in HRS, Chapter 226, consists of three major parts:

- Part I, describes the overall theme including Hawai'i's desired future and quality of life as expressed in goals, objectives, and policies.
- Part II, Planning Coordination and Implementation, describing a statewide planning system designed to coordinate and guide all major state and county activities and to implement the goals, objectives, policies, and priority guidelines of the Hawai'i State Plan.
- Part III, Priority Guidelines, which express the pursuit of desirable courses of action in major areas of statewide concern.

The proposed project is consistent with the objectives and policies of the Hawai'i State Plan. The directly relevant State Plan goals, objectives, policies and priority guidelines, along with a discussion of how the project conforms to them, are those related to population, use of the physical environment, and relating to water facility systems. They are provided in **Table 7-1** and discussed below.

Table 7-1. Hawai'i State Plan Applicability to the Proposed Project

Hawai'i State Plan Objectives, Policies, and Priority Guidelines	Applicability to the Proposed Project
Objectives and Policies	
§226-5 Objective and policies for population	**Applicable**
§226-6 Objectives and policies for the economy--in general	Not Applicable
§226-7 Objectives and policies for the economy-- agriculture	Not Applicable
§226-8 Objective and policies for the economy--visitor industry	Not Applicable
§226-9 Objective and policies for the economy--federal expenditures.	Not Applicable
§226-10 Objective and policies for the economy--potential growth activities	Not Applicable
§226-10.5 Objectives and policies for the economy--information industry	Not Applicable
§226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.	Not Applicable
§226-12 Objective and policies for the physical environment--scenic, natural beauty, and historic resources.	Not Applicable
§226-13 Objectives and policies for the physical environment--land, air, and water quality	**Applicable**
§226-14 Objective and policies for facility systems--in general	Not Applicable
§226-15 Objectives and policies for facility systems--solid and liquid wastes	Not Applicable
§226-16 Objective and policies for facility systems--water	**Applicable**
§226-17 Objectives and policies for facility systems--transportation	Not Applicable
§226-18 Objectives and policies for facility systems--energy	Not Applicable
§226-18.5 Objectives and policies for facility systems--telecommunications	Not Applicable
§226-19 Objectives and policies for socio-cultural advancement--housing	Not Applicable
§226-20 Objectives and policies for socio-cultural advancement--health	Not Applicable

Hawai'i State Plan Objectives, Policies, and Priority Guidelines	Applicability to the Proposed Project
§226-21 Objective and policies for socio-cultural advancement--education	Not Applicable
§226-22 Objective and policies for socio-cultural advancement--social services	Not Applicable
§226-23 Objective and policies for socio-cultural advancement--leisure	Not Applicable
§226-24 Objective and policies for socio-cultural advancement--individual rights and personal well-being	Not Applicable
§226-25 Objective and policies for socio-cultural advancement--culture	Not Applicable
§226-26 Objectives and policies for socio-cultural advancement--public safety	Not Applicable
§226-27 Objectives and policies for socio-cultural advancement--government	Not Applicable
Priority Guidelines	
§226-102 Overall Direction	Not Applicable
§226-103 Economic priority guidelines	Not Applicable
§226-104 Population growth and land resources priority guidelines	**Applicable**
§226-105 Crime and criminal justice	Not Applicable
§226-106 Affordable housing	Not Applicable
§226-107 Quality education	Not Applicable
§226-108 Sustainability	**Applicable**
§226-109 Climate change adaptation priority guidelines	**Applicable**

HRS§226-5 Objective and policies for population.

Objective: It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic, and social objectives contained in this chapter.

Policies: (b)(4) Encourage research activities and public awareness programs to foster an understanding of Hawai'i's limited capacity to accommodate population needs and to address concerns resulting from an increase in Hawai'i's population; and (b)(7) Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

Discussion: The inclusion of an East Kapolei 215 R-1 3.0 MG reservoir and transmission system provides a venue for a practical means of preserving Hawai'i's limited resources and technological adaptations to support a growing island population. The R-1 reservoir and transmission system also has the potential to provide additional water to O'ahu's planned growth in Kapolei. The project facilitates the necessary support services for the orderly growth of this region and will be phased, to coincide with the area's growth.

HRS §226-13 Objectives and policies for the physical environment – land, air, and water quality.

Objective: Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:

Policies: (b)(1) Foster educational activities that promote a better understanding of Hawai'i's limited environmental resources; (b)(2) Promote the proper management of Hawai'i's land and

water resources; and (b)(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaiʻi's people.

Discussion: As described previously, the East Kapolei 215 R-1 reservoir site provides a venue for technological adaptations to support a growing island population with limited resources. As discussed throughout this document, the proposed project facilitates and proper management of land and water resources.

HRS §226-16 Objective and policies for facility systems – water

Objective: Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.

Policies: (b)(2): Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs; and (b)(4): Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

Discussion: The project site is a Type A utility installation located in an area zoned AG-1 that has been designated for future BWS facility expansion. Whereas the existing reservoir provides a potable water storage function, the proposed R-1 water reservoir and transmission system will contribute an important addition to the available non-potable water supply for ʻEwa. Impacts from predicted climate change, including declining precipitation, increased temperature, decreases in stream base flow and potential impacts to aquifers; combined with rapid population growth in Kapolei, and advancements in groundwater technologies are all reasons to initiate non-potable storage operations on the project site. Once constructed, the site could provide non-potable water resources to facilitate future changes due to a modified climate.

HRS §226-104 Priority Guideline, Population growth and land resources

Discussion: The R-1 water reservoir is a public utility use, proposed in an appropriately designated land use district (SLUD: Urban). The proposed transmission system will be located along and within the exiting East Kapolei 215 reservoir site access road (with a small pipeline bulb-out into the D.R. Horton – Schuler Division Hoʻopili Gateway Development), and Farrington Highway, Kūalakaʻi Parkway, and Kapolei Parkway ROWs. Improvements are proposed to be phased to coincide with the community's population growth.

HRS §226-108 Priority Guideline, Sustainability

Discussion: The R-1 water reservoir and transmission system improvements directly support the State's priority guidelines pertaining to sustainability in that the R-1 system is fulfilling a critical community need without compromising environmental, social, or cultural priorities.

HRS §226-109 Priority Guideline, Climate change adaptation

Discussion: The R-1 water reservoir site and transmission system improvements support climate change adaptation priority guidelines, particularly guideline (10), "Encourage planning and management of the natural and built environments that effectively integrate climate change policy". Integration of climate change policy is needed when climatic trends which include rising air temperatures, decreasing prevailing northeasterly trade winds, and decreasing precipitation are affecting stream base flows which in turn, are predicted to adversely affect aquifer recharge and freshwater availability (University of Hawaiʻi Sea Grant, 2014). Scientists have observed that all of the Hawaiian Islands have seen longer periods of drought in recent years. While models predict a variety of effects from changing rainfall patterns, if drought events increase in duration or frequency, there is a likelihood of increased stress to aquifers, our water supply. Development of the non-potable R-1 water reservoir and transmission system water source responds to evidence of increased drought and water supply vulnerability.

7.2.2 State Land Use Law

The State Land Use Commission classifies all lands in the State of Hawaiʻi into one of four land use designations: Urban, Rural, Agricultural and Conservation. According to HRS, Chapter 205, State Land Use Law:

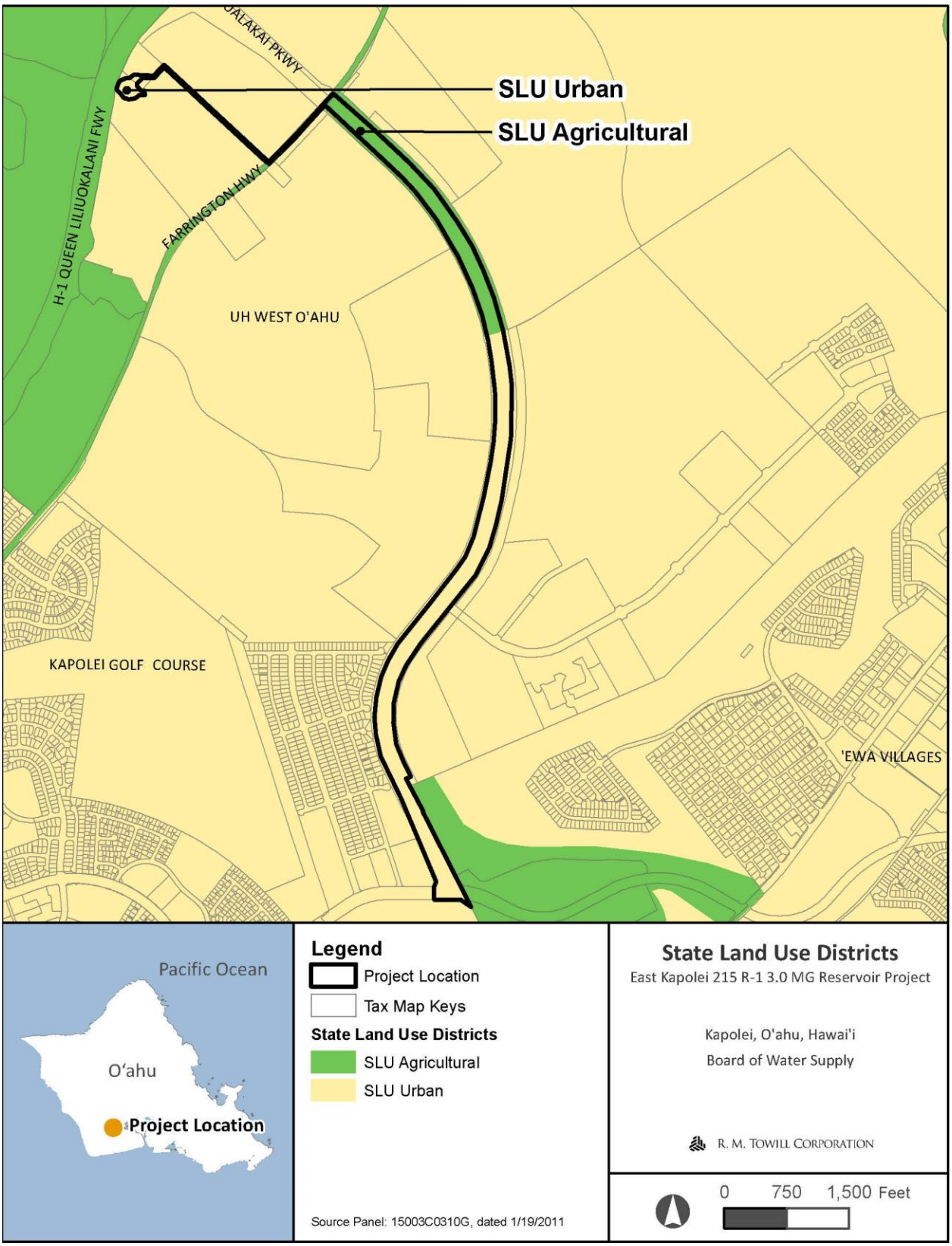
> *"Chapter 205, HRS, Districting and classification of lands:"*
>
> *"(a) There shall be four major land use districts in which all lands in the State shall be placed: urban, rural, agricultural and conservation. The land use commission shall group contiguous land areas suitable for inclusion in one of these four major districts. The commission shall set standards for determining the boundaries of each district provided that:"*
>
> *"(1) In the establishment of boundaries of urban districts those lands that are now in urban use and a sufficient reserve area for foreseeable urban growth shall be included;"*
>
> *"In establishing the boundaries of the districts in each county, the commission shall give consideration to the master plan or general plan of the county."*
>
> *(b) Urban districts shall include activities or uses as provided by ordinances or regulations of the county within which the urban district is situated.*

The proposed action involves the use of land within the Urban and Agricultural State Land Use Districts. The project involving the construction of an R-1 water reservoir site and appurtenant improvements are consistent with this designation. See **Figure 7-1, State Land Use Districts**.

7.2.3 State Environmental Policy, Chapter 344, Hawaiʻi Revised Statutes

The State Environmental Policy (HRS, Chapter 344), establishes a set of guidelines to conserve the State's natural resources and to enhance quality of life through all State programs, authorities and resources. The goals set forth for conservation focus on an effort to maintain and enhance the use of natural resources in order to create productive harmony between nature and the requirements of the people of Hawaiʻi.

Figure 7-1. State Land Use Districts



The State Environmental Policy also sets goals to enhance quality of life through diverse opportunities for social and economic growth in the community. These opportunities are pursued through sustainable practices and use of renewable resources to create stable improvements in community identity, resource efficiency, and harmony with the natural environment. The policies and guidelines of the State Environmental Policy which pertain to this project are discussed below.

HRS§344-3 Objectives and Policies for State Environmental Policy.

Objective: It shall be the policy of the State, through its programs, authorities, and resources to the following policies. Policy: (1) Conserve the natural resources, so that land, water, mineral, visual, air and other natural resources are protected by controlling pollution, by preserving or augmenting natural resources, and by safeguarding the State's unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of the people of Hawai'i.

HRS§344-4 Guidelines.

Objective: In pursuance of the state policy to conserve the natural resources and enhance the quality of life, all agencies, in the development of programs, shall, insofar as practicable, consider the following guidelines.

Policies:

- *(2) Land, water, mineral, visual, air, and other natural resources.*
  - *(a) Encourage management practices which conserve and fully utilize all natural resources.*
  - *(b) Promote irrigation and waste water management practices which conserve and fully utilize vital water resources.*
  - *(c) Promote the recycling of waste water.*
- *(3) Flora and fauna.*
  - *(b) Foster the planting of native as well as other trees, shrubs, and flowering plants compatible to the enhancement of our environment.*
- *(9) Education and culture.*
  - *(b) Encourage both formal and informal environmental education to all groups.*

Discussion: The proposed R-1 water reservoir and transmission system is supportive of the State's environmental guidelines and policies. The proposed improvements directly support a mission of conservation and resource protection. First, creation of the 3.0 MG R-1 water reservoir at this location will provide necessary operations and maintenance support to BWS facilities in the growing population and employment centers of Kapolei and 'Ewa. This elevated location will improve water service response times for the repair of main breaks and associated water loss.

Second, the project will provide the intended use of the site, a non-potable R-1 water reservoir. The proposed R-1 water reservoir will develop a non-potable water resource for irrigation and commercial uses which will contribute a resource to the available non-potable water supply for ʻEwa where the population is growing and non-potable water resources are predicted to grow scarcer due to effects of climate change.

7.2.4 Section 401 and 402, Clean Water Act

The CWA is the key legislation governing surface water quality protection in the United States. Sections 401 and 402 of the Act require permits for actions that involve wastewater discharges or discharge of dredged or fill material into WOUS. The EPA is responsible for administering the CWA. In Hawaiʻi, the EPA has delegated responsibility for implementing the Act to the State DOH CWB under HAR, Chapter 11-55, Water Pollution Control. States can use their Water Quality Standards (WQS) in the Section 401 WQC to review and approve, condition, or deny all Federal permits or licenses that may result in discharges to State waters, including wetlands. States and tribes make decisions to deny, certify, or condition permits or licenses primarily to ensure that the activity will comply with State WQS. In addition, States and tribes look at whether the activity will violate effluent limitations, new source performance standards, toxic pollutants, and other water resource requirements of State/tribal law or regulation. No jurisdictional "WOUS" are located in the project area, therefore DOH WQC under CWA, Section 401, would not be applicable to the project. Section 402 of the CWA is applicable to this project. This section makes it unlawful to discharge any pollutant from a point source into navigable waters, unless a NPDES permit is obtained.

Discussion: The proposed project involves the installation of a 16-inch transmission main across Hunehune Gulch. Hunehune Gulch is a normally dry ditch that conveys run-off between agricultural fields. In the project's extents, Hunehune Gulch is conveyed beneath Kūalakaʻi Parkway via a concrete lined culvert. The new 16-inch transmission main would be installed above the concrete lined culvert and no work would be required in Hunehune Gulch. Kaloʻi Gulch, an intermittent non-perennial stream, and Kaloʻi Drainage Channel parallel the east side of Kūalakaʻi Parkway and the transmission main extents. No work is proposed in Kaloʻi Gulch or Kaloʻi Drainage Channel.

No jurisdictional "WOUS" are located in the project area, therefore DOH WQC under CWA, Section 401, would not be applicable to the project. A NPDES permit pursuant to the CWA, Section 402, will be filed for discharges of storm water runoff associated with construction activities.

7.2.5 Coastal Zone Management Act

All land and water use activities in the state must comply with HRS, Chapter 205A, Hawaiʻi Coastal Zone Law. The State of Hawaiʻi designates the Coastal Zone Management Program (CZMP) to manage the intent, purpose and provisions of HRS, Chapter 205(A)-2, as amended, for the areas from the shoreline to the seaward limit of the State's jurisdiction, and any other area which a lead agency may designate for the purpose of administering the CZMP.

The program outlines management objectives centered around ten areas: 1) Recreational Resources; 2) Historic Resources; 3) Scenic and Open Space Resources; 4) Coastal Ecosystems; 5) Economic Uses; 6) Coastal Hazards; 7) Managing Development; 8) Public Participation in Coastal Management; 9) Beach Protection; and 10) Marine Resources. All lands within the State of Hawai‘i fall within the CZM area.

Discussion: One CZM implementation tool that the State and Counties use is the application of a Special Management Area (SMA) proximate to shoreline resources. The project site is outside the SMA, and therefore the proposed project is not subject to the SMA requirements. However, in acknowledgment that the entire state is within the Coastal Zone, consideration of the CZM Act is warranted. The R-1 water reservoir and transmission system improvements are generally supportive of all the CZM management objectives detailed in HRS, Chapter 205A, in that the development is proposed on land appropriately zoned for the uses proposed. The use of non-potable water resources for the City of Kapolei irrigation and commercial landscape maintenance with the overall purpose of conservation of potable drinking water contribute to a program supportive of water conservation and water quality protection which in turn, support coastal and nearshore resources.

7.3 City and County of Honolulu

7.3.1 General Plan

The O‘ahu General Plan is the policy document for the long-range development of the island of O‘ahu. Adopted in 1977 and most recently amended in 2021, the plan sets forth the long-range objectives and policies for the general welfare of the island over a 20-year time horizon. Combined with the regional development plans, the General Plan provides a direction and framework to guide the programs and activities of the CCH.

The relevant goals, objectives, policies and implementing actions, along with a discussion of how the project conforms, are discussed below.

Section II: Balanced Economy

Objective: G. To bring about orderly economic growth on O‘ahu.

Policies: (1) Concentrate economic activity and government services in the primary urban center and in the secondary urban center at Kapolei.

Discussion: The project site is located in an area zoned AG-1. The site has been used by the CCH for Type A Utility installation as evidenced by the existence of a BWS 4.0 MG potable water reservoir immediately adjacent to the proposed R-1 3.0 MG reservoir site, which is another Type A Utility installation. Type A utility installations are allowed in the AG-1 zoned district. The proposed project will position needed operations and maintenance support closer to the BWS facilities in the ‘Ewa and Wai‘anae Districts, as well as retain economic activity and government services within an area targeted by the General Plan for such uses.

Section III: Natural Environment and Resource Stewardship

Objective: B. To preserve and enhance natural landmarks and scenic views of O'ahu for the benefit of both residents and visitors as well as future generations.

Policies: (3) Locate and design public facilities, infrastructure and utilities to minimize the obstruction of scenic views.

Discussion: The proposed R-1 water reservoir and transmission system are appropriately proposed in an established public facility site. Urban uses surround the project site to the west. The University of Hawai'i West O`ahu campus and Hawai'i Tokai International college are to the south. East of the project site are 'Ewa community land uses, commercial and residential developments.

Sensitivity to the eventual residential development to the east has been planned into the site design. The East Kapolei 215 reservoir site is 185 ft above MSL. Due to the project site's existing public facility use and surrounding uses, the development of the proposed East Kapolei 215 R-1 3.0 MG reservoir and transmission system will not obstruct or significantly alter any view planes. The site is not situated in an area that would obstruct any panoramic views identified in the 'Ewa Development Plan.

Section V: Transportation and Utilities

Objective: B. Provide an adequate supply of water and environmentally sound systems of waste disposal for O'ahu's existing population and for future generations, and support a one water approach that uses and manages freshwater, wastewater, and stormwater resources in an integrated manner.

Policies: (4) Encourage the increased availability and use of recycled or brackish water to meet non-potable demands.

Discussion: The proposed project is critically necessary for BWS to provide its first elevated R-1 water storage site. The new R-1 reservoir and 16-inch transmission main system will serve to stabilize the problem of fluctuating water pressure levels in the water system and help to reliably meet peak water demand periods in the City of Kapolei and the surrounding region by providing continuous 24/7 R-1 water rather than direct pumping on a 11-hour schedule (10 pm – 9 am). The proposed project would provide elevated gravity flows to the BWS West R-1 pump system serving lands along Kūalaka'i Parkway, including the DHHL, University of Hawai'i West O'ahu Campus and west to the City of Kapolei, Kapolei Business Park, West Kapolei, Campbell Industrial Park, and Kalaeloa.

The proposed project will involve the construction of a new 3.0 MG R-1 reservoir and improvements to the BWS infrastructure for the use of R-1 (recycled) water in the 'Ewa District of O'ahu. The new R-1 reservoir would provide needed storage for R-1 non-potable water from the BWS's Honouliuli WRF, which was expanded in 2019, adding 2.0 MGD of R-1 treatment capacity for a total of 12 MGD of R-1 capacity. In addition, the WRF which was originally

designed to meet the 1993 DOH reuse guidelines, now meets the 2002 DOH reuse guidelines, which expanded the available uses of R-1 water. The additional 2002 UV disinfection requirements allowed for the use of unrestricted R-1 water for all agricultural crops, including vegetable crops. According to the Department of Health (2002), Guidelines for the Treatment and Use of Recycled Water, R-1 water can be used for irrigation and other purposes where non-potable water can be useful. The use of R-1 water can also help preserve the limited drinking water supply when it is appropriate to use non-drinking water.

VII. Physical Development and Urban Design

Objective: D. To develop a secondary urban center in 'Ewa with its nucleus in the Kapolei area.

Policies: (1) Support public projects that are needed to facilitate development of the secondary urban center at Kapolei.

Discussion: The proposed R-1 reservoir and 16-inch transmission main system will serve to stabilize the problem of fluctuating water pressure levels in the water system and help to reliably meet peak water demand periods in the City of Kapolei and surrounding region by providing continuous 24/7 R-1 water. The proposed East Kapolei R-1 Reservoir and Transmission Main project will provide necessary BWS facilities to support current and planned development within the Ewa Region, consistent with the General Plan.

7.3.2 'Ewa Development Plan

The 'Ewa DP, revised in 2013, and amended in 2020, is one of eight community-oriented plans intended to help guide public policy, investment and decision-making on a 25-year planning horizon, sets forth a vision and implementation plan for a Secondary Urban Center in 'Ewa, with Kapolei at its heart. The 'Ewa DP vision statement notes that the development of adequate infrastructure is essential to meet the needs of new and existing development. Future population and economic growth on O'ahu is to be directed to the 'Ewa planning region and the Primary Urban Center. As such, the 'Ewa DP serves as a policy guide for the actions and decisions that will support that growth. The 'Ewa DP designates the areas immediately surrounding the project site as Residential and Low Density Apartment, Medium Density Apartment/Commercial Mixed Use, and Industrial. In the surrounding area, the 'Ewa DP also designates the City of Kapolei (Medium and High Density Residential, and Commercial) and Parks and Golf Courses. The applicability of the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project to the 'Ewa DP policies and guidelines are discussed below.

Discussion: The proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project is in conformance with the DP's vision to meet the infrastructure needs of new and existing development of the Secondary Urban Center in 'Ewa.

7.3.3 City and County of Honolulu Kapolei Urban Design Plan

The Kapolei Urban Design Plan (UDP) exists to define the character of the City of Kapolei and to provide general guidance for its development in the context of the Kapolei region. The UDP was approved by the City Council in 2008 and is addressed in Section 3.6 of the 'Ewa DP. The

City of Kapolei and Surrounding Area Long Range Master Plan as shown in the UDP designates the project site for Public Facility use.

Discussion: The proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project site is in conformance with its Public Facility designation as shown in the UDP.

7.3.4 City and County of Honolulu Land Use Ordinance

The Land Use Ordinance (HRS §21-3) implements the goals and objectives of the O'ahu General Plan and the 'Ewa Development Plan. All lands within the CCH are zoned into specific districts. According to the DPP, the project site is zoned Restricted Agriculture (AG-1). See **Figure 7-2, CCH Zoning Districts**.

Section 21-3.50 of the CCH Land Use Ordinance states that the intent of the AG-1 district, "is to set aside areas to conserve and protect important agricultural lands for the performance of agricultural functions by permitting only those uses which perpetuate the retention of these lands in the production of food, feed, forage, fiber crops and horticultural plants."

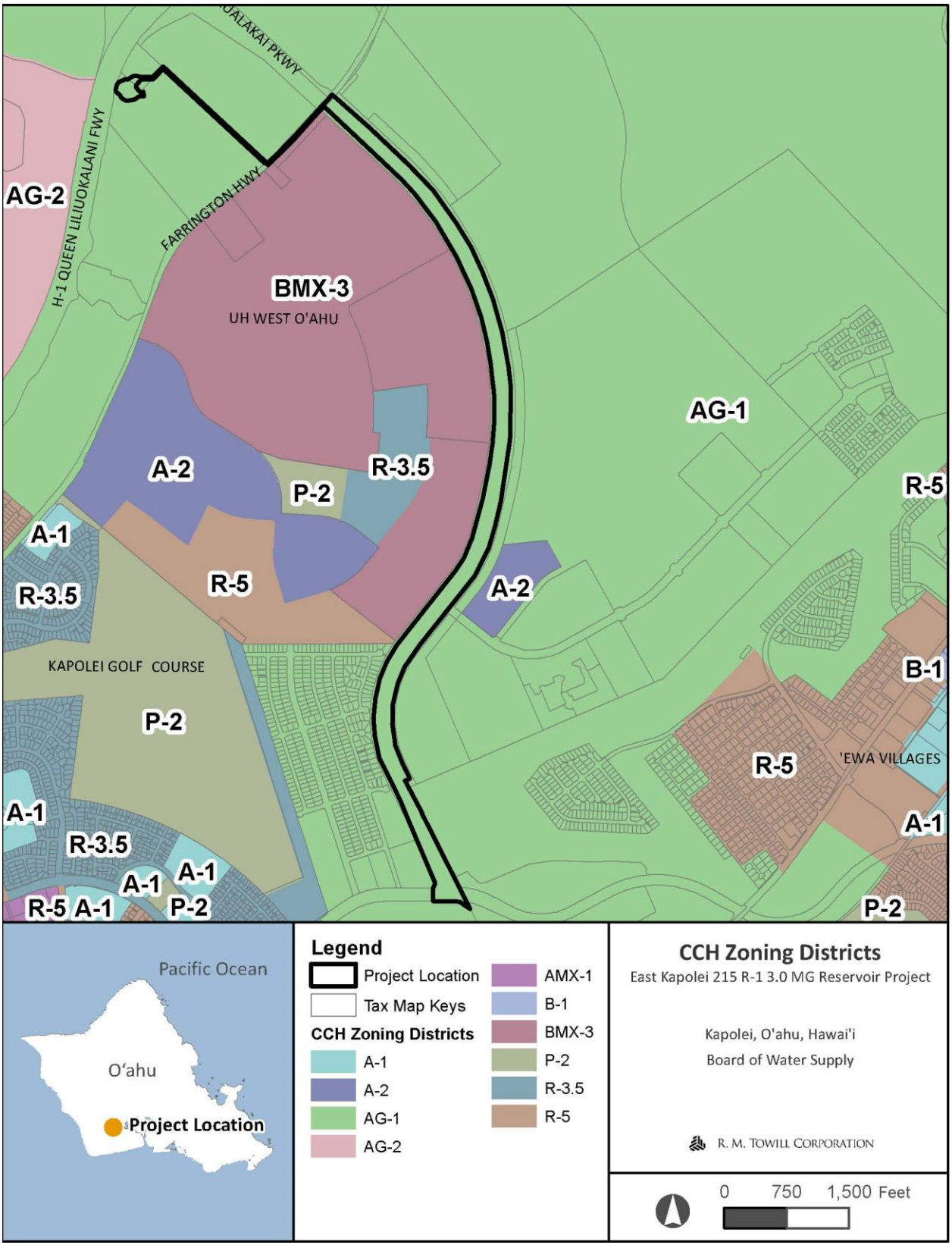
Discussion: This project is defined by the CCH Land Use Ordinance as a Type A Utility installation which would have, "… minor impact on adjacent land uses and typically include 46 Kilovolt (kV) transmission substations, vaults, water wells and tanks and distribution equipment, sewage pump stations, telecommunications antennas (except as provided or defined as Type B utility installations), and other similar uses (CCH DPP 2017)."

The proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project is consistent with the Land Use Ordinance as it is a Type A utility installation allowed in the AG-1 land use district.

7.3.5 Special Management Area

The project site is not within the Special Management Area (SMA) defined by the CCH.

Figure 7-2. CCH Zoning Districts



Section 8
Permits and Approvals That May Be Required

8.1 Federal

FAA Form 7460-1 Notice of Proposed Construction or Alteration (FAA)

Section 7, ESA, Consultation (USFWS)

Section 106, NHPA, Consultation (DLNR, SHPD)

8.2 State of Hawai'i

Final EA and FONSI HRS, Chapter 343 (BWS), this document.

Section 402, CWA, NPDES Construction Storm Water (DOH-Clean Water Branch)

Lease Agreement by the BLNR

Easement Agreement to be Resolved between BWS and BLNR

8.3 City and County of Honolulu

Grubbing, Grading and Stockpiling Permit (DPP)

Trenching Permit (DPP)

Street Usage Permit (DTS)

Traffic Control Plans (DPP)

Building Permit (DPP)

Section 9
Agencies, Organizations, and Individuals to be Consulted for the Environmental Assessment

The following agencies, organizations, and individuals will be contacted during the HRS, Chapter 343, environmental review process to disclose the environmental conditions of the site, the proposed undertaking, and the potential impacts and mitigation measures that will be applied to ensure against adverse impacts.

9.1 Federal Government

USFWS
U. S. Environmental Protection Agency, Region 9 - Pacific Islands Contact Office

9.2 State of Hawai'i

DLNR:
- Engineering Division
- Office of Conservation and Coastal Lands (OCCL)
- Division of State Parks
- DOFAW
- SHPD
- Land Division

Department of Education:
- Hawai'i State Library, Hawai'i Document Center
- Hawai'i State Library, Kapolei Library

DHHL
DOH:
- CAB
- CWB
- Environmental Health Administration
- Safe Drinking Water Branch
- Solid and Hazardous Waste Branch

DBEDT, Office of Planning, Coastal Zone Management
HDOT:
- Director, HDOT
- Statewide Transportation Planning Office, HDOT

Office of Planning and Sustainable Development
Office of Hawaiian Affairs

9.3 City and County of Honolulu

Department of Planning and Permitting
    Planning Division
    Traffic Review Branch
Department of Community Services
Department of Design and Construction
Department of Environmental Services
Department of Facility Maintenance
Department of Parks and Recreation
Department of Transportation Services
    Transportation Mobility Division
Fire Department
Honolulu Authority for Rapid Transportation
Police Department

9.4 Elected Officials, Organizations and Individuals

Office of the Mayor
Senator Mike Gabbard (District 20)
Representative Sharon E. Har (District 42)
Council Member Andria Tupola (District 1)
Makakilo/Kapolei/Honokai Hale Neighborhood Board
Spectrum
Hawaiian Telcom
Hawaiian Electric Company
Historic Hawaiʻi Foundation

9.5 Pre-Assessment Consultation for the Environmental Assessment

Pre-assessment consultation letters, dated November 12, 2022 were sent to public and private agencies, organizations, and individuals to notify and initiate consultation for the preparation of the Chapter 343, HRS, EA for the project. The purpose of the pre-assessment consultations was to accomplish the following:

- Solicit input to help identify environmental and permitting issues to be considered and addressed in the upcoming EA; and
- Inform agencies, organizations, and individuals regarding planned activities in the area and the upcoming EA process.

A list of the comments received during the pre-assessment consultation and sections referenced within the Draft EA to address the comments is provided in **Table 9-1**. All written comments received during the pre-assessment consultation were responded to and addressed in the content

of the Draft EA. The full record of the pre-assessment consultation comments received is provided in **Appendix E**.

Table 9-1. Comments Received During the Pre-Assessment Consultation for the EA

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
1	City and County of Honolulu, Department of Community Services Anton C. Krucky, Director	November 25, 2022	Our review indicates that the proposed project is located approximately one mile from several properties in Ewa Villages that the Department of Community Services leases out for the provision of special needs housing. We ask that this project take into consideration the health, safety, accessibility, and long-term wellbeing of people living nearby and/or involved with activities in the surrounding neighborhood.	The BWS acknowledges this comment and will ensure the proposed project takes into consideration the health, safety, accessibility, and long-term well-being of people living nearby and/or involved with activities in the surrounding neighborhood.	Section 5.1
2	City and County of Honolulu, Department of Facility Maintenance Dawn B. Szewczyk, P.E., Director and Chief Engineer	November 30, 2022	We have no comments at this time, as we do not have any facilities or easements on the subject properties. However, please note that Kualaka'i Parkway is under the jurisdiction of the State Department of Transportation and Farrington Highway to the west of Kualaka'i Parkway is under the jurisdiction of the City and County of Honolulu.	The BWS acknowledges this comment and appreciates the clarification for the ownership of the project segments within Kualaka'i Parkway and Farrington Highway.	Sections 1 and 3.4
3	City and County of Honolulu, Department of Environmental Services Roger Babcock, Jr., Ph.D., P.E., Director	December 2, 2022	1. We understand there are more than one R-1 distribution systems starting at the Board of Water Supply's Honouliuli Water Recycling Facility, each with its own pump system. Which system or systems will this new Reservoir be connected to? 2. We are particularly interested in the systems which provide R-1 water to our facilities at the Honouliuli Wastewater Treatment Plant (WWTP), and to the City golf courses, and how the proposed improvements will change the R-1 pump systems, the controls for the pumps, and any other benefits or impacts. Can the system for delivering R-1 to the WWTP be modified so that R-1 in excess of the WWTP's needs may no longer be released to the WWTP	The BWS acknowledges these comments. A discussion of the project in relation to BWS's R-1 systems, Honouliuli Water Recycling Facility, projected demands, proposed infrastructure, and an estimated construction schedule is provided in the Draft EA, Section 3.	Section 3

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
			effluent outfall? There should be a plan for discontinuing the discharge of R-1 to the outfall in consideration of the secondary treatment upgrades being made at the WWTP, and the need to efficiently maximize the beneficial use of the R-1 water. 3. Please include information on the proposed schedule for the improvements, including the schedule for any changes to the systems that provides R-1 water to the WWTP or to the City golf courses.		
4	City and County of Honolulu, Department of Design and Construction Haku Miles, P.E. Acting Director	December 5, 2022	The Department of Design and Construction has no comments to offer at this time.	The BWS confirms the Department of Design and Construction has no pre-consultation comments to offer.	N/A
5	City and County of Honolulu, Fire Department Craig Uchimura, Acting Assistant Chief	December 5, 2022	6. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2018 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1, as amended.) A fire department access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2018 Edition, Section 18.2.3.2.1.) 7. Fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3. 8. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to	1. The BWS acknowledges this comment and intends to comply with fire safety design requirements for building and facility construction, including the provision of fire department access roads. 2. Fire department access roads will be in accordance with NFPA 1; 2018 Edition, Section 18.2.3. 3. This comment is acknowledged. The provision of an appropriate water supply including fire hydrants and mains shall be provided to all facilities and buildings associated with the proposed project, as required by the NFPA 1; 2018 Edition, Sections 18.3 and 18.4. 4. Civil drawings will be submitted to the City and County of Honolulu's Department of Planning and Permitting for routing to the HFD for review and approval.	Section 5.13.5

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
			all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Sections 18.3 and 18.4. 9. Submit civil drawings to the City and County of Honolulu's Department of Planning and Permitting and route them to the HFD for review and approval. 10. The abovementioned provisions are required by the HFD. This project may necessitate that additional requirements be met as determined by other agencies.	5. BWS acknowledges that this project may necessitate additional requirements as determined by other agencies and will comply with those requirements.	
6	State of Hawaiʻi, Department of Education Roy Ikeda, Interim Public Works Manager, Planning Section	December 6, 2022	Based on the information provided, the proposed Project will not impact Hawaiʻi State Department of Education facilities.	The BWS acknowledges this comment and that the proposed project will not impact Hawaiʻi State Department of Education facilities	Section 5.13.7
7	Hawaiian Telcom Justin Medeiros Network OSP Engineer	E-mail dated: December 7, 2022	Please note that Hawaiian Telcom has underground and aerial infrastructure and cables along the entirety of the work area. A one-call will need to be made before digging commences in order to locate the utilities. I do not have any additional comments at this time.	The BWS acknowledges this comment and will ensure a one-call is initiated by the contractor prior to the commencement of digging to locate the utilities.	Section 5.13.2
8	City and County of Honolulu, Police Department Glenn Hayashi, Assistant Chief of Police, Support Services Bureau	December 12, 2022	Based on the information provided, the Honolulu Police Department does not have any comments or concerns at this time.	The BWS acknowledges that the City and County of Honolulu, Police Department has no pre-consultation comments to offer.	N/A
9	State of Hawaiʻi, Department of Hawaiian Home Lands William J. Ailā Jr., Chairman, Hawaiian Homes Commission	December 14, 2022	After reviewing the project description for the planned construction and improvements, we note that these upgrades will help to provide service to DHHL's homestead communities and commercial properties in the Kapolei Region. However, we request that our ʻEwa Moku homestead lessees and commercial	The BWS acknowledges this comment and will ensure the DHHL ʻEwa Moku homestead lessees and commercial lessees in the vicinity of the project are given adequate notification about the project and any related impacts. The BWS will continue to appraise DHHL about future BWS projects.	Sections 2.2, 5.1, 5.9, 5.10, 5.13.1, and 5.13.2

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
			lessees be given adequate notification about the project, anticipated construction-related traffic, noise and air quality disturbances, and impact to their daily needs such as water service. The DHHL currently has about 8,154 acres of land on Oʻahu and anticipates adding to our land inventory. The Department's Oʻahu Island Plan notes that unconstrained lands will be used to fulfill our top priority for homestead development for native Hawaiian beneficiaries. We ask that the Board of Water Supply continue to engage the Department about projects that could affect DHHL's near- and long-term developments.		
10	State of Hawaiʻi, Department of Transportation Edwin H. Sniffen, Director of Transportation	December 14, 2022	HDOT has the following comments: <u>Airports Division (HDOT-A)</u> 1. The proposed transmission line and reservoir are approximately 1.2 miles and 3.0 miles, respectively, from the property boundary of Kalaeloa Airport (JRF). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAMFAA-DOT-Airports_08-01-2016.pdf. 2. Federal Aviation Administration (FAA) regulation requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary	<u>Airports Division (HDOT-A)</u> 1. The BWS acknowledges this comment and will review the Technical Assistance Memorandum (TAM) for guidance. 2. The BWS acknowledges this comment and will submit Federal Aviation Administration Form 7460-1 Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9. 3. The BWS acknowledges this comment and will incorporate measures to minimize hazardous attractants in compliance with the FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On Or Near Airports. <u>Highways Division (HDOT-HWY)</u> 1. The BWS acknowledges this comment. An evaluation of the potential for impacts on public transportation facilities, including State highway	Section 5.13.1

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
			construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp. 3. Standing water has the potential to become a wildlife attractant, which can become a hazard to aircraft operations. The HDOT-A recommends the project incorporate measures to minimize hazardous attractants in compliance with the FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On Or Near Airports. If the project results in a wildlife attractant, these hazards shall be immediately mitigated by the developer upon notification by the HDOT-A and/or FAA. <u>Highways Division (HDOT-HWY)</u> In the absence of a site plan at this time, the primary access point appears to be on Farrington Highway (west of the intersecting Kualakai Parkway, State Route 8930), via a private access road. 1. A full evaluation in the Draft EA should be provided on whether the expanded facility (new and existing), drainage concerns or daily operations will have any local impacts to the State highway facilities. 2. The HDOT-HWY, Right-of-Way Branch should be consulted on any permits required for work along the State right-of-way. 3. The Applicant should coordinate with HDOT-HWY on the project construction schedule to minimize possible conflicts with our scheduled highway and maintenance projects in the area.	facilities is provided in the Draft EA Section 5.13.1. 2. The BWS acknowledges this comment and will consult the HDOT-Highways Division for any permit that may be required for the proposed project. 3. The BWS acknowledges this comment and will coordinate with the HDOT-Highways Division to minimize possible conflicts with scheduled highway and maintenance projects in the vicinity.	

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
11	City and County of Honolulu, Department of Planning and Permitting Dawn Takeuchi Apuna, Director Designate	December 16, 2022	We have reviewed the document and have the following comments for the preparation of the Draft EA 1. The Draft EA should discuss the proposed Project's consistency with: A. The Oahu General Plan (2021). B. The Ewa Development Plan (July 2013, amended 2020). C. The development standards for each of the applicable zoning districts of the four tax map parcels as follows: 1) 9-4-059: 001: R-5 Residential 2) 9-1-018: 007: AG-1 Limited Agricultural 3) 9-1-018: 008: AG-1 Limited Agricultural 4) 9-1-017: 096: AG-1 Limited Agricultural 2. The Draft EA should describe and analyze potential impacts from activities proposed to occur within the entirety of the Project footprint, inclusive of transmission lines, access points, and construction base yards. 3. The Draft EA should also identify all permits required for Project activities. 4. All four of the affected parcels are located within Flood Zone D. The Draft EA should explain how the Project will identify the applicable flood data, and any design or mitigation measures to ensure public safety, environmental protection, and protection of sensitive resources such as wetlands and streams that may be present in the Project vicinity.	1. The BWS acknowledges these comments. A. A description of the proposed project's compliance with the Oʻahu General Plan (2021) is included in the Draft EA, Section 7.3.1. B. A description of the proposed project's compliance with the 'Ewa Development Plan (2020) is included in the Draft EA, Section 7.3.2. C. A description of the proposed project's compliance with the applicable zoning districts is included in the Draft EA, Section 7.3.4. 1) Tax Map Parcel 9-4-059: 001 was a typo in the subject line of the request for comment letter and will be stricken. 2) 9-1-018: 007: AG-1. BWS notes this as Restricted Agricultural. 3) 9-1-018: 008: AG-1. BWS notes this as Restricted Agricultural. 4) 9-1-017: 096: AG-1. BWS notes this as Restricted Agricultural. 5) An additional TMK was added since the pre-assessment, 9-1-018: 012: AG-1. BWS notes this as Restricted Agricultural. 2. The BWS acknowledges this comment and will ensure the Draft EA	Sections 5.4, 5.6, 5.7, 7.3.1, 7.3.2, 7.3.4, and 8

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
				analyzes potential impacts of the proposed project. 3. A list of the permits required for the proposed project is included in the Draft EA, Section 8. 4. A description of the proposed project's compliance with the applicable flood zones (D, X, and AE) is included in the Draft EA, Section 5.7. No wetlands occur in the project area as provided in the Draft EA, Section 5.6. A discussion of streams present in the project vicinity is provided in the Draft EA, Section 5.4.	
12	United States Department of the Interior, Fish and Wildlife Services, Pacific Islands Fish and Wildlife Office Jiny Kim, Acting Island Team Manager, Oʻahu, Kauaʻi, Northwestern Hawaiian Islands, and American Samoa	December 16, 2022	Our data indicate the following federally listed species may occur or transit through the vicinity of the proposed project area: the endangered ʻōpeʻapeʻa (Hawaiian hoary bat, *Lasiurus cinereus semotus*); endangered ʻuaʻu (Hawaiian petrel, *Pterodroma sandwichensis*), endangered Hawaiʻi distinct population segment (DPS) of ʻakēʻakē (band-rumped storm-petrel, *Hydrobates castro*), and threatened ʻaʻo (Newell's shearwater, *Puffinus auricularis newelli*) (hereafter collectively referred to as Hawaiian seabirds); and the endangered plant *Abutilon menziesii* (koʻoloaʻula, red ilima). To avoid and minimize impacts to the endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project design: • Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15). • Do not use barbed wire for fencing. To avoid and minimize potential project impacts to seabirds we recommend you incorporate the	The BWS acknowledges this comment and will ensure all prudent and precautionary measures are observed for listed species that may occur or transit through the vicinity of the proposed project area: the endangered ʻōpeʻapeʻa (Hawaiian hoary bat, *Lasiurus cinereus semotus*); endangered ʻuaʻu (Hawaiian petrel, *Pterodroma sandwichensis*), endangered Hawaiʻi distinct population segment (DPS) of ʻakēʻakē (band-rumped storm-petrel, *Hydrobates castro*), and threatened ʻaʻo (Newell's shearwater, *Puffinus auricularis newelli*) (hereafter collectively referred to as Hawaiian seabirds); and the endangered plant *Abutilon menziesii* (koʻoloaʻula, red ilima). This is identified in the Draft EA, Section 5.8.	Section 5.8

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
			following applicable measures into your project design: • Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary. • Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area. • Avoid nighttime construction during the seabird fledging period, September 15 through December 15. *Abutilon menziesii* likely occurred within lowland dry grassland, shrubland, and forest. However, it currently persists within highly degraded communities dominated by alien plants. On Oʻahu *A. menziesii* occurs on substrate composed of limestone characterized by sinkholes and coralline rubble with thin soils and pockets of humus. The proposed activities of the East Kapolei MG Reservoir and 16-Inch Transmission Main Project were occupied by a population of *Abutilon menziesii*. The State of Hawaiʻi Habitat Conservation Plan (HCP) for *A. menziesii* at Kapolei of March 2004, and the U.S. Fish and Wildlife Service (Service) Biological Opinion issued by our office on August 5, 2004 (1-2-2004-F-123), outlines conservation measures for *A. menziesii.* The development of the property has been considered in the Service's Biological Opinion. However, the BWS will have to obtain the Certificate of Inclusion from the Hawaiʻi Department of Transportation. The BWS (and any subsequent landowners who agree to accept transfer of the Certificate of Inclusion) must agree to and implement the terms of the HCP.		

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
13	State of Hawaiʻi, Department of land and Natrual Resources, Land Division Russell Y. Tsuji, Land Administrator	December 16, 2022	Enclosed are responses/comments received from our (a) Engineering Division and (b) Land Division, Oahu District. <u>Engineering Division</u> The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). Be advised that 44CFR, Chapter 1, Subchapter B, Part 60 reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards. The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood zones subject to NFIP requirements are identified on FEMA's Flood Insurance Rate Maps (FIRM). The official FIRMs can be accessed through FEMA's Map Service Center (msc.fema.gov). Our Flood Hazard Assessment Tool (FHAT) http://gis.hawaiinfip.org/FHAT) could also be used to research flood hazard information. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below: Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098. <u>Land Division, Oʻahu District</u> Land Division is discussing with BWS the final configuration of the easement needed for this project.	<u>Engineering Division</u> The BWS acknowledges these comments and thanks the Engineering Division for these references. A description of the proposed project's compliance with the applicable flood zones (D, X, and AE) is included in the Draft EA, Section 5.7. <u>Land Division, Oʻahu District</u> The BWS acknowledges this comment and will coordinate the proposed project easement and other requirements with the Land Division, Oʻahu District for any requirements for the connection of the new BWS R-1 3.0 MG non-potable water reservoir site to easement 9668 within the easement access road.	Sections 2.1, 3.3.1, 3.4, and 5.7

No.	Commentor	Date of Letter	Comments	Response	Draft EA Reference Sections
14	City and County of Honolulu, Department of Transportation Services J. Roger Morton, Director	December 16, 2022	1. Draft Environmental Assessment (DEA). The applicant shall submit the completed DEA to the Department of Transportation Services (DTS) for review. 2. Rail Stations. Applicant shall coordinate the construction activities/installed underground utilities with the Honolulu Authority for Rapid Transportation (HART) in the vicinity of the University of Hawaii West Oahu Rail Transit Station, on both sides of Kualakai Parkway. 3. Street Usage Permit. A street usage permit from the DTS shall be obtained for any construction-related work that may require the temporary closure of any traffic lane, sidewalk, bicycle lane, or pedestrian mall on a City street. Impact mitigation to transit operations shall be included in the permit application/plan. 4. Bus Stops. The project site is in the immediate vicinity of bus stops. Please coordinate roadway improvements with DTS – Transportation Mobility Division (TMD). Contact DTS-TMD at TheBusStop@honolulu.gov 5. AM/PM Peak Periods. The applicant shall minimize disruption to the AM and PM peak hour traffic on Farrington Highway. 6. Pedestrian and Bicycle Access. The project site is in the immediate vicinity of sidewalks and bikeways. The applicant shall minimize disruption to these pedestrian and bicycle facilities.	1. The BWS acknowledges this comment and will submit the completed DEA to DTS for review. 2. The BWS acknowledges existing Honolulu Authority for Rapid Transportation (HART) underground utilities are present in the vicinity of the University of Hawaiʻi West Oʻahu Rail Transit Station, on both sides of Kualakai Parkway, and will coordinate with HART to ensure no impact to existing utilities. 3. The BWS will obtain a street usage permit from the DTS for any construction-related work that may require the temporary closure of any traffic lane, sidewalk, bicycle lane, or pedestrian mall on a City street. 4. The BWS acknowledges this comment and will coordinate the project with the DTS – Transportation Mobility Division (TMD). 5. The BWS acknowledges this comment and will minimize disruption to the AM and PM peak-hour traffic on Farrington Highway. 6. The BWS acknowledges this comment and will minimize disruption to pedestrian and bicycle facilities in the vicinity of the project.	Sections 1, 2.4, and 5.13.1

9.6 Draft Environmental Assessment Comments and Responses

An opportunity for public comments will also follow the publication of this Draft EA with the Office of Planning and Sustainable Development, Environmental Review Program. All relevant written public comments received during the 30-day public comment period will receive a written response for inclusion and use in the preparation of the project's forthcoming Final EA.

This section is reserved for written comments and responses for the Draft EA.

Section 10
Summary of Effects

In accordance with the content requirements of HRS, Chapter 343, and the significance criteria in HAR, Section 11-200.1-13, an applicant or agency must determine whether an action may have significant impacts on the environment, including all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects, and its short- and long-term effects.

HAR, Section 11-200.1-24 requires discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Short-term and long-term do not necessarily refer to fixed time periods but are viewed relative to environmentally significant consequences of the proposed action. **Sections 10.1** and **10.2** below discuss the extent to which the proposed action involves trade-offs among short-term and long-term gains and losses, as well as the extent to which the proposed action forecloses future options and/or narrows the range of beneficial uses of the environment.

In making the determination of whether an action may have significant impacts on the environment, HAR §11-200.1-13 established "Significance Criteria" to be applied as a basis for identifying whether significant environmental impacts will occur. According to the HAR §11-200.1 an action shall be determined to have a significant impact on the environment if it meets any one of the criteria. The relationships of the proposed action to the criteria are discussed below in **Section 10.3**. See **Table 10-1** at the end of this section for a summary of impacts and proposed mitigation.

10.1 Short Term Effects

Short-term effects associated with the proposed project will be principally during the construction phase. Noise will be temporarily generated from construction activities and the related mobilization of equipment. Construction equipment is expected to include, but not be limited to, backhoe(s), loader(s), or excavator(s), work trucks, and powered hand tools. All internal combustion powered equipment will be muffled in accordance with standard engine operating practices. Upon the completion of work, noise levels will return to pre-existing ambient levels.

Fugitive dust may be generated during construction. The contractor will be required to control fugitive dust through the regular wetting of soils and ground areas susceptible to the generation of dust during work activities. Only enough water will be used to wet the surface of ground areas and prevent the generation of runoff.

Protection of water quality will be through the use of mitigative measures including silt fencing/curtains, berms, and other applicable erosion controls to prevent construction storm water related soils and silt from leaving active areas of work. Specifications for the use of these measures will be through the construction plan approval process and NPDES permit application that will be filed by the design consultant during the design phase.

Upon completion of work all construction equipment, machinery, and personnel will be demobilized from the job site with no further disturbance to the area. All debris and waste materials will be disposed of at an approved refuse facility. Active work areas will be replanted with vegetation, similar to that found at the existing site.

10.2 Long Term, Secondary, and Cumulative Effects

Potential long-term direct, secondary, and cumulative impacts have been evaluated and are documented for the following resources or issues: land use; land ownership; public health and safety; roadways and traffic; utilities; public facilities and services; topography, geology, and soils; hydrology; natural hazards; climate and air quality; noise; visual resources; marine environment; terrestrial flora and fauna; cultural resources; and socioeconomics. Of these resources and issues evaluated, the following long-term direct, secondary, and cumulative impacts are potentially significant.

Surface Water, Drainage, and Water Quality. The proposed project will provide critically needed R-1 water storage for the City of Kapolei's irrigation and light industrial operation's needs, which would in turn, help to sustain Oʻahu's potable water supply. The increase in impermeable surface area is expected to be negligible based on the existing hard surfaces of the surrounding area. Accordingly, an adverse increase in surface runoff is not expected to result in significant adverse impacts. Upon completion of work, all equipment used on-site will be demobilized and all debris and waste materials disposed of at an approved State or County refuse facility.

The proposed project would result in positive long-term and secondary impacts by providing environmental benefits in the form of reduced discharges of storm water associated sediments in runoff, and improved public health and safety, and visual aesthetics by the anticipated facilitation of irrigation water for new and existing landscaping in and throughout the public spaces in Kapolei town.

Visual Resources. The East Kapolei 215 R-1 3.0 MG reservoir project site is not currently situated in an area that would obstruct any panoramic views identified in the ʻEwa DP. The proposed reservoir would not be visible from the H-1 Freeway and would not block makai views of the shoreline. While the proposed reservoir would be visible from the portion of Farrington Highway fronting the proposed reservoir site and portions of Kūalakaʻi Parkway it would not obstruct mauka views of the Waiʻanae Range and would be similar in construction to the existing 4.0 MG potable water reservoir. Screening trees would be planted on the makai side of the reservoir site to mitigate visual impacts from Farrington Highway and Kūalakaʻi Parkway. The proposed 16-inch transmission main would be installed below grade and would not degrade scenic values.

In the future, the ʻEwa DP will bring development up to the proposed reservoir site by rezoning current agricultural land makai of the reservoir site to urban. No significant long-term or secondary impacts to panoramic views from this future development are expected. The project, however, would result in positive long-term and secondary impacts by minimizing negative

environmental impacts associated with planned growth and development by promoting the use of R-1 water and ensuring that limited potable water resources are available, which is consistent with the ʻEwa DP's principles of sustainability.

Socio-Economics. There would be positive long-term and secondary impacts in the areas of social benefit for residents and visitors from the development of the R-1 non-potable water storage improvements in and for the City of Kapolei's irrigation water supply. With or without the proposed action, landscaped gardens, parks, golf courses, and urban streetscapes would increase with the anticipated future growth of the State. Long-term gains resulting from the development of the proposed project include the more efficient operational use of BWS non-potable water reservoir and transmission lines that will support continued operations and ongoing commerce, trade, and tourism-related activities.

The proposed project will maintain and enhance economic productivity by supporting the effective use of State and CCH lands to accommodate future growth in the ʻEwa district. The project will further benefit the State of Hawaiʻi, and residents and visitors to Oʻahu, by helping to maintain private and public green spaces to support continued healthy and vibrant environments within the Kapolei community as an integral part of the island of Oʻahu as a desirable place to live and visit.

The potential for significant adverse cumulative impacts are not anticipated:

The proposed project is consistent with the long-range goals, policies, and objectives articulated in policy documents for the preservation of the State's natural resources so that land, water, mineral, and other natural resources are protected by controlling or augmenting natural resources.

The project itself would not lead to plans for future uncontemplated construction but will support existing and planned projects by providing recycled, non-potable irrigation water for private and public development, parks, golf courses, and City of Kapolei facilities.

The proposed project is designed to provide facility improvements to the existing BWS East Kapolei 215 water reservoir site to ultimately supply R-1 non-potable water for maintenance and enhancement of public and private facilities in the ʻEwa district.

The proposed project would result in positive long-term impacts by providing increased operational efficiencies for the BWS R-1 non-potable water supply and storage system in West Oʻahu.

The project is located in an area that is adequately served by public services and facilities, including police and fire protection. The proposed project would not significantly affect the existing level of service of either police or fire protection. The potential (less than significant) construction related impacts associated with the future use of the site would not alter the ability of fire or police protection from providing an adequate level of service in the project environs and would not place an undue burden on the public facilities that would support the project.

10.3 Significance Criteria

In accordance with the provisions set forth in HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, this Draft EA has preliminarily determined that the project will have no significant adverse impact to air and water quality, existing utilities, noise, archaeological or cultural sites, or wildlife habitat. All anticipated impacts will be temporary and will not adversely impact the environmental quality of the area.

According to the Significance Criteria:

1. *Irrevocably commit a natural, cultural, or historic resource;*

Discussion: No adverse impact to natural, cultural, or historic resources is anticipated. The R-1 water reservoir site was partly developed to accommodate a potable water reservoir and appurtenances a number of years ago several years ago in conjunction with public transportation required infrastructure for the City of Kapolei. Impacts to the natural environment are addressed in-depth in **Section 3**.

No adverse impact to cultural practices or beliefs is anticipated. The R-1 water reservoir system improvements are not anticipated to affect the exercise of Native Hawaiian rights related to gathering, access, or other customary activities at the project site. A Cultural Impact Assessment completed to evaluate the potential adverse impact to cultural practices concludes that Hawaiian rights related to gathering, access, or other customary activities within the project area will not be affected and there will be no adverse effect upon cultural practices or beliefs.

One previously identified historic property, SIHP # 50-80-12-4664 (plantation era irrigation infrastructure), was identified within the northeast portion of the proposed East Kapolei 215 R-1 3.0 MG reservoir site. Based on the field inspection and background research for this report, the portion of SIHP #50-80-12-4664 within the present project area is evaluated as lacking integrity. Thus SIHP #50-80-12-4664 is suggested as likely significant only under HAR §13-284-6 Criterion "d", for its information potential regarding sugar cane cultivation in the area, and is not expected to be eligible for listing in the NRHP. A "no historic properties affected" determination was recommended in conjunction with the report of findings and recommendations in the LRFI (February 2018). In a letter dated April 6, 2018, the SHPD concurred with the determination of no historic properties affected (see **Appendix A**).

No significant archaeological or cultural sites are anticipated to be discovered. However, in the unlikely event that any remains or artifacts are encountered, practices as identified in **Section 5.14, Archaeological and Cultural Resources**, of this document will be applied:

> Any inadvertent finds will immediately result in the cessation of work and the immediate reporting of the find to the SHPD who will furnish further instructions regarding the treatment of the find and the conditions when work may be resumed.

2. *Curtail the range of beneficial uses of the environment;*

Discussion: The proposed improvements will facilitate more efficient use of the land and water, as they will facilitate the development of technology at the reservoir site to operate and stabilize pressure levels remotely, therefore more efficiently, for BWS operations in the ʻEwa and Waiʻanae districts. The improvements will also allow BWS to develop a new R-1 water source for the City of Kapolei.

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

The proposed project is consistent with the environmental policies, goals and guidelines as delineated in HRS, Chapter 344, and as documented in this EA.

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

Discussion: No adverse impact to economic or social welfare or cultural practices or beliefs is anticipated. The proposed R-1 water reservoir system improvements will support the needs of a growing population.

5. *Have a substantial adverse effect on public health;*

The proposed project will be developed in accordance with Federal, State, and County of Hawaiʻi, rules and regulations governing public safety and health. The R-1 water reservoir project is not anticipated to result in long-term adverse impacts to ambient air quality and noise levels. As discussed in **Sections 5.7**, the proposed R-1 water reservoir project will not exacerbate any natural hazard conditions and no significant impact related to hazardous substances is anticipated.

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

Discussion: The proposed R-1 water reservoir system will not affect the area population, as the public utility nature of the project does not provide an incentive for people to move to the area. Rather, the proposed facilities are needed to more efficiently serve the growing population of West Oʻahu.

7. *Involve a substantial degradation of environmental quality;*

The proposed project will be developed in accordance with the environmental policies of HRS, Chapter 343. The analysis provided in this EA indicates that no substantial environmental degradation is anticipated or expected.

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

Discussion: The proposed R-1 water reservoir system may have a positive effect upon the environment from a land use point of view, in that it more efficiently uses land that is already urbanized, and is intended and allowed as a public utility installation use. The intended site design, which includes water reuse, non-potable water for landscape irrigation, native plant and xeriscape landscaping, as well as low-impact stormwater infrastructure avoids a considerable cumulative impact to the environment.

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

There are no threatened or endangered flora or fauna species within or immediately surrounding the project site.

10. *Have a substantial adverse effect on air or water quality or ambient noise levels;*

Any potential for adverse impacts to air, water quality, or noise levels will be addressed by the use of appropriate mitigative measures as described in this EA.

11. *Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*

The proposed project site is located in an area that is already in use as a public facility with a reservoir site already in place that accommodates BWS potable water within the growing City of Kapolei. The project itself does not possess any sensitive characteristics that would detract from or adversely impact the surrounding environment.

12. *Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies;*

Discussion: The site is not situated in an area that would detract from any Panoramic Views identified in the ʻEwa DP. **Section 5.11** describes the potential for visual impacts and mitigation measures.

13. *Require substantial energy consumption or emit substantial greenhouse gases.*

Construction activities that require the use of heavy machinery would present an increase in greenhouse gases, however, this would only be short-term and cease with construction. The energy that is used will be in the form of fossil fueled internal combustion equipment, machinery, and vehicles, and electricity supplied to the site by either an existing Hawaiian Electric Company-power connection or by the use of portable generator(s). The use of these forms of energy is not expected to be greater or significantly greater than that used for the development of similar projects.

Table 10-1. East Kapolei 215 R-1 3.0 MG Reservoir Project Impacts Summary

Resource Area	Potential Short-term Impacts	Long-term Impacts	Cumulative Impacts	Mitigation and BMPs	Draft EA Section
Climate	Construction activities that require the use of heavy machinery would present a short-term increase in greenhouse gases.	No Adverse Impact.	Minimal Cumulative Impact- because the direct impact to climate would be only short-term, and would not increase the use of machinery, the project would make no persistent contribution to cumulative impacts. Climate change is expected to reduce rainfall in leeward Oʻahu with an associated decrease in aquifer sustainable yields. Elevated R-1 storage will increase R-1 use because of its accessibility and functionality. An increase in reuse will benefit limited natural water resources which would otherwise be used if R-1 were unavailable due to limited pumping schedules.	No Mitigation required.	5.1 Climate
Geology, Topography, and Soil Resources	Ground disturbing activities (i.e., during construction).	No Adverse Impact.	No Cumulative Impact.	• Erosion control measures will be employed during construction. • Site restoration to original condition at conclusion of the project. • Disposal will be at an approved facility or location in accordance with Federal, State, and County of Kalawao regulatory regulations.	5.2 Geology and Topography 5.5 Soils and Potential for Hazardous Materials
Groundwater and Surface Water	Potential storm water runoff during construction. Localized and potential increase in turbidity.	No Adverse Impact.	No Cumulative Impact.	• Construction will be regulated through NPDES permit conditions in accordance with CWA regulations. • During construction, work activities will be in compliance with HAR 11-54 WQS and HAR 11-55 Water Pollution Control. • Discharge pollution prevention measures will be employed in all phases of the project. • Following construction, all areas of ground disturbance will be stabilized with appropriate materials including the use of vegetative ground cover.	5.5 Water Resources and Hydrology
Wetlands	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	No Mitigation required.	5.6 Wetlands

Resource Area	Potential Short-term Impacts	Long-term Impacts	Cumulative Impacts	Mitigation and BMPs	Draft EA Section
Natural Hazards	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	No Mitigation required.	5.7 Natural Hazards
Terrestrial Flora	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	• Prior to the start of grubbing/grading of the project site, a qualified biologist should complete a survey of the area to be disturbed to be sure that no *Abutilon menziesii* are present. In the event that *Abutilon menziesii* is located, BWS must contact USFWS for instructions before starting any clearing work. Additionally, BWS will obtain a Certificate of Inclusion from the Hawaiʻi Department of Transportation as necessary.	5.8.1 Terrestrial Flora
Terrestrial Faunal and Avifaunal Resources	• Increased lighting during the construction of the proposed project.	No Adverse Impact.	No Cumulative Impact.	• Light fixtures utilized for this project will be designed and installed to reduce glare and shield light from migrating and/or nocturnally flying seabirds. • In accordance with HRS, Chapter 205A-30.5(b) and 205A-71(b) artificial lighting provided for operations, security, and public safety will be properly positioned and shielded to minimize adverse impacts. • Design features for lighting will be based on guidance in “The Newell’s Shearwater Light Attraction Problem, A guide for Architects, Planners, and Resort Managers.” • Prior to the start of grubbing/grading of the reservoir site, a qualified biologist should complete a survey of the area to be disturbed to be sure that no nesting pueo are present. In the event that a nest is located, DLNR, Division of Forestry and Wildlife will be contacted for instructions before starting any clearing work. • Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15) and do not use barbed wire for fencing.	5.8.2 Terrestrial Fauna

Resource Area	Potential Short-term Impacts	Long-term Impacts	Cumulative Impacts	Mitigation and BMPs	Draft EA Section
Noise	• Temporary source of noise above ambient levels from construction noise.	No Adverse Impact.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent with existing development and the direct impact to noise would only be short-term, the project would make no persistent contribution to cumulative impacts.	• Construction vehicles and machinery, and all noise attenuation equipment are maintained in good operating condition. • During construction, work activities will be in compliance with HAR, Chapter 11-59 and 11-60.1.	5.9 Noise Conditions
Air Quality	• Temporary and localized emissions from increased fugitive dust and odors arising from the construction related equipment, and vehicles.	No Adverse Impact.	Minimal Cumulative Impact – because the direct impact to air quality would be only short-term, the project would make no persistent contribution to cumulative impacts.	• Construction equipment and vehicles shall be maintained in proper working order to reduce air emissions. • During construction, work activities will be in compliance with HAR, Chapter 11-59 and 11-60.1. • Fugitive dust will be controlled with regular wetting of the soil by the contractor and/or by the use of dust screens, as required.	5.10 Air Quality
Visual Resources	• Temporary visual impacts from the presence of construction equipment and construction activities.	No Adverse Impact.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent visually with existing development. Screening trees will be planted along the makai side of the reservoir site to mitigate visual impacts from Farrington Highway and Kūalakaʻi Parkway.	• Equipment will be confined to work areas. • All construction related equipment will be removed following the completion of work.	5.11 Visual Resources
Socio-Economic Environment and Demographics	• No Adverse Impact.	No Adverse Impact.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to support the local economy and anticipated increased area population. Because population growth on Oʻahu is anticipated to occur with or without the implementation of the proposed project. No significant adverse cumulative impacts to the socio-economic environment are anticipated.	No Mitigation required.	5.12 Socio-Economic Environment and Demographics

Resource Area	Potential Short-term Impacts	Long-term Impacts	Cumulative Impacts	Mitigation and BMPs	Draft EA Section
Transportation Facilities	• Potential for limited, non-substantial short-term effects on transportation due to construction activities near the job site.	No Adverse Impact.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent with the transportation use of the existing development.	No Mitigation required.	5.13.1 Roads and Transportation
Electrical, Water, and Wastewater	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	No Mitigation required.	5.13.2 Utilities
Solid and Hazardous Waste	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	• Disposal of solid waste will be handled in accordance with applicable Federal, State, and CCH rules and regulations.	5.13.3 Solid Waste
Police, Fire, Health Care and Emergency Services	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	No Mitigation required.	5.13.4 Police Protection 5.13.5 Fire Protection 5.13.6 Health Care and Emergency Services
Schools and Libraries	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	No Mitigation required.	5.13.7 Schools and Libraries
Recreational Facilities	• No Adverse Impact.	No Adverse Impact.	No Cumulative Impact.	No Mitigation required.	5.13.8 Recreational Facilities
Archaeological and Cultural Resources	• Potential for inadvertent discovery of cultural deposits and iwi kūpuna.	No Adverse Impact.	No Cumulative Impact.	• SHPD will be consulted regarding the proposed project's potential to impact historic resources and the necessity for further project-related historic preservation. The project will comply with the requirements of the SHPD.	5.14 Archaeological and Cultural Resources
Traditional Cultural Practice	• Potential for inadvertent discovery of cultural deposits and iwi kūpuna.	No Adverse Impact.	No Cumulative Impact.	• SHPD will be consulted regarding the proposed project's potential to impact historic resources and the necessity for further project-related historic preservation. The project will comply with the requirements of the SHPD.	6.0 Cultural Impact Assessment

Section 11
Summary of Findings and Significance Determination

In accordance with the provisions set forth in HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, this EA has evaluated and assessed the potential for environmental impacts associated with the proposed project and it is preliminarily determined that a HRS, Chapter 343, Environmental Impact Statement will not be required.

The proposed East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main project is not expected to result in significant adverse impacts to geology, soils, hydrology, stream flow, biological resources, air quality, natural hazards, cultural resources, socioeconomics, or land uses. Minimal impacts may consist of minor traffic, noise, and air quality disturbances to the University of Hawai`i West Oʻahu campus and Hawaiʻi Tokai International College, businesses, and residents in the area that may traverse the immediate surrounding location of the project site, but will completely cease once construction is completed.

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Appendices

Appendix A **Draft Archaeological Literature Review and Field Inspection Report for the Kūalakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, TMKs: [1] 9-1-017:096 Kūalakaʻi Parkway ROW, Farrington Highway ROW, and [1] 9-1-018:008. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Thomas Martel III, B.A., and Hallet H. Hammatt, Ph.D. February 2018.**

AND

Addendum to an Archaeological Literature Review and Field Inspection Report for the Kualakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, Addressing a Small Southern Extension within the TMK: [1] 9-1-017:096 Kualakaʻi Parkway ROW. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Scott A. Belluomini, B.A., and David W. Shideler, M.A. October 2020.

Appendix B **Final Cultural Impact Assessment for the Proposed East Kapolei R-1 Reservoir and Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, TMKs: [1] 9-1-017:096 Kūalakaʻi Parkway Right-of-Way, Farrington Highway Right-of-Way, and [1] 9-1-018:008. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Liʻi Bitler, B.A., Brittany Beauchan, M.A., and Hallet H. Hammatt, Ph.D. February 2018.**

Appendix C **Draft Biological surveys for a proposed BWS East Kapolei reservoir and transmission line, Kapolei, Oʻahu. AECOS No. 1518. Prepared by Eric Guinther and Susan Burr. September 2017.**

Appendix D **Correspondence for Transfer of Land in Tax Map Key: (1) 9-1-018: Por. 008 from the Board of Land and Natural Resources to the BWS for Construction and Operation of the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main Project.**

Appendix E **Pre-Assessment Consultation Letters for Hawaiʻi Revised Statutes, Chapter 343.**

Appendix A

Draft Archaeological Literature Review and Field Inspection Report for the Kūalakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, TMKs: [1] 9-1-017:096 Kūalakaʻi Parkway ROW, Farrington Highway ROW, and [1] 9-1-018:008. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Thomas Martel III, B.A., and Hallet H. Hammatt, Ph.D. February 2018.

AND

Addendum to an Archaeological Literature Review and Field Inspection Report for the Kualakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu, Addressing a Small Southern Extension within the TMK: [1] 9-1-017:096 Kualakaʻi Parkway ROW. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Scott A. Belluomini, B.A., and David W. Shideler, M.A. October 2020.

Draft

Archaeological Literature Review and Field Inspection Report for the Kualakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu TMKs: [1] 9-1-017:096 Kualakaʻi Parkway ROW, Farrington Highway ROW, and [1] 9-1-018:008

Prepared for
Engineering Concepts, Inc.,
and
R.M. Towill Corporation

Prepared by
Thomas Martel III, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: HONOULIULI 131/133)

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Management Summary

Reference	Archaeological Literature Review and Field Inspection for the Kualaka‘i Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMKs: [1] 9-1-017:096 Kualaka‘i Parkway ROW, Farrington Highway ROW, and [1] 9-1-018:008 (Martel and Hammatt 2018)
Date	February 2018
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: HONOULIULI 131/133
Investigation Permit Number	CSH operates 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, State of Hawai‘i Department of Health (DOH), Environmental Protection Agency (EPA), City & County of Honolulu Board of Water Supply (BWS)
Land Jurisdiction	State of Hawai‘i
Project Proponent	Engineering Concepts, Inc. and R.M. Towill Corporation, on behalf of the BWS
Project Funding	BWS, DOH, EPA
Project Location	The project area comprises portions of the East Kapolei 215 Reservoir access road and proposed R-1 reservoir location, Farrington Highway from an East Kapolei 215 Reservoir access road to Kualaka‘i Parkway, and Kualaka‘i Parkway from Farrington Highway to Mango Tree Road. The project area is depicted on a portion of a 2013 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle.
Project Description	This archaeological literature review and field inspection (LRFI) addresses two components of the project consisting of Component 1, the construction of the R-1 reservoir and appurtenances, and Component 2, the installation of the 10,800-foot (ft) long 16-inch water main along a portion of Farrington Highway and Kualaka‘i Parkway, as well as the initial geotechnical investigation in support of the project.
Project Acreage	The project area consists of 3.9 acres (1.58 hectares) for Component 1 and 67.8 acres (27.44 hectares) for Component 2, with a total of 71.7 acres (29.02 hectares) for the entire project area.
Area of Potential Effect (APE)	For the purposes of this LRFI, the area of potential effect is considered to be the entire approximately 71.7-acre (29.02-hectare) project area.
Project-Related Disturbance	Proposed ground disturbing activities include excavation for water mains and appurtenances, geotechnical borings, and grading and excavation for the construction of the R-1 reservoir.

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 cultural resources/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 and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per HAR §13-276, nor does it fulfill the requirements of Section 106 of the National Historic Preservation Act. Consequently, this report cannot be used to make formal recommendations for federal agency and SHPD review and acceptance.
Fieldwork Effort	Fieldwork was conducted on 15 August 2017 by CSH archaeologists Thomas Martel III, B.A., Samantha Cragen, B.A., and David W. Shideler, M.A., under the general supervision of Principal Investigator, Hallett H. Hammatt, Ph.D. This work required approximately 2 person-days to complete.
Results Summary	The results of the field inspection were consistent with what was expected based on background research and the previous archaeological studies conducted in the vicinity. One previously identified historic property (State Inventory of Historic Places [SIHP] # 50-80-12-4664) was identified within Component 1 and no historic properties were identified within Component 2.
Recommendations	The results of the field inspection were consistent with what was expected based on background research and the previous archaeological studies conducted in the vicinity. Based on the extensive grading and the absence of any surface historic properties or subsurface cultural deposits within Component 2 of the project area, it is likely that no known or previously unidentified historic properties will be affected by the proposed project. Within Component 1 of the project area, portions of SIHP # 50-80-12-4664 (plantation era irrigation infrastructure [Runyon et al. 2011]) were identified, as well as newly identified portions (CSH 1). Consultation with the SHPD can determine the future course of action. A "no historic properties affected" determination is recommended. As a general precaution, the project plans should include provisions stating that "In the event that historic resources, including structural remains, subsurface cultural deposits, 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 contact the SHPD at (808) 692-8015."

Table of Contents

List of Figures

List of Tables

Section 1 Introduction

1.1 Project Background

At the request of Engineering Concepts, Inc. and R.M. Towill Corporation on behalf of the City & County of Honolulu Board of Water Supply (BWS), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this literature review and field inspection (LRFI) report for the Kualaka‘i Parkway 16-inch R-1 Transmission Main project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMKs: [1] 9-1-017:096 Kualakai Parkway Right-of-Way (ROW), Farrington Highway ROW, and [1] 9-1-018:008. The project area is depicted on a portion of the 2013 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), two tax map plats (Figure 2 and Figure 3), and a 2014 Google Earth aerial photograph (Figure 4).

The proposed project consists of two components: Component 1 (Figure 5 through Figure 7) involves the construction of the New East Kapolei 215 R-1 Reservoir with associated connections to Component 2 (Figure 8 through Figure 13), which consists of a new 16-inch transmission main that extends along Farrington Highway and Kualaka‘i Parkway (The project area consists of 3.9 acres (1.58 hectares) for Component 1 and 67.8 acres (27.44 hectares) for Component 2, with a total of 71.7 acres (29.02 hectares) for the entire project area.

Table 1). The new R-1 reservoir (Component 1) is projected to be 3.0 million gallons in capacity and will stabilize water pressures in the water system and help meet water demands during peak. The new 16-inch transmission main (Component 2) will extend from the existing R-1 system through Kualaka‘i Parkway to supply the R-1 reservoir. The project also includes initial geotechnical investigation consisting of soil borings along the proposed water line alignment at approximately 500-foot (ft) intervals and a minimum of one boring per street. Boring depth shall be a minimum of 8 ft or at 30 inches below the maximum water main invert depth indicated on project plans.

The project area consists of 3.9 acres (1.58 hectares) for Component 1 and 67.8 acres (27.44 hectares) for Component 2, with a total of 71.7 acres (29.02 hectares) for the entire project area.

Table 1. Proposed undertaking for the two components associated with the project

Component	Proposed Undertaking
1	R-1 reservoir construction, a control building, and appurtenances from reservoir to East Kapolei 215 Reservoir access road up to Farrington Highway
2	16-inch water main installation from Farrington Highway at East Kapolei 215 Reservoir access road to Kualaka‘i Parkway and from Kualaka‘i Parkway to Mango Tree Road (total of 10,800 ft [3,292m] in length)

1.2 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

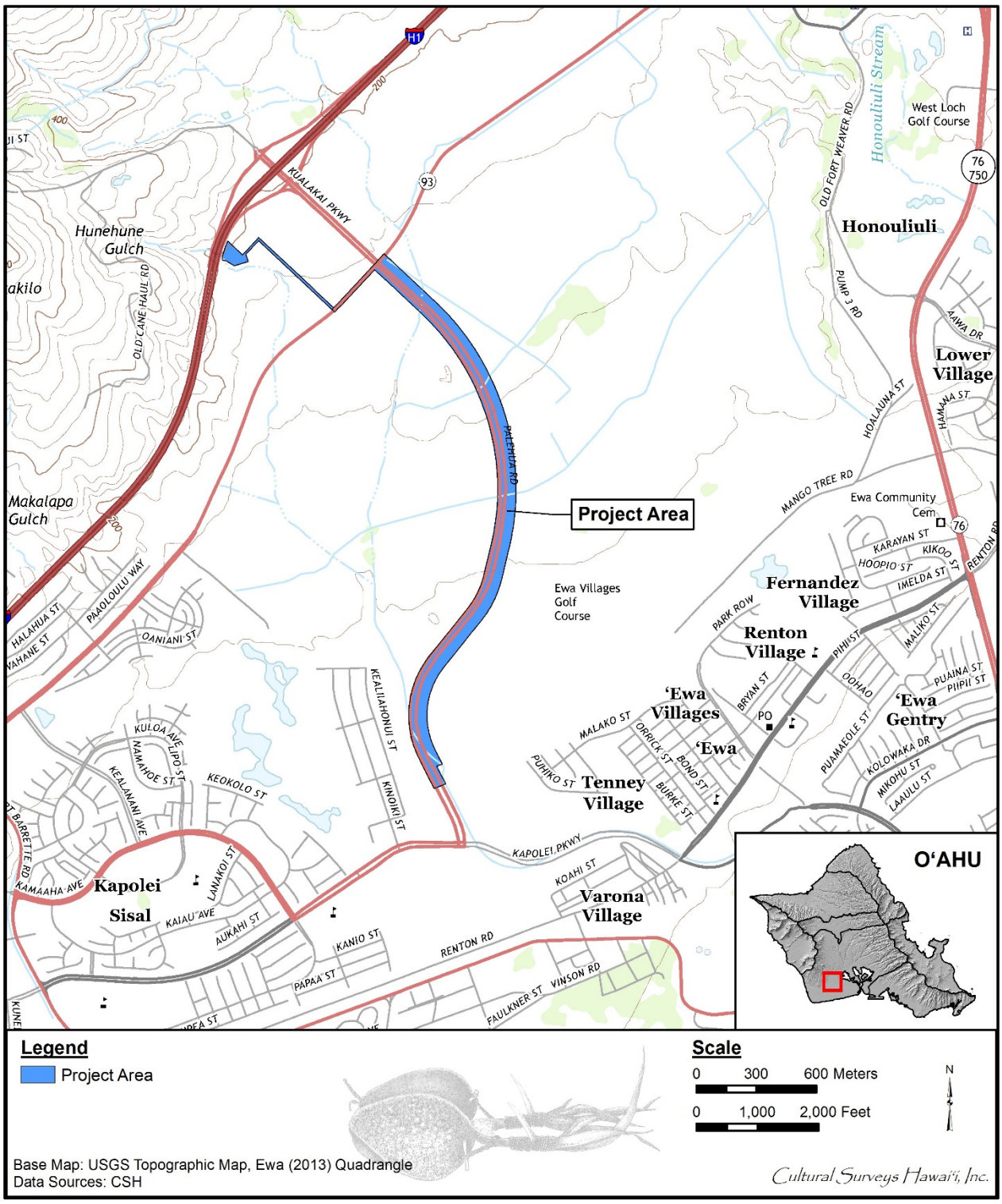

Figure 1. Portion of the 2013 Ewa USGS 7.5-minute topographic quadrangle showing the location of the project area

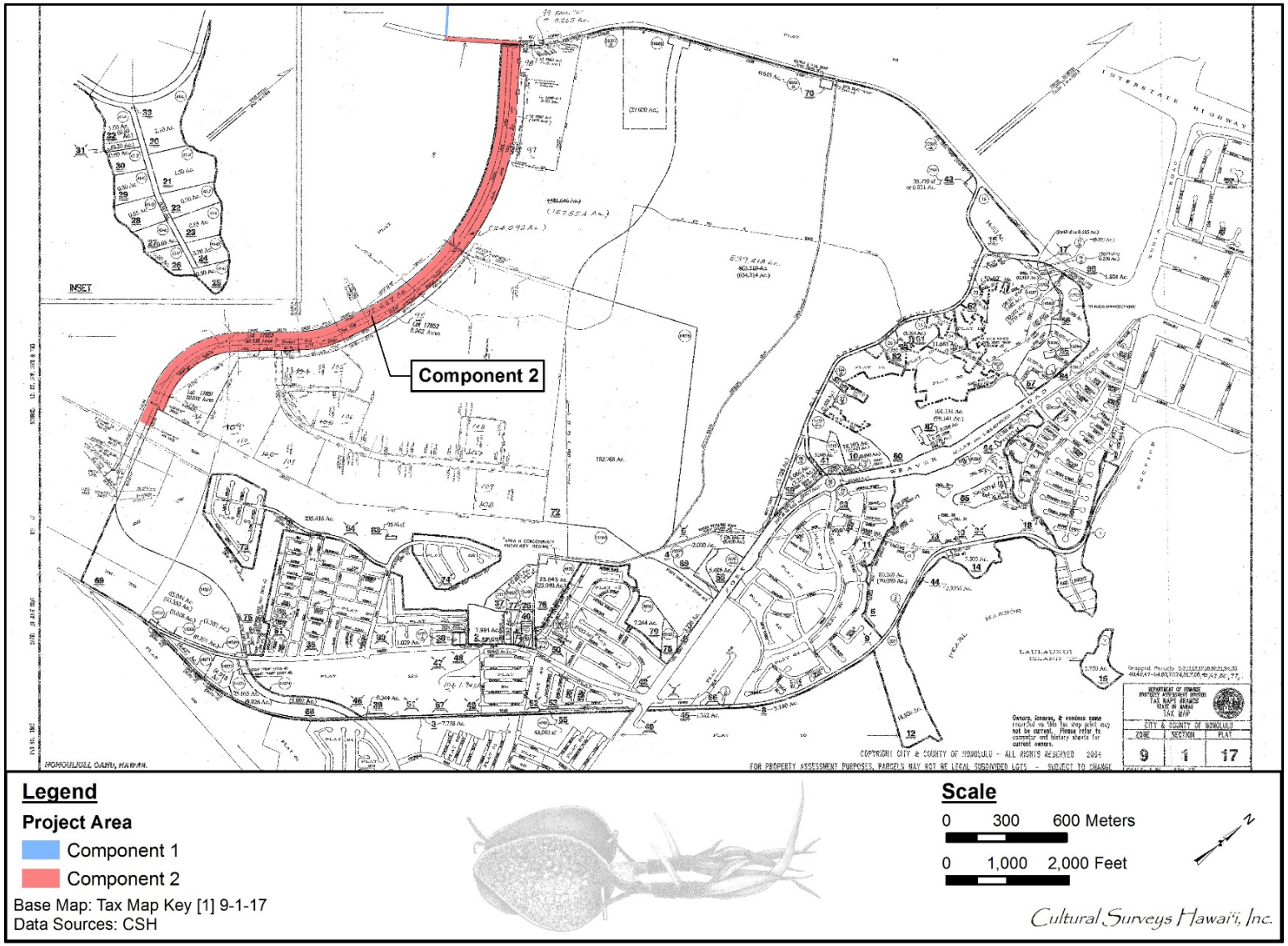

Figure 2. Tax Map Key (TMK) [1] 9-1-017 showing Component 2 of the project area (Hawai‘i TMK Service 2014)

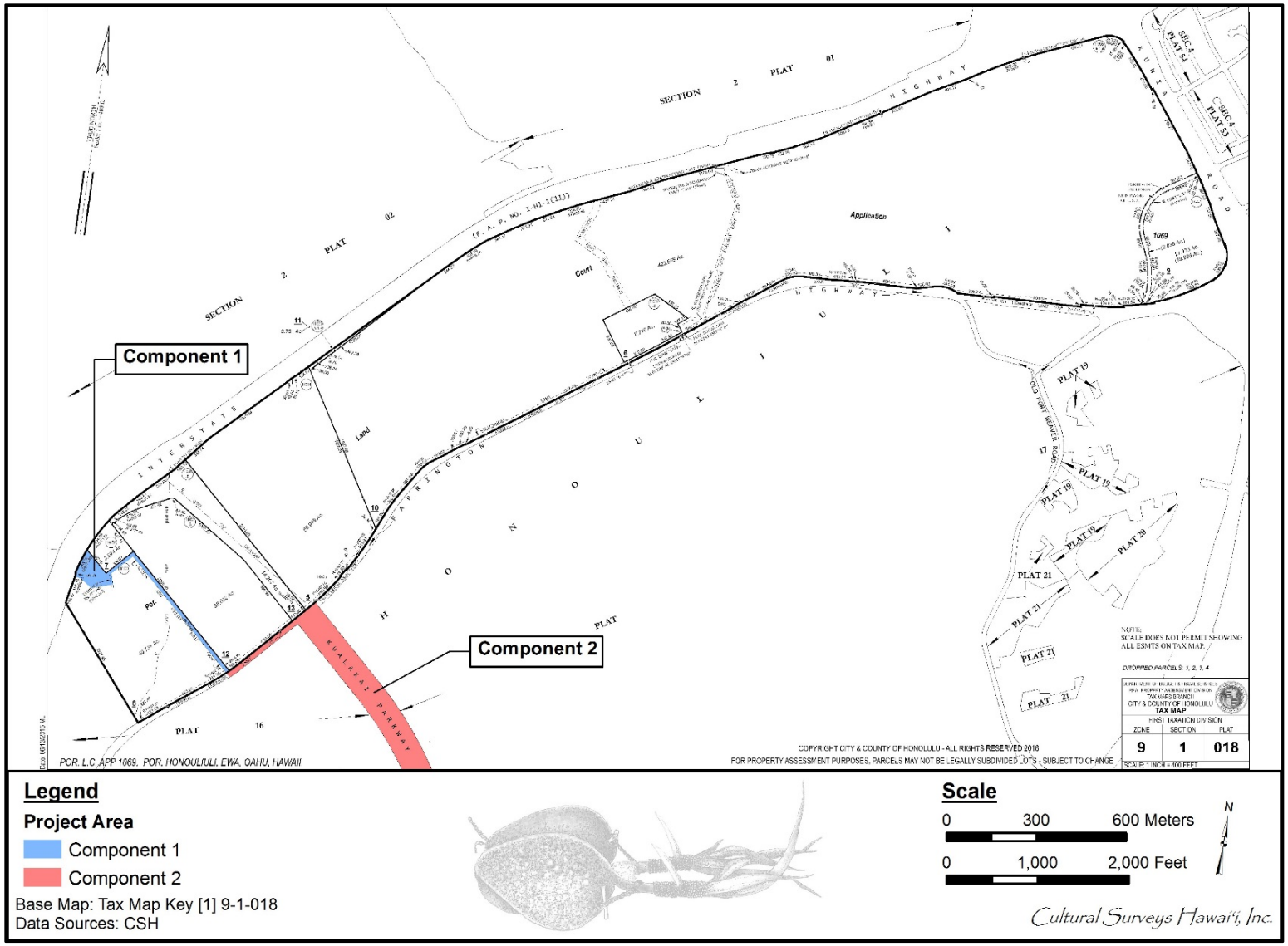

Figure 3. TMK: [1] 9-1-018 showing Component 1 and a portion of Component 2 of the project area (Hawai‘i TMK Service 2014)

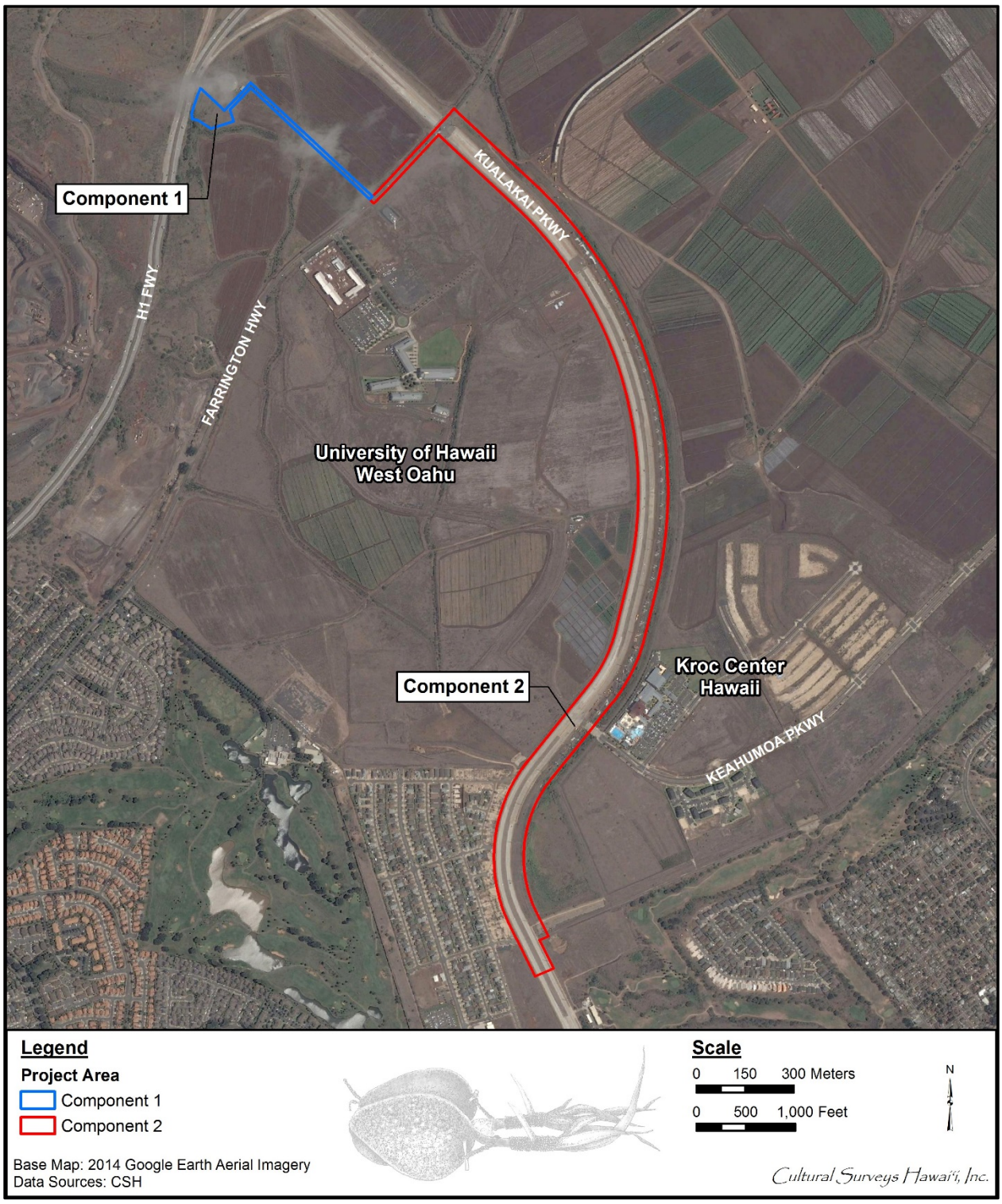

Figure 4. 2014 Google Earth aerial photograph of the project area showing Components 1 and 2

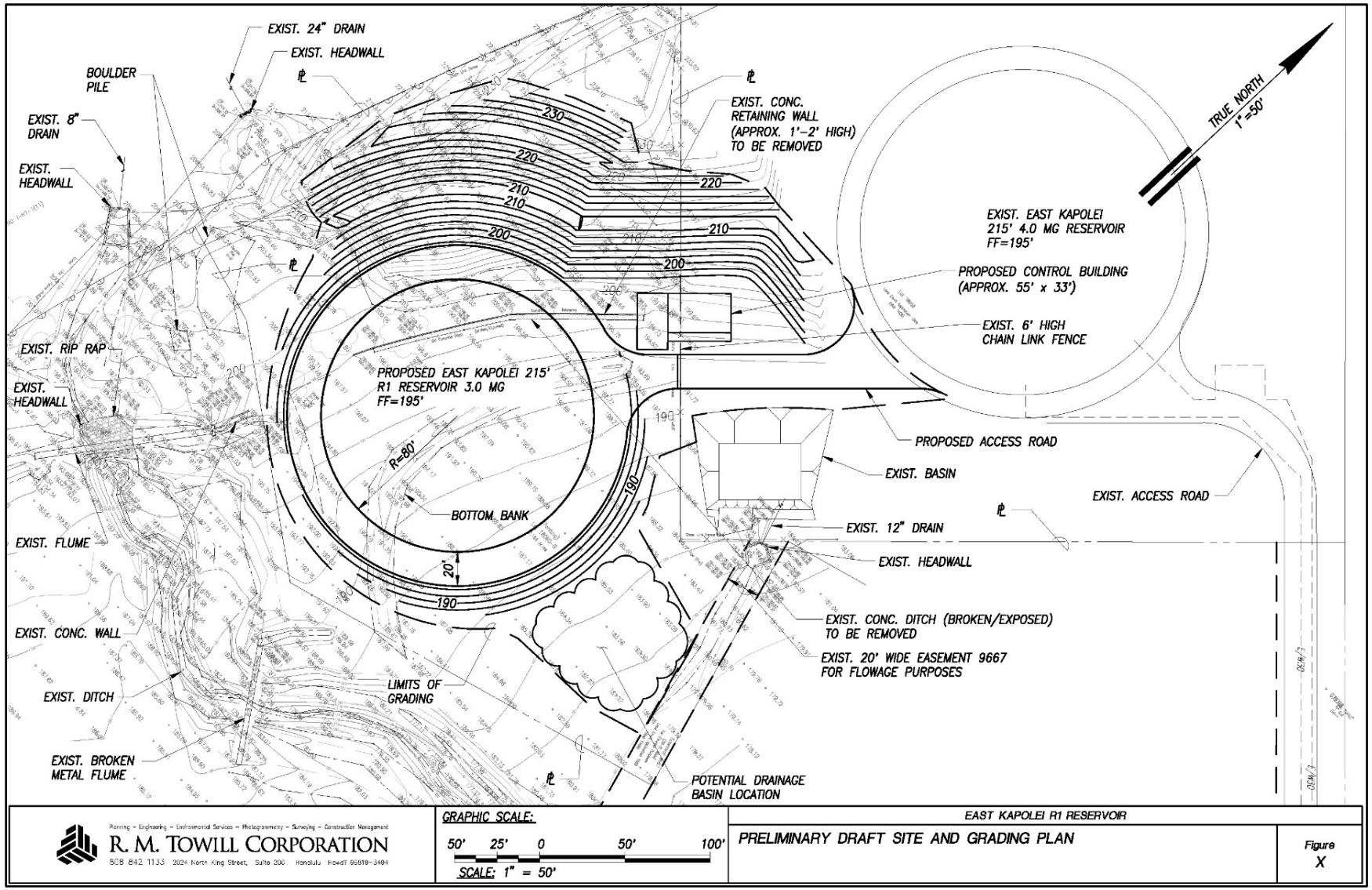

Figure 5. Component 1: grading plan for the R-1 reservoir (courtesy of client)

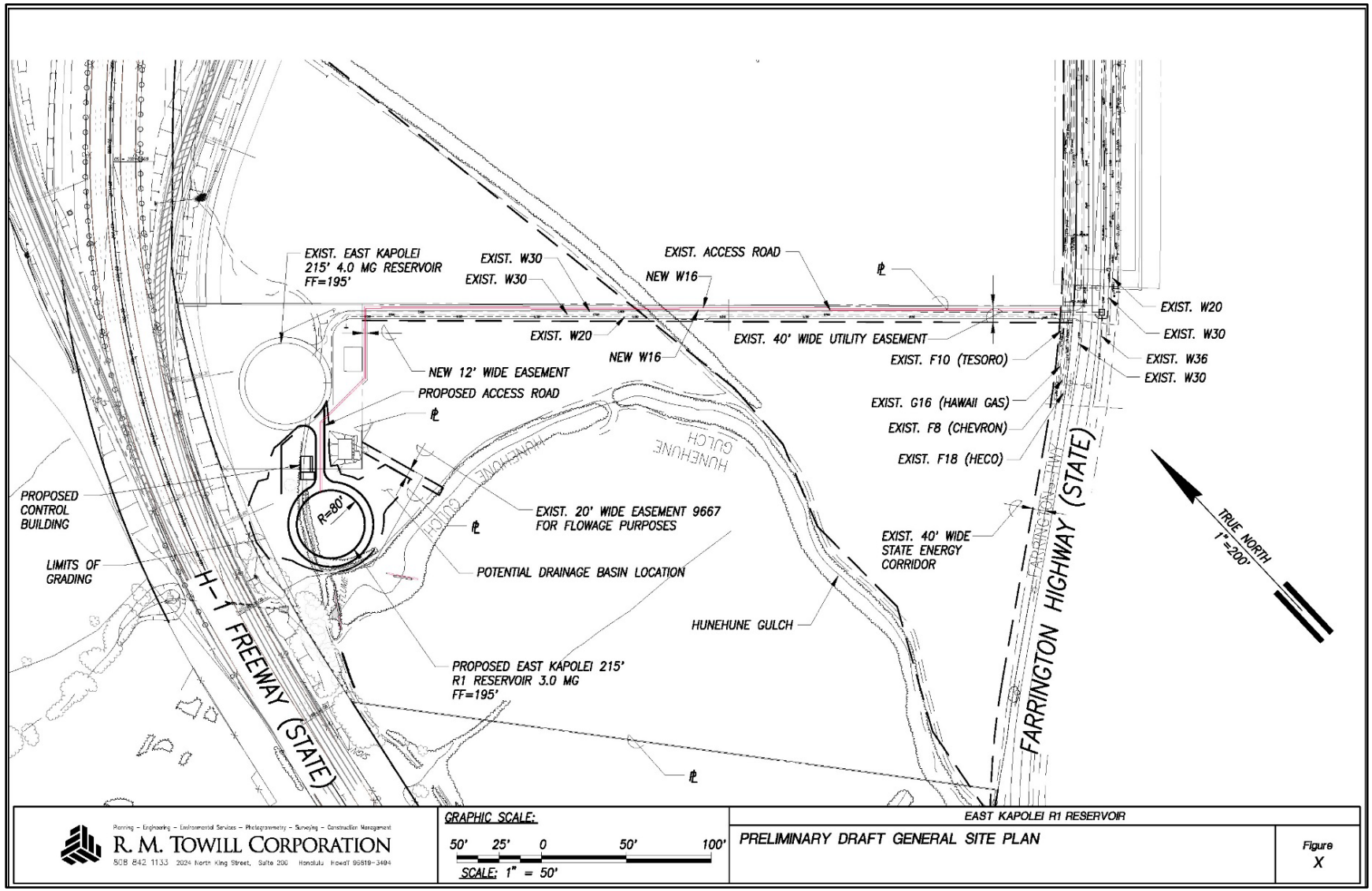

Figure 6. Component 1: general site plan for the R-1 reservoir and appurtenances (courtesy of client)

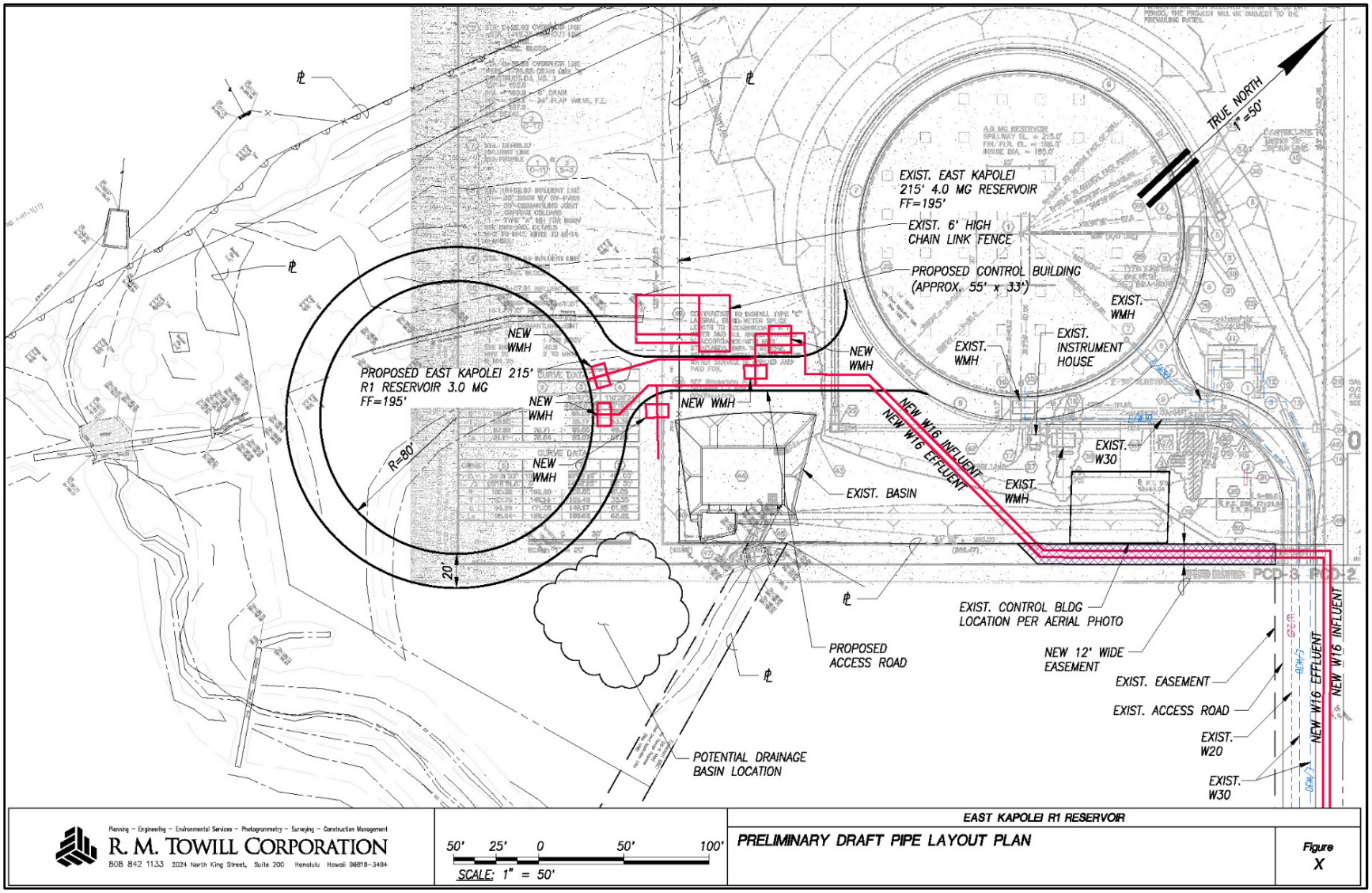

Figure 7. Component 1: proposed pipe layout plan for the R-1 reservoir and appurtenances (courtesy of client)

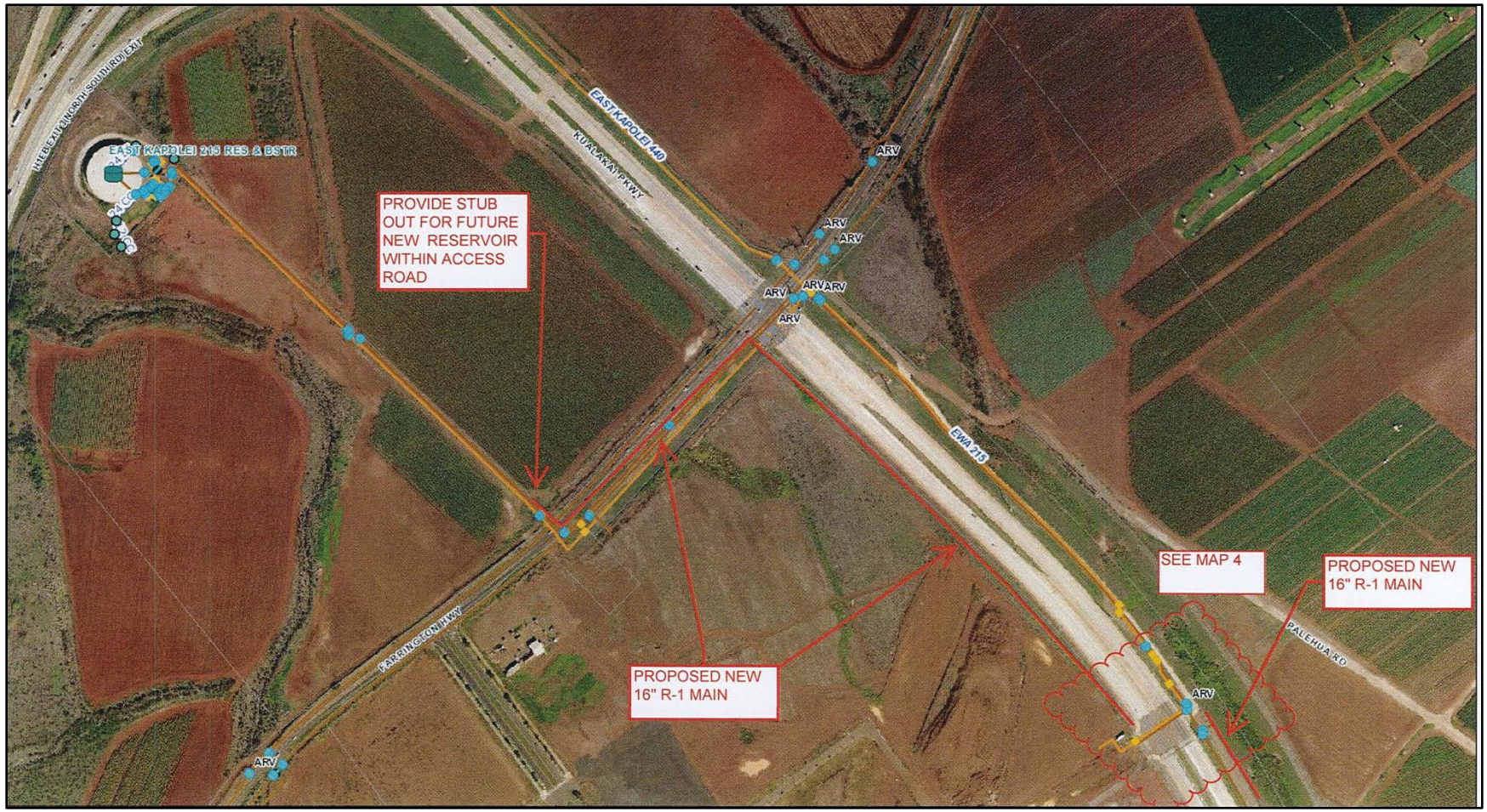

Figure 8. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 1 (courtesy of client)

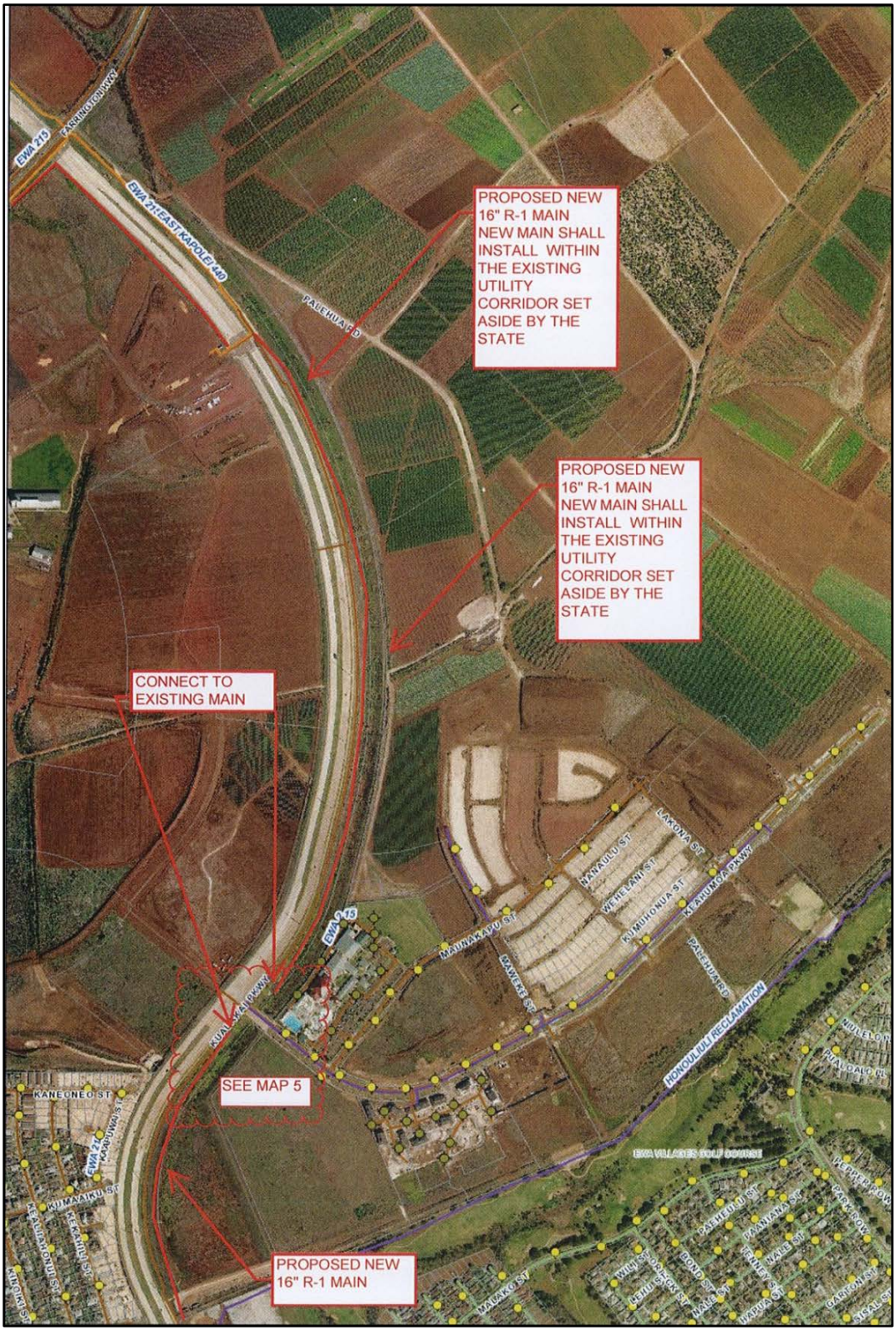

Figure 9. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 2 (courtesy of client)

Figure 10. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 3 (courtesy of client)

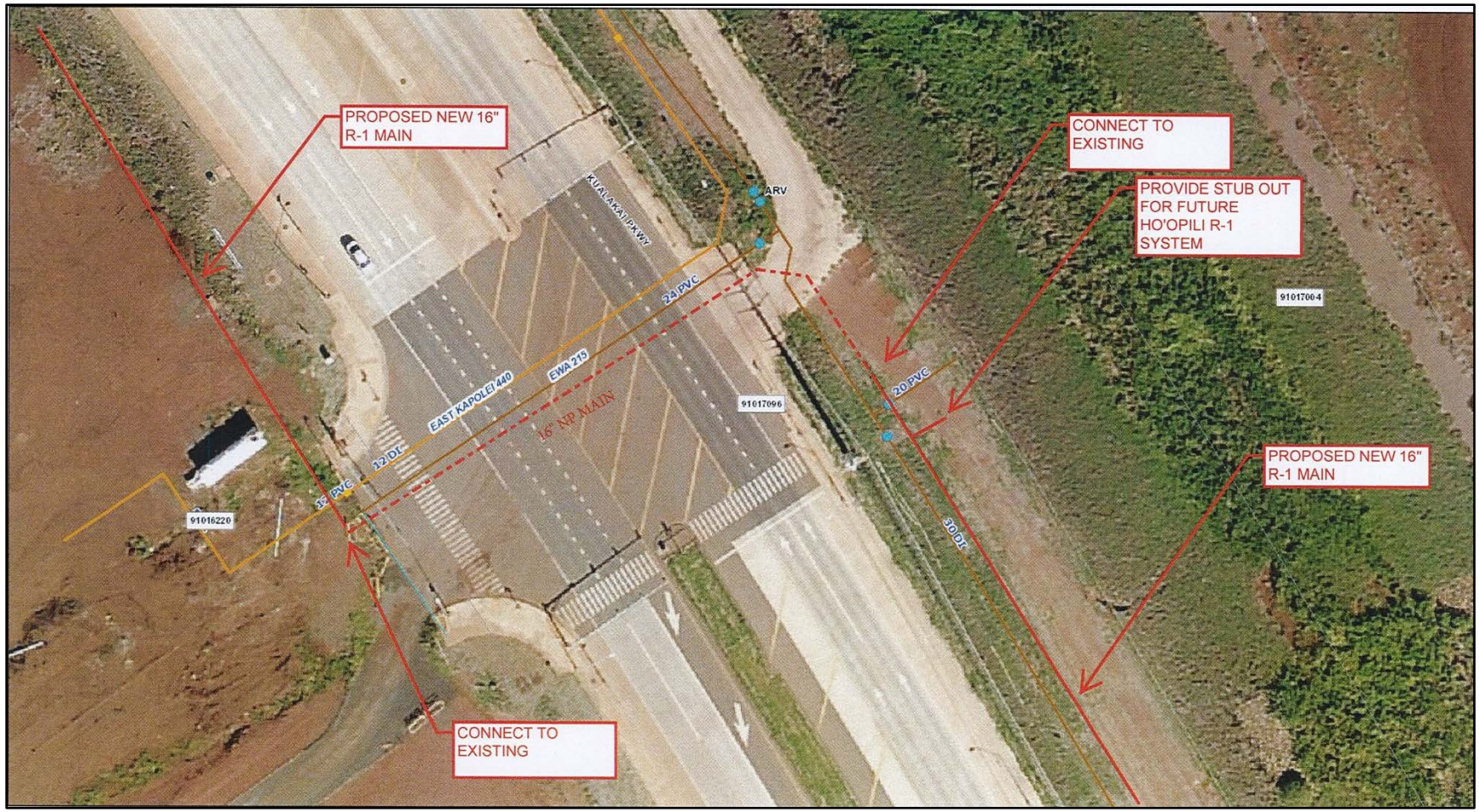

Figure 11. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 4 (courtesy of client)

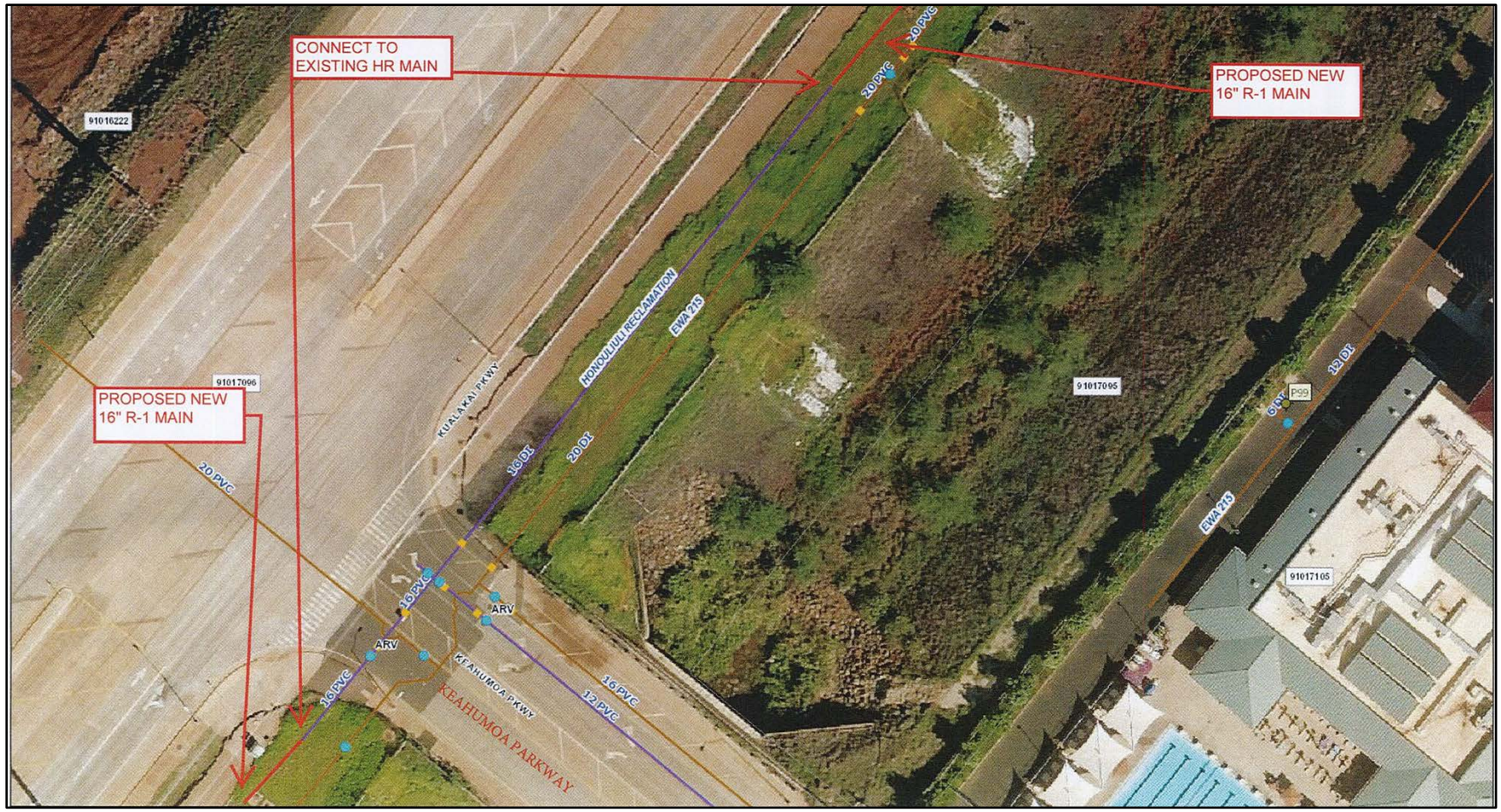

Figure 12. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 5 (courtesy of client)

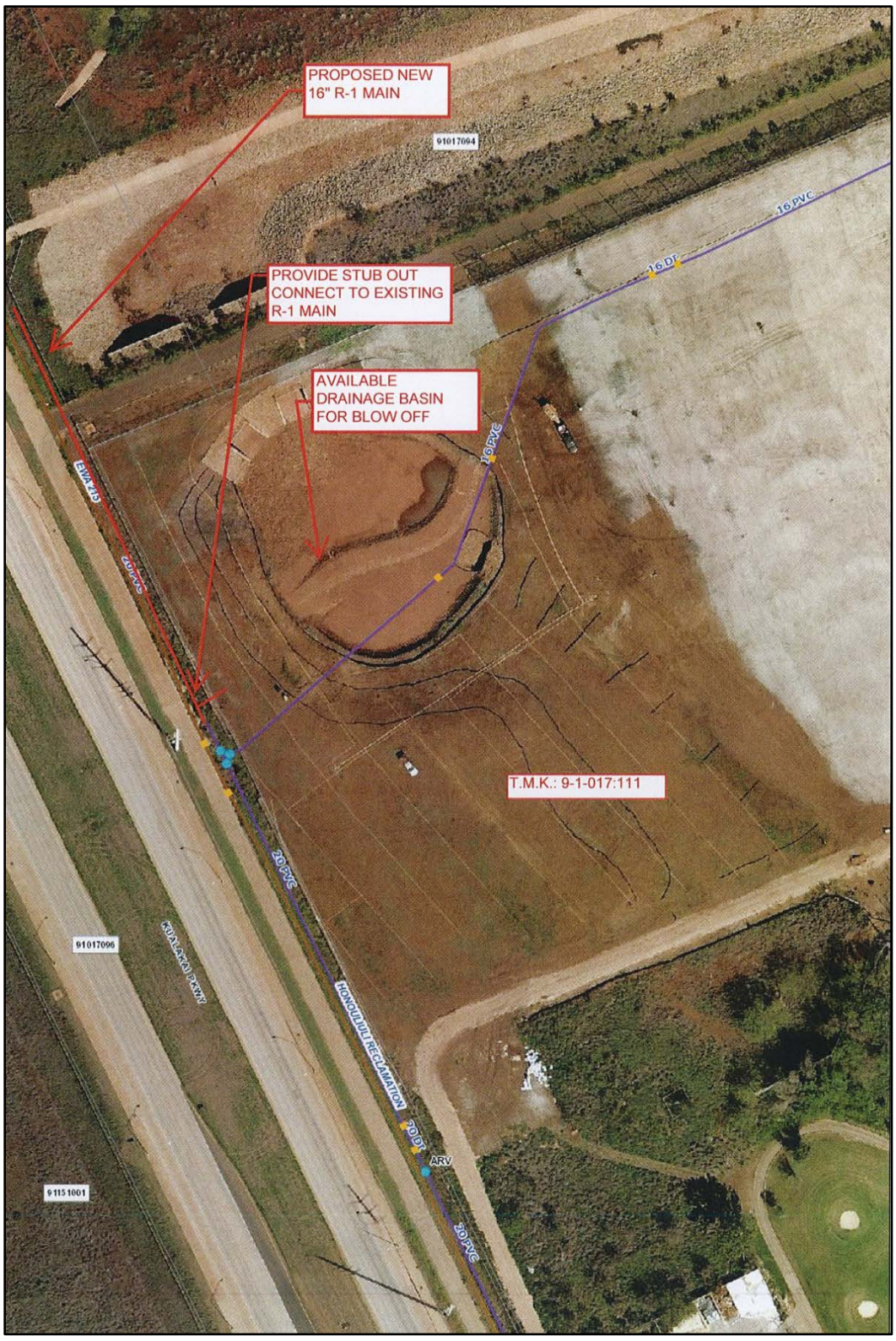

Figure 13. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 6 (courtesy of client)

management recommendations. This document is intended to facilitate project planning and support the project's historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per Hawai‘i Administrative Rules (HAR) §13-276, nor does it fulfill requirements of Section 106 of the National Historic Preservation Act.

1.3 Environmental Setting

1.3.1 Natural Environment

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's soils consist primarily of the Honouliuli series of clays (HxA, HxB) with smaller patches in the Molokai (MuB, MuC), Waialua (WkA), Waipahu (WzA), and Kunia (KyA) series of silty clays and the Ewa (EwC) series of stony silty clays (Figure 14 and Figure 15). Honouliuli Clay is described as "dark reddish-brown, very sticky and very plastic clay throughout" (Foote et al. 1972).

Soils of Honouliuli Series are described as follows:

> This series consists of well-drained soils on coastal plains on the island of O‘ahu in the ‘Ewa area. These soils developed in alluvium derived from basic igneous material. They are nearly level and gently sloping. Elevations range from 15 to 125 feet. The annual rainfall amounts to 18 to 30 inches and occurs mainly between November and April. The mean annual soil temperature is 74° F. Honouliuli soils are geographically associated with ‘Ewa, Lualualei, Mamala, and Waialua soils.
>
> These soils are used for sugar cane, truck crops, orchards, and pasture. The natural vegetation consists of kiawe, koa haole, fingergrass, bristly foxtail, and bermudagrass. [Foote et al. 1972:43]

Soils of the Molokai Series are described as follows:

> This series consists of well-drained soils on uplands on the islands of Maui, Lanai, Molokai, and Oahu. These soils formed in material weathered from basic igneous rock. They are nearly level to moderately steep. Elevations range mainly from nearly sea level to 1,000 feet but are as much as 1,500 feet on Lanai. The annual rainfall amounts to 20 to 25 inches, most of which occurs between November and April. The summers are hot and dry. The mean annual soil temperature is 73° F. Molokai soils are geographically associated with Holomua, Keahua, Lahaina, and Uwala soils.
>
> In this survey area a shallow variant of the Molokai series was mapped. This soil, Molokai silty clay loam, shallow variant, 15 to 25 percent slopes, severely eroded, is described in alphabetical order, along with other mapping units of this series.
>
> These soils are used for sugarcane, pineapple, pasture, wildlife habitat, and home sites. The natural vegetation consists of kiawe, ‘ilima, uhaloa, feather fingergrass, and buffalo grass. [Foote et al. 1972:96]

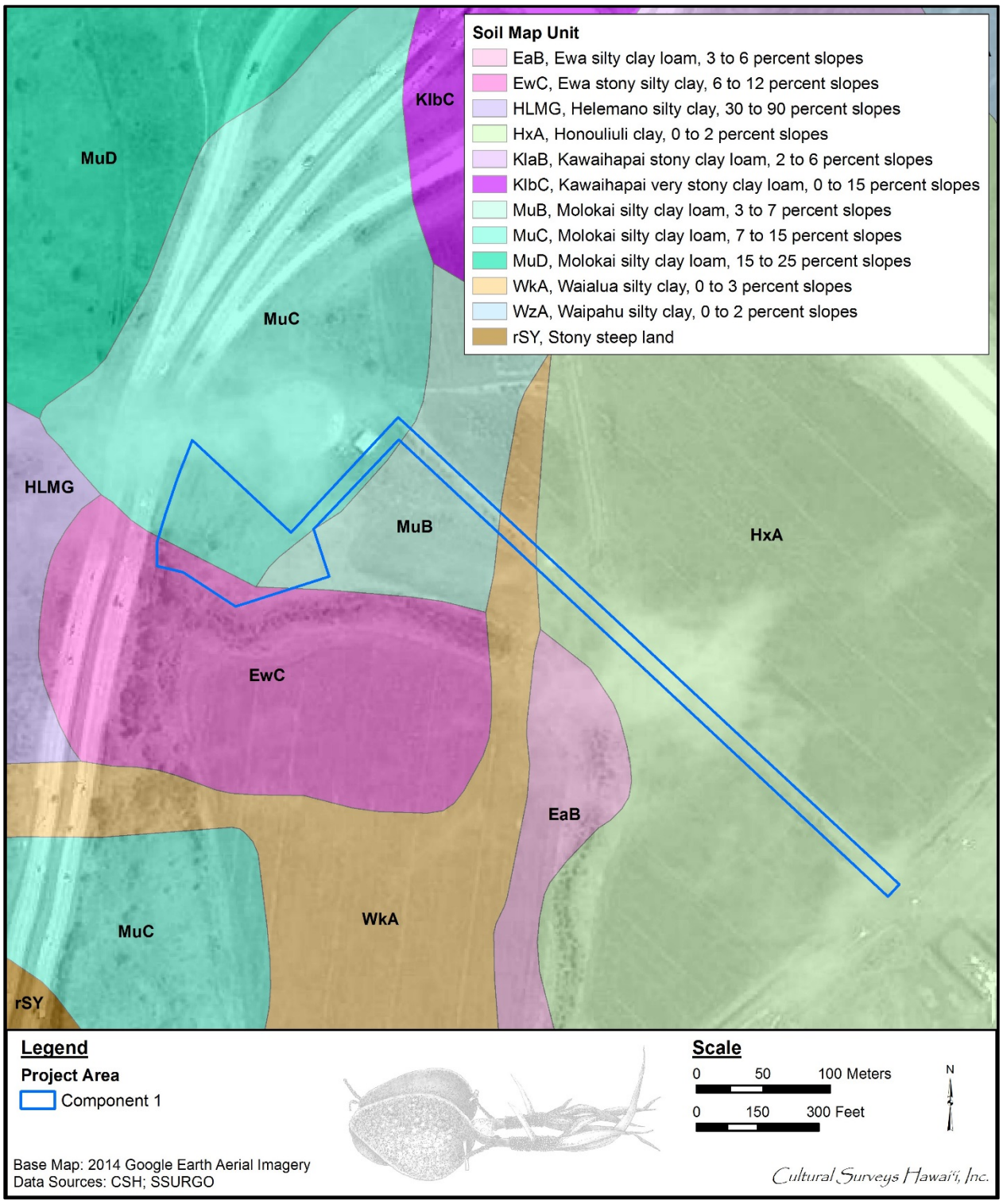

Figure 14. Portion of a 2014 Google Earth aerial photograph with overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and surrounding the Component 1 portion of the project area

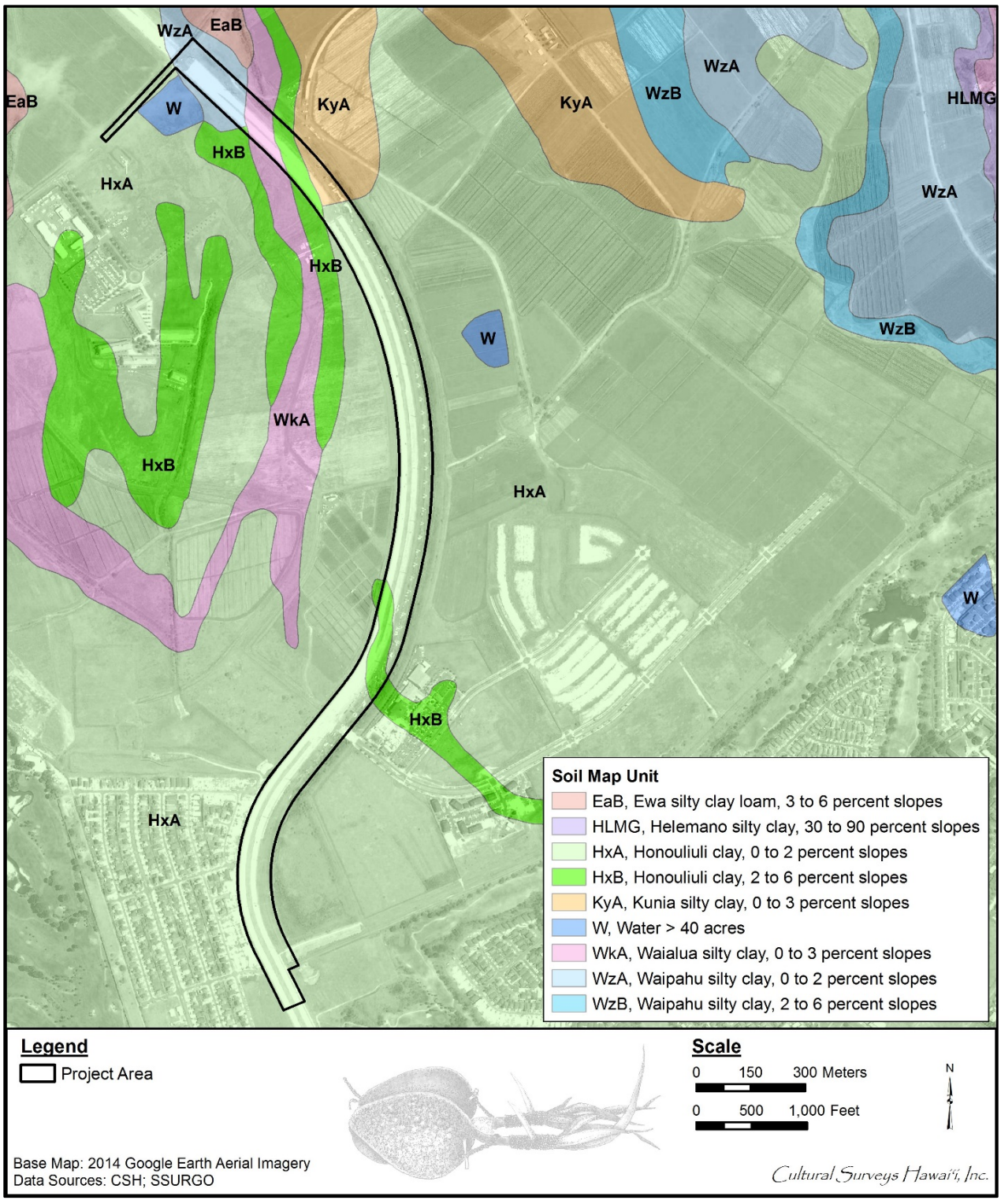

Figure 15. Portion of a 2014 Google Earth aerial photograph with overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and surrounding the Component 2 portion of the project area

Soils of the Waialua Series are described as follows:

> This series consists of moderately well drained soils on alluvial fans; these soils developed in alluvium weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 100 feet. The annual rainfall amounts to 25 to 50 inches; most of it occurs between November and April. The mean annual soil temperature is 73° F. Waialua soils are geographically associated with Honouliuli, Kaena, and Kawaihapai soils.
>
> These soils are used for sugarcane, truck crops, orchards, and pasture. The natural vegetation is swollen fingergrass, koa haole, and uhaloa. [Foote et al. 1972:128]

Soils of the Waipahu Series are described as follows:

> This series consists of well-drained soils on marine terraces on the island of O‘ahu. These soils developed in old alluvium derived from basic igneous rock. They are nearly level to moderately sloping. Elevations range from nearly sea level to 125 feet. Rainfall amounts to 25 to 35 inches annually; most of it occurs between November and April. The mean annual soil temperature is 75° F. Waipahu soils are geographically associated with Hanalei, Honouliuli, and Waialua soils. [Foote et al. 1972:134]

Soils of the Kunia Series are described as follows:

> This series consists of well-drained soils on upland terraces and fans on the island of Oahu. These soils developed in old alluvium. They are nearly level to moderately sloping. Elevations range from 700 to 1,000 feet. The mean annual rainfall amounts to 30 to 40 inches, most of which occurs from November to April. The mean annual soil temperature is 71° F. Kunia soils occur on the foot slopes of the Waianae Range, near Schofield Barracks. They are geographically associated with Kolekole, Lahaina, and Wahiawa soils.
>
> These soils are used for sugarcane, pineapple, home sites, and military reservations. Most areas are cultivated, and the natural vegetation is not significant. [Foote et al. 1972:77]

The project area vegetation consists primarily of introduced species including exotic grasses, *koa haole* (*Leucaena leucocephala*), *klu (Acacia farnesiana),* and castor bean plant (*Ricinus Communis*). The only native species identified in the project area was *‘uhaloa* (*Waltheria indica*), traditionally used for medicinal purposes.

The project corridor extends across the ‘Ewa Plain, a Pleistocene reef platform overlain by alluvium from the southern end of the Wai‘anae Mountain Range. This alluvium supported commercial sugarcane cultivation for over a century. The ‘Ewa Plain is hot and dry with an average annual rainfall of 25 inches (Giambelluca et al. 2013) and an average annual temperature of 74 F (23 C) (Giambelluca et al. 2014) . Despite the aridity, the area is prone to flooding. Floods of 1916, 1917, 1923, and 1927 have been well documented by archival photographs, some of which show standing water as far as the eye can see. Honouliuli Stream is the only major stream in the area, although it is located well outside the project area. Hunehune Gulch, a non-perennial stream, quickly traverses a portion of the Component 1 portion of the project area.

1.3.2 Built Environment

The portion of the project area that encompasses Component 1 includes a fallow field at the location of the planned R-1 reservoir, an extant reservoir tank and a BWS access road. The portion of the project area that encompasses Component 2 includes the heavily disturbed and graded shoulders of Farrington Highway and Kualaka‘i Parkway. The project area crosses the asphalt paved roadway in several locations. High voltage power lines cross the project area. The ongoing Honolulu High-Capacity Transit Corridor Project (HHCTCP) is adjacent to a portion of Component 2 of the project area along Kualaka‘i Parkway.

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological fieldwork permit number 17-08, issued by the SHPD pursuant to HAR §13-282. Fieldwork was conducted on 15 August 2017 by CSH archaeologists Thomas Martel III, B.A., Samantha Cragen, B.A., and David W. Shideler, M.A., under the general supervision of Principal Investigator, Hallett H. Hammatt Ph.D. This work required approximately 2 person-days 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 10 to 20 m apart conducted by two to three CSH archaeologists to ensure the entire surface of the project area was observed with sufficient ground visibility.

Photographs were taken of the general study area to document the area's natural and/or built environment and potential historic properties. Only minimal vegetation clearance was attempted, mostly for the purposes of feature photography.

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.

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.

Section 3 Background Research

3.1 Traditional and Historical Background

3.1.1 Traditions of Hawaiian Gods and Demi-gods

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 1991a: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 1991a:111; Pukui et al. 1974:200). The collection of myths and traditions presented in this section focus near the current project area in the central portion of Honouliuli Ahupua‘a, and also areas near Pearl Harbor.

3.1.2 The Naming of Honouliuli

Honouliuli is the largest *ahupua‘a* (traditional land division) 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:

> 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 the 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 it fell. So Ewa (strayed) became known by the name. The stone that strayed. [Told to E.S. by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:1]

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 (lit. long hill). 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:

> This is a spot where two small hills of the Waianae range come down parallel on the boundary between Honouliuli and Nanakuli (Ewa and Waianae). The ancient

> Hawaiians said the hill on the Ewa side was the male and the hill on the Waianae side was female. The stone was found on the Waianae side hill and the place is known as Pili o Kahe (Pili = to cling to, Kahe = to flow). The name refers, therefore, to the female or Waianae side hill. And that is where the boundary between the two districts runs. [Told to E.S. by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:1]

Honouliuli has a number of topographic features, peaks, streams, gulches, coastal points, and a number of ancient villages, as shown on Figure 16. A list of the names shown on Figure 16 and their meaning is presented in Table 2. All place names meanings are from Pukui et al. (1974) *Place Names of Hawaii*, unless otherwise noted.

3.1.3 Trails through Honouliuli

There were several pre-Contact/early historic trails across ‘Ewa: a cross-*ahupua‘a* trail that traversed ‘Ewa and connected Honolulu to Wai‘anae; a *mauka-makai* (mountain-coast) trail that branched off from the cross-*ahupua‘a* trail and followed the boundary between Honouliuli and Hō‘ae‘ae to the Pōhākea Pass and Kolekole Pass to Wai‘anae; and a second branching *mauka-makai* trail that generally followed the path of Waikele Stream in Waikele Ahupua‘a to Wahiawā in central O‘ahu (see Figure 12). Of the first *mauka-makai* trail, ‘Ī‘ī (1959:97) noted “from Kunia the trail went to the plain of Keahumoa, on to Maunauna, and along Paupauwela, which met with the trails from Wahiawā and Waialua.” ‘Ī‘ī (1959) places the area called Kunia east of Pōhākea Pass in the *ahupua‘a* of Honouliuli and Hō‘ae‘ae, *makai* of the modern town of Kunia, and places the plain of Keahumoa between Kunia and Paupauwela, in the most *mauka* (inland, toward the mountains) portion of Honouliuli. The trail passed near the peak called Maunauna in upper Honouliuli.

The north end of the current project area appears to meet the cross-*ahupua‘a* trail across the Honouliuli plain in the vicinity of Farrington Highway, which generally follows the ancient cross-*ahupua‘a* trail. To the east of Honouliuli, this trail was just *mauka* of the floodplains near Pearl Harbor, skirting the inland edges of the productive taro fields. In western Honouliuli, the trail dipped down toward the coast in the direction of a prominent hill and landmark, Pu‘uokapolei. The trail then crossed into Wai‘anae at the coast near Pili o Kahe, the stone that marked the boundary between the ‘Ewa and Wai‘anae districts (Figure 17).

3.1.4 Pu‘uokapolei and the Plains of Kaupe‘a

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‘uokapolei, Astronomical Marker and *Heiau*

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 (*Oahu 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

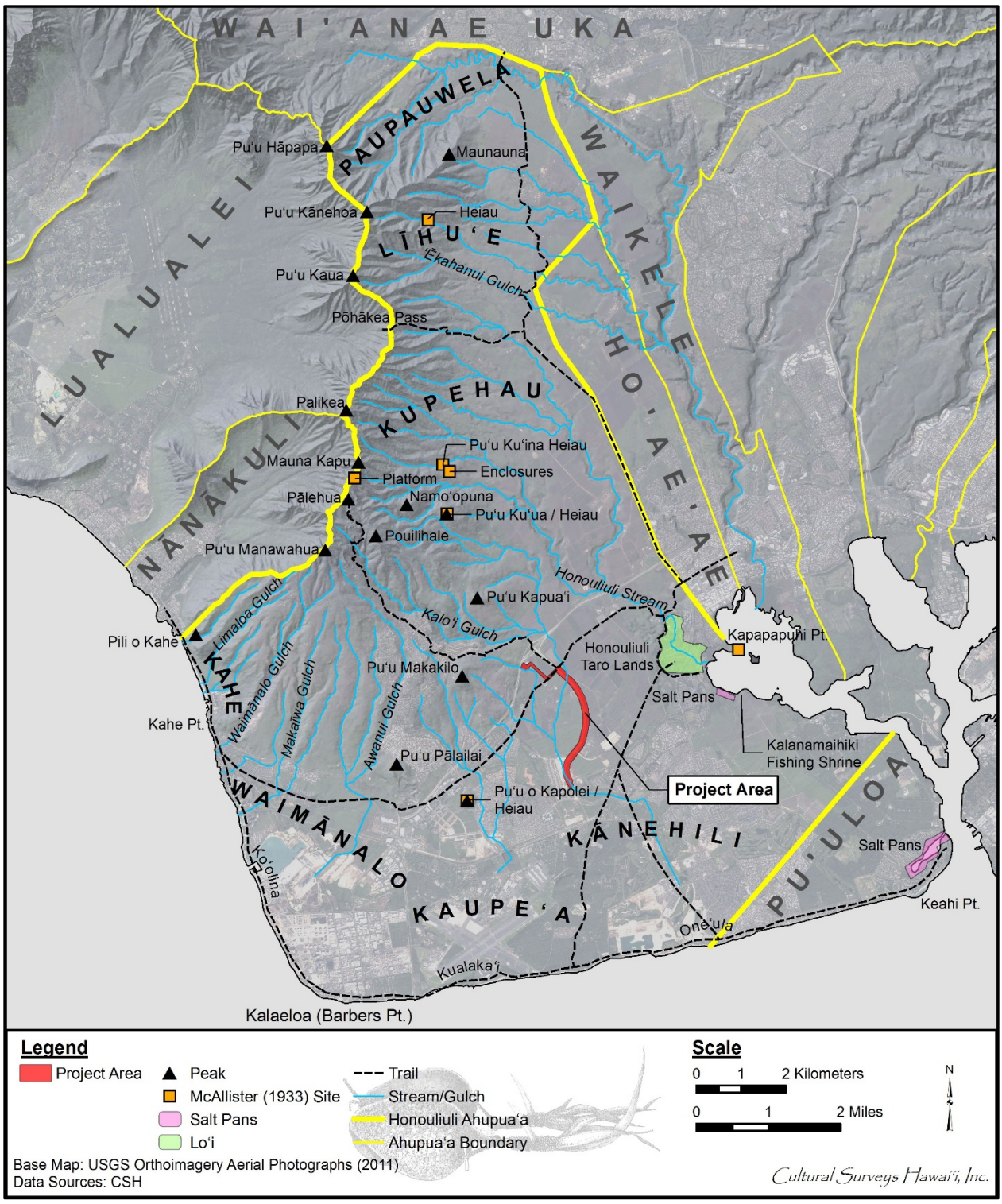

Figure 16. Place names of Honouliuli in relation to the project area overlying a 2011 USGS Orthoimagery aerial photograph; note the modern Farrington Highway generally follows the ancient cross-*ahupua‘a* trail

Table 2. Honouliuli place names

Place Name	Meaning
Akupu Spring	–
Anianikū Cove	–
Awanui Gulch	–
‘Ēkahanui Gulch	Large bird’s nest fern
Hāpapa, Pu‘u	Rock stratum hill; a shallow soil (Thrum 1922:643)
Honouliuli Stream/Gulch	Dark bay; blue harbor (Thrum 1922:643)
Huliwai Gulch	–
Ka‘aikukui Gulch	The candlenut root
Ka‘aumakua (peak)	The family god
Kahe Point	Flow
Kahe, Pu‘u	Flow
Kaihuopala‘ai (West Loch)	The nose of Pala‘ai
Kalaeloa Point	The long point
Kalo‘i Gulch	The taro patch
Kānehili Plain	–
Kānehoa, Pu‘u	Named for native shrubs; Kāne's friend (Thrum 1922:643)
Kapapapuhi (Kapapuhi) Point	The numerous eels (Thrum 1922:645)
Kapolei, Pu‘u o (hill, *heiau*)	Beloved Kapo, a sister of Pele
Kapuai (peak)	Footstep (Thrum 1922:645)
Kaua, Pu‘u	War hill or fort hill
Kaula Bay	–
Kaupe‘a Plain	–
Keon‘ō‘io Gulch	The sandy place with bone *(‘ō‘io*) fish
Kolekole Pass	Raw, scarred
Ko‘olina (village)	–
Kualaka‘i (village)	*Tethys* (a sea creature)
Ku‘ina, Pu‘u (peak; *heiau*)	–

Place Name	Meaning
Kupaka‘akahi (beach)	–
Ku‘ua, Pu‘u (peak; *heiau*)	Relinquished hill
Laulaunui Island	Large leaf package
Limaloa Gulch	Long arm
Makaīwa Gulch	Mother of pearl eyes
Makakilo, Pu‘u	Observing eyes
Manawahua, Pu‘u	Great grief hill or nausea hill
Manawaiahu Gulch	–
Manawaielu Gulch	–
Maunakapu (peak)	Sacred mountain
Maunauna (peak)	Mountain sent on errands
Mo‘opune, Pu‘u	Grandchild hill
One‘ula (village)	Red sand
Pālailai Gulch	Young *lai* fish
Pālailai, Pu‘u	Young *lai* fish hill
Pālehua (peak)	*Lehua* flower enclosure
Palikea (peak)	White cliff
Pili o Kahe Point	Clinging to Kahe
Pōhākea Pass	White stone
Pōhaku Palaha	Broad rock (Thrum 1922:666)
Poliwai Gulch	Water bosom
Pouilihale, Pu‘u	Dark house hill
Wai‘eli Gulch	Dug water
Waimānalo Gulch	Potable water

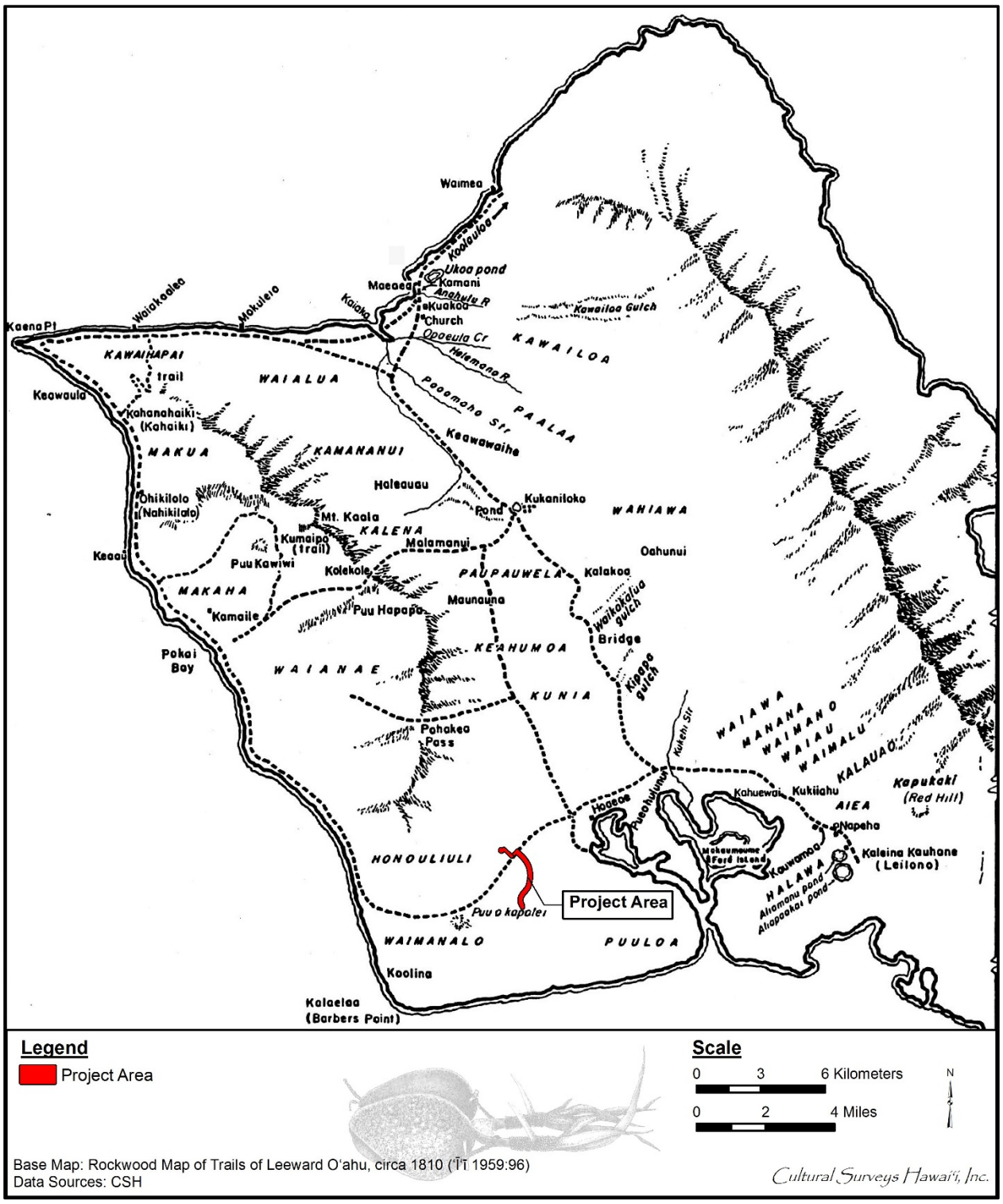

Figure 17. Portion of Rockwood map of trails of Leeward O‘ahu, ca. 1810, in relation to the current project area (‘Ī‘ī 1959:96)

> of coolness and for the sprouting of new buds on growing things—the season was called Ho‘oilo [winter, rainy season] [Kamakau 1976:14].

A *heiau* 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 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. Fornander (*A Lamentation for Kahahana*, 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.

Pu‘uokapolei and Kamapua‘a

Pu‘uokapolei was the home of Kamapua‘a’s grandmother, Kamaunuaniho, one of the three migrants from Kahiki that were ancestors to the people of O‘ahu (*Legend of Kamapuaa*, Fornander 1919:5(2):318; Kahiolo 1978:81, 107). Kamapua‘a, the Hawaiian pig god, once lived in Kaluanui on the windward side of O‘ahu, but he escaped to ‘Ewa when he was pursued by the chief Olopana.

> Kamapua‘a subsequently conquered most of the island of O‘ahu, and, installing his grandmother [Kamaunuaniho] as queen, took her to Pu‘uokapolei, 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 1904:50–51]

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 Pu‘uokapolei.” Another account (*Ka Loea Kālai‘āina* 13 January 1900 in Sterling and Summers 1978:34) speaks of Kekeleaiku, the older brother of Kamapua‘a, who also lived on Pu‘uokapolei.

Pu‘uokapolei and the Plains of Kaupe‘a and Kānehili

Hi‘iaka sang this bitter chant addressed to Lohiau and Wahine-‘ōma‘o, which uses the association of the Plains of Kaupe‘a as a place for the wandering of lost souls:

Ku‘u aikana i ke awa lau o Pu‘uloa,	We meet at Ewa’s leaf-shaped lagoon, friends;
Mai ke kula o Pe‘e-kaua, ke noho oe,	Let us sit, if you will on this lea
E noho kaua e kui, e lei i ka pua o ke kauno‘a,	And bedeck us with wreaths of Kauno‘a,
I ka pua o ke akuli-kuli, o ka wili-wili;	Of akuli-kuli and wili-wili,
O ka iho‘na o Kau-pe‘e i Kane-hili,	My soul went astray in this solitude;
Ua hili au; akahi no ka hili o ka la pomaika‘i;	It lost the track for once, in spite of luck,
E Lohiau ipo, e Wahine-oma‘o,	As I came down the road to Kau-pe‘a.
Hoe ‘a mai ka wa‘a i a‘e aku au.	

> 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 1993:162–163]

Several other Honouliuli places are mentioned in this chant, including Pe‘e-kaua, which may be a variation of Kau-pe‘e or Kaupe‘a, and the plains of Kānehili, the last of which again refers to wandering, as the word *hili* means “to go astray” (Emerson 1993:162). In the chant, Hi‘iaka is moving downhill from Kaupe‘a, probably the plains adjacent to Pu‘uokapolei, toward the coast to the plain of Kānehili.

The Plains of Kaupe‘a, Pu‘uokapolei, and the Realm of Homeless Souls

There are several places on the ‘Ewa coastal plain associated with *ao kuewa*, the realm of the homeless souls. Samuel Kamakau (1991b:47–49) 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 ream 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*) died, 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 1991a: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 1991a:49]

The breadfruit tree Leilono was said to have been located on the ‘Ewa-Honolulu border, above Āliamanu. In another section of his account of the dead, Kamakau (1991a:29) calls the plain of wandering souls the “plain at Pu‘uokapolei.”

> 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 1991b:29]

This 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.

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

[*A Lamentation for Kahahana*, Fornander 1919:6(2):297]

Fornander provides some notes on this lament. The god dwelling at Kapolei is Kahahana, stating that this is where his soul has gone. Kamao is one of the names of the door to the underworld. This lament draws an association with wandering souls and the place where the first breadfruit tree was planted by Kaha‘i at Pu‘uloa (*A Lamentation for Kahahana*, Fornander 1919:6(2):304).

Pukui (1983:180) offers this Hawaiian saying, which places the wandering souls in a *wiliwili* grove at Kaupe‘a.

> *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.
>
> [Pukui 1983:180]

Beckwith (1940:154) has stressed that “the worst fate that could befall a soul was to be abandoned by its *‘aumakua* 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.

The Plain 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 rock. This legend suggests the plain around Pu‘uokapolei was called Pukaua. The legend 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 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* grove on the hill. These women were named Pu‘uokapolei and Nāwaineokama‘oma‘o (*Ka Hōkū o Hawai‘i*, February 22, 1927, translation in Maly 1997:19). As she continued her travels, she looked to the ocean and saw the canoe carrying Lohi‘au.

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

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

3.1.5 The Caves of Honouliuli

‘Ewa was famous for the many limestone caves formed in the uplifted coral, called the “Ewa Karst.” This 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. In traditional Hawaiian times, the areas of exposed coral outcrop were undoubtedly more extensive.

Some of these caves, called *ka-lua-ōlohe* were inhabited by the *ōlohe*, a type of people that looked like other humans but had tails like dogs (Beckwith 1940:343). These people were skilled in wrestling and bone-breaking and often hid along narrow passes to rob travelers; they were also reputed to be cannibals. One famous cannibal king, Kaupe, lived in Līhu‘e in upland Honouliuli, was an *ōlohe*.

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.

> It seems that by Kekauonohi’s orders, the coffin containing her late husband’s remains was removed to Puuloa, 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 Puuloa, 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.

3.1.5.1 Pearl Harbor (Pu‘uloa) and West Loch (Kaihuopala‘ai)

<u>The “Silent Fish” of Pearl Harbor</u>

Pearl Harbor was called Pu‘uloa or *Keawalau-o-Pu‘uloa*, “the many harbored-sea of Pu‘uloa” (Pukui 1983:182) by the Hawaiians. An alternate name was Awawalei, or “garland (*lei*) of harbors” (Handy and Handy 1972:469). Pukui (1983:120) uses the name Awalau for Pearl Harbor, as in the saying “*Huhui na ‘ōpua i Awalau*, The clouds met at Pearl Harbor. Said of the mating of two people.” Emerson (1993:167) interpreted Awalau as “leaf-shaped lagoon.”

Clark (1977:70) says its English name came from the name Waimomi, or “water of the pearl,” an alternate name for the Pearl River (Pearl Harbor). The harbor was named Pearl Harbor after the pearl oysters of the family Pteriidae (mainly *Pinctada radiata*), which were once abundant on the harbor reefs, but were later decimated by over-harvesting. This oyster was supposedly brought from Kahiki, the Hawaiian ancestral lands, by a *mo‘o* (lizard or water spirit) named Kānekua‘ana (Handy and Handy 1972:470).

Kānekua‘ana was the *kia‘i* (food guardian) for ‘Ewa. When food was scarce, the descendants of Kua‘ana built *waihau heiau* (a *heiau* for *mo‘o*) for her and lit fires to plead for her blessings. For ‘Ewa the chief *i‘a* (marine food) blessing was the famous *pipi*, or pearl oyster. Samuel Kamakau describes the *pipi* of Honouliuli.

> 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 up] 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 cuttle fish, and shining with the colors of the rainbow-reds and yellow 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 1991b:83]

This oyster, the *pipi*, was sometimes called “the silent fish,” or, *i‘a hamau leo o ‘Ewa*, ‘Ewa’s silent sea creature (Handy and Handy 1972:471). The *pipi* collectors were supposed to stay quiet while harvesting the shells, as in the sayings:

> *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]
>
> *Haunāele ‘Ewa i ka Moa‘e.* ‘Ewa is disturbed by the Moa‘e wind.
>
> Used about something disturbing, like a violet argument. When the people of ‘Ewa went to gather the *pipi* (pearl oyster), 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]
>
> *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].
>
> *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]

Sereno Bishop, an early resident of O‘ahu, wrote of his time in the area around 1836, and of the pearl oyster, the *pipi*, and another edible clam, identified by Margaret Titcomb (1979:351) as probably the hieroglyph clam (*Lioconcha heiroglyphica*), :

> The lochs or lagoons of Pearl River were not then as shoal as now. The subsequent occupation of the uplands by cattle denuded the country of herbage, and caused vast quantities of earth to be washed down by storms into the lagoons, shoaling the water for a long distance seaward. No doubt the area of deepwater and anchorage has been greatly diminished. In the thirties, the small oyster was quite abundant, and common on our table. Small pearls were frequently found in them. No doubt the copious inflow of fresh water favored their presence. I think they have become almost entire extinct, drowned out by the mud. There was also at Pearl River a handsome speckled clam, of a delicate flavor which contained milk white pearls of exquisite luster and perfectly spherical. I think the clam is still found in the Ewa Lochs. [Bishop 1901:87]

Older Hawaiians believed the *pipi* disappeared around the time of the smallpox epidemic of 1850-1853, because Kānekua‘ana became displeased at the greed of some *konohiki* (overseers).

> The people of the place believe that the lizard was angry because the konohikis imposed kapus [bans], were cross with the women and seized their catch of oysters. So this ‘fish’ was removed to Tahiti and other lands. When it vanished a white, toothed thing grew everywhere in the sea, of ‘Ewa, which the natives of ‘Ewa had named the pahikaua (sword). It is sharp edged and had come from Kauai-helanai, according to this legend. [Manu 1885 in Sterling and Summer 1978:50]

Pahikaua is the Hawaiian name for the mussel, *Brachidontes crebristriatus* (Mytilidae), which was also a popular clam eaten by the residents of Pearl Harbor.

A clarification of the story of Kānekua‘ana and the pearl oysters of Pearl Harbor is given, in which it seems an overseer had set a ban on the *pipi* for several months of the year so that their numbers could increase. A poor widow, a relation of the *mo‘o*, took some of the *pipi* and hid them in a basket. The *konohiki* found the hidden shells, and took them from her, emptying them back into the sea, which was proper. However, after this he followed the woman home and also demanded that she pay a stiff fine in cash, which she did not have. The *mo‘o* thought this was unjust and the next night she took possession of a neighbor who was a medium.

> . . . After the overseer had gone back to Palea the lizard goddess possessed her aged keeper [a woman of Ewa] and said to those in the house, ‘I am taking the pipi back to Kahiki and they will not return until all the descendants of this man are dead. I go to sleep. Do not awaken my medium until she wakes of her own accord.’ The command was obeyed and she slept four days and four nights before she awoke. During the time that she slept the pearl oysters vanished from the places where they were found in great numbers, as far as the shore. The few found today are merely nothing . . . [*Ka Loea Kālai‘āina*, 3 June 1899, translation in Sterling and Summers 1978:50]

Ka‘ahupāhau, the Queen Shark of O‘ahu

Pearl Harbor, in legendary traditions, is closely associated with shark *‘aumakua*, guardian spirits for specific Hawaiian families or clans. Pukui (1943:56) and others (Sheldon 1883) claim the sharks of Pearl Harbor were so tame that people used to ride on their backs, and their human relatives would feed them with *‘awa*. The most famous guardian shark was Ka‘ahupāhau, the queen shark of O‘ahu, who lived in Pu‘uloa (Pearl Harbor). Her name means “cloak well cared for” (Pukui 1943:56), or “well cared-for feather cloak”; the feather cloak was a symbol of royalty.

Ka‘ahupāhau and her brother, Kahi‘uka, had been born as humans and were turned into sharks (Mary Kawena Pukui, 29 March 1954, in Sterling and Summers 1978:56).

> The mother, who was a chiefess, of Ka‘ahupahau was gathering limu [seaweed] in the waters of Pearl Harbor when she had a miscarriage. Thinking the baby dead she left it in the water to be washed away. Later she went again to gather limu and was bitten by a shark. She went to a kahuna [priest] who told her that the shark was Ka‘ahupahau who was her own daughter, the baby she thought was dead. The kahuna advised her to go to the place and build an ahu (heap) of hau a sort of landing from which she could feed the shark and care for it. It was from that time by command of the mother that all people of Ewa were to be always be protected from sharks whether in Pearl Harbor or outside. [E.S. as told by Simeon Nawaa, 22 March 1954, in Sterling and Summers 1978:56]

This explains the meaning of the shark's name Ka‘ahupāhau, "the mound (*ahu*) of *hau*" (*Hibiscus tiliaceus*). The grandmother of Ka‘ahupāhau and her brother, Koihala, lived in Honouliuli; one day she was making *lei* for her shark grandchildren. A young girl named Pāpio rudely begged for one of the *lei*, but Koihala refused. On her way to her favorite surfing spot at Keahi Point, Pāpio snatched up one of the *lei*, and laughingly went surfing. Koihala angrily told Ka‘ahupāhau about the stolen *lei*, and the shark killed the girl, grabbing her from a rock in the sea where she was resting.

> Ka‘ahupahau soon recovered from her anger and became very sorry. She declared that from hence forth all sharks in her domain should not destroy, but protect the people round about. As flowers were the cause of the trouble she forbade their being carried or worn on the water of Pu‘uloa. From that time all the people of that locality and the sharks in the lochs were the best of friends . . . [Pukui 1943:56]

In a second version of this story, the shark gods Kānehunamoku and Kamohoali‘i were the ones that had placed a *kanawai* (decree) against the attack of men by all sharks around O‘ahu. As a result of the attack of the chiefess Pāpio, Ka‘ahupāhau was put on trial and tried at Uluka‘a (the realm of the gods). She escaped the punishment of death, but was placed in confinement.

> After her confinement ended several years later Ka‘ahupahau was very weak. She went on a sightseeing trip, got into trouble, and was almost killed. But she received great help from Kupiapia and Laukahi‘u, sons of Kuhaimoana, when their enemies were all slain the *kanawai* was firmly established. This law-that no shark must bite or attempt to eat a person in Oahu waters-is well known from Pu‘uloa to the Ewa. Anyone who doubts my work must be a *malihini* [recent resident] there. Only in recent times have sharks been known to bite people in Oahu waters or to have devoured them; it was not so in old times. [Kamakau 1991b:73]

This information on the protective nature of Ka‘ahupāhau is somewhat contradicted by the writings of the Russian explorer Otto Von Kotzebue, who walked to Pearl Harbor in 1821, but was unable to actually sail on the waters. He was told that people were thrown into the water as sacrifices to the sharks. However, it is uncertain if the person who told him this was an actual resident of ‘Ewa, who would know the real truth. Kotzebue's account is here:

> In the Pearl River there are sharks of remarkable size, and there have made on the banks an artificial pond of coral stones, in which a large shark is kept, to which, I was told, they often threw grown-up people, but more frequently children, as victims. [Kotzebue 1821:338–348]

The protection of Ka‘ahupāhau is emphasized in many other Hawaiian traditions. One time, a man-eating shark called Mikololou from the Ka‘ū district of the island of Hawai‘i, came visiting at Pearl Harbor with other sharks, some man-eating, some not. Mikololou remarked, "What fine, fat crabs you have here," from which Ka‘ahupāhau knew that some of the sharks were man-eaters, since sharks referred to fishermen as "fat crabs." She directed the fishermen to place a barrier of nets across the entrance to the harbor, and when the sharks left her home, they could not get back out to the ocean.

> The sharks of the lochs attacked the man-eaters from outside and beat them unmercifully. A shark from Ka‘u, Hawaii, who was not a man-eater, threw his weight over the nets and pressed them down. His sons changed themselves into

> pao‘o [blennies] fishes and leaped where the net was forced down, thus escaping from the place where the battle of shark was raging. Mikololou was caught fast in the nets and dragged ashore where his head was cut off and his body burned. [Pukui 1943:56]

In another version of this story, Mikololou is accompanied to Pearl Harbor with his shark friends Kua, Keali‘ikauaoka‘ū, Pākaiea, and Kalani; Mikololou was the only man-eater. To escape the nets:

> Keali‘ikauaoka‘ū changed himself into a pao‘o fish, which lives among the rocks, and leapt out of the net. Kua changed into a lupe, as the spotted stingray is called, and weighted down the net on one side, helping his son Kalani and nephew Pākaiea, who were half human, to escape. [Pukui and Green 1995:40]

Only Mikololou was caught in the nets, and his body was tossed on shore to rot, until only the tongue was left. In some versions of this story, the tongue immediately jumps into the water and then becomes a shark again (Pukui and Green 1995:41). In other versions (Pukui 1943:56), the tongue is eaten by a dog, which then jumps into the water, turns into a shark, and escapes. In both versions, Mikololou returns to Ka‘ū, never to bother Ka‘ahupāhau again.

In one version (Webb 1923:307–308) version, Mikololou went back to his home island of Hawai‘i and organized an army of sharks to return to Pearl Harbor, but he was again defeated by the fishermen of ‘Ewa under the command of Ka‘ahupāhau, who slaughtered so many of the sharks that from then on “the sea of Pu‘uloa is safe and peaceful through her law that sharks shall not attack man. That is why these waters are safe for people to swim from shore to shore without fear” (Webb 1923:308). The watchful eye of Ka‘ahupāhau led to these Hawaiian sayings:

Alahula Pu‘uloa, he alahele Everywhere in Pu‘uloa is the trail

na Ka‘ahupāhau 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]

Ho‘ahewa na niuhi ia. The man-eating sharks blamed

Ka‘ahupāhau 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]

Mehameha wale no o Pu‘uloa, Pu‘uloa became lonely when

i ka hele a Ka‘ahupāhau. 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]

Make o Mikololou a ola Mikololou died and came to life again

i ke ale lo through his tongue.

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

There were other guardian sharks in Pearl Harbor, including a brother of Ka‘ahupāhau’s named Kahi‘ukā (the smiting tail), and a son named Kūpīpī (Pukui 1943:57) or, in some versions, twin sons, named Kūpīpī and Kūmaninini (Pukui and Green 1995:41). In one version of the Story of Pāpio, recounted above, it is said the Ka‘ahupāhau later turned into a stone, although the people of Pu‘uloa continued to feed her (Sterling and Summers 1978:56).

> Kahi‘ukā was the brother of Ka‘ahupahau. The name means ‘smiting tail.’ This shark was called by this name because it was his duty to warn the people of Ewa of the presence of strange and unfriendly sharks in these waters and he did so by nudging them or striking at them with his tail. When ever anyone was fishing and felt a nudge they would know it was Kahi‘uka, warning them and they would leave the water immediately. [E.S. as told by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:56]

There are two different accounts of the home of this shark brother. The above reference says Kahi‘ukā lived at the site of the old dry dock. Mary Pukui disagrees, and says the site of the old dry dock was the home of the son, not the brother of Ka‘ahupāhau. Mary Pukui says Kahi‘ukā lived in a cavern underwater off Moku‘ume‘ume (Ford Island) near Keanapua‘a Point; he had a stone form in deep water some distance from the cave that could be seen from the surface (Mary Kawena Pukui, 29 March 1954 in Sterling and Summers 1978:56). J.S. Emerson (1892:11) wrote in the late nineteenth century that Kahi‘ukā’s keeper, Kimona, would often find fish nets missing and knew that Kahi‘ukā had carried them up shore to a place of safety. Pukui also relates that the shark was named “smiting tail” because one side was longer than the other, and the shark would use his tail to smite unfriendly sharks.

<u>Ka‘ehu-iki-manō-o-Pu‘uloa, the Little Yellow Shark</u>

One of the shark *‘aumakua* associated with Pearl Harbor was the little yellow shark called Ka‘ehu, who was born on the Big Island, but later traveled to O‘ahu and settled at Pu‘uloa. His ancestor was Kama‘ili‘ili, the Hawaiian shark god, brother of the Hawaiian volcano goddess, Pele. Ka‘ehu was a guardian of the Hawaiian people and once saved several surf riders at Waikīkī from a man-eating shark called Pehu (Knudsen 1946:9–13; Westervelt 1963:55–58).

In Thrum’s translation of this legend, the shark’s name is Ka-ehu-iki-manō-o-Pu‘uloa, meaning “the small, blonde shark of Pu‘uloa.” He was born in Puna, Hawai‘i, but soon left on a tour of all of the islands, so that he could call and pay respects to all of the king-sharks of Hawai‘i.

> . . . Puuloa, Oahu, was the next objective. Reaching its entrance they visited the pit of Komoawa, where Kaahupahau’s watcher lived. Here the young shark made himself known, as usual; the object of the journey, and the desire to meet the famous queen-shark protector of Oahu‘s water . . . Welcome greetings were sent by the messenger, who was bid entertain the visitors in the outer cave, and on the morrow the party could come up the lochs to meet the queen . . . The company then repaired to the royal cave at Honouliuli, where the visitors were supplied with soft coconut and *awa*, their home food and beverage. [Thrum 1923:301–302]

The cave of Komoawa may be the Hawaiian words for “channel” or harbor” entrance (Pukui and Elbert 1986:164). In another version of this story, the shark watcher himself is named

Komoawa and the cave that he lives in is called Kea‘ali‘i. Kea‘ali‘i guards the entrance to Pearl Harbor, while the home of Ka‘ahupāhau is deeper into Honouliuli lagoon (Sheldon 1883).

In 1823, the missionary Hiram Bingham accompanied Liholiho (King Kamehameha II) and his company to the royal compound at Pu‘uloa, where he was shown a cave that was home to a shark god.

> I one day accompanied the king and others by boat to see the reputed habitation of an Hawaiian deity, on the bank of the lagoon of ‘Ewa. It was a cavern or fissure in a rock, chiefly under water, where, as the traditions teach, and as some then affirmed, a god, once in human form, taking the form of a shark, had his subterraqueous abode. Sharks were regarded by the Hawaiians as gods capable of being influenced by prayers and sacrifices, either to kill those who hate and despise them, or to spare those who respect and worship them . . . [Bingham 1847:177]

Although Bingham stated in this year that no one any longer believed these stories, there were some who kept the beliefs of the guardian sharks alive. In 1912, dredging in Pearl Harbor was completed and a large dry dock was completed, but collapsed the very next year. The Native Hawaiians believed the dock had collapsed because it had been built over the home of Kūpīpī the shark son of Ka‘ahupāhau’s, who lived in a cavern near the harbor entrance at Pu‘uloa. “Angered by the violation of his home, the shark prince destroyed the imposing structure” (Clark 1977:69–70). The dock was rebuilt in the same year, but this time only after a blessing on the construction was made by Hawaiian traditional practitioners.

In other versions of this story, the name of the shark is interpreted as “the little ruddy shark” (Emerson n.d.), or the “little reddish-haired shark,” named for the reddish (*‘ehu*) hair of Ka‘ehu. In this version, the cave of Ka‘ehu is called Pānau, and the human mother and father of the little shark are Kapukapu and Holei of Pānau, in Puna, Hawai‘i (Emory et al. 1959:63).

Kāne and Kanaloa and the Fish Ponds of West Loch

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).

According to Mary Pukui (1943:56–57), who visited Kapākule Fishpond when she was young, the pond was built by the legendary little people of Hawai‘i, the *menehune*, 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 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* (scad fish, *Trachurops 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) says the pond was used to catch the larger *akule (*goggler*), ‘ōpelu* (mackerel scad), *weke* (goat fish), *kawakawa* (bonito), and sharks. It was unusual for having walls made of coral. This contradicts much of the legendary material that says sharks were not killed within 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).

Samuel Kamakau adds more information on the pond Kapākule, and a second one called Kepo‘okala.

> At Pu‘uloa on Oahu were two unusual ponds [fish traps]—Kapakule and Kepoolala. Kapakule was the better one. The rocks of its walls, *kuapa*, could be seen protruding at high tide, but the interlocking stone walls (*pae niho pohaku*) of the other pond were still under water at high tide…It [Kapakule] was said to have been built by the *‘e‘epa* people [mysterious people] at the command of Kane ma . . .
>
> This is how the fish entered the pond. At high tide many fish would go past the *mauka* side of the pond, and when they returned they would become frightened by the projecting shadows of the trunks, and would go into the opening. The fish that went along the edge of the sand reached the seaward wall, then turned back toward the middle and entered the *anapuna* (the arched portion of the trap) A man ran out and placed a ‘cut-off’ seine net (‘*omuku lau*) in the opening, and the fish shoved and crowded into it. The fish that were caught in the net were dumped out, and those not caught in the net were attacked with sharp sticks and tossed out, or were seized by those who were strong. [Kamakau 1976:88]

<u>The Story of Kaihuopala‘ai</u>

In the Legend of Maikohā (*Legend of Maikoha*, Fornander 1919:5(2):270–271), a sister of Maikohā, a deified hairy man who became the god of *tapa* makers, named Kaihuopala‘ai, journeys to O‘ahu:

> *‘Ike aku la o Kaihuopala‘ai i ka maikai o Kapapaapūhi, he kāne e noho ana ma Honouliuli ma ‘Ewa. Moe iho la lāua, a noho iho la o Kaihuopala‘ai i laila a hiki i kēia lā. ‘Oia kēlā loko kai e ho‘opuni ia nei i ka ‘anae, nona nā i‘a he nui loa, a hiki i kēia kākau ana.*
>
> Kaihuopala‘ai saw a goodly man by the name of Kapapaapūhi who was living at Honouliuli, ‘Ewa; she fell in love with him and they were united, so Kaihuopala‘ai

> has remained in ‘Ewa to this day. She was changed into that fishpond in which mullet are kept and fattened, and that fish pond is used for that purpose to this day. [*Legend of Maikoha*, Fornander 1919:5(2):270]

The name of Maikohā’s sister, Kaihuopala‘ai, which means “the nose of Pala‘ai” (Pukui et al. 1974:68) is also the name the Hawaiians used for the west loch of Pearl Harbor. McAllister (1933) recorded that other Hawaiians say there never was a fishpond by that name. Beckwith (1918) says Kaihuopala‘ai changed into the fishpond near the place called Kapapapūhi, which means “the eel flats.” This is identified on old maps as the peninsula that juts into the west side of West Loch (sometimes spelled Kapapa‘apūhi); early Hawaiian settlement was focused on this area.

There is also a famous *pōhaku*, or rock, associated with the traveling mullet of Pearl Harbor.

> . . . I . . . asked the person sitting on my left, ‘What place is this?’ Answer—‘This is Pearl City.’ It was here that mullets were bred in the ancient times and that flat stone there was called Mullet Rock or Pōhaku Anae. It lies near the beach by Ewa mill. [*Ka Nūpepa Kū‘oko‘a*, 2 October 1908 Sterling and Summers 1978:53]

The Traveling Mullet of Honouliuli

The story of Kaihuopala‘ai, or Ihuopala‘ai, is also associated with the tradition of the *anae-holo*, the traveling mullet of Pearl Harbor (Nakuina 1998:270–272):

> 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]

In Nakuina’s account, Ihupala‘ai is a male who possesses a Kū‘ula or fish god that supplied the large mullet known as *‘anae*. His sister lived in Lā‘ie, and there came a time when there were no fish to be had. She sent her husband to visit Ihupala‘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 proverb or poetical saying identified with Honouliuli:

The fish fetched by the wind. Ka i‘a hali a ka makani

> 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]

Pukui et al. (1974:68) give the name of the husband in this story as Lā‘ie and the name of the wife as Pala‘ai, which ties into the name of the west loch of Pearl Harbor, called Kaihu o Pala‘ai, “the nose of Pala‘ai.” Another version has a woman named Awawalei (an alternate version for the name of Pearl Harbor), who had a brother named Laniloa (the point on Lā‘ie at which the mullet stops its migration and makes its way back to Pearl Harbor), and another brother (a mullet) who lived with an eel named Papapūhi, which relates to the name of the fishpond in the tale called Kapapapūhi (*Ka Loea Kālai‘āina*, 21 October 1899).

3.1.6 Early Historic Period

In AD 1795, 17 years after Captain James Cook made the first Western Contact with the Hawai‘i, the great Hawaiian warrior Kamehameha completed his conquest of the island of O‘ahu and then went on to consolidate his rule over all of the Hawaiian islands. He gave the *ahupua‘a* (traditional land division) 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.

Various Hawaiian legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian *ali‘i* (chiefly class). This would be attributable, for the most part, to the plentiful marine and estuarine resources available at the coast, along which several sites interpreted as permanent habitations and fishing shrines have been located. Other attractive subsistence-related features of the *ahupua‘a* include irrigated lowlands suitable for wetland taro cultivation, as well as the lower forest area of the mountain slopes for the procurement of forest resources. Handy and Handy (1972) report:

> The lowlands, bisected by ample streams, were ideal terrain for the cultivation of irrigated taro. The hinterland consisted of deep valleys running far back into the Ko‘olau range. Between the valleys were ridges, with steep sides, but a very gradual increase of altitude. The lower part of the valley sides were excellent for the cultivation of yams and bananas. Farther inland grew the ‘awa for which the area was famous. [Handy and Handy 1972:429]

In addition, breadfruit, coconuts, *wauke* (paper mulberry, *Broussonetia papyrifera,* used to make *kapa* for clothing), bananas, *olonā* (*Touchardia latifoli*, used to make cordage), and other plants were grown in the interior. ‘Ewa was known as one of the best areas to grow gourds and was famous for its *māmaki* (*Pipterus* spp.; used to make *kapa* for clothing). It was also famous for a rare taro called the *kāī o ‘Ewa*, which was grown in mounds in marshy locations (Handy and Handy 1972:471). The cultivation of this prized and delicious taro led to the saying:

> *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 of a maiden of ‘Ewa, who, like the Kāī taro, is not easily forgotten.
>
> [Pukui 1983:305]

The lochs of Pearl Harbor were ideal for the construction of fishponds and fish traps. Forest resources along the slopes of the Wai‘anae Range probably acted as a viable subsistence alternative during times of famine and/or low rainfall (Handy 1940:211; Handy and Handy 1972:469–470). The upper valley slopes may have also been a resource for sporadic quarrying of basalt used in the manufacturing of stone tools (Hammatt et al. 1990).

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:I: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:II: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:III:361–363]

Subsequent to Western Contact in the area, the landscape of the ‘Ewa plains and Wai‘anae slopes was adversely affected by the removal of the sandalwood forest and the introduction of domesticated animals and new vegetation species. Domesticated animals, including goats, sheep and cattle, were brought to the Hawaiian Islands by Vancouver in the early 1790s, and were allowed to graze freely about the land for some time after. It is unclear when the domesticated animals were brought to O‘ahu. However, L.A. Henke reports the existence of a longhorn cattle ranch in Wai‘anae by at least 1840 (Frierson 1972:10). During this same time, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing.

At Contact, the most populous *ahupua‘a* on the island was Honouliuli, with the majority of the population centered on Pearl Harbor. The earliest map of the area (Malden 1825) shows no habitation closer than the western edge of West Loch in the vicinity of Papapapuhi Point (Figure 18). In 1832, a missionary census of Honouliuli recorded the population as 1,026. Within four years, the population was down to 870 (Schmitt 1973:19, 22). In 1835, there were eight to ten deaths for every birth (Kelly 1991:157–158). Between 1848 and 1853, there was a series of epidemics of measles, influenza, and whooping cough that often wiped out whole villages. In 1853, the population of ‘Ewa and Wai‘anae combined was 2,451 people. In 1872, it was 1,671 (Schmitt 1968:71). The inland area of ‘Ewa was probably abandoned by the mid-nineteenth century, due to population decline and consolidation of the remaining people in the town of Honouliuli, near Kapapapūhi Point.

3.1.7 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.

In 1855, the Land Commission awarded all of the unclaimed lands in Honouliuli, 43,250 acres, to Miriam Ke‘ahikuni Kekau‘ōnohi (Royal Patent 6971 in 1877; Parcel 1069 in the Land Court office; Land Commission Award 11218), a granddaughter of Kamehameha I, and the heir of Kalanimōkū, who had been given the land by Kamehameha after the conquest of O‘ahu (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,

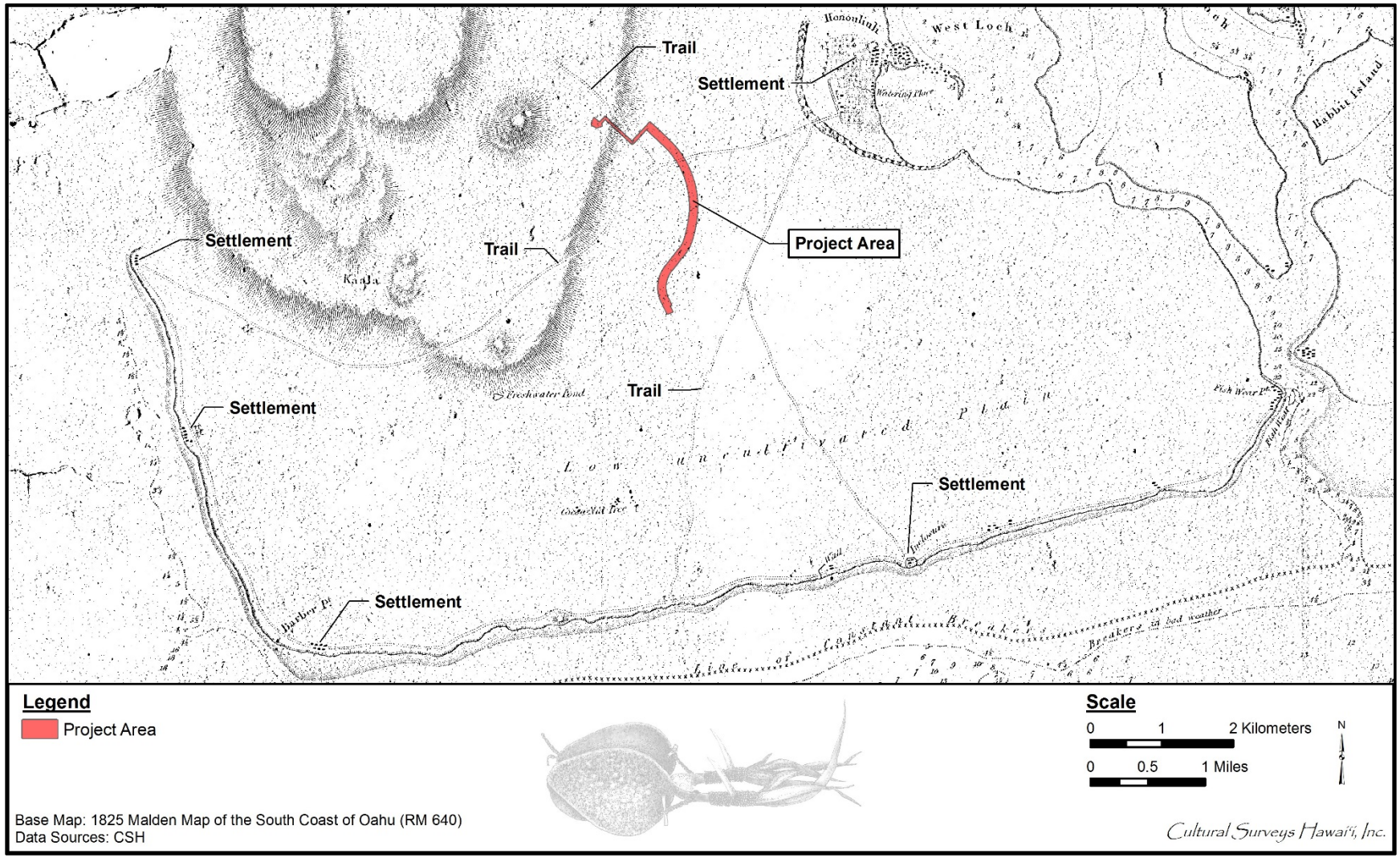

Figure 18. Portion of an 1825 Malden map of the South Coast of O‘ahu showing the location of the project area in relation to settlements and trails

all her property was passed on 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). In 1864, Ha‘alelea died, and his second wife, Anadelia Amoe, transferred ownership of the land to her sister’s husband John Coney.

During the Māhele of 1848, 96 individual land claims were made in the *ahupua‘a* of Honouliuli, with 72 claims being registered and awarded by King Kamehameha III to commoners (Table 3; Tuggle and Tomonari-Tuggle 1997:34). The 72 *kuleana* awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, irrigated *lo‘i* (taro fields), *kula* (pasture or dry field), and house lots. The 1825 Malden map of the South Coast of O‘ahu (see Figure 18) shows the current project area located west of the dense cluster of LCA parcels in lower Honouliuli Gulch, known as the “Honouliuli Taro Lands.” No LCAs were recorded within the current project area.

3.1.8 Mid- to Late 1800s and 1900s

Early Ranching on the ‘Ewa Plain

In 1871, John Coney rented the lands of Honouliuli to James Dowsett and John Meek, who used the land for cattle grazing. In 1877, James Campbell purchased most of Honouliuli Ahupua‘a for $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). He let the land rest for one year and then began to restock the ranch, so that he had 5,500 head after a few years (Dillingham 1885 in Frierson 1972:14).

In 1881, a medical student touring the island to provide smallpox vaccinations to the population, viewed Campbell’s property, called Honouliuli Ranch:

> I took a ride over the Honouliuli Ranch which is quite romantic. The soil is a deep, reddish loam, up to the highest peaks, and the country is well-grassed. Springs of water abound. The *‘ilima*, which grows in endless quantities on the plains of this ranch, is considered excellent for feeding cattle; beside it grows the indigo plant, whose young shoots are also good fodder, of which the cattle are fond. Beneath these grows the manieizie grass, and Spanish clover and native grasses grow in the open; so there is abundant pasturage of various kinds here. As I rode, to the left were towering mountains and gaping gorges; ahead, undulating plains, and to the right, creeks and indentations from the sea. A wide valley of fertile land extends between the Nuuanu Range and the Waianae Mountains and thence to the coast of Waialua. There are many wild goats in this valley, which are left more or less undisturbed because they kill the growth of mimosa bushes, which would otherwise overrun the country and destroy the pasturage for cattle. [Briggs 1926:62–63]

In 1880-81, Honouliuli Ranch was described as follows:

> Acreage, 43,250, all in pasture, but possessing fertile soils suitable for agriculture; affords grazing for such valuable stock. The length of this estate is no less than 18 miles. It extends to within less than a mile of the sea coast, to the westward of the Pearl River inlet . . . There are valuable fisheries attached to this estate . . . [Bowser 1880:489]

Table 3. 72 *Kuleana* LCAs in Honouliuli Ahupua‘a

LCA	Awardee	*‘Ili* (small land division)		LCA	Awardee	*‘Ili*
748	Kalauhala	Panahaha, Kaaumakua		906	Kanoho	Kamoku
749	Mahina	Kaulaula		907	Luana	Kamaipipipi, Niukee
751	Kalauli	Kamoku, Polapola, Kalihikahi		910	Nunu	Kaaumakua
752	Haae	Kailikahi, Kailihai		911	Kauhailepa	Poohilo
753	Manuwa	Kamoku		914	Kamaala	Niukee, Kapapahi
754	Kaunahi	Niukee		916	Kama	Loloulu, Makau
755	Keinohana-nui	Niukee, Kailikahi, Kaakau		917	Kaulu	Kamilomilo, Kaaumakua
756	Kauouo	Kaaumakua		947	Kaopala	Loloulu, Kaulaula
758	Nihua	Niukee		960	Poopuu	Loloulu
760	Kuhemu	Kamaipipipi, Niukee, Naopala, Kailikahi		1565	Kaalauahi	Niukee, Kapapahi
761	Kinolua	Niukee, Kailikahi, Ilikahi, Palahemo		1570	Kekua	Poohilo
762	Kalama	Kaaumakua		1570-B	Paekane	Kaaumakua
763	Keliiaa, Solomona	Hiwa, Poohilo, Mauakapuoa, Uani / Maui, Polapola		1570-C	Naholowaa	Kaaumakua
765	Kamalae	Niukee, Kailikahi, Palahemo		1573	Kawahamana	Niukee, Kapapapuhi
766	Paele	Niukee, Kaluamooiki, Kailikahi		1580	Kanahuna	Kamilomilo
767	Hapauea	Niukee, Kapapahi		1580-B	Kapioho	Polapola, Kahiwapalaai
768	Pio	Kahaumakua, Niukee, Waioha		1598	Kekua	Loloulu, Kapapahi
827	Kauakahilau	Poohilo		1605-B	Nakai	Mahuna, Niukee
828	Kawahaea	Poohilo		1666	Mauwele	Poohilo
831	Kaekuna	Poohilo		1666-B	Kuahilo	Poohilo
832	Opiopio	Poohilo		1670	Moano	Loloulu, Kaaumakua
834	Oni	Poohilo, Kailikahi		1672	Makue	Kamoku, Kapapapuhi

LCA	Awardee	*‘Ili* (small land division)		LCA	Awardee	*‘Ili*
839	Kaaiawaawa	Kamilomilo, Kailikahi, Haole, Poohilo		1699	Leleiaupa	Maui, Poaiwaikele
845	Kekukahiko	Kapapahi, Niukee		1701	Alaluka	Pohilo
847	Hinaa	Poohilo		1703	Aimaikai	Kamilomilo
848	Kapule	Poohilo		1713	Healani	Niukee, Kapapuhi
869	Pue	Maui		1719	Hilea	Kaaumakua
872	Kahakuliilii	Loloulu, Paakai, Papaioua		1720	Hilinae	Polapola
874	Laamaikahiki	Polapola, Hiwa		5204	Kalama 2	Polapola
876	Nohunohu	Niukee, Nukee		5653	Kua	Maui, Polapola, Kahui
881	Kikala	Polapola		5654	Kuhiena	Maui, Poohilo
886	Kahalewai	Kamoku, Manuwa		5653-B	Kanehikili	Poohilo
892	Aoao, Samuela	Kapapahi, Niukee		5670-B	Kaohai	Kaihuopalaai, Polapola
898	Kaneaola	Polapola		5670-C	Kumupopo	Poohili, Kepoe, Loloulu, Puaaluu
901	Kuahine	Nukee / Niukee,		5950	Pihana	Kamoku
902	Haakue	Waimanalo		10933	Uia	Niukee
905	Kaimuena	Kaaumakua				

> From Mr. Campbell's veranda, looking eastward, you have one of the most splendid sights imaginable. Below the house there are two lochs, or lagoons, covered with water fowl, and celebrated for their plentiful supply of fish, chiefly mullet . . . Besides Mr. Campbell's residence, which is pleasantly situated and surrounded with ornamental and shade trees, there are at Honouliuli two churches and a school house, with a little village of native huts. [Bowser 1880:495]

Most of Campbell's lands in Honouliuli were used exclusively for cattle ranching. At that time, one planter remarked "the country was so dry and full of bottomless cracks and fissures that water would all be lost and irrigation impracticable" (Ewa Plantation Company 1923:6–7). In 1879, Campbell brought in a well-driller from California to search the ‘Ewa plains for water. A well, drilled to a depth of 240 ft near Campbell's home in ‘Ewa, resulted in "a sheet of pure water flowing like a dome of glass from all sides of the well casing" (*The Legacy of James Campbell* n.d. in Pagliaro 1987:3). Following this discovery, plantation developers and ranchers drilled numerous wells in search of the valuable resource. The capital of entrepreneurs like James Campbell, Benjamin Dillingham, and W.R. Castle, along with the rapid development of artesian water, led to the creation of Ewa Plantation which was incorporated in 1890.

> The first crop, 2,849 tons of sugar, was harvested in 1892. Ewa was the first all-artesian plantation and, in spite of early troubles . . . it gave an impressive demonstration of the part artesian wells were to play in the subsequent history of the Hawaiian sugar industry. [Kuykendall 1967:69]

Other Enterprises in Campbell Lands

Parts of Campbell's lands were also used to grow rice. By 1885, 200 acres in Honouliuli were used for rice and 50 acres were used to grow bananas (article in *Pacific Commercial Advertiser*, 15 August 1885, summarized in Silva 1987:A-12). The rice fields were planted in former taro fields or in undeveloped swamps, such as those near the former Honouliuli Taro Lands. The rice fields in 1882 were described by Frank Damon during a tour of the area:

> . . . Towards evening we reached Honouliuli, where the whole valley is leased to rice planters . . . This was one of the largest rice plantations we visited. Sometimes two or three men only, have a few fields which they cultivate for themselves, and we often too came upon houses where there were eight or ten men working their own land. But the larger plantations are owned by merchants in Honolulu, who have a manager acting for them , , , [Damon 1882:37]

In 1890, Dillingham leased all Honouliuli lands below 200 ft to William Castle, who used most of the land for sugarcane cultivation, but also sub-leased some lands for rice cultivation, pasture, wood lots, bee-keeping, garden crops, and quarries. Some land above 650 ft was also leased for the cultivation of canaigre, which may be a word used for pineapple (Frierson 1972:15–16).

An additional agricultural trial was conducted in the Honouliuli area for the cultivation of sisal, a plant used to make fibers for rope and other material. Some sisal was planted before 1898 and production continued until the 1920s (Frierson 1972:16). This was grown mainly on the coastal plain of Honouliuli in Kānehili, just *mauka* of Kualaka‘i Beach (now Nimitz Beach). An article in the *Paradise of the Pacific* in 1902 described this venture in glowing terms:

> The venture was made and a tract of land containing a large percentage of disintegrated coral, in the neighborhood of Ewa Plantation, where nothing else

> would grow, was chosen for the planting . . . The Hawaiian Fiber Co., which Mr. Turner organized, and of which he is now manager, has 755 acres under fence, two and a half miles of which is stone wall with good gates at convenient places . . . In a large field containing 130 acres, mauka of the Oahu Railway & Land Co. track, the first harvest is to be gathered in a few months . . . Out of this section of 130 acres the company has figured on securing 50 tons of clean fiber, for which it is offered eight cents per pound in Honolulu or nine cents per pound in San Francisco . .. [*Paradise of the Pacific* March 1902:17]

Into the early twentieth century, some Hawaiian families continued to live in Honouliuli, including the fishing village of Kualaka‘i, preserving the traditional lifestyle. One resident, Mrs. Eli Williamson, recalled,

> In the Honouliuli area the train stopped among the *kiawe* (algaraboa) trees and *malina* (sisal) thickets. We disembarked with the assorted food bundles and water containers. Some of the Kualaka‘i *‘ohana* (family) met us to help carry the *‘ukana* (bundles) along a sandstone pathway through the *kiawe* and *malina*. The distance to the frame house near the shore seemed long. When we departed our *‘ukana* contained fresh lobsters, *limu* (algae), fish and *i‘a malo‘o* (dried fish) . . . [Williamson in Kelly 1985:160]

History of the Oahu Railway and Land Company (OR&L)

In 1886, James Campbell and B.F. Dillingham put together the “Great Land Colonization Scheme,” which was an attempt to sell Honouliuli land to homesteaders (Thrum 1886:74). This homestead idea failed. Two factors influencing the failure were the lack of water and the distance from ‘Ewa to Honolulu. The water problem was solved by the drilling of artesian wells, and Dillingham decided the area could be used instead for large-scale agricultural cultivation (Pagliaro 1987:4). The transportation problem was to be solved by the construction of a railroad, which Dillingham soon began to finance under the company name of the Oahu Railway & Land (OR&L).

During the last decade of the nineteenth century, the railroad reached from Honolulu to Pearl City in 1890, to Wai‘anae in 1895, to Waialua Plantation in 1898, and to Kahuku in 1899 (Kuykendall 1967:III:100). This railroad line eventually ran across the center of the ‘Ewa Plain, generally running along the *makai* boundary of the sugarcane fields. To attract business to the new railroad, Dillingham sub-leased all Honouliuli lands below 200 ft to William Castle, who in turn sublet the area to the newly formed Ewa Plantation Company (Frierson 1972:15). Dillingham’s Honouliuli lands above 200 ft that were suitable for sugarcane cultivation were sublet to the Oahu Sugar Company. Throughout this time, and continuing into modern times, cattle ranching continued in the area, and Honouliuli Ranch was the “fattening” area for the other ranches (Frierson 1972:15).

Operations at the OR&L began to slow down in the 1920s, when electric streetcars were built for public transportation within the city of Honolulu and automobiles began to be used by families for transportation outside the city (Chiddix and Simpson (2004:185). The build-up to World War II turned this decline around, as the U.S. military utilized the OR&L lines to transport materials to build defense projects around the island. Historians have noted that one of the most serious mistakes made by the Japanese in their 1941 attack on Pearl Harbor was their decision not to bomb the railway infrastructure. Soon after the attack, the OR&L operated 24 hours a day, transporting

war materials and troops from Honolulu to the new and expanded army, naval, and air bases. The huge naval base at Pearl Harbor had its own rail lines that connected to the OR&L rail lines.

In August 1945, the war ended and so did the OR&L's heyday as a military transport line:

> She had served her country well and proudly during the war, but operating round-the-clock on what little maintenance could be squeezed in, had taken a prodigious hit on the locomotives and track. Traffic stayed steady for a short time, but soon dropped precipitously as soldiers and sailors went home, military posts were shrunk or razed, and civilians could again get tires, gasoline and new cars. [Chiddix and Simpson 2004:257]

There was no choice but to abandon the OR&L main line, and in 1946 Water F. Dillingham, son of B.F. Dillingham, wrote,

> The sudden termination of the war with Japan changed not only the character of our transportation, but cut the freight tonnage to a third and the passenger business to a little above the pre-war level. With the increased cost of labor and material and the shrinkage in freight tonnage and passenger travel, it was definite that the road could not be operated as a common carrier. With no prospect of increased tonnage, and the impossibility of increasing rates against truck competition, your management has applied to the Interstate Commerce for authority to abandon its mainline. [Walter Dillingham in Chiddix and Simpson 2004:257]

After the war, most of the over 150 miles of OR&L track was pried up, locomotives were sold to businesses on the U.S. mainland, and railway cars were scrapped. In 1947, the U.S. Navy took over a section of the OR&L track for their own use: to transport bombs, ammunition, and torpedoes from the ammunition magazines at Lualualei, West Loch, and Waikele, on OR&L's Wahiawā Branch line to Pearl Harbor Naval Base (Treiber 2005:25–26). The track to Waipahu was abandoned in the 1950s, but the line from the magazines in Lualualei to the wharves in West Loch at Pearl Harbor remained open until 1968.

History of the Ewa Plantation Company

The Ewa Plantation Company was incorporated in 1890 for sugarcane cultivation. The first crop, 2,849 tons of sugar, was harvested in 1892. Ewa Plantation Company was the first all-artesian plantation, and it gave an impressive demonstration of the part artesian wells were to play in the later history of the Hawaiian sugar industry (Kuykendall 1967:III:69). 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. When the rainy season began, they plowed ground perpendicular to the slope so that soil would be carried down the drainage ditches on to the lower coral plain. After a few years, about 373 acres of coral wasteland were reclaimed in this manner (Immisch 1964). By the 1920s, Ewa Plantation Company was generating large profits and was the "richest sugar plantation in the world" (*Paradise of the Pacific*, December 1902:19–22 in Kelly 1985:171).

During the twentieth century, the Ewa Plantation Company continued to grow and, by the 1930s, encompassed much of the eastern half of Honouliuli Ahupua‘a (Figure 19 through Figure 27). This growth impelled the creation of plantation villages to house the growing immigrant labor force working the fields. After the outbreak of World War II, which siphoned off much of the plantation's manpower, along with the changeover to almost complete reliance on mechanical

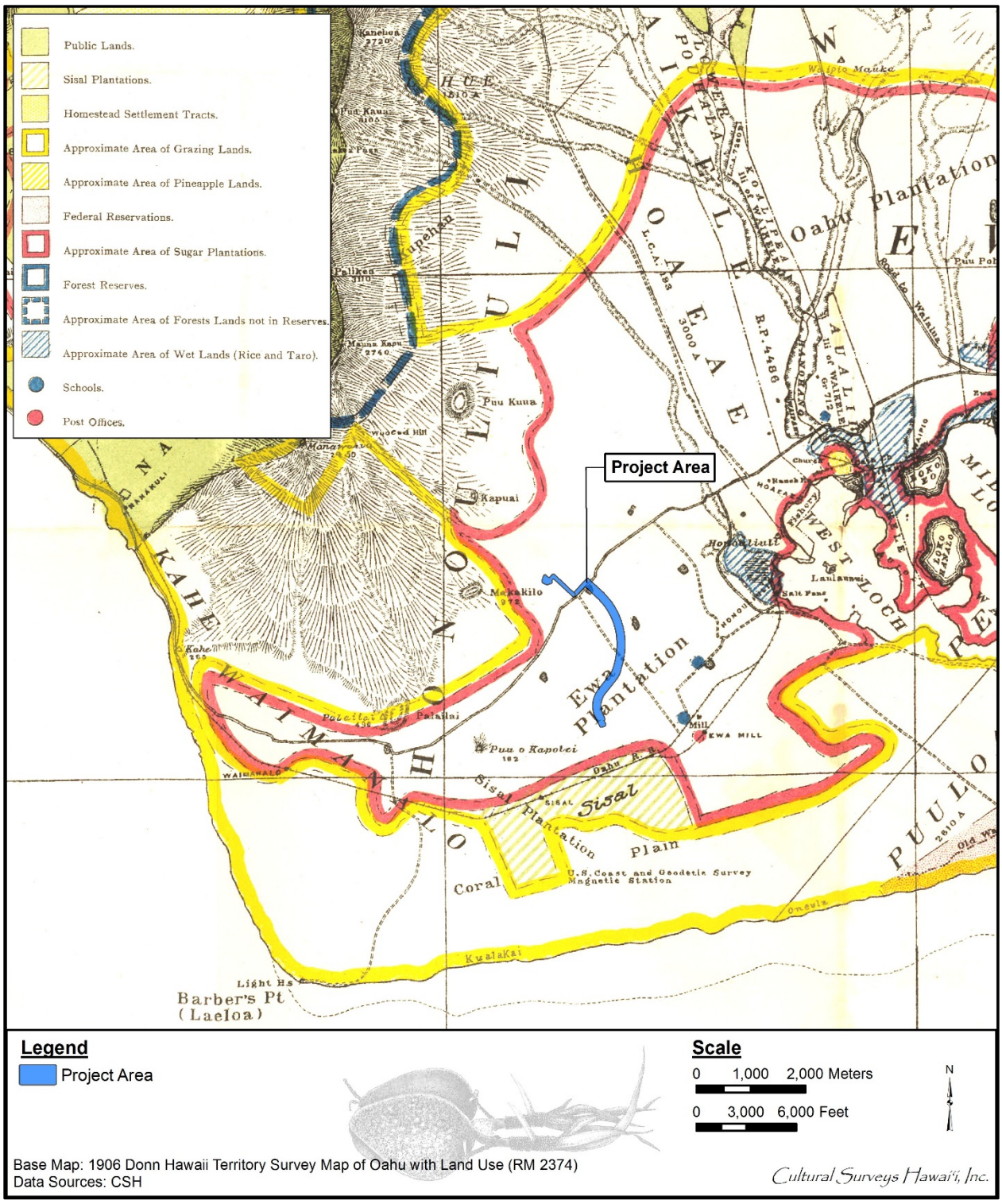

Figure 19. Portion of a 1906 Donn Hawaii Territory Survey map of O‘ahu with land use, showing location of current project area within sugar plantation lands

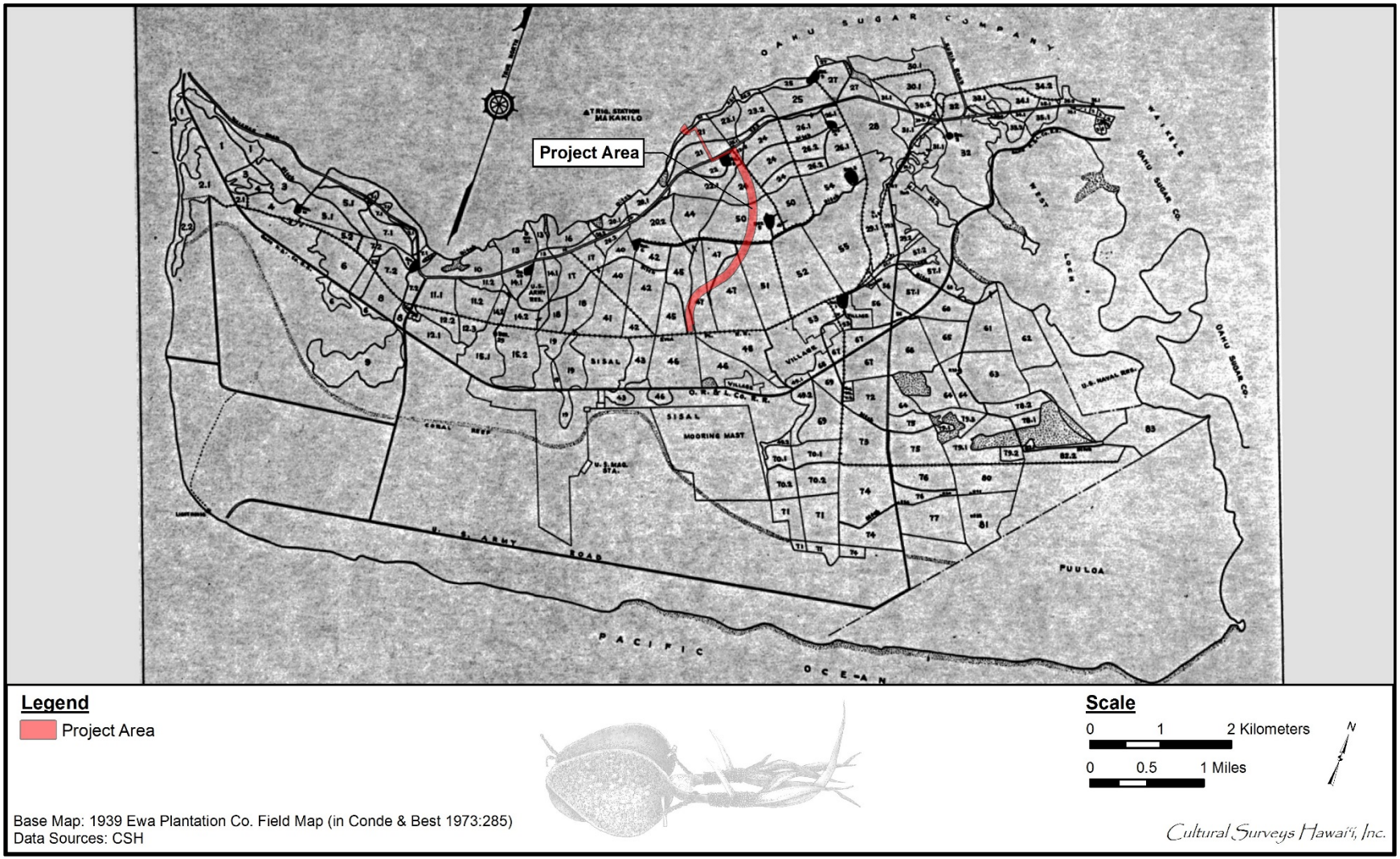

Figure 20. Portion of a 1939 Ewa Plantation Company field map showing the location of the project area (adapted from Condé and Best 1973:285)

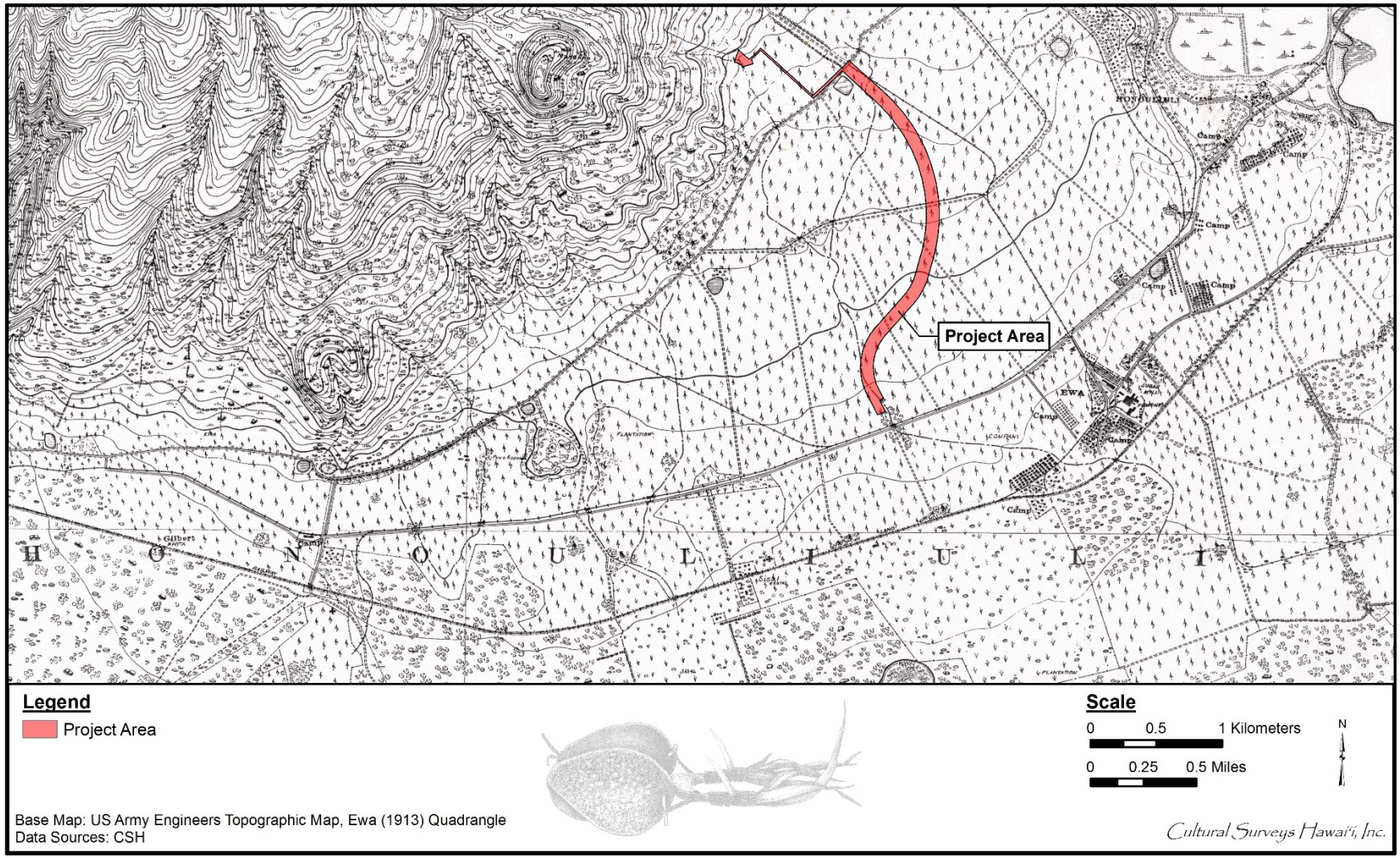

Figure 21. Portion of a 1913 U.S. Army Engineers topographic map, Ewa quadrangle, showing the location of the current project area

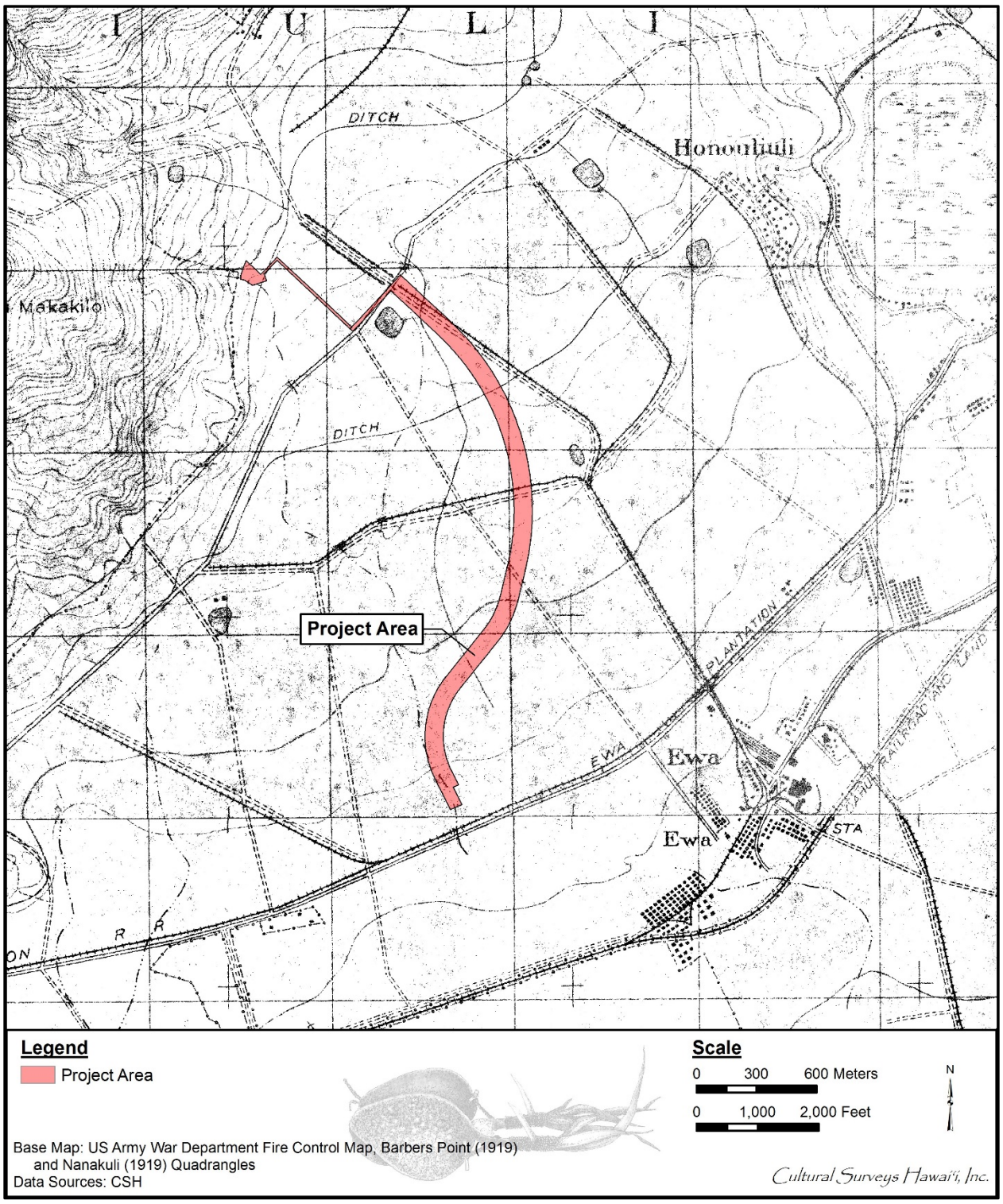

Figure 22. Portion of a 1919 U.S. Army War Department fire control map, Nanakuli and Barbers Point Quadrangles, showing the location of the current project area

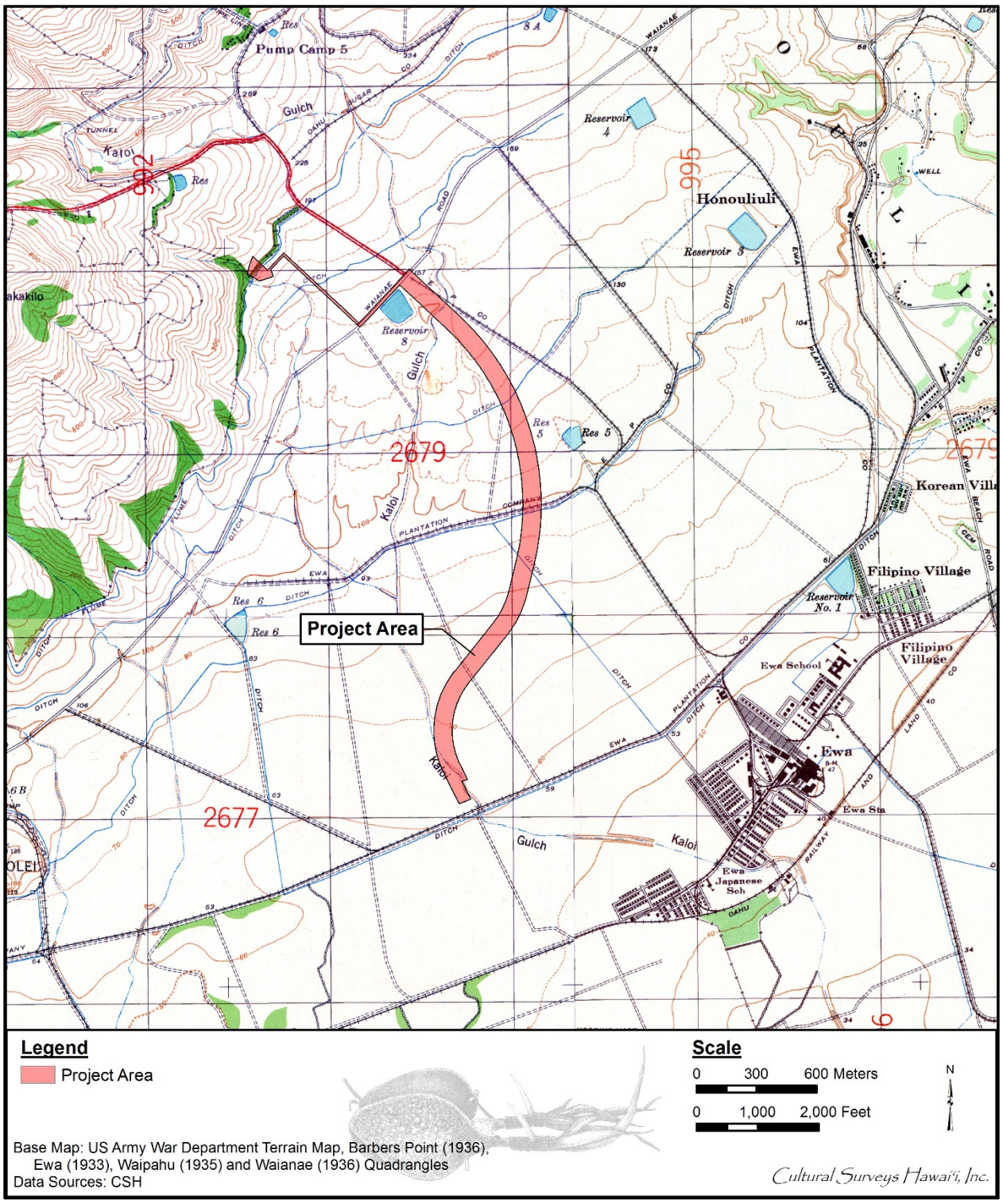

Figure 23. Portion of a 1930s U.S. Army War Department terrain map, Barbers Point (1936), Ewa (1933), Waipahu (1935), and Waianae (1936) Quadrangles, showing the location of the current project area

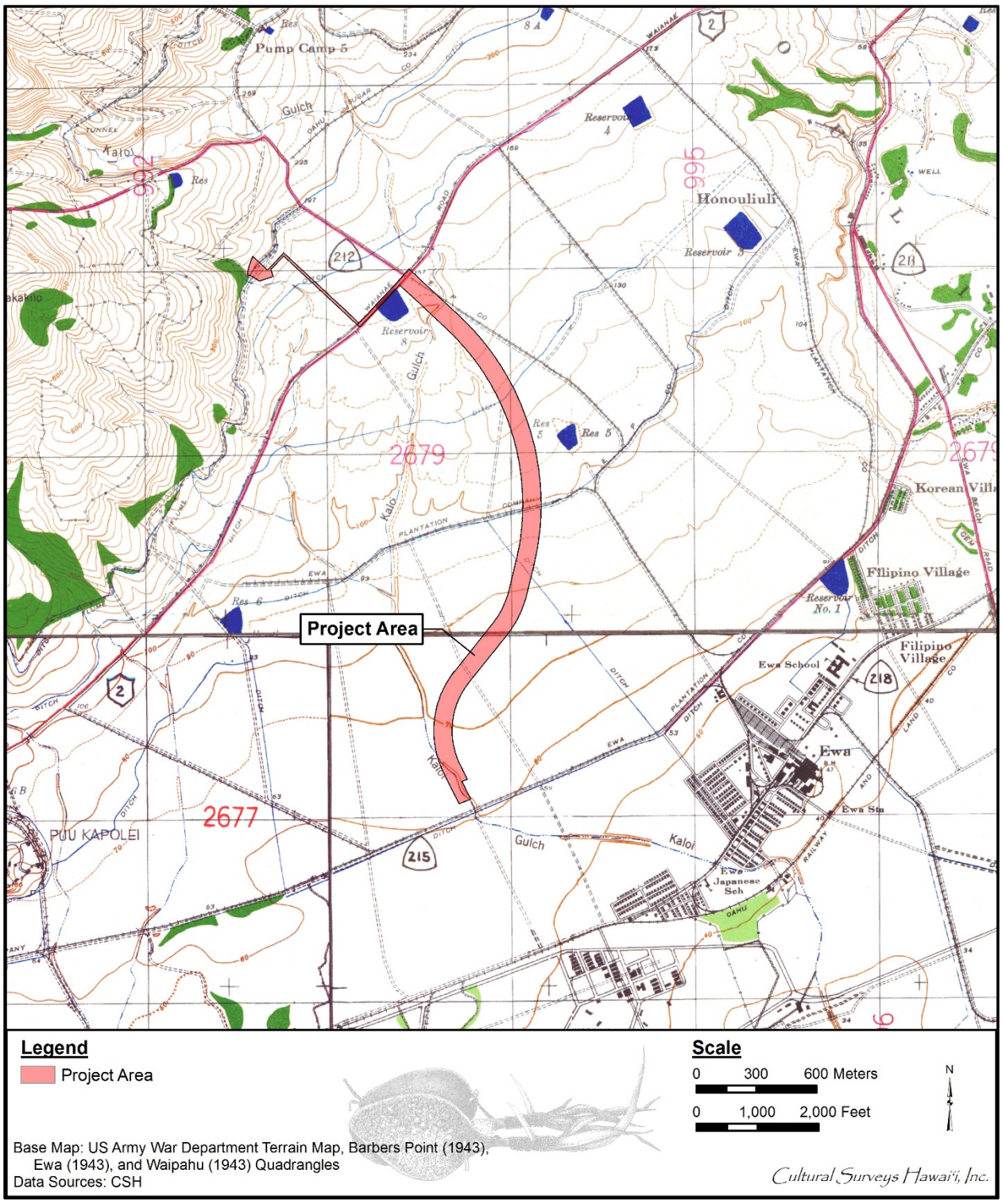

Figure 24. Portion of a 1943 U.S. Army War Department terrain map, Barbers Point, Ewa and Waipahu Quadrangles, showing the location of the current project area

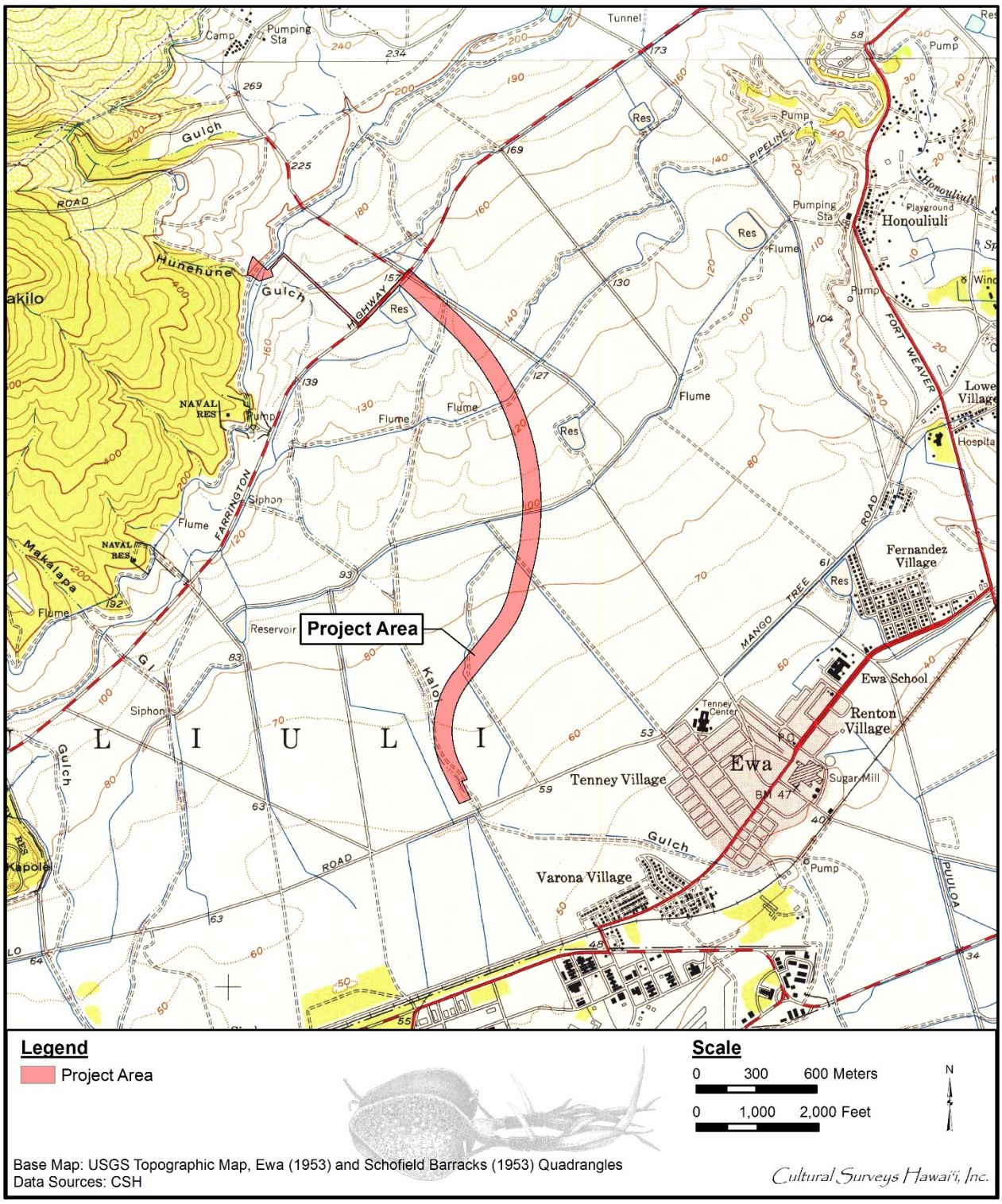

Figure 25. Portion of a 1953 Ewa and Schofield Barracks USGS topographic quadrangles, showing the location of the current project area

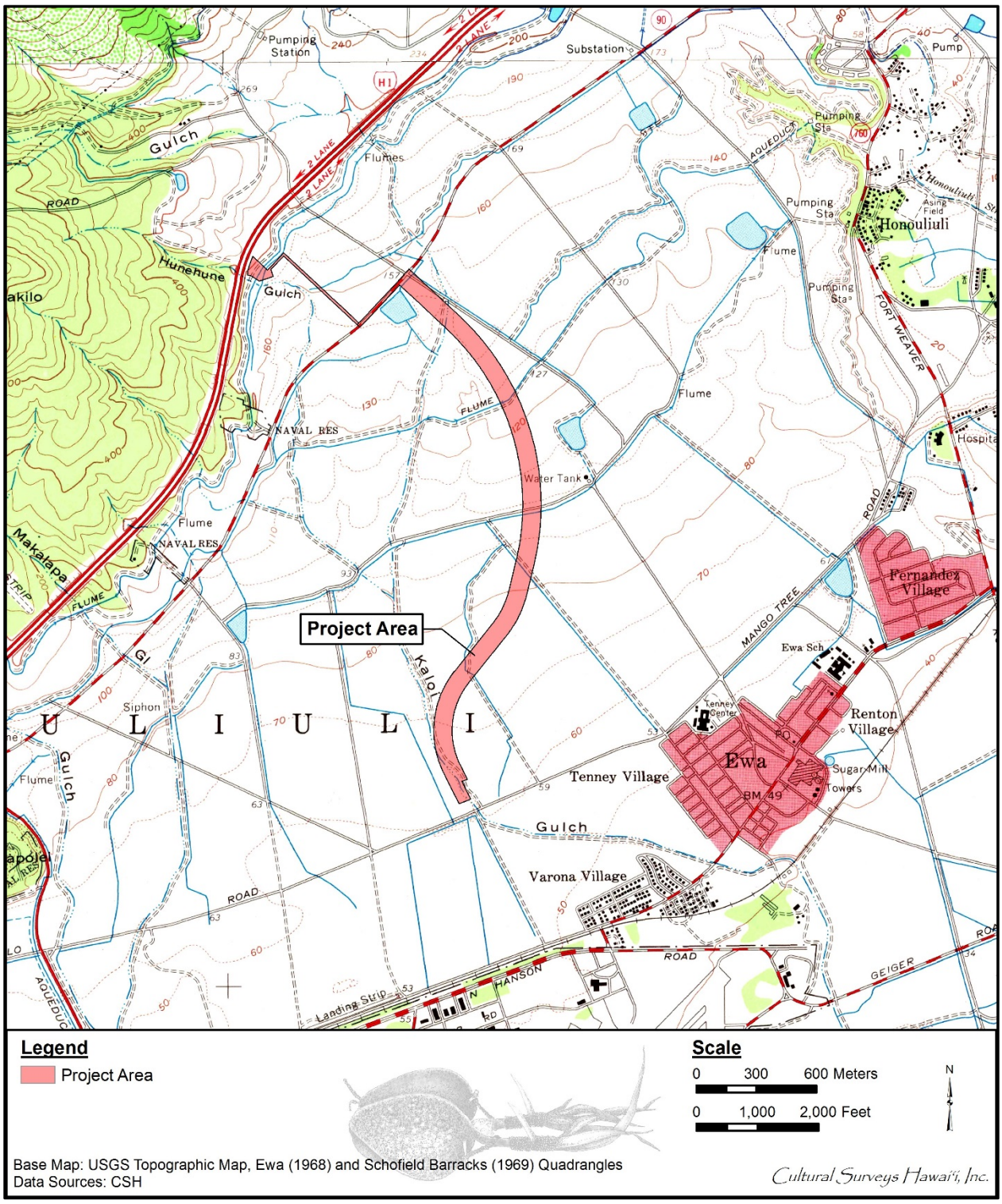

Figure 26. Portion of a 1968 Ewa and 1969 Schofield Barracks USGS topographic quadrangles, showing the location of the current project area

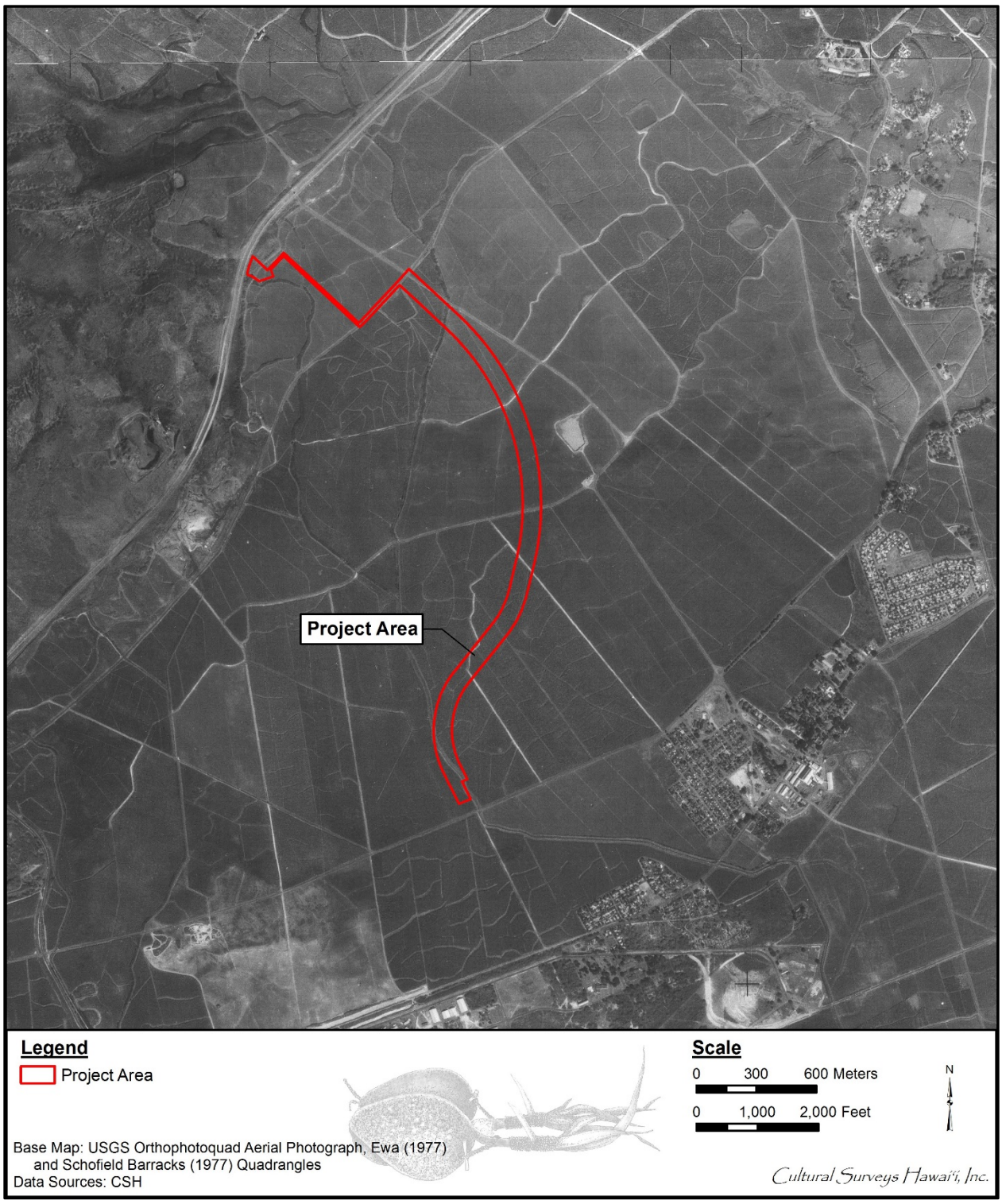

Figure 27. 1977 USGS Orthophotoquad aerial photograph, Ewa and Schofield Barracks Quadrangles, showing the location of the current project area

harvesting in 1938, there was little need for the large multi-racial (Japanese, Chinese, Okinawan, Korean, Portuguese, Spanish, Hawaiian, and Filipino) labor force that had characterized most of the early history of the plantation.

During the subsequent decades of the twentieth century, sugarcane operations at Ewa Plantation were phased out and former cane lands were rezoned for residential development. Structures in the former plantation villages fell into disrepair or were demolished. However, portions of the area—including Varona Village, Tenney Village and Renton Village—were designated the Ewa Villages Historic District (State Inventory of Historic Places [SIHP] # 50-80-12-9786) which has been nominated for the National Register of Historic Places. Additionally, the still-extant OR&L rail line through Honouliuli has been placed on the National Register of Historic Places (SIHP # 50-80-12-9714).

The Oahu Sugar Company was incorporated in 1897. Prior to commercial sugar cultivation, the lands occupied by the Oahu Sugar Company were described as being "of near desert proportion until water was supplied from drilled artesian wells and the Waiahole Water project" (Condé and Best 1973:313). The Oahu Sugar Company took control over the Ewa Plantation lands in 1970 and continued operations until 1995, when they decided to shut down sugarcane production in the combined plantation areas, including the present study area (Dorrance and Morgan 2000:45, 50).

The network of plantation infrastructure including ditches, flumes, reservoirs, roads, and railroads, is indicated on maps and photographs of the area (see Figure 20 through Figure 27). A number of these plantation features are indicated to have existed throughout the project area and have been observed by archaeologists in various states of repair (further discussion below in Section 3.2).

The Military Development at Pearl Harbor

In 1891, Russian explorer Otto Von Kotzebue tried to observe Pearl River, but his group could not obtain a canoe. What he was told led him to speculate on the possible importance of Pearl Harbor to the future:

> In the mouth of this river are several islands; it is so deep, that the greatest ship of the line can lie at anchor a few fathoms from the shore; and so broad, that a hundred vessels can conveniently find room in it. The entrance into the Pearl Rivers is in the same situation as the harbor of Hana-rura; but the windings between the reefs are, however, said to render a passage more difficult. If this place were in the hands of the Europeans, they would certainly employ means to make this harbour the finest in the world. [Kotzebue 1821:338–348]

The early missionary Levi Chamberlain was able to take an outrigger canoe trip to Pearl River:

> Kawaa took passage in our canoe to go down the harbor to a place where oysters are abundant to give orders to his people to gather a mess. The sail down the harbor was delightful . . . The passage down the creek for a number of miles was very pleasant till we got down near the reef and our course altered. We then could sail no longer as the wind was against us. The sail was lowered the mast taken down and secured across the outrigger and the rowers plied their paddles. [Journal of Levi Chamberlain 1822-1849, Hawaiian Mission Schools, Storage Case 4:899 in Sterling and Summers 1978:51]

The first foreign attempt to survey Pearl Harbor was made in 1840 during the U.S. Exploring Expedition, led by Charles Wilkes.

> In this district is a large inlet of the sea, into which the river Ewa empties; at the entrance of this inlet is the village of Laeloa (at Kalaeloa Pont): the shore is known by the name of Pearl River or harbour, from the circumstance that the pearl oyster is found here; and it is the only place in these islands where it occurs.
>
> The inlet has somewhat the appearance of a lagoon that has been partly filled up by alluvial deposits. At the request of the king, we made a survey of it: the depth of water at its mouth was found to be only fifteen feet; but after passing this coral bar, which is four hundred feet wide, the depth of water becomes ample for large ships, and the basin is sufficiently extensive to accommodate any number of vessels. If the water upon the bar should be deepened, which I doubt not can be effected, it would afford the best and most capacious harbour in the Pacific . . . [Wilkes 1970:79]

Although Wilkes was impressed by the harbor, he was not at this time thinking of how this survey could benefit the American government in the future. In fact, Wilkes (1970:79) concluded, "As yet there is no necessity for such an operation, for the port of Honolulu is sufficient for all the present wants of the islands, and the trade that frequents them."

This had changed in less than 30 years, however. The U.S. military had tried to make a coaling station on Midway Island in 1869 by blasting through the coral reef to make a harbor, but the plan failed. In 1873, General Schofield presented a confidential report to the U.S. Secretary of War, recommending that Pearl Harbor should be available to the U.S. Navy. Schofield wrote,

> In case it should become the policy of the Government of the United States to obtain the possession of this harbor for naval purposes, jurisdiction over all the waters of Pearl River with the adjacent shores to the distance of 4 miles from any anchorage should be ceded to the United States by the Hawaiian Government . . .
>
> The cession of Pearl River could probably be obtained by the United States in consideration of the repeal of the duty of Sandwich Island sugar. Indeed, the sugar–planters are so anxious for a reciprocity treaty, or so anxious rather for free trade in sugar with the United States, that many of them openly proclaim themselves in favor of annexation of these islands of the United States. [Sen. Ex. Docs, 52nd Cong. 2nd Sess. No. 77:150–154, reproduced in Judd 1971:Appendix 3]

This reciprocity treaty was concluded in 1876, with the provision that Hawai‘i would not "lease or relinquish sovereignty to another country or any harbor, etc." In 1887, the treaty was renewed and amended and allowed the United States the "exclusive right to enter the harbor of Pearl River, in the Island of Oahu, at to establish and to maintain there a coaling and repair station for the use of vessels of the United States" (Judd 1971:128).

After annexation of the Hawaiian Islands to the United States in 1899, development began to create a Pacific base that could be used as a staging area for the Spanish-American war (Coletta 1985:433). Dredging of the harbor began in 1901, and additional dredging to deepen and widen the channel was conducted in 1908 and again in the 1920s. Money for the funding of the construction of dry docks and other support facilities was approved in 1908. In 1931, the U.S.

Navy built an ammunition depot at West Loch on a 213-acre parcel that it had bought from the Campbell Estate. Construction of a new depot in Lualualei Valley and at West Loch Harbor began in 1931.

In the early 1930s, the U.S. Navy leased 700 acres of the Campbell Estate to build Ewa Field, a base with a mooring mast for Navy airships. Although the mast was completed, the program was abandoned before the *Akron*, the designated airship for the mast, was built. In 1937, 18 miles of roads were built in the coastal Honouliuli area, and in 1939-1940 the U.S. government bought 3,500 acres of land in this area, to build several other military camps and installations, including Barbers Point Naval Air Station (Landrum et al 1997:62–67).

On 7 December 1941, the Japanese Navy launched a devastating surprise attack on the U.S. Naval base at Pearl Harbor and other military facilities. Although the major battle damage to the U.S. Pacific Fleet was at its base at Ford Island in the Middle Loch of Pearl Harbor, Honouliuli did not escape unscathed.

> The Waipahu and Ewa sugar plantation, next to Pearl Harbor and the town of Wahiawa, adjoining Schofield Barracks, saw more action than did Honolulu.
>
> At Waipahu, machine gun bullets, shrapnel, and shells started two cane fires, riddled the sugar mill, hit the plantation hospital in four places, went through the roof of the company store, exploding in an electric supply warehouse, and narrowly missed many houses. In nearly all of the fields of tall cane, many of which contained terrified women and children, shells buried themselves-dozens of them in some concentrated areas-blasting holes in the ground the size of barrels, and flattening cane for several square yards.
>
> At Ewa, after bombing the nearby Marine airfield [at Barbers Point], enemy planes machine-gunned the plantation’s main street, the mill and power plant and some 30 houses and started two cane fires. [Allen 1999:20]

The attack had consequences not only for the military, but also for the civilians, mostly Japanese, who lived around West Loch.

> Two permanent local evacuations were ordered in the first month of the war, partly to remove civilians from areas which might be dangerous in event of further attack and partly to protect installations from possible sabotage or espionage activities. On a Thursday less than two weeks after the bombing, farmers adjacent to West Loch at Pearl Harbor were ordered to leave their farms by sundown. The order was modified to allow two days to prepare and the men were permitted to return to their farms during daylight until livestock could be moved and crops harvested. The displaced farmers, who had only recently been established at West Loch by the Farm Security Administration, were forced to seek temporary housing with friends and relatives or at Ewa plantation. Since they had invested in the enterprises practically all of their life’s savings and considerable money borrowed from the FSA as well, several suffered heavy losses. [Allen 1999:122]

West Loch was later used as the major staging area for U.S. Navy vessels for the Pacific Fleet, especially for ships called Tank Landing Ships (LST), those capable of landing on shore to disembark vehicles and marines. On Sunday morning, 21 May 1944, 29 LSTs, slated to sail to the

Mariana Islands for the invasion of Saipan, were in West Loch. Each LST carried a crew of 119 men, 200 marines with ammunition, and vehicles with gas. An explosion at 3:08 blasted one LST, quickly leading to fires on the other ships. In addition, 20 buildings on shore at the West Loch facility were damaged. In all, six of the LSTs sank, 163 men died, and 396 people, including civilians, were injured (Leniham 1989: Chap. II). Today, Naval Magazine (NAVMAG)–West Loch is used for the storage of ammunition, and the five wharfs at West Loch provide marine terminal services for ocean-transported ordnance (Landrum et al. 1997:68).

3.2.2.4 Residential and Commercial Development in Honouliuli

A series of historic topographic maps shows the gradual residential and commercial development of Honouliuli. On the 1919 War Department map (see Figure 22), residential areas were limited to a cluster at Honouliuli near the old taro lands adjacent to West Loch, and the Ewa Plantation Village *makai* of Honouliuli. On the 1930s USGS map (see Figure 23), both Honouliuli and the Ewa Plantation Villages were expanding with new and improved roads. On the 1943 War Department map (see Figure 24), Ewa Villages had expanded with additional “ethnic camps,” while Honouliuli had become a smaller residential area, rather than a separate “village.” On the 1953 USGS topographic map (see Figure 25), residential subdivisions were spreading to the shore of Pearl Harbor. However, the Honouliuli lands in the vicinity of the current project area remained almost exclusively under commercial sugarcane cultivation until the end of the twentieth century, as evidenced by the 1977 USGS Orthophotograph (see Figure 27).

3.1.9 Contemporary Land Use

During the post-Contact period through modern times, the project area was primarily used for pastureland and for sugarcane irrigation and cultivation. Currently, the project area is used for diversified agricultural activities, pastureland, seed cultivation, and other uses. In recent times, areas in the vicinity of the current project area have been subject to development such as the University of Hawai‘i–West O‘ahu campus and the Kroc Center Hawaii. The south portion of the project area is also located in close proximity to residential housing (see Figure 4).

3.2 Previous Archaeological Research

The previous archaeological studies in the vicinity of the current project area predominantly cover relatively large parcels of land (often hundreds of acres) (Figure 28 and Table 3). It is noteworthy that nearly 100% of this western portion of the project area has been studied in prior archaeological studies. The following discussion of previous archaeological studies covers those projects associated with the North-South Road Project Corridor, as it is the most relevant to the majority of the current project (Component 2), and then covers other studies in the vicinity by date. Previously identified historic properties in the vicinity of the current project area are indicated on a map (Figure 29).

3.2.1 North-South Road Project Corridor

The proposed North-South Road corridor was divided into three portions or phases (Phase IA, IB, and IC). An archaeological reconnaissance survey of the entire 4.5-km (14,730-ft) Long Land Corridor was conducted by CSH archaeologists (Hammatt and Chiogioji 1997). Several plantation-era remnants were noted, however, no further archaeological investigation was recommended for the project area corridor. Despite the CSH recommendation, SHPD requested on-call archaeological monitoring for the North-South Road project.

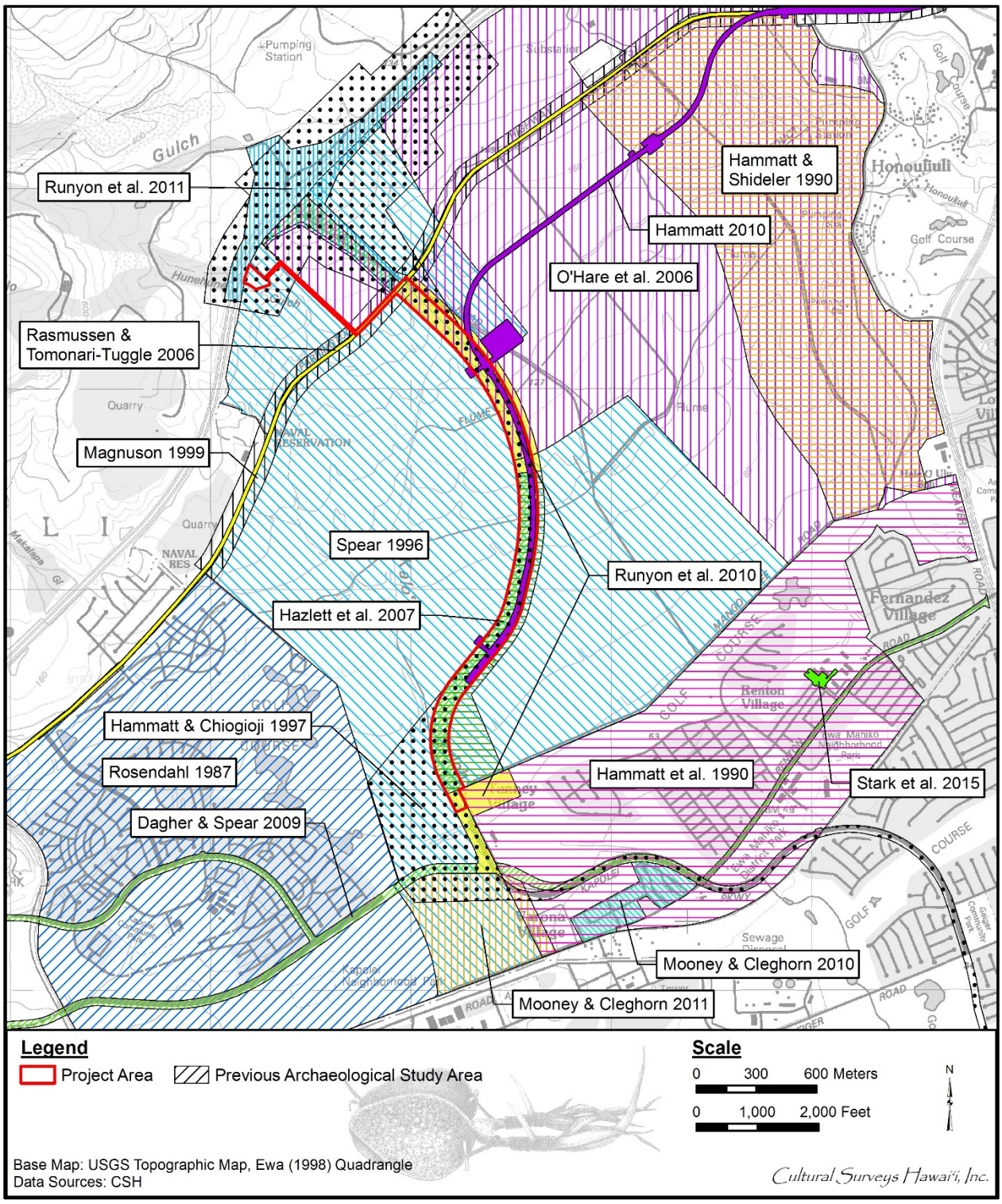

Figure 28. Portion of a 1998 Ewa USGS topographic quadrangle, showing previous archaeological survey areas near the current project area

Table 4. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results
Rosendahl 1987	Reconnaissance survey	East of Ft Weaver Rd	Virtual absence of finds, except for a disturbed historic artifact scatter dubbed “T-2”
Hammatt et al. 1990	Reconnaissance survey	Ewa Villages	No traditional historic properties identified; many plantation-era historic properties identified including villages, a cemetery, a reservoir, and railroad segments
Hammatt and Shideler 1990	Archaeological inventory survey	St. Francis Medical Center West	Entire study area, located on a bluff NE of flood plain of Honouliuli Stream, had been extensively disturbed, contained no surface structures or other remains, and unlikely to contain any subsurface historic properties
Spear 1996	Reconnaissance survey	Kapolei Town	No significant findings
Hammatt and Chiogioji 1997	Reconnaissance survey	4.5-km North-South Rd Corridor	Documented SIHP # 50-80-12-9714 (OR&L Right-of-Way), several plantation-era remnants noted
Magnuson 1999	Reconnaissance survey	Farrington Hwy	Documented six bridges, a section of railroad track, and an irrigation ditch, all older than 50 years but evaluated as not significant.
Rasmussen and Tomonari-Tuggle 2006	Archaeological monitoring	Waiau Fuel Pipeline Corridor	Not monitored near current project area
O’Hare et al. 2006	Archaeological inventory survey	Ho‘opili, East Kapolei	Several previously recorded (Hammatt and Shideler 1990) historic properties; SIHP #s 50-80-12-4344 (plantation infrastructure); -4345 (railroad berm); -4346 (northern pumping station); -4347 (central pumping station); -4348 (southern pumping station); and four new features of SIHP # -4344 (a linear wall, stone-faced berm, concrete ditch, and concrete catchment)

Reference	Type of Study	Location	Results
Hazlett et al. 2007	Archaeological monitoring	Phase IA, North-South Rd	No significant findings
Dagher and Spear 2009	Literature search and field inspection	Kapolei and Makakilo, Honouliuli Ahupua'a	No significant findings in vicinity of current project area
Mooney and Cleghorn 2010	Archaeological inventory survey	Varona Village	Five newly identified plantation-era structures within SIHP # 50-80-11-9786 (Ewa Plantation Villages Historic District); SIHP #s 50-80-12-7129 (Historic Plantation House); -7130 (Historic Plantation House); -7131 (Historic Structure Foundation); -7132 (Historic Structure Foundation); and -7133 (Historic Streetlight)
Hammatt 2010	Archaeological inventory survey	HHCTCP Phase I	SIHP # 50-80-09-7751 (buried *lo‘i* deposit)
Runyon et al. 2010	Archaeological monitoring	Phase IB, North-South Rd	No significant findings
Runyon et al. 2011	Archaeological monitoring	Phase IC, North-South Rd	A portion of a previously documented historic property, SIHP # 50-80-12-4664 (a concrete plantation-era water diversion structure containing two sluice gates); one new historic property, SIHP # 50-80-14-7128 (burnt trash fill layer used in construction of Palehua Rd and containing plantation-era artifacts)
Mooney and Cleghorn 2011	Archaeological inventory survey (recorded as an archaeological assessment)	Ka Makana Ali‘i mixed-use complex	No significant findings
Stark et al. 2015	Archaeological inventory survey (recorded as an archaeological assessment)	Ewa Elementary School, within Renton Village	No significant findings

Reference	Type of Study	Location	Results
Hawai‘i Register			Three additional historic properties found on Hawai‘i Register of Historic Places: SIHP #s 50-80-12-7387 (OR&L Base Yard); -9708 (Waialua Agricultural Company Engine No. 6); and -9761 (Railway Rolling Stock)

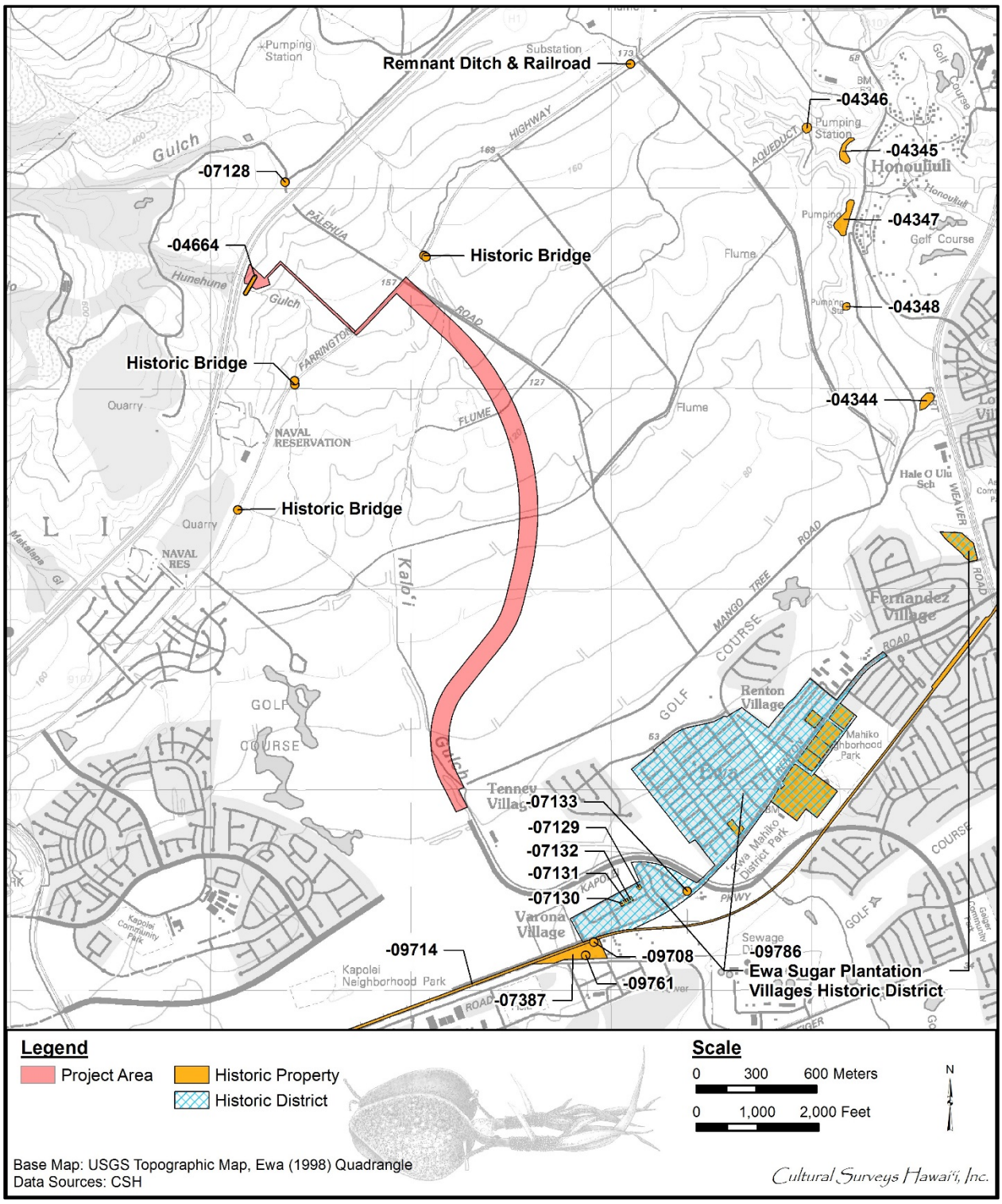

Figure 29. Portion of a 1998 Ewa USGS topographic quadrangle, showing historic properties near the current project area

The 1997 study (Hammatt and Chiogioji) noted the *makai* end of the North-South Road project corridor (Phase IA) is located approximately 300 m northwest of Varona Village (a portion of the Ewa Villages Historic District), and 400 m north of the OR&L Right-of-Way. Within the Phase IA and Phase IB study corridors, two plantation-era structures were observed. Within Phase IA, a ditch (following alongside a plantation road) was observed crossing through the study corridor approximately 1,300 m *makai* of Farrington Highway. The ditch measured approximately 2 m (6.6 ft) wide and 1.5 m (4.9 ft) deep, and was constructed of cut stone with a mortar coating. Within Phase IB, a flume remnant was observed on the west side of the study corridor, approximately 800 m south of Farrington Highway. The flume consisted of "half-round sheet metal supported by a brick and wood framework and was raised approximately 0.6 m (2 f.) above the ground surface. The flume remnant has been wrecked and other discontinuous remnants of the flume were observed continuing west beyond the corridor" (Hammatt and Chiogioji 1997:18).

The 1997 study (Hammatt and Chiogioji) noted within the *mauka* end of the North-South Road project corridor (Phase IC), "wrecked remnants of a flume alignment were observed on both sides of Palehua Road just makai of the H-1 Freeway" (Hammatt and Chiogioji 1997:18). A small flume remnant that crossed Hunehune Gulch on the west end of the project corridor *makai* of H-1 was also observed. The observed flumes were not considered of historic value and were therefore not classified as historic properties during the survey investigation.

Upon completion of the North-South Road Phase IA project, an archaeological monitoring report was written (Hazlett et al. 2007). The report indicated the Phase IA North-South Road project corridor was extensively graded and plowed repeatedly over the past century by the Ewa Plantation Company in association with sugar cultivation and associated plantation activities. The plantation-era ditch structure identified in previous archaeological studies (Hammatt and Chiogioji 1997, Chiogioji et al. 2004) was located within the project area. A portion of the ditch and nearby plantation road were removed as part of the road cutting and grading, however, "portions of the ditch continue intact for considerable distances to the east and west of the corridor" (Hazlett et al. 2007:14). No stratigraphic variations, soil anomalies, or cultural material were discovered to indicate the presence of buried land surfaces or subsurface deposits. The vast majority of all project-related excavations took place entirely within a ubiquitous dark reddish-brown (5 YR 3/2) clay loam sediment. The study recommended an on-call monitoring program consisting of weekly site visits for future construction work on the remaining phases of the North-South Road project.

From 2007 to 2010, archaeological monitoring was conducted by CSH for Phase 1B of the North-South Road project (Runyon et al. 2010). The study was accepted by SHPD in a letter dated 29 November 2011 (LOG NO.: 2010.3892, DOC. NO.: 1111MV17). The project area consisted of two separate areas within a stretch of the North-South Road (subsequently known as Kualaka‘i Parkway) corridor. The *mauka* (inland) portion of the project area extended from Farrington Highway southeast approximately 1.09 km. The *makai* portion of the project area extended from Kapolei Parkway northward approximately 0.5 km. These portions correspond with the North and the South portions of the current project area.

Archaeological monitoring of ground disturbing activities for the roadway and associated development infrastructure produced no findings for cultural deposits. The observed stratigraphy indicated the *mauka* segment of the project area contained a thick natural stratum of clay loam

sediment. The *makai* segment of the project area contained the same natural clay loam sediment overlying the coral shelf at approximately 3 m below the current ground surface.

In coordination with the SHPD, on-call monitoring initially included weekly site visits to observe ongoing construction operations and was ultimately changed to monthly site visits due to the majority of excavations being conducted through project related disturbed and redeposited sediments.

From 2007 to 2009, archaeological monitoring was conducted by CSH for Phase 1C of the North-South Road project (Runyon et al. 2011). The study was accepted by SHPD in a letter dated 29 November 2011 (LOG NO.: 2011.0626, DOC. NO.: 1111MV18). The Phase 1C portion of the North-South Road project encompassed the *mauka* and *makai* sides of a portion of H-1 and extended southward to Farrington Highway. This project area covered portions of the Component 2 portion of the current project area.

The Phase 1C portion of the North-South Road project consisted of the construction of a new highway interchange and roadway. The project included the construction of two on-ramps and two off-ramps connecting H-1 to the newly constructed North-South road and associated development infrastructure.

Two historic properties were observed during this monitoring project. A portion of a previously documented historic property, (SIHP # 50-80-12-4664) a concrete plantation-era water diversion structure containing two sluice gates, was documented within the project area. One new historic property, (SIHP # 50-80-14-7128) a burnt trash fill layer used in the construction of Palehua Road and containing plantation-era artifacts, was observed along the southwest boundary of the project area (Nakamura et al. 1993). SIHP # 50-80-12-4664 is located within the Component 1 portion of the current project area and SIHP # 50-80-12-7128 is located in the vicinity of the H-1 freeway and outside the current project area.

3.2.2 Rosendahl 1987

In 1987, Paul H. Rosendahl, Inc. conducted a combined surface and subsurface survey of approximately 260 acres in two discontinuous parcels east of Fort Weaver Road. The northern of the two parcels extended *mauka* to the intersection of Fort Weaver Road and Farrington Highway. The main relevance of this study is in documentation of the virtual absence of finds in the vicinity. In the northern parcel, there was one heavily disturbed surface artifact collection area (designated “T-2”) relating to a pre-1900 historic habitation, consisting of a scatter of glass and ceramic vessel fragments. This artifact scatter was located outside the current project area. Given the preparation of the study for inclusion in an environmental impact study, it is assumed the study was reviewed and found to be acceptable to allow development to proceed.

3.2.3 Hammatt et al. 1990

In 1990, CSH conducted an archaeological reconnaissance survey of an approximately 616-acre Ewa Village project (Hammatt et al. 1990). This study was conducted adjacent to and southeast of the current project area. The study found no evidence of traditional Hawaiian activity due to extensive historic disturbances, but documented many plantation-era historic properties. These plantation-era historic properties include village sites, a cemetery, a reservoir, and railroad remnants.

3.2.4 Hammatt and Shideler 1990

In 1990, CSH conducted an archaeological inventory survey for a proposed expansion of Saint Francis Medical Center West on an approximately 24-acre parcel *makai* of Farrington Highway and west of Fort Weaver Road (Hammatt and Shideler 1990). This study is located outside the current project area along Farrington Highway. A pedestrian survey and background research revealed that the entire study area, located on a bluff northeast of the flood plain of Honouliuli Stream, had been extensively disturbed, contained no surface structures or other remains, and was unlikely to contain any subsurface historic properties. It is understood that the SHPD rendered a "no effect" letter for this project.

3.2.5 Spear 1996

In 1996, Scientific Consultant Services, Inc. conducted an archaeological reconnaissance and assessment of the East Kapolei Development project, *makai* of the H-1 Freeway, in the vicinity of the North-South Road corridor, and including portions of Kalo‘i and Hunehune gulches. This brief letter report addresses approximately 1,300 acres including the current project area; the East Kapolei Station and park and ride facility; and the UH West O‘ahu Station and northern park and ride facility. The study cites a 1994 SHPD letter that "clearly indicates that most of the [Spear 1996] project area has been declared to have no effect on historic sites due to the many years of commercial sugarcane production on these lands."

A limited field inspection documented in the Spear (1996) letter report did not identify any historic properties, but noted the 4 m wide and 4 m deep Kalo‘i and Hunehune gulches had been modified for cane irrigation. The study concluded that, on the basis of the SHPD letter and the field inspection, "that future development on these land parcels will have 'no effect' on historic sites, and that no further cultural resource work is required" (Spear 1996:1). While it is unclear whether there was a formal SHPD response to the Spear (1996) letter report, the conclusions seem reasonable.

3.2.6 Hammatt and Chiogioji 1997a and 1997b

In 1997, CSH conducted two similar archaeological reconnaissance surveys of a corridor that would become the "North-South Road" project, extending south from the H-1 Freeway. The earlier study (Hammatt and Chiogioji 1997a) extended south to approximately 5,300 ft inland of the ‘Ewa Beach shoreline. The later study (Hammatt and Chiogioji 1997b) was shorter in length, not extending south of the OR&L right-of-way. For the purposes of discussion relating to the current project, the two Hammatt and Chiogioji 1997 studies are essentially identical, with both studies addressing the current project area. It is unclear whether either of these studies was commented on by the SHPD. A letter signed by Dr. Don Hibbard, SHPD Administrator, dated 8 March 1996 (LOG NO.: 16697, DOC. NO.: 9603NN03) on the subject of the "North-South Road Corridor Project" only expresses concern for appropriate mitigation of impact to the OR&L right-of-way.

Background research and a pedestrian survey for the Hammatt and Chiogioji 1997 studies revealed the entire area had been extensively graded in association with sugarcane cultivation and the construction of plantation infrastructure. The Hammatt and Chiogioji 1997a study corridor crossed two previously identified areas of archaeological concern (both located outside and to the south of the current project area): SIHP # 50-80-12-9786, consisting of the Ewa Villages Historic District; and SIHP # 50-80-12-9714, the OR&L right-of-way. These historic properties were not

located in the vicinity of the Hammatt and Chiogioji 1997b study area. The Hammatt and Chiogioji 1997b study concluded: “No further archaeological investigation is recommended for the entire project area corridor and on-site or on-call monitoring is not justified during future construction activities” (Hammatt and Chiogioji 1997b:22).

Despite the recommendation cited above, the construction of the North-South Road project has been subjected to on-call archaeological monitoring programs by CSH. There have been no significant finds to date within the current project area.

3.2.7 Magnuson 1999

In 1999, International Archaeological Research Institute, Inc. conducted an archaeological reconnaissance survey for approximately 3.3 miles along Farrington Highway, between Golf Course Road and Fort Weaver Road, with an approximately 200-ft wide corridor on each side. This study was conducted on a portion of the current project area along Farrington Highway. This study documented six bridges, a section of railroad track, and an irrigation ditch. The report suggested these identified sites would most likely be destroyed during the highway expansion and recommended no further work for documentation. Although the sites were older than 50 years, they were evaluated as not significant for inclusion on the National Register of Historic Places.

3.2.8 O’Hare et al. 2006

In 2006, CSH conducted an archaeological inventory survey of approximately 1,600 acres for the East Kapolei project (subsequently known as the Ho‘opili project) (O’Hare et al. 2006). The study was accepted by SHPD in a letter dated 3 November 2006 (LOG NO. 2006.3670, DOC. NO. 0611amj01). The Ho‘opili project area was bounded on the east by Fort Weaver Road, *makai* by Mango Tree Road, and *mauka* by the H-1 Freeway. The study area was configured by the owner/developer interests to dove-tail with the Spear (1996) study, with the western boundary of O’Hare et al. (2006) study area following the general configuration of the east side of the Spear (1996) study. A non-contiguous portion of the O’Hare et al. (2006) study area was *mauka* of the H-1 Freeway. A portion of this study area is located adjacent to the current project area.

Several historic properties within the O’Hare et al. (2006) study area were previously identified during an archaeological survey in 1990 (Hammatt and Shideler 1990). These previously identified historic properties included SIHP #s 50-80-12-4344, plantation infrastructure; -4345, railroad berm; -4346, northern pumping station; -4347, central pumping station; and -4348, southern pumping station. Four additional archaeological features were documented by the O’Hare et al. (2006) study. These additional features, grouped under SIHP # 50-80-14-4344, include Feature D, a linear wall along the east bank of Honouliuli Stream; Feature E, a linear wall along the east bank of Honouliuli Stream; Feature F, a stone-faced berm constructed perpendicular to the orientation of the stream; and Feature G, a concrete ditch and concrete masonry catchment basement on the west bank of Honouliuli Gulch.

No areas of concern were documented in the vicinity of the current project area by the O’Hare et al. (2006) study. While plantation irrigation features of SIHP # 50-80-14-4344 (i.e., Features D through G) were documented outside the current project area, within Honouliuli Gulch, no further work was recommended and there are no preservation concerns (O’Hare et al. 2006:116–117). Portions of SIHP # 50-80-14-4344 (Features A–C) were destroyed sometime between 1990 and 2005 (O’Hare et al. 2006:73).

3.2.9 Rasmussen and Tomonari-Tuggle 2006

In 2004, archaeological monitoring was conducted along the Waiau Fuel Pipeline corridor, extending from the Hawaiian Electric Company's Barbers Point Tank Farm to the Waiau Generating Station. The Waiau Fuel Pipeline corridor follows Farrington Highway to Kunia Road, angles *makai* near Kunia Road, then continues east along the OR&L right-of-way near the Pearl Harbor coast. It appears no archaeological monitoring was conducted west of Waipi‘o Peninsula, as the corridor to the west had been determined to not be archaeologically sensitive.

3.2.10 Dagher and Spear 2009

In 2009, Scientific Consultant Services Hawaii conducted a literature search and field inspection for the Kapolei Computerized Traffic Control System, Phase II in Kapolei and Makakilo, Honouliuli Ahupua‘a (Dagher and Spear 2009). This project area included a portion of Component 2 of the current project area. The field inspection included not only portions of the current project area, but also outside to the east and west in a targeted effort to identify plantation-era flumes and ditches. No evidence of flumes, ditches, or other historic or cultural materials were observed.

3.2.11 Hammatt 2010

In 2010, CSH conducted an archaeological inventory survey of Construction Phase I for the Honolulu High-Capacity Transit Corridor Project, Honouliuli, Hō‘ae‘ae, Waikele, Waipi‘o, Waiawa, and Manana Ahupua‘a, ‘Ewa District, Island of O‘ahu (TMK: [1] 9-1, 9-4, 9-6, 9-7 [Various Plats and Parcels]) (Hammatt 2010). The project area encompassed 7.4 miles and extended from the North-South Road in Kapolei to the University of Hawai‘i at Mānoa and Waikīkī. Only one historic property was identified during the study, SIHP # 50-80-09-7751, a subsurface *lo‘i* deposit located near the proposed Waipahu Transit Center. No sites were identified within the current project area.

3.2.12 Mooney and Cleghorn 2010

In 2010, Pacific Legacy, Inc. conducted an archaeological inventory survey of approximately 22.4 acres of Varona Village. This project area is located to the southeast of the current project area. The study aimed to identify any traditional Hawaiian historic properties due to the project area already being included within the Ewa Plantation Villages Historic District (SIHP # 80-11-9786). No traditional historic properties were identified, however, five newly documented historic properties were identified including two home sites, two outbuilding foundations, and a streetlamp.

3.2.13 Mooney and Cleghorn 2011

In 2011, Pacific Legacy, Inc. conducted an archaeological assessment for the proposed Ka Makana Ali‘i mixed-use complex. This project area is located south of the current project area. Despite the excavation of 62 backhoe trenches, no archaeological resources were encountered.

3.2.14 Stark et al. 2015

In 2015, CSH conducted an archaeological inventory survey (negative finds recorded as an archaeological assessment) for the Ewa Elementary School Building E project, within Renton Village. This project area is located to the east of the current project area. Despite the pedestrian survey and excavation of 12 backhoe trenches, findings were limited to nine historic era artifacts.

No archaeological historic properties were identified and CSH recommended no further archaeological work for the project.

3.3 Background Summary and Predictive Model

Various Hawaiian legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian *ali‘i.* This would be attributable, for the most part, to the plentiful marine and estuarine resources available at the coast. Other attractive subsistence-related features of the *ahupua‘a* include irrigated lowlands suitable for wetland taro cultivation, as well as the lower forest area of the mountain slopes for the procurement of forest resources. Honouliuli Ahupua‘a has a number of important topographic features, peaks, streams, gulches, coastal points, and a number of ancient villages, as well as several pre-Contact/early historic trails.

According to historic background research, the entire project corridor is comprised of lands formerly under cultivation of sugarcane. Virtually the entire corridor has been extensively graded and plowed repeatedly over the past century in association with sugar cultivation and the construction of plantation infrastructure. Since the cessation of cane production, the lands in the vicinity of the project corridor have been under diversified agricultural cultivation.

Any pre-Contact surface features and/or shallow subsurface deposits would likely have been destroyed by the continual commercial utilization of the area for crop land. According to previous archaeological studies within and in the near vicinity of the project area, plantation-era infrastructure possibly exists within the current project area, although it may have been disturbed by past grading events.

During a reconnaissance survey for the North-South Road project, Hammatt and Chiogioji (1997) observed a flume remnant on the west side of the study corridor, approximately 800 m south of Farrington Highway. The flume consisted of "half-round sheet metal supported by a brick and wood framework and was raised approximately 0.6 m (2 ft.) above the ground surface. The flume remnant has been wrecked and other discontinuous remnants of the flume were observed continuing west beyond the corridor" (Hammatt and Chiogioji 1997:18).

During monitoring for the North-South Road project, Hazlett et al. (2007) documented a cut stone and mortared irrigation ditch (no SIHP # assigned) extending across the project area approximately 1,300 m *makai* of Farrington Highway. A portion of the ditch and nearby plantation road were removed as part of the road cutting and grading, however, "portions of the ditch continue intact for considerable distances to the east and west of the corridor" (Hazlett et al. 2007:14).

Runyon et al. (2011) documented plantation infrastructure remnants (SIHP # 50-80-12-4664) within Component 1 of the current project area. Other disturbed segments of plantation infrastructure were noted.

Dagher and Spear (2009) conducted a field inspection of portions of the current project area, as well as outside the project area to the east and west in a targeted effort to identify plantation-era flumes and ditches. No evidence of flumes, ditches, or other historic or cultural materials were observed.

With all of the available information from previous studies, it is relatively safe to assume plantation-era infrastructure within Component 2 of the current project area has been altered,

displaced, or destroyed, although there may still be intact portions in undeveloped portions of the project area. Within Component 1 of the current project area, one previously identified historic property (SIHP # 50-80-12-4664) has been documented, as well as other remnants of plantation-era infrastructure in the near vicinity. The potential for subsurface cultural deposits is unlikely given the past land use history within the entire project area.

Section 4 Results of Fieldwork

Fieldwork was conducted on 15 August 2017 by CSH archaeologists Thomas Martel III, B.A., Samantha Cragen, B.A., and David W. Shideler, M.A., under the general supervision of Principal Investigator, Hallett H. Hammatt, Ph.D. This work required approximately 2 person-days to complete.

Ground visibility during the field inspection ranged from good to poor. The project area vegetation consisted primarily of introduced species including exotic grasses, *koa haole* (*Leucaena leucocephala*), *klu (Acacia farnesiana),* and castor bean plant (*Ricinus Communis*). The only native species identified in the project area was *‘uhaloa* (*Waltheria indica*), traditionally used for medicinal purposes. For purposes of the field inspection, the project area was divided into two components. Component 1 comprises the corridor that extends along the BWS access road, from Farrington Highway and extends to the existing BWS reservoir, up to and including the proposed site of the new R-1 reservoir. Component 2 comprises the R-1 Main corridor that extends along Kualaka‘i Parkway and Farrington Highway. One previously identified historic property, SIHP # 50-80-12-4664, was identified within the Component 1 portion of the project area, with a continuation (CSH 1) extending across the proposed reservoir location.

4.1 Component 1

An asphalt road with a concrete curbing (Figure 30 and Figure 31) extends *mauka* from Farrington Highway, to an existing BWS reservoir. The road and the reservoir are not visible on a 1977 aerial photograph of the area (see Figure 27), and so any potential features associated with these modern developments are assumed to be modern as well. The modern features observed include two cinder block retaining walls with chain link fences located along the road (Figure 32 and Figure 33), an earthen drainage ditch located *makai* of the reservoir (Figure 34), and a basalt and concrete culvert with metal pipe and associated earthen ditch located *makai* of the reservoir (Figure 35).

Beyond the existing reservoir location to the southwest is the proposed site for a new reservoir (Figure 36 and Figure 37). Portions of plantation-era infrastructure have been identified in the immediate area, near Hunehune Gulch. One of these is a portion of SIHP # 50-80-12-4664, a concrete plantation-era water diversion structure containing two sluice gates, previously documented by Runyon et al. (2011). The portion of SIHP # 50-80-12-4664 documented by Runyon et al. (2011) consists of a metal flume that crosses Hunehune Gulch, and connects to a cut stone and mortared water diversion structure with sluice gates, and then to a portion of a metal culvert extending underground within the current project area.

During the current field inspection of Component 1 of the current project area, it was found that the subsurface culvert extends approximately 10 m to a portion of exposed metal culvert located adjacent to a concrete retaining wall (CSH 1; refer to Section 4.3). The concrete retaining wall extends across the project area in a roughly northeast-southwest alignment, disappearing just before the chain link fence surrounding the existing reservoir.

The concrete wall (CSH 1) is most likely a portion of a plantation-era concrete ditch that previously extended perpendicular to what is now Farrington Highway. No inscriptions were observed on the portions within and adjacent to the project area, although inscriptions were

Figure 30. Modern BWS access road, view to southeast

Figure 31. Modern BWS access road with concrete curbing, view to southwest

Figure 32. Modern cinder block retaining wall along BWS access road, view to southwest

Figure 33. Modern cinder block retaining wall along BWS access road, view to northeast

Figure 34. Modern earthen drainage ditch located *makai* of existing BWS reservoir, view to southeast

Figure 35. Modern mortared basalt culvert located *makai* of existing BWS reservoir, view to northwest

Figure 36. General view of proposed R-1 reservoir location within Component 1 of the project area taken from upslope location along fence line for existing reservoir, view to south

Figure 37. General view of proposed R-1 reservoir location within Component 1 of the project area, archaeologist standing on artificial earthen berm, view to east

previously observed on portions of SIHP # 50-80-12-4664 in the vicinity of Makakilo Gulch, reading April and September 1941 respectively (Nakamura et al. 1993). The concrete wall and the subsurface and exposed portions of the metal culvert that are within the current project area are most likely associated with the rest of the previously documented SIHP # 50-80-12-4664.

A broken flume remnant was observed to the south of the proposed R-1 reservoir site that also crosses Hunehune Gulch (Figure 38). An artificial earthen berm (see Figure 37) was observed at the northeast end of the broken flume, suggesting the rest of the structure was graded away.

4.2 **Component 2**

The project area along Kualaka‘i Parkway and Farrington Highway has seen extensive modification in modern times, primarily associated with the North-South Road project (Kualaka‘i Parkway) and the ongoing HHCTCP. The entire length of the current project area was surveyed by foot, except in areas where there was active construction for the HHCTCP, due to safety concerns. No potential historic properties were identified in this developed portion of the project area (Figure 39 through Figure 45). Previous reports suggest plantation infrastructure remnants in the vicinity of Component 2 of the current project area have already been destroyed.

The subsurface metal culvert documented by Runyon et al (2011) was found to extend approximately 10 m underground to a portion that has been exposed and appears disarticulated (Figure 46). Adjacent to this exposed portion of metal culvert is a retaining wall that ranges from 40-60 cm high, and is approximately 30 m long (Figure 47 and Figure 48). The wall appears to be concrete, but upon further inspection of disturbed portions, it is shown to consist of stacked basalt cobbles and small boulders with a concrete coating on the exterior (Figure 49 and Figure 50). Disturbed portions were observed in the middle portion of the wall (see Figure 49) and at the extreme northeast end where the wall disappears (see Figure 50). At the northeast end, there is an exposed segment of concrete below the retaining wall that extends 95 cm out from the wall, is 4.5 m long, and is 10 cm higher than the land surface (Figure 51). Together, these remnants most likely constitute a continuation of SIHP # 50-80-12-4664.

The concrete wall and associated remnants (CSH 1) are most likely a portion of a plantation-era concrete ditch that previously extended perpendicular to what is now Farrington Highway. No inscriptions were observed on the portions within and adjacent to the project area (inscriptions were observed on portions of SIHP # 50-80-12-4664 in the vicinity of Makakilo Gulch, reading April and September 1941 respectively-Nakamura et al. 1993).

Figure 38. Broken flume remnant located south of the proposed R-1 reservoir, view to southwest

Figure 39. Modern drainage overflow at *makai* end of Component 2 portion of project area, view to east

Figure 40. Kualaka‘i Parkway at *makai* end of Component 2 portion of project area, view to north

Figure 41. Kualaka‘i Parkway at *makai* end of Component 2 portion of project area, HHCTCP corridor and Kroc Center Hawaii visible, view to northeast

Figure 42. Kualaka‘i Parkway at middle portion of Component 2 portion of project area, HHCTCP corridor and Kroc Center Hawaii visible, view to south

Figure 43. Kualaka‘i Parkway, approaching intersection with Farrington Highway, view to northwest

Figure 44. Farrington Highway, taken from intersection with Kualaka‘i Parkway, view to southwest

Figure 45. Farringtown Highway, looking toward BWS access road, view to northwest

Figure 46. Exposed metal culvert, portion of CSH 1, view to south

Figure 47. Exposed metal culvert with adjacent retaining wall visible, portions of CSH 1, view to southwest

Figure 48. Retaining wall, portion of CSH 1, view to north

Figure 49. Disturbed middle section of retaining wall, portion of CSH 1, view to west

Figure 50. Disturbed section of retaining wall at northeastern end, highlighting construction style of stacked basalt with concrete covering, portion of CSH 1, view to northwest

Figure 51. Exposed segment of concrete below retaining wall, portions of CSH 1, view to northeast

4.3 **Discussion of Historic Property and Significance**

4.3.1 SIHP # 50-80-12-4664 Overview

Formal Type:	Irrigation infrastructure
Previous Documentation	Nakamura et al. 1993, Rasmusson 2006, and Runyon et al. 2011
Function:	Water control
Location:	Component 1 of project area, at location of proposed new R-1 reservoir
Dimensions:	40-60 cm tall, 30 m long
Age:	Plantation era, likely in the 1940s

Remnants of plantation-era irrigation infrastructure were observed within the northwest portion of the project area. Portions of this infrastructure have been previously documented by Nakamura et al. (1993) and Runyon et al. (2011) as SIHP # 50-80-12-4664.

4.3.2 Nakamura et al. (1993) documentation of SIHP # 50-80-12-4664

The Nakamura et al. (1993) archaeological inventory survey designated SIHP # 50-80-12-4664 *mauka* (NW) of the H1 (Queen Liliuokalani Freeway) on the northeast side of Makakilo Drive approximately 2.3 kilometers to the southwest. As defined, “It consists of an irrigation flume, lined with smooth cement and a reservoir” (Nakamura et al. 1993:25). The meandering flume followed the contour for a distance of 915 m and was dated to 1941 on the basis of date inscriptions in the concrete. The study evaluated site significance as follows:

> Although this system may have been in use until recently, its construction in 1941 qualifies it as a historic site. Being associated with sugar cane cultivation, its significance may be based upon multiple criteria A and C of the National Register significance Evaluation Criteria. Criterion A states that a site is significant based on its association with events that have made an important contribution to the broad patterns of history in a region. Criterion C states, in part, that a site is significant for its embodiment of the distinctive characteristics of a type, period, or method of construction. [Nakamura et al. 1993:32]

However, the study concluded that :

> …the significance of Site 50-80-12-4664 can be considered to have been realized and no further work is necessary prior to removal. Following a brief discussion of this site and its disposition, a staff archaeologist with HPD/DLNR verbally concurred that the significance of this site has been realized through the data recovery procedures completed. [Nakamura et al. 1993:32]

4.3.3 Rasmussen (2006) documentation of SIHP # 50-80-12-4664

The Rasmussen (2006) archaeological assessment (understood as a literature review and field inspection) study area included the Nakamura et al. 1993study area and documented

> … a concrete and basalt culvert … [that] appears to be of similar construction to the sugarcane flume (Site 50-80-12-4664; TMKs 9-2-019:72 and 9-2-003:081)

> built in 1941, which was recorded by Nakamura et al. (1993:32). [Rasmussen 2006:iii]

It is related that “Rasmussen originally recorded the site for Nakamura et al. (1993)” (Rasmussen 2006:iii). It appears that Rasmussen (2006) basically documented the same portion of flume that Rasmussen had documented in the Nakamura et al. (1993) study.

Rasmussen arguably significantly expands the historic property from Nakamura et al’s “flume and reservoir” writing that: “Site 50-80-12-4664 . . . consists of identifiable features related to sugarcane cultivation” (Rasmussen 2006:17). Rasmussen (2006:22-27) goes on to designate seven features as contributing elements of the historic property (see Table 5).

Recommendations for further work appear limited to a presentation of expectations; that “there appears to be a low likelihood of archaeological sites in the project area.” Rasmussen (2006:iii)

4.3.4 Runyon et al (2011) documentation of SIHP # 50-80-12-4664

The portion previously documented by Runyon et al (2011) monitoring report (refer to Appendix A) extends into Component 1 of the current project area and consists of a metal flume that crosses Hunehune Gulch, and connects to a cut stone and mortared water diversion structure with sluice gates, and then to a portion of a metal culvert that extends underground. Where the recordation of the historic property by Runyon et al. (2011) ends, this LRFI continues.

SIHP # 50-80-12-4664 was used to designate a concrete plantation-era water diversion structure containing two sluice gates. It was noted that:

> SIHP # 50-80-12-4664 consists of a previously documented plantation-era flume system. A separate portion of the site was previously recommended eligible under Criterion A (reflects major trends or events in the history of the state or nation) and Criterion C (excellent example of a site type). However, the portion of SIHP # 50-80-12-4664 documented during this project investigation is only recommended eligible under Criterion D (historic property has yielded or may be likely to yield information important in prehistory or history). [Runyon et al 2011:69]

No further discussion regarding treatment of the historic property s offered.

The portion previously documented in the Runyon et al (2011) monitoring report (refer to Appendix A) extends into Component 1 of the current project area and consists of a metal flume that crosses Hunehune Gulch, and connects to a cut stone and mortared water diversion structure with sluice gates, and then to a portion of a metal culvert that extends underground. Where the recordation of the historic property by Runyon et al. (2011) ends, this LRFI continues.

SIHP # 50-80-12-4664 was used to designate a concrete plantation-era water diversion structure containing two sluice gates. It was noted that:

> SIHP # 50-80-12-4664 consists of a previously documented plantation-era flume system. A separate portion of the site was previously recommended eligible under Criterion A (reflects major trends or events in the history of the state or nation) and Criterion C (excellent example of a site type). However, the portion of SIHP # 50-80-12-4664 documented during this project investigation is only recommended

Table 5. Features of SIHP # 50-80-12-4664 (as designated in Rasmussen 2006:22-34)

Feature #	Feature Type/Description	Functional Assessment	Integrity	Criterion	Reference
1	The U-shape in plan view concrete flume previously identified during the Nakamua (1993) survey	Irrigation of sugarcane	Yes	D	Rasmussen 2006:22
2	A double drain culvert located above the flume constructed of mortared subangular to subrounded basalt cobbles and small boulders that are coated with concrete.	Irrigation of sugarcane	Yes	D	Rasmussen 2006:22
3	A similar culvert, or walled drainage, located upslope (NW) of Feature 2The culvert is roughly U-shaped. The arms of the culvert are 1.8 m long and 0.45 m wide. The interior portion of the U is 0.6 m wide, for a total width of 1.5 m. It is constructed with mortared subangular to subrounded basalt boulders and cobbles. A coating of concrete covers the top of the culvert wall.	Irrigation of sugarcane	Yes	D	Rasmussen 2006:22
4	A rock-lined ditch 1.25 to 1.35 m high and 3.7 m wide The ditch walls are constructed of stacked and faced subangular to subrounded basalt boulders and cobbles.	Irrigation of sugarcane	Yes	D	Rasmussen 2006:22, 25
5	Feature 5 consists of plow scars located on the lower slopes west of Makakilo Drive. The scars are about 25 cm apart and oriented north/south (uphill/downhill). The plow scars likely indicate agricultural activities, such as sugarcane.	Cultivation of sugarcane	Yes	D	Rasmussen 2006:25
6	A 6 m wide crushed coral roadbed	Transportation	Yes	D	Rasmussen 2006:26
7	A crushed basalt cobble foundation or paving, likely for a historic outbuilding, possibly associated with ranching or sugarcane cultivation activities. It is approximately 18 by 23 m in size.	Temporary habitation	Yes	D	Rasmussen 2006:27

eligible under Criterion D (historic property has yielded or may be likely to yield information important in prehistory or history). [Runyon et al 2011:69]

No further discussion regarding treatment of the historic property is offered.

4.3.5 Significance

Portions of SIHP # 50-80-12-4664, sugar plantation infrastructure outside of the project area, have been previously evaluated as eligible to the National Register of Historic Places (NRHP) per 36 CFR 60.4 and Hawaii Register of Historic Places (HRHP) per HAR §13-198-8 and under HAR §13-284-6 (Table 6).

Table 6. Previous evaluations of SIHP # 50-80-12-4664

Reference	Significance/ Eligibility Criteria	Notes
Nakamura et al. 1993	A and C	“The significance of Site 50-80-12-4664 can be considered to have been realized and no further work is necessary prior to removal”
Rasmusson 2006	D	Greatly expanded SIHP # 50-80-12-4664 to include “identifiable features related to sugarcane cultivation”
Runyon et al. 2011	d	Assessed SIHP # -4664 as significant per HAR §13-284-6 under Criterion d

Nakamura et al. (1993) evaluated SIHP # -4664 as significant under NRHP Criteria A and C, but then argued (citing SHPD accord) that “the significance of Site 50-80-12-4664 can be considered to have been realized and no further work is necessary prior to removal” (Nakamura et al. 1993:32).

Rasmussen (2006) greatly expanded SIHP # -4664 to include “identifiable features related to sugarcane cultivation” (Rasmussen 2006:17) and re-evaluated SIHP # -4664 as significant under NRHP Criterion D.

Runyon et al. (2011) assessed SIHP # -4664 as significant per HAR §13-284-6 under Criterion d. There is no discussion of site integrity per se. There is no evaluation under National Register of Historic Places criteria or Hawaii Register of Historic Places criteria.

Based on the field inspection and background research for this report, that portion of SIHP # 50-80-12-4664 within the present project area is evaluated as lacking integrity.

- Integrity of location of the remnants of plantation infrastructure within the project area is mixed. Some of the infrastructure is in place and some has been displaced (see Figure 46and Figure 49).
- Integrity of design has largely been lost. The design of the sugarcane plantation infrastructure is not apparent.
- Integrity of setting has been lost. The remnants of sugarcane infrastructure have completely lost their setting within the former commercial sugar cane fields.

- Integrity of materials is mixed. Some remnants of the plantation infrastructure retain integrity of materials but other remnants have lost the integrity of materials through demolition and erosion (see Figure 46, Figure 49, and Figure 50).
- Integrity of workmanship has been compromised with loss of the integrity of the sugarcane infrastructure to demolition and erosion, (see Figure 46, Figure 49, and Figure 50). The remnant of the historic property present does not illustrate the aesthetic principles of a historic period, or reveal individual, local, regional, or national applications of either technological practices or aesthetic principles.
- Integrity of feeling has been lost. The historic property does not evoke the aesthetic or historic sense of a past period of time.
- Integrity of association is lacking because of the general lack of integrity of setting, location, design, workmanship, materials, and feeling

Thus SIHP # -4664 is suggested as likely significant only under HAR §13-284-6 Criterion d, for its information potential regarding sugar cane cultivation in the area. With the present documentation, no further archaeological work for this remnant of sugar cane cultivation irrigation infrastructure within the project area is recommended.

Section 5 Summary and Recommendations

Various Hawaiian legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian *ali‘i.* This would be attributable, for the most part, to the plentiful marine and estuarine resources available at the coast. Other attractive subsistence-related features of the *ahupua‘a* include irrigated lowlands suitable for wetland taro cultivation, as well as the lower forest area of the mountain slopes for the procurement of forest resources. Honouliuli Ahupua‘a has a number of important topographic features, peaks, streams, gulches, coastal points, and a number of ancient villages, as well as several pre-Contact/early historic trails.

According to historic background research, the entire project corridor is comprised of lands formerly under cultivation of sugarcane. Virtually the entire corridor has been extensively graded and plowed repeatedly over the past century in association with sugar cultivation and the construction of plantation infrastructure. Since the cessation of cane production, the lands in the vicinity of the project area have been under diversified agricultural cultivation.

Any pre-Contact surface features and/or shallow subsurface deposits would likely have been destroyed by the continual commercial utilization of the area for crop land. According to previous archaeological studies within and in the near vicinity of the project area, plantation-era infrastructure has been documented within Component 1, and possibly exists within Component 2, although it most likely has been altered, displaced, or destroyed, although there may still be intact portions outside the project area.

Recommendations

The results of the field inspection were consistent with what was expected based on background research and the previous archaeological studies conducted in the vicinity. Based on the extensive grading and the absence of any surface historic properties or subsurface cultural deposits within Component 2 of the project area, it is likely that no known or previously unidentified historic properties will be affected by the proposed project. Within Component 1 of the project area, portions of SIHP # 50-80-12-4664 (plantation-era irrigation infrastructure [Runyon et al. 2011]) were identified, as well as newly identified portions (CSH 1).

Based on the field inspection and background research for this report, the historic property is likely significant only under Criteria d per HAR §13-275-6, for its information potential regarding sugar cane cultivation in the area.

The proposed project will impact the newly identified portion of SIHP # -4664 (CSH 1) and will most likely not impact the previously identified portions of SIHP # -4664. The portion that will be impacted (CSH 1) has not been fully documented and has not reached its information potential.

Consultation with the SHPD can determine the future course of action. A “no historic properties affected” determination is recommended. As a general precaution, the project plans should include provisions stating that “In the event that historic resources, including structural remains, subsurface cultural deposits, 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 contact the SHPD at (808) 692-8015.”

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Appendix A Historic Property Description of SIHP # 50-80-12-4664 (from Runyon et al. 2011)

FORMAL TYPE:	Water Diversion
FUNCTION:	Agriculture
# OF FEATURES:	1
AGE:	Historic
DIMENSIONS:	Approximately 42 meters E/W by 1.5 meters N/S
LOCATION:	Ramp C
TAX MAP KEY:	H-1 Right-of-Way (ROW)
LAND JURISDICTION:	State of Hawai‘i

A portion of this flume system was originally documented in 1993 (Nakamura et al.) during an archaeological inventory survey conducted by Aki Sinoto Consulting for development Parcels D and D-1 in Makakilo (see also Section 3.2, Previous Archaeological Research). The site was documented within their Parcel D-1 project area and was designated SIHP # 50-80-12-4664. The site was documented as consisting of a reservoir and a smooth cement flume which follows the natural contours of the land covering a linear distance of approximately 3000 feet/915 meters, and measuring roughly 1.32 m wide by 0.88 m high. Two dates were found inscribed on the flume wall and culvert reading April and September 1941 respectively. A separate inscription found near a portion of the flume which is supported by structural footings which create a bridge crossing Makakilo Gulch, indicates a construction of 1963. Portions of the flume were documented as having been disturbed by the construction of nearby dirt roads. As the flume was found below the 200 foot elevation, it was likely constructed by the Ewa Plantation Company.

Within the current project area, SIHP No. 50-80-12-4664 consists of an agricultural water diversion structure. The site includes a metal flume, approximately 34 m long N/S by 1.25 m wide E/W, and a metal siphon pipe, approximately 1.25 m in diameter, situated over top of Hunehune Gulch in the southwest portion of Ramp C. The metal flume is situated with approximately 10 meters of flume on the west side of Hunehune Gulch and 13.5 meters on the east side of the gulch. On the east side, the metal flume connects with a cut stone and mortar flume or water diversion structure, approximately 7 m in length E/W by 1.5 meters in width N/S. Two sluice gate openings and wooden gate remnants were observed in the *makai* (seaward) wall near the east end of the structure. The east end of the flume continues via a metal culvert underground for an unknown distance. The water diversion structure is in fair condition and appears to have not been directly affected by the current construction project. The site was further documented in 2006 (Rasmussen) during an archaeological assessment by International Archaeological Research Institute, Inc. (IARII). The site appeared to be in the same condition as when recorded in 1993.

Figure 52. Photo of the large metal siphon pipe (left) and metal flume (right) located along the southwest edge of Ramp C crossing Hunehune Gulch (SIHP # -4664), view to west

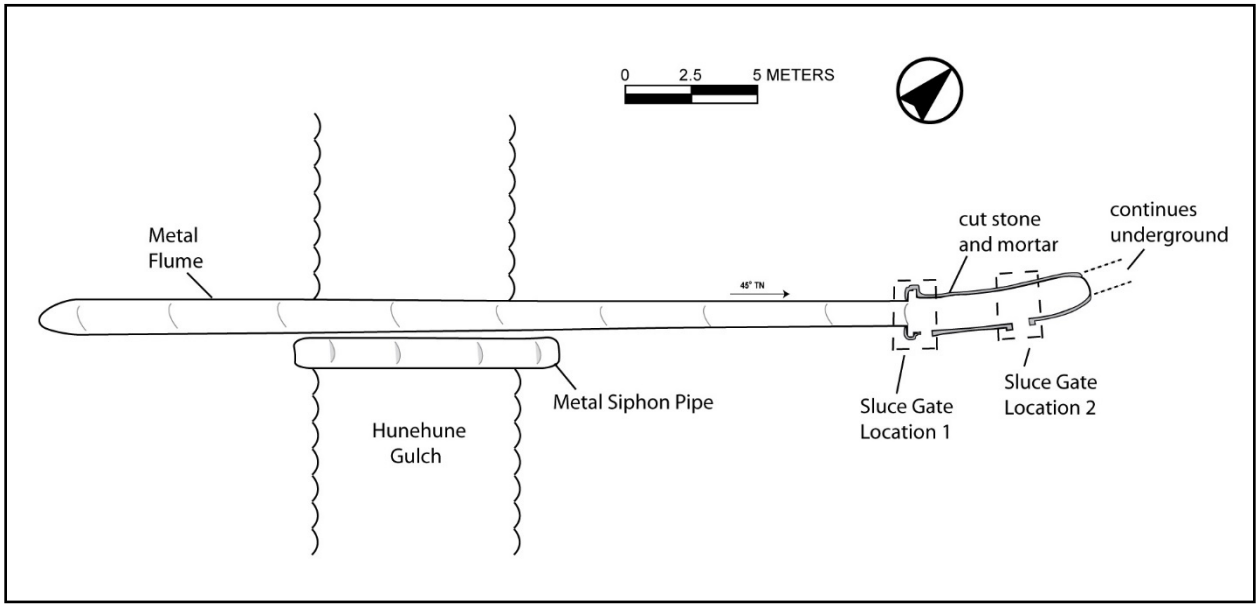

Figure 53. Plan map of SIHP # -4664, found on the southwest edge of Ramp C

Figure 54. Photo of the historic water diversion structure (SIHP # -4664), Sluice Gate Location 1

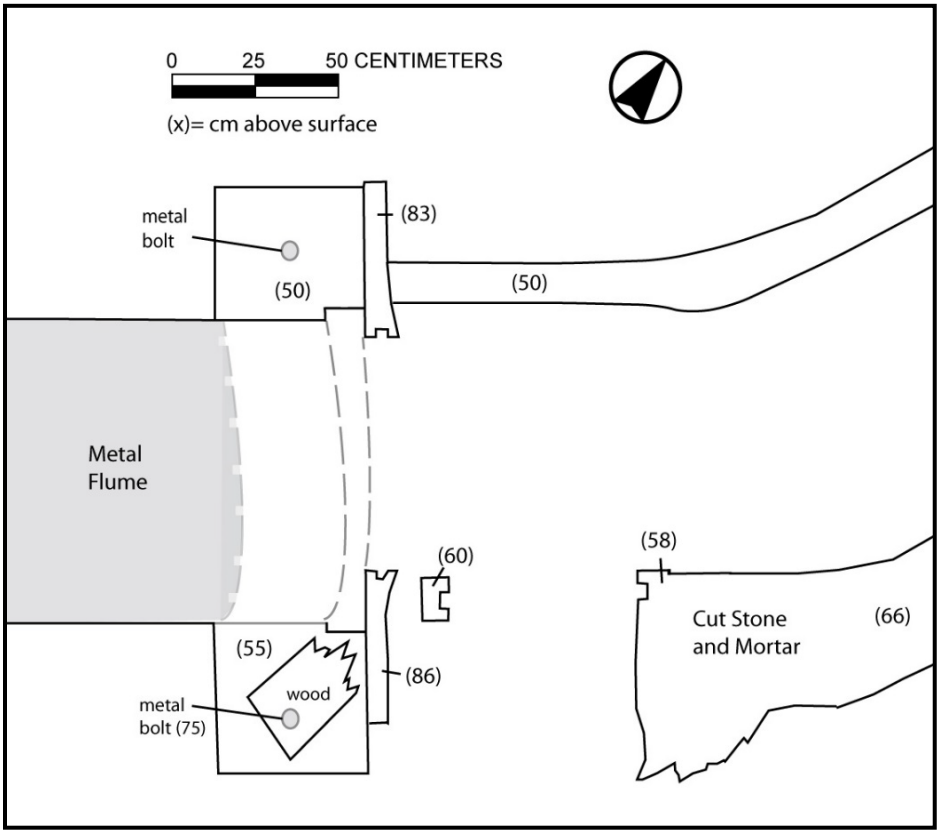

Figure 55. Plan view of Sluice Gate Location 1 (SIHP # -4664)

Figure 56. Photo of the historic water diversion structure (SIHP # -4664), Sluice Gate Location 2

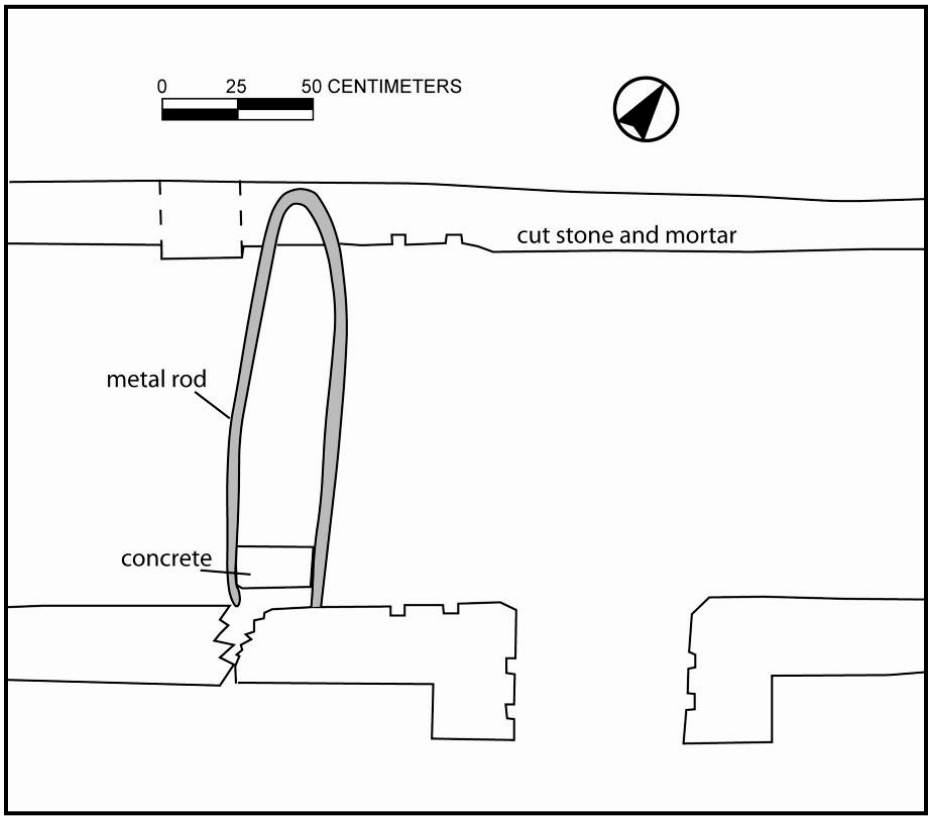

Figure 57. Plan view of Sluice Gate Location 2 (notice the notches in the walls for the sluice gates to slide into) (SIHP # -4664)

Figure 58. Photo of SIHP # -4664 on southwest edge of Ramp C, view to west

Addendum to an Archaeological Literature Review and Field Inspection Report for the Kualakaʻi Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu

Addressing a Small Southern Extension within the TMK: [1] 9-1-017:096 Kualakaʻi Parkway ROW

Prepared for
Engineering Concepts, Inc.
on behalf of the
City and County of Honolulu Board of Water Supply (BWS)

Prepared by
Scott A. Belluomini, B.A.,
and
David W. Shideler, M.A.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: HONOULIULI 188)

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Management Summary

Reference	Addendum to an Archaeological Literature Review and Field Inspection Report for the Kualaka‘i Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, Addressing a Small Southern Extension within the TMK: [1] 9-1-017:096 Kualaka‘i Parkway Right-of-Way (ROW) (Belluomini and Shideler 2020)
Date	October 2020
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: HONOULIULI 188
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 20-07, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	SHPD, Environmental Protection Agency (EPA), State of Hawai‘i Department of Health (DOH), City and County of Honolulu Board of Water Supply (BWS)
Project Proponent	BWS
Project Funding	BWS, DOH, EPA
Project Location	The project area comprises portions of the East Kapolei 215 Reservoir access road and proposed R-1 reservoir location, Farrington Highway from an East Kapolei 215 Reservoir access road to Kualaka‘i Parkway, and Kualaka‘i Parkway from Farrington Highway to Mango Tree Road as addressed in a prior study (Martel III and Hammatt 2018). This addendum study addresses an additional, small (6.1 acre), contiguous southerly extension of the project area along Kualaka‘i Parkway south to the Kapolei Parkway. The project area is depicted on a portion of a 2013 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2019 aerial photograph (Figure 3).
Land Jurisdiction	State of Hawai‘i Department of Transportation (HDOT)
Project Acreage	The addendum project area addressed, spanning the Kualaka‘i Parkway, is approximately 6.1 acres (2.5 hectare). This would be in addition to the area addressed in the Martel III and Hammatt 2018 study of 71.7 acres (29.02 hectares) for a total project area estimated as 77.8 acres (31.52 hectares). The actual area of project impact is anticipated to be a very small fraction of this.

Project Description and Ground Disturbance	Proposed ground disturbing activities for the project would include excavation for water mains and appurtenances, geotechnical borings, and grading and excavation for the construction of the R-1 reservoir (as previously addressed). Within the southern extension along Kualaka‘i Parkway south to the Kapolei Parkway addressed in this addendum study, ground disturbance would be the continuation of the excavation for water mains and appurtenances.
Historic Preservation Regulatory Context	This study falls under the rules established by Hawai‘i Revised Statutes (HRS) §6E-8 and HAR §13-275. The SHPD previously completed a §6E-8 Historic Preservation Review (dated 6 April 2018, Log No. 2017.02699, Doc. No. 1801KM07, included here as Appendix A) which concurred with a determination of no historic properties affected for the proposed project. Since the project has been extended slightly (approximately 350 m) along Kualaka‘i Parkway south to the Kapolei Parkway, this extension is addressed in this addendum study. Section 106 of the National Historic Preservation Act applies to the project due to funding from the EPA. The Section 106 process is being conducted by the EPA separately from the HRS 6E compliance process.
Document Purpose	This investigation was designed 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 environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per HAR §13-276.
Natural and Built Environment	The addendum project corridor is located approximately 4 km inland from the coast at approximately 100-foot (ft) elevation on the ‘Ewa Plain, a Pleistocene reef platform overlain by alluvium from the southern end of the Wai‘anae Mountain Range. The addendum project area overlies Honouliuli clay, 0 to 2% slope (HxA) soil (Foote et. al 1972, Figure 4). This alluvium supported commercial sugarcane cultivation for over a century. The ‘Ewa Plain is hot and dry with annual rainfall at the neighboring “Reservoir 6 Os” station of 577 mm (22.7 inches) (Giambelluca et al. 2013), suggested to be representative. This is insufficient for non-irrigated agriculture. Honouliuli Stream is the only major stream in the area, although it is located well outside the project area. The Kalo‘i Gulch drainage formerly traversed this addendum project area but this drainage has been channelized. The immediate vicinity of the project area is at present largely undeveloped, but this area of Kapolei is quickly being developed in subdivisions. The Ka Makana Ali‘i shopping center is a major new development immediately to the southwest of the south end of the present project area extension.

Background Research Methods	Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2020).
Cultural Context	The cultural context of the addendum project area is indicated in Figure 5, which shows the relationship to the Kalo‘i Gulch drainage but otherwise there are no notable land forms or named places in the immediate vicinity. A trail connecting the Honouliuli Taro Lands (understood as the center of habitation and cultivation in the *ahupua‘a* [traditional land division]) extended down to the south coast but passed to the east of the project area (Figure 5 and Figure 7). The main cross-*ahupua‘a* trail connecting ‘Ewa with the Wai‘anae coast was well to the north of the addendum project area (Figure 5, Figure 6, and Figure 7). The addendum project area is understood as part of a dry, “Low uncultivated plain” as called out on the 1825 Malden map (Figure 7) with settlements at a distance along the coast.
Land Commission Awards (LCAs)	During the Māhele land division of 1848, Miriam Ke‘ahikuni Kekau‘ōnohi acquired a deed (Royal Patent #6971) to all unclaimed land within the *ahupua‘a* (which includes the present project area), which totaled 43,250 acres. The 72 *kuleana* awards given to commoners were located in the lower portions of Honouliuli Ahupua‘a near Pearl Harbor with its fishponds and irrigated taro fields (Maly 1997). No *kuleana* claims were awarded within the project area.
Review of Historic Maps	The 1873 Alexander map (Figure 8) still shows the project area as part of the featureless ‘Ewa plain with virtually no human enterprise indicated. However, by the time of the 1899 Beaseley map (Figure 9) the project area and vicinity have been transformed into a sea of Ewa Plantation sugarcane fields (the addendum project area is in fields 5 and 8). The Oahu Railway & Land (OR&L) railroad ran well to the south, but a roughly parallel Ewa Plantation railway crossed Kalo‘i Gulch and the addendum project area that is the focus of this study. The 1906 Donn map (Figure 10) shows the project area within the area of the Ewa Plantation sugarcane fields and shows a short-lived sisal plantation just to the south. A 1913 U.S. Army Engineers map (Figure 11) shows the addendum project areas in a sea of commercial sugarcane but provides details. Kalo‘i Gulch is shown as an unnamed dashed line descending from the east side of Pu‘u Makakilo, well to the northwest, through the cane fields to the vicinity of the east side of the addendum project area

Review of Historic Maps (cont.)	where it takes a sharp turn to the southeast. An improved plantation road, with a (Ewa Plantation) railroad immediately adjacent on the north (*mauka*, inland) side, runs through the addendum project area seemingly crossing over a small bridge or culvert at Kalo‘i Gulch on the east side of the project area. The east side of the addendum project area is depicted with a different format than the surrounding, uniform, sea of sugarcane and this is interpreted as a clearing mound (no clear structure is indicated). There is no indication of this posited clearing mound feature on later maps suggesting the stone and debris had been removed. A layout of *mauka*/*makai* (seaward) trending unimproved roads is indicated as providing access to the sugarcane fields. One of these unimproved field access roads is indicated running through the southern portion of the addendum project area seemingly ending at the parallel road and railroad line.
Synopsis of Previous Archaeological Work in the Vicinity	Previous archaeological studies in the vicinity are depicted in Figure 22 and summarized in Table 1. Previously identified historic properties in the vicinity are located on Figure 23 and summarized in Table 2. The relationship and import of previous archaeological studies to the majority of the project area was addressed in a prior study (Martel III and Hammatt 2018) In a reconnaissance survey for the North-South Road project, Hammatt and Chiogioji (1997) covered the present extension of the project area but observed no historic properties in the immediate vicinity (Hammatt and Chiogioji 1997:18). Runyon et al. (2011) documented monitoring of very substantial trenching in the current project area but identified no cultural deposits and recommended no further archaeological monitoring in their area of study (including the present addendum project area). Dagher and Spear (2009) conducted a field inspection of the vicinity of the intersection of Kualaka‘i Parkway and Kapolei Parkway at the south end of the addendum project area but found no evidence of flumes, ditches, or other historic or cultural materials. Numerous historic properties have been identified at Varona Village, 400 m southeast of the south end of the present addendum project area (Figure 20), but these are understood as directly associated with that plantation camp. Thus, the present addendum project area has been addressed in three prior archaeological studies with no identifications of historic properties in the vicinity.

Fieldwork Effort	A brief field inspection of the project area was conducted by CSH archaeologist David W. Shideler, M.A., on 19 October 2020 that took approximately 2 hours. A track log and key showing the general location and direction of the following photographs is provided in Figure 24. The field inspection was completed to identify the likelihood of historic properties being present within the project area. Photographs were taken of the project area and are presented from the southwest corner moving in a generally counterclockwise direction. The project area extension is largely paved for the northwest/southeast trending Kualaka‘i Parkway and the intersecting southwest/northeast trending Kapolei Parkway (Figure 25). The southeast corner of the project area extension extends southeast of the Kapolei Parkway into a weedy previously graded area (Figure 26). The sidewalks of Kualaka‘i Parkway are quite wide with a previously graded strip in weeds along the northeast side (Figure 27 through Figure 30). A chain link fence was understood to demarcate most of the northeast edge of the project area extension (Figure 27 and Figure 30). Similarly, a wide sidewalk and a previously graded strip in weeds extends along the southwest side with a bounding chain link fence understood as the southwest edge of the project area extension (Figure 31 through Figure 34). Views are provided looking southeast and northwest at the main intersection (Figure 35 and Figure 36). Maps and aerial photographs from 1919 (see Figure 13) depict an Ewa Plantation railroad line (with a closely parallel road on the *makai* side) as having crossed the north portion of the addendum project area. This indicated alignment was examined but no evidence of the former plantation transportation infrastructure was observed (views of the posited crossing alignment to the northeast and southwest are provided in Figure 37 and Figure 38). No historic properties were observed during the field inspection. The likelihood of subsurface cultural deposits was evaluated as low.
Historic Properties Potentially Affected	No historic properties have been documented in the present addendum project area and none were observed during the field inspection for this study. No surface historic properties are believed to be present and the prospect for subsurface historic properties is evaluated as very low.
Discussion of Project Effect and Recommendations	It is recommended that the BWS pursue a determination letter (as per HAR §13-275-3) from the SHPD using this study to provide supporting information for the determination. This literature review and field inspection study supports a determination of “no historic properties affected” and no further historic preservation review steps are warranted for this extension of the project area.

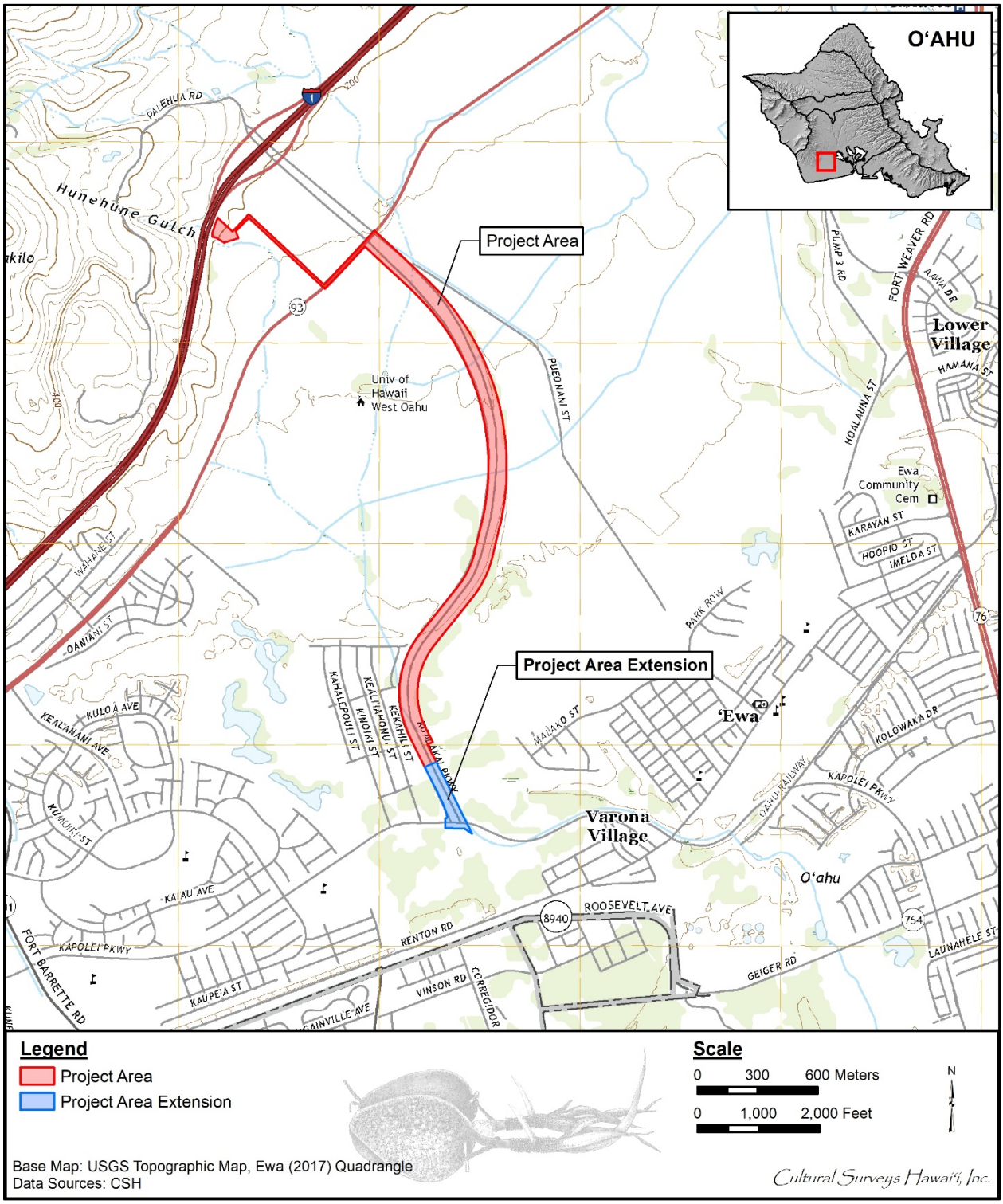

Figure 1. Portion of a 2017 Ewa USGS 7.5-minute topographic quadrangle showing the project area and extension

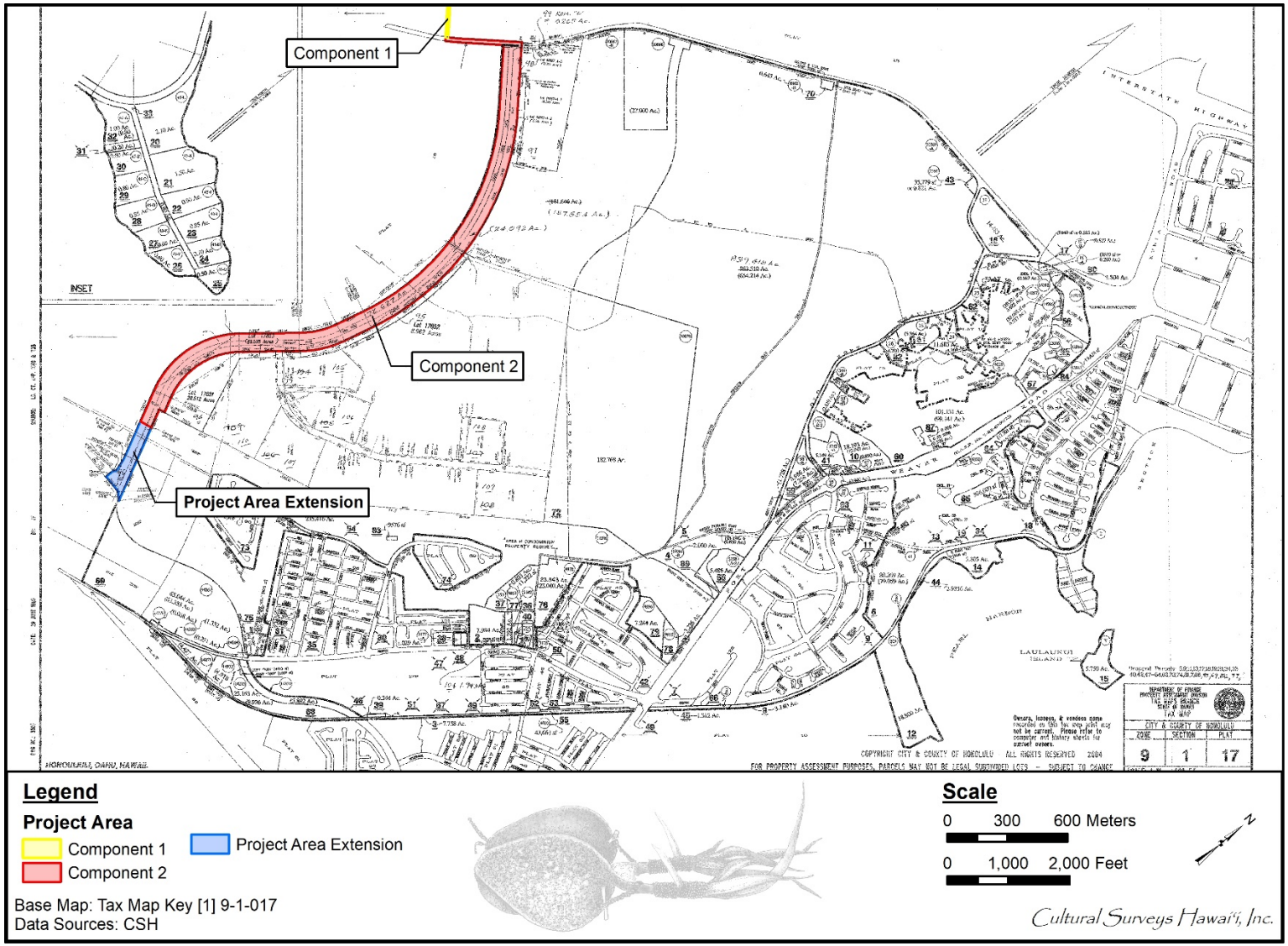

Figure 2. TMK: [1] 9-1-017 showing the project area (Hawai‘i TMK Service 2019)

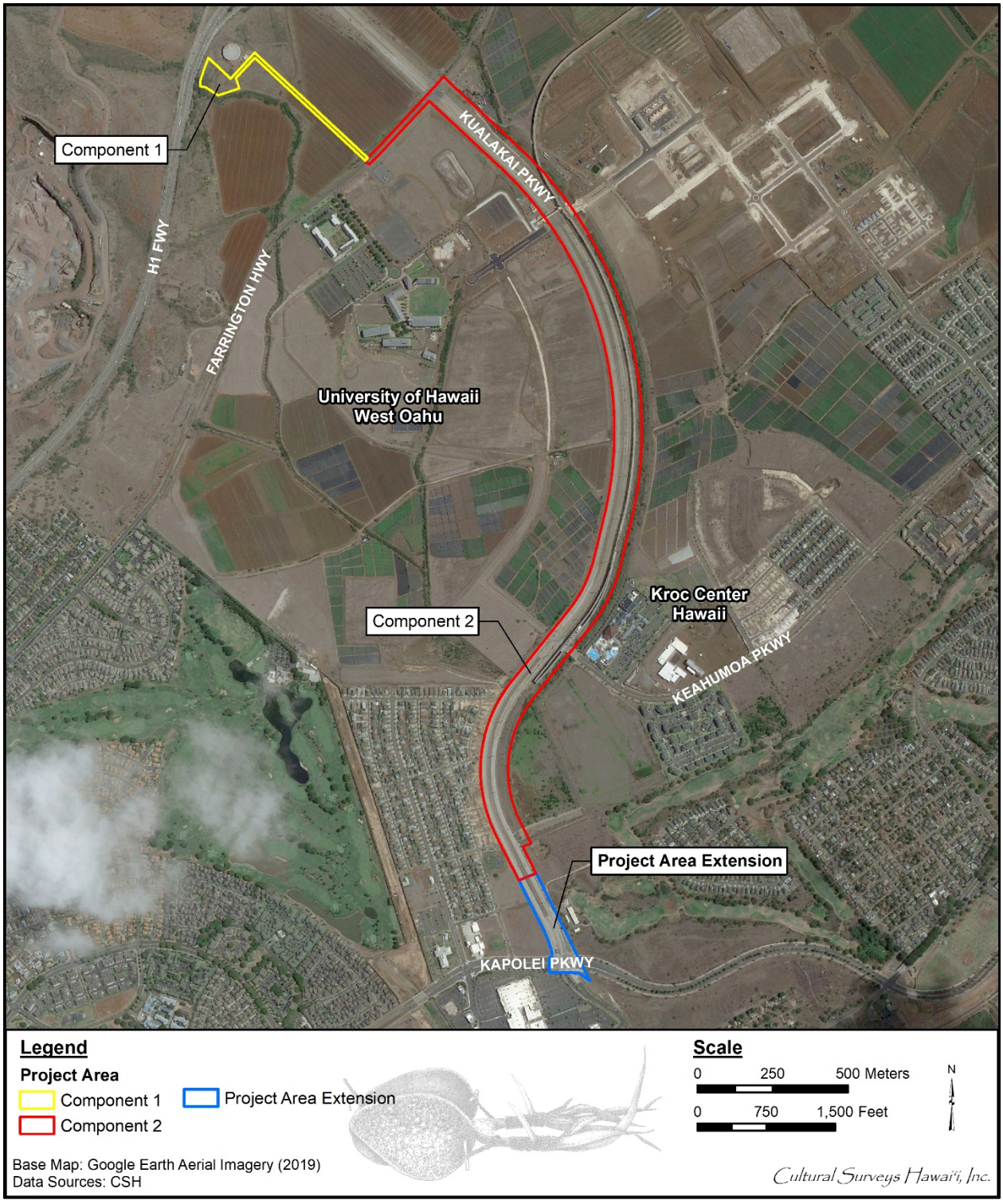

Figure 3. 2019 Google Earth aerial photograph showing the project area

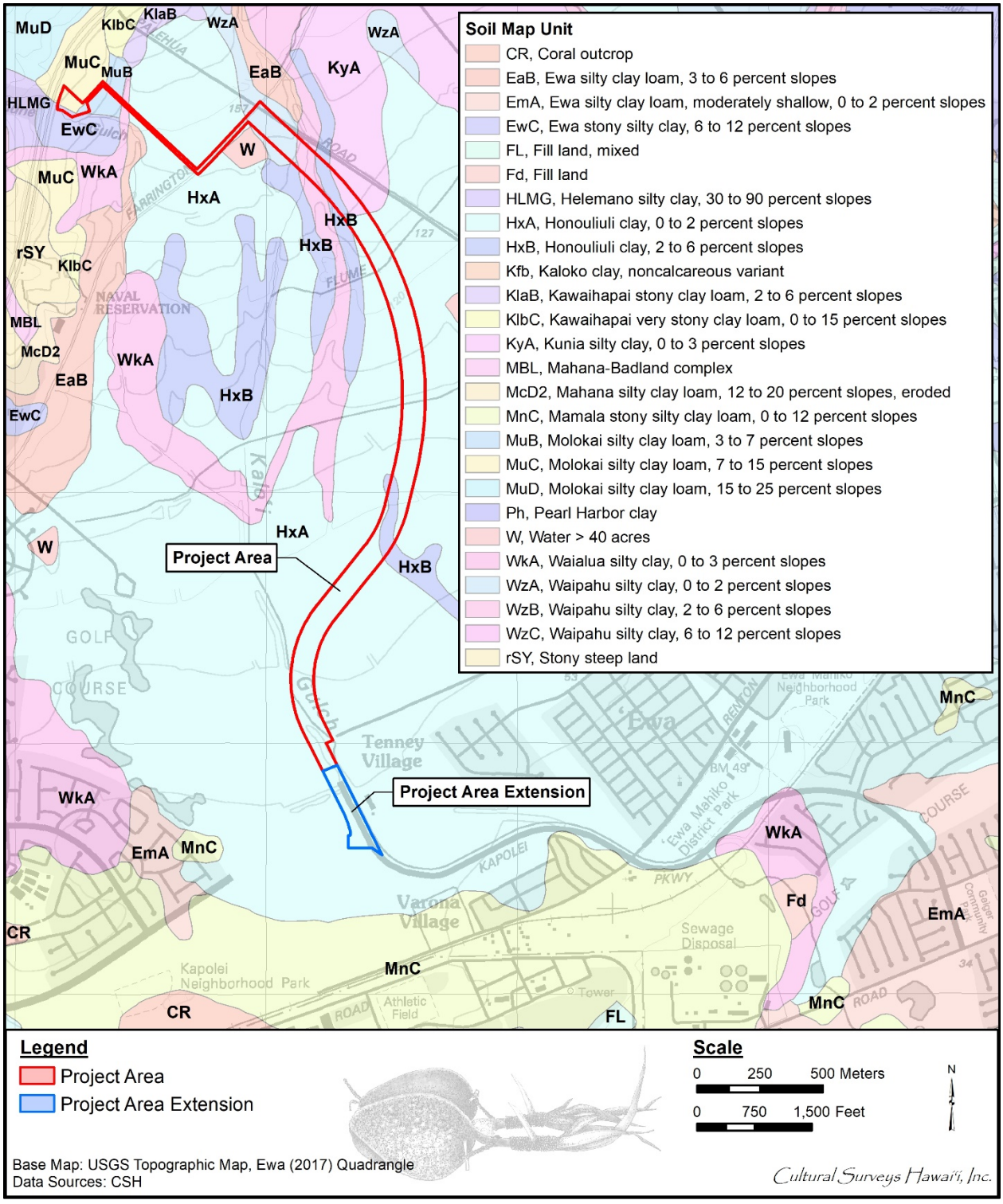

Figure 4. Portion of a 2017 Ewa USGS 7.5-minute topographic quadrangle with overlay of the project area soils (Foote et. al 1972; USDA SSURGO 2001)

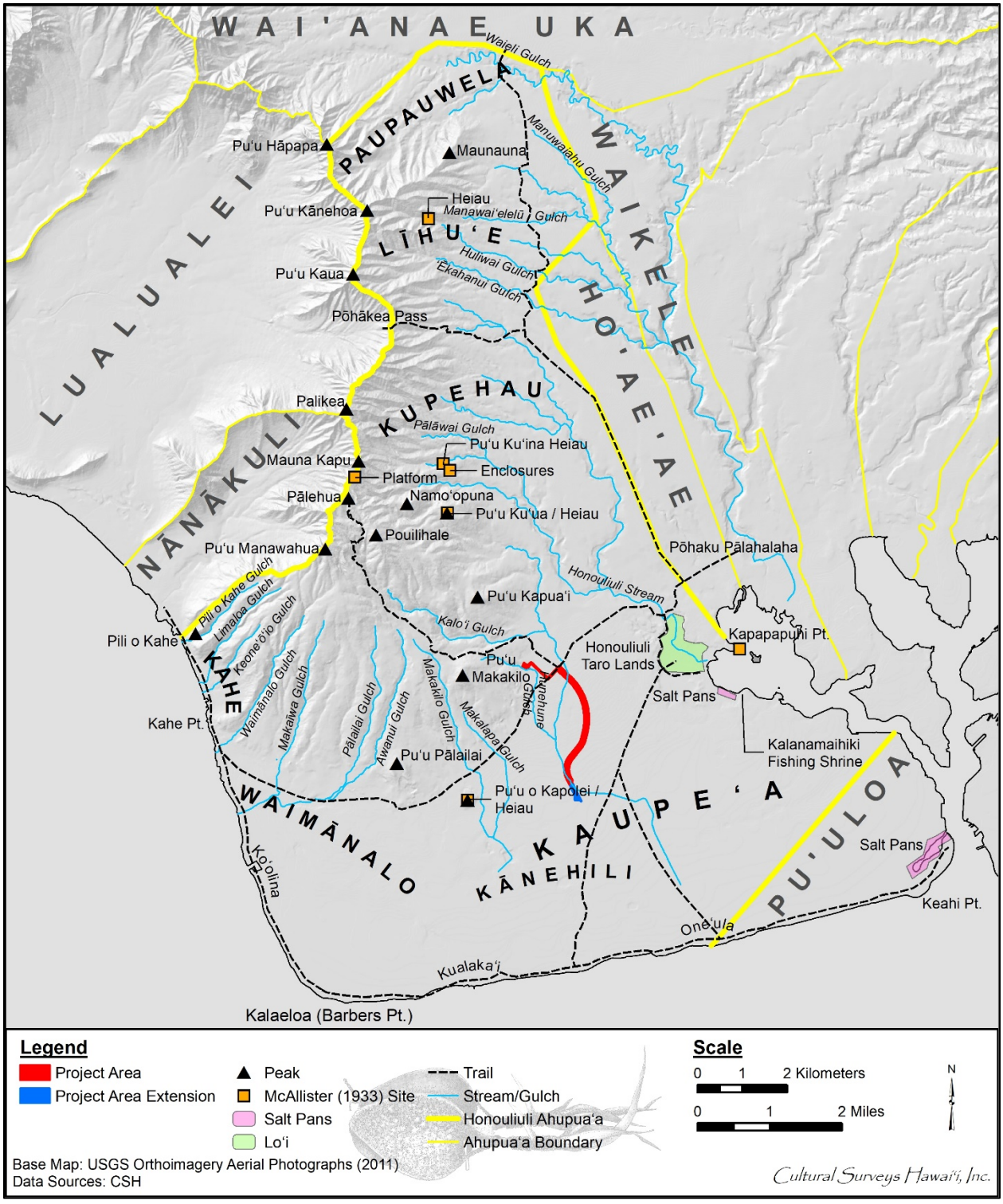

Figure 5. Place names of Honouliuli in relation to the project area overlying a 2011 USGS Orthoimagery aerial photograph; note the modern Farrington Highway generally follows the ancient cross-*ahupua‘a* trail

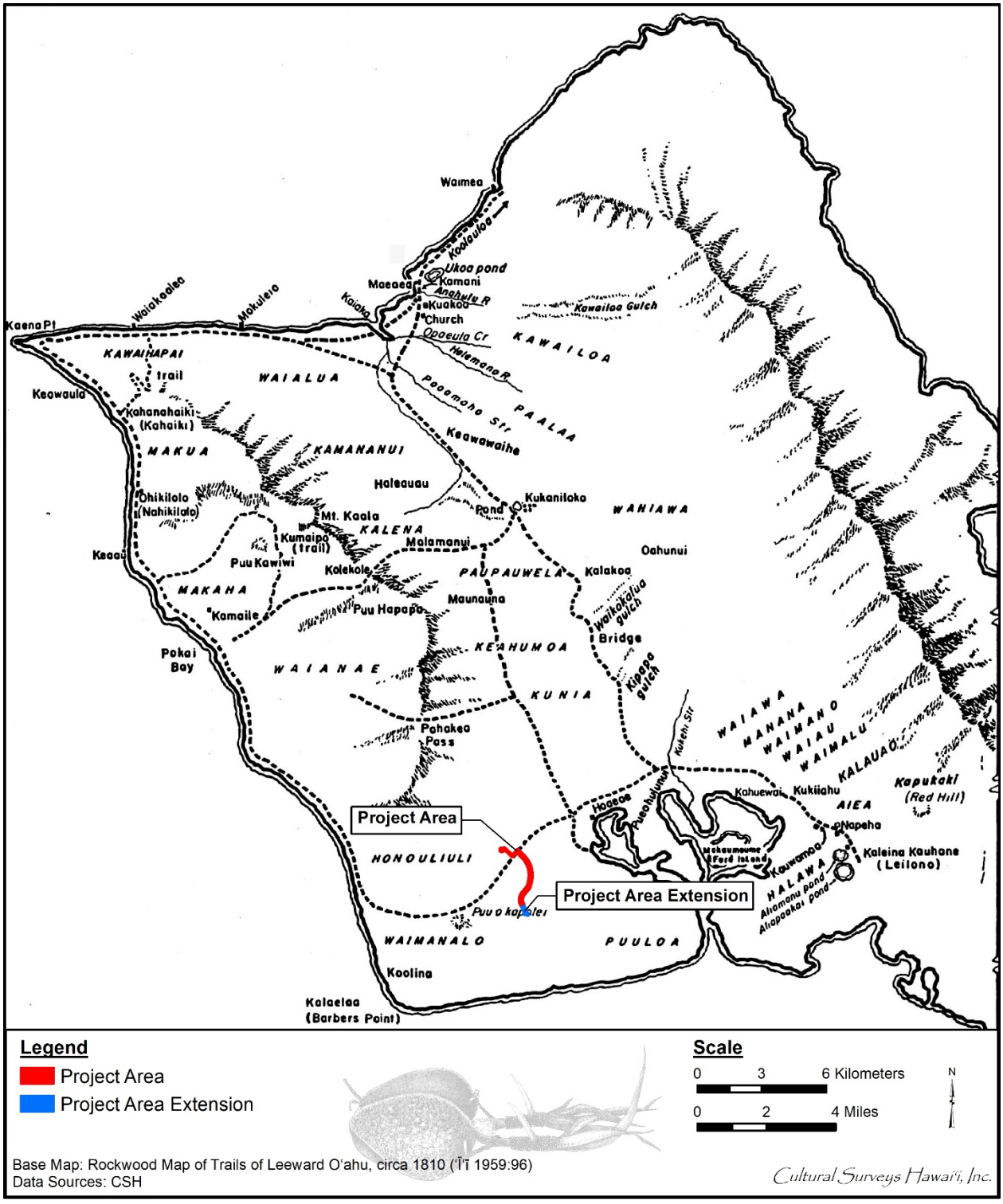

Figure 6. Portion of Rockwood map of trails of Leeward O‘ahu, ca. 1810, in relation to the current project area (‘Ī‘ī 1959:96)

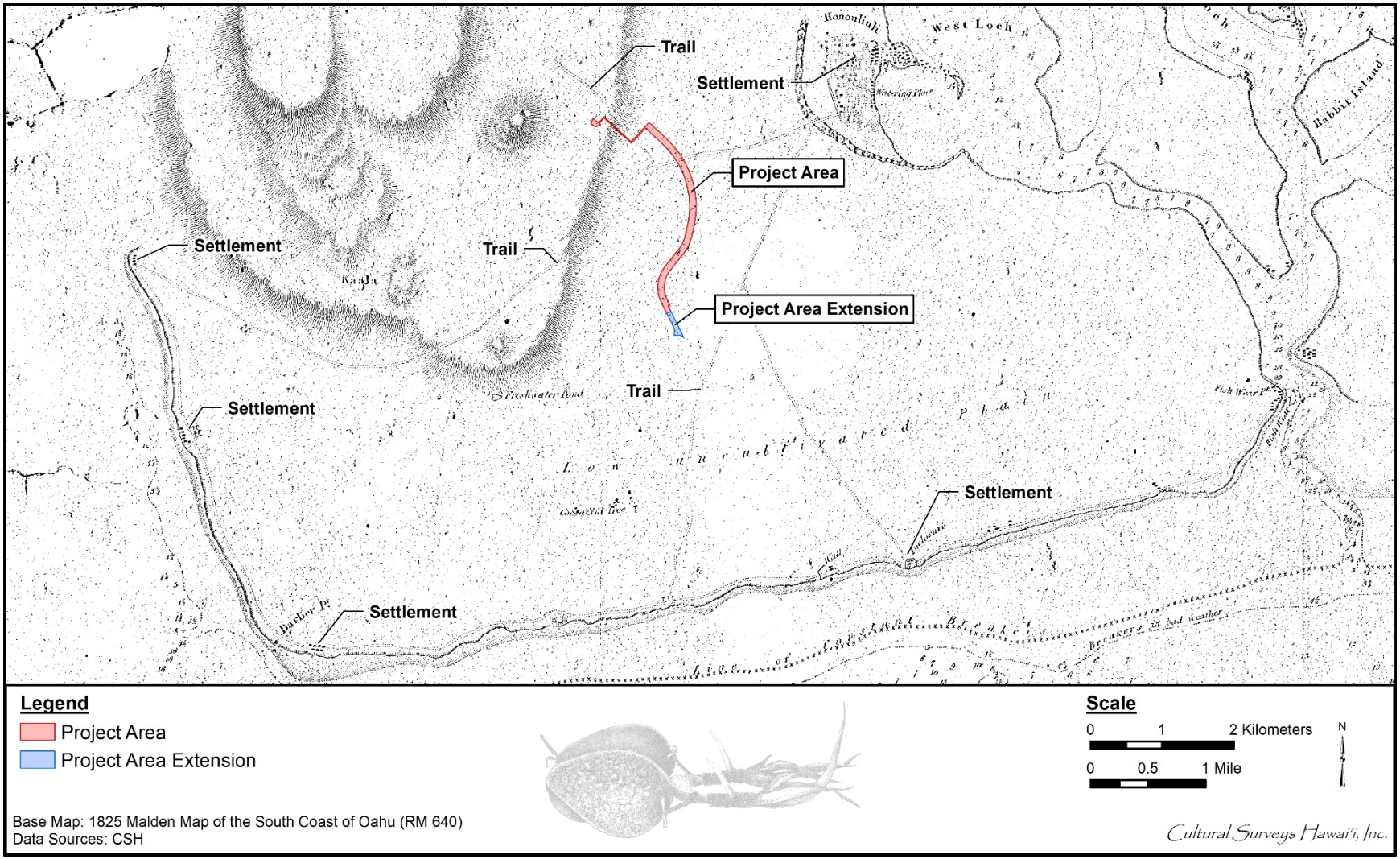

Figure 7. Portion of an 1825 Malden map of the South Coast of O‘ahu showing the location of the project area in relation to settlements and trails

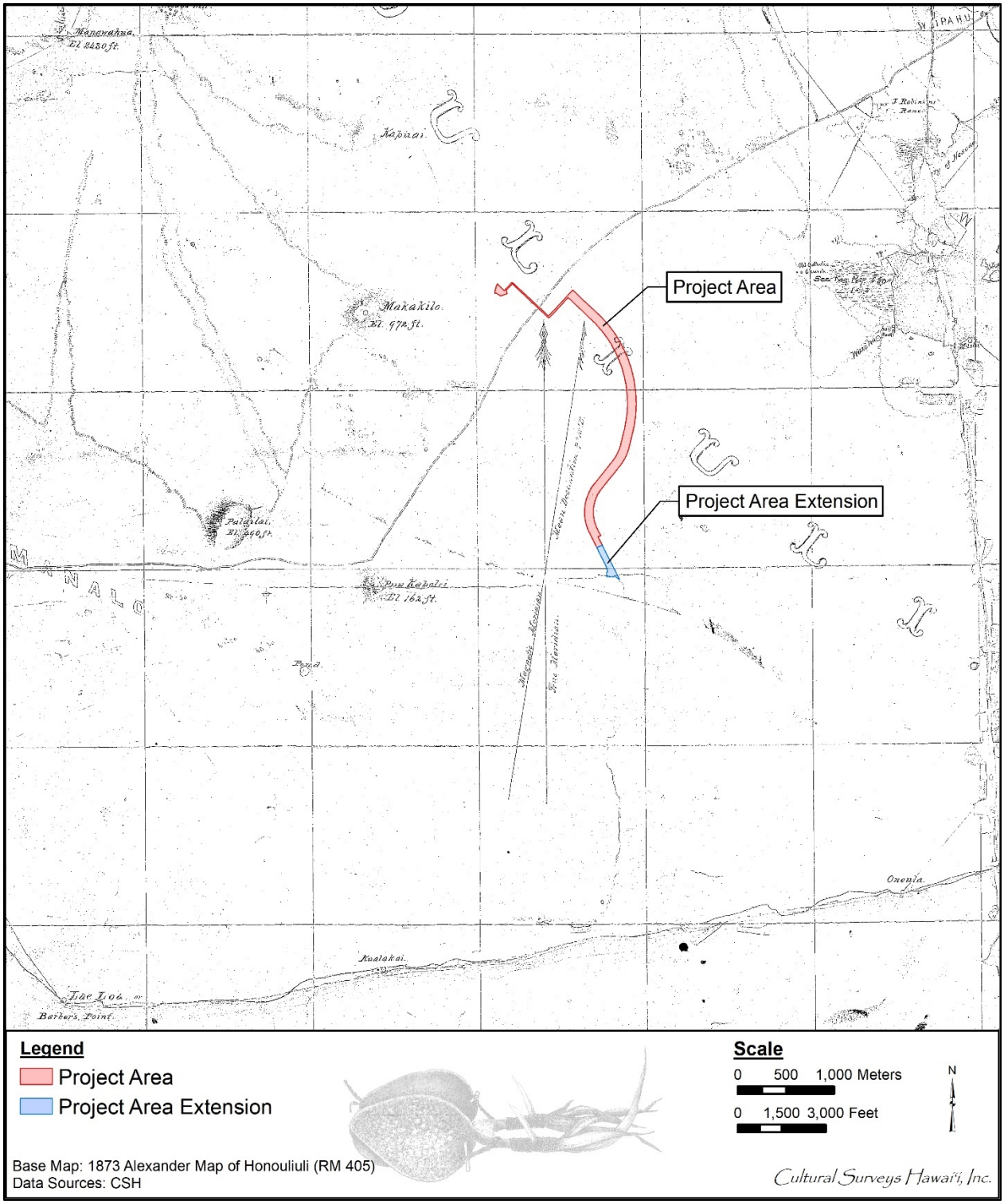

Figure 8. Portion of 1873 Alexander map of Honouliuli (RM 405) showing the location of the current project area within the relatively featureless ‘Ewa plain

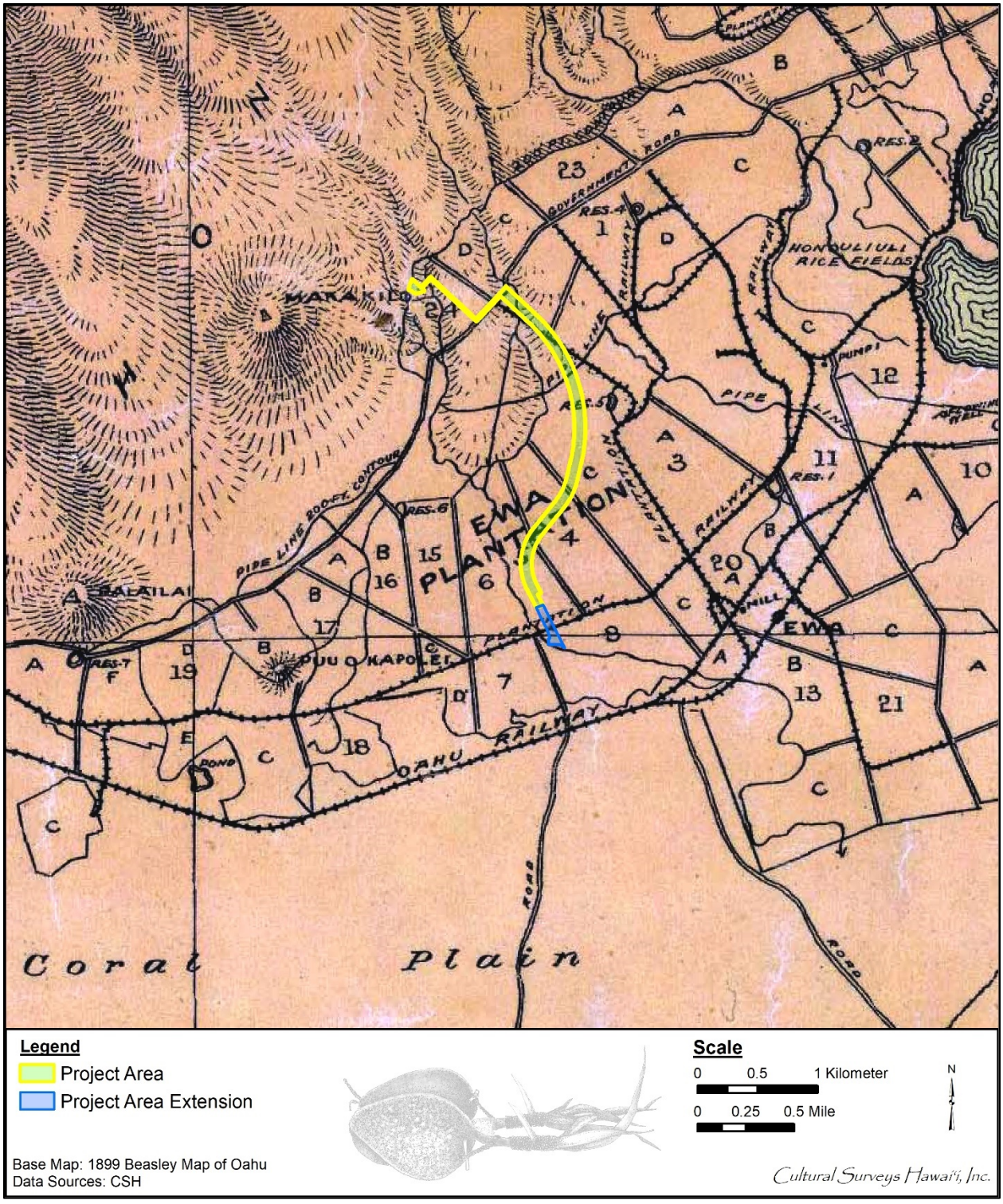

Figure 9. Portion of 1899 Beasley map of Oahu showing the location of the current project area within Ewa Plantation sugarcane fields 5 and 8, crossed by an Ewa Plantation railway

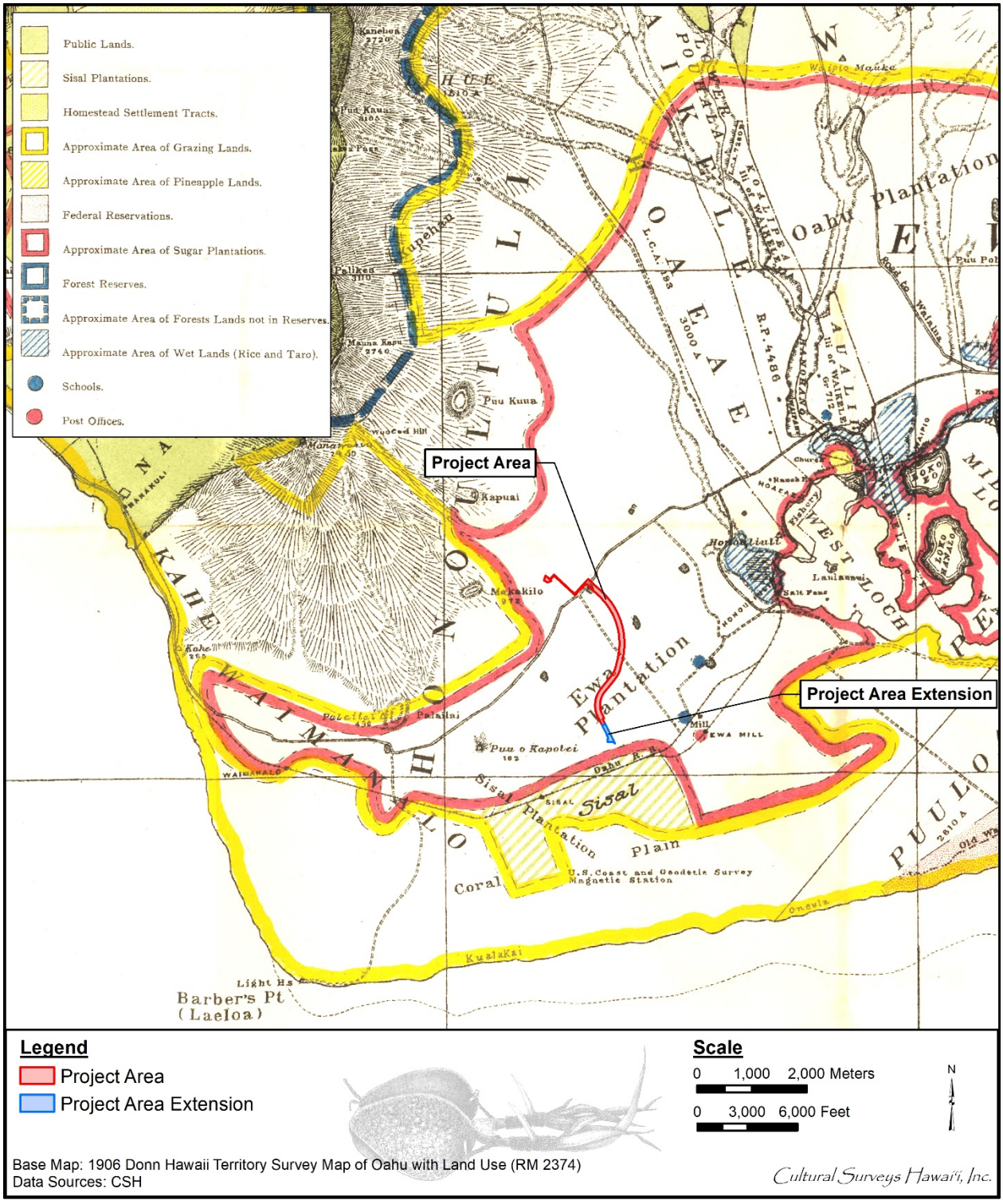

Figure 10. Portion of a 1906 Donn Hawaii Territory Survey map of O‘ahu with land use, showing the location of current project area within sugar plantation lands

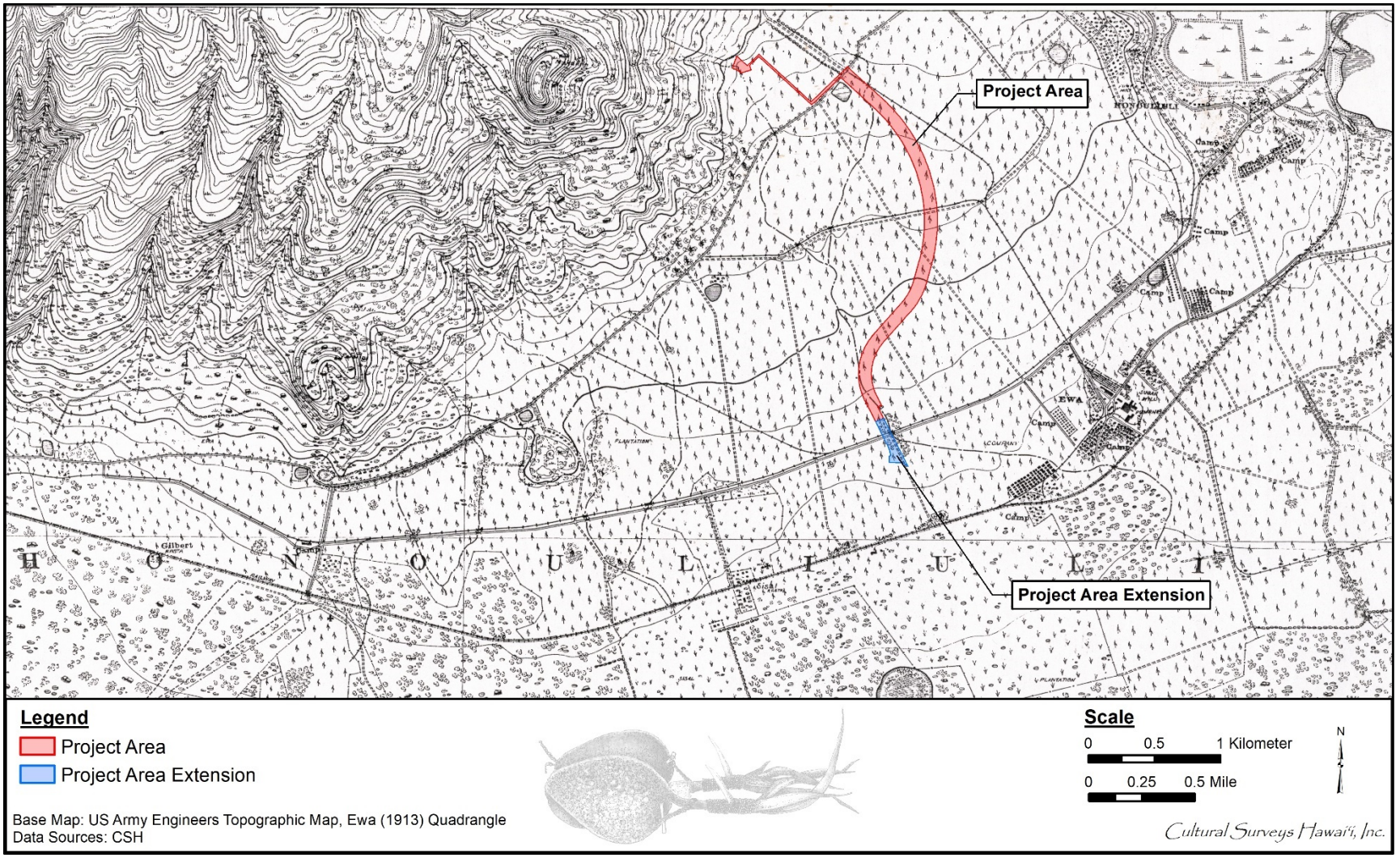

Figure 11. Portion of a 1913 U.S. Army Engineers topographic map, Ewa quadrangle, showing the location of the current project area

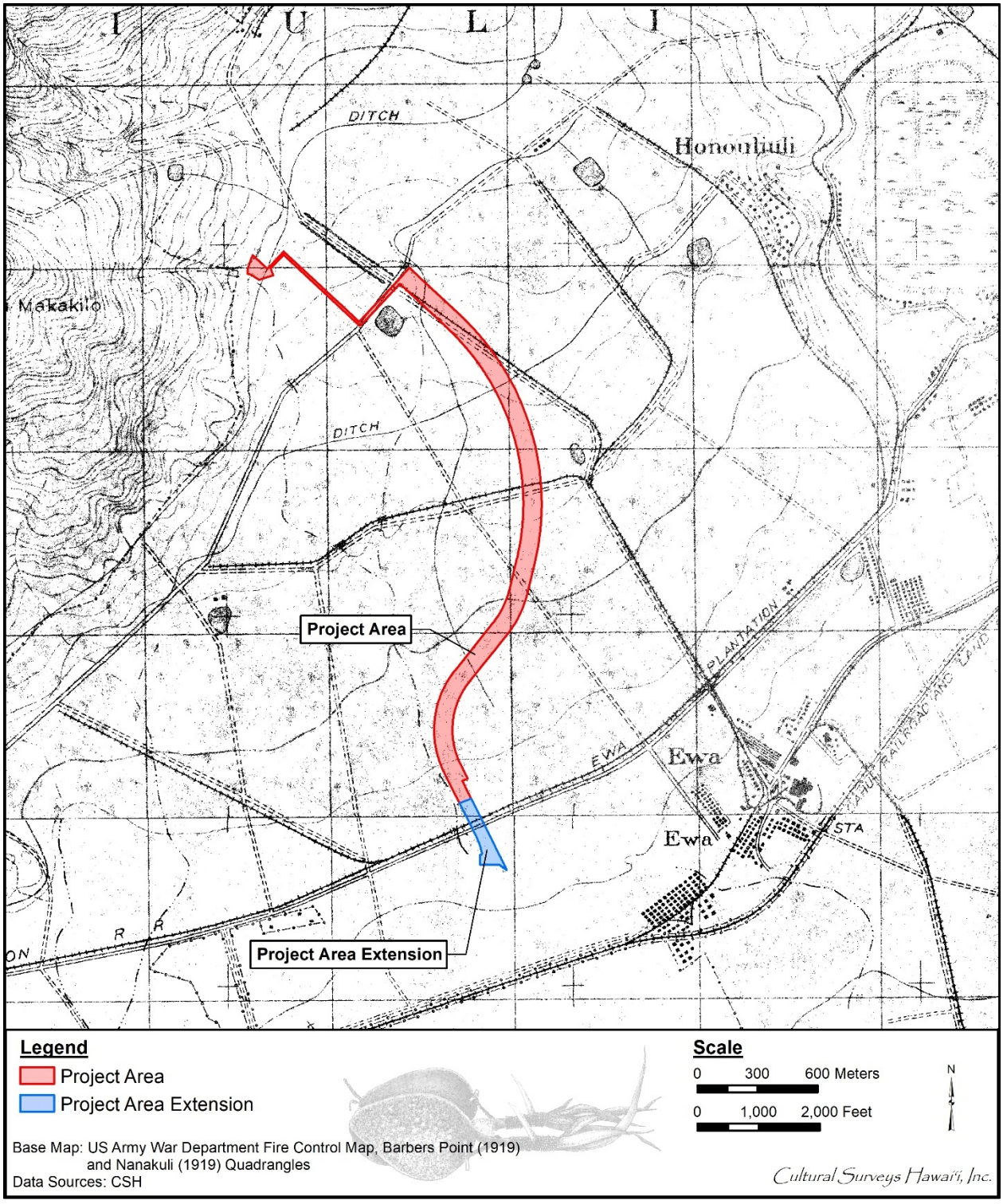

Figure 12. Portion of a 1919 U.S. Army War Department fire control map, Nanakuli and Barbers Point quadrangles, showing the location of the current project area

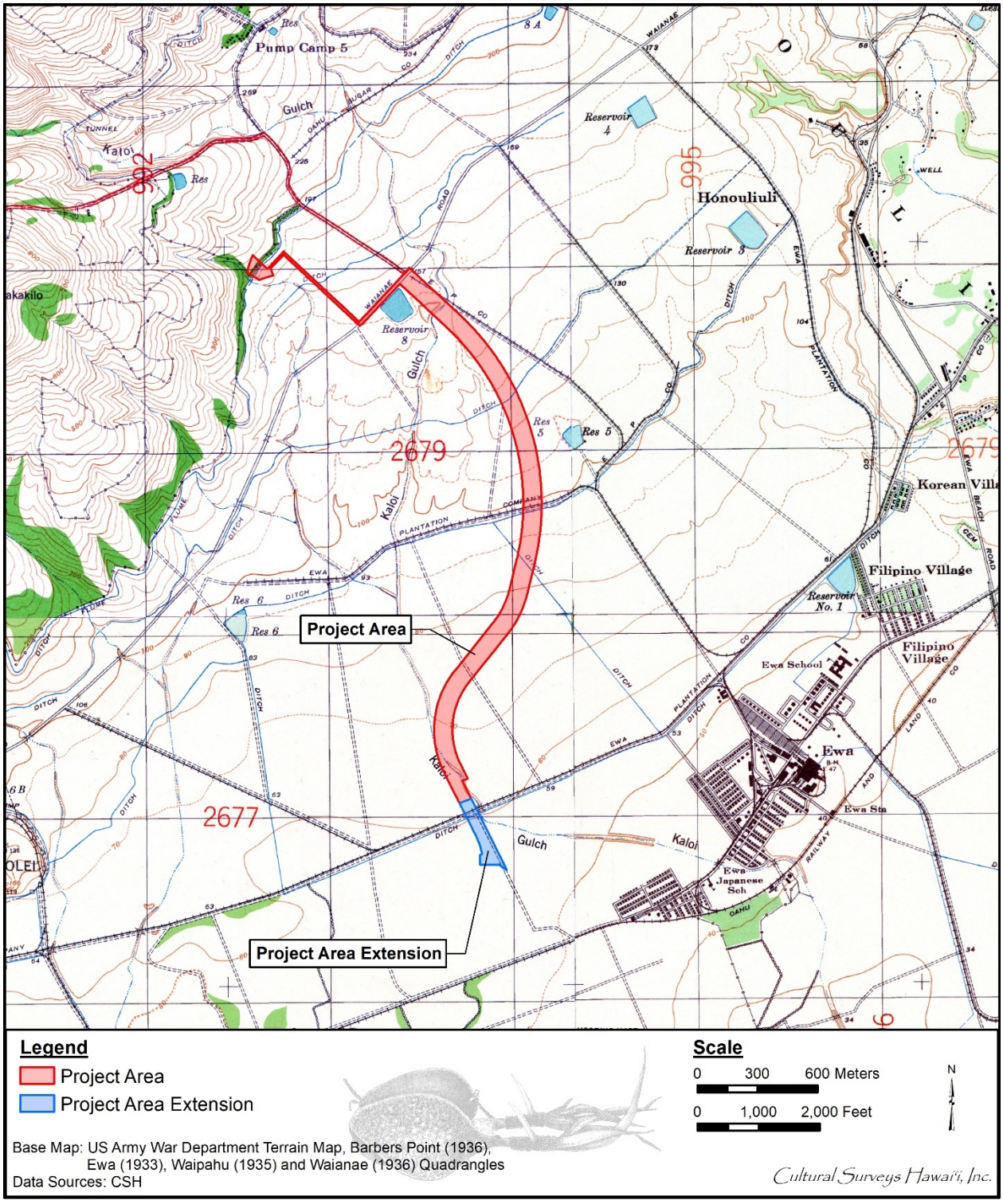

Figure 13. Portion of a 1930s U.S. Army War Department terrain map, Barbers Point (1936), Ewa (1933), Waipahu (1935), and Waianae (1936) quadrangles, showing the location of the current project area

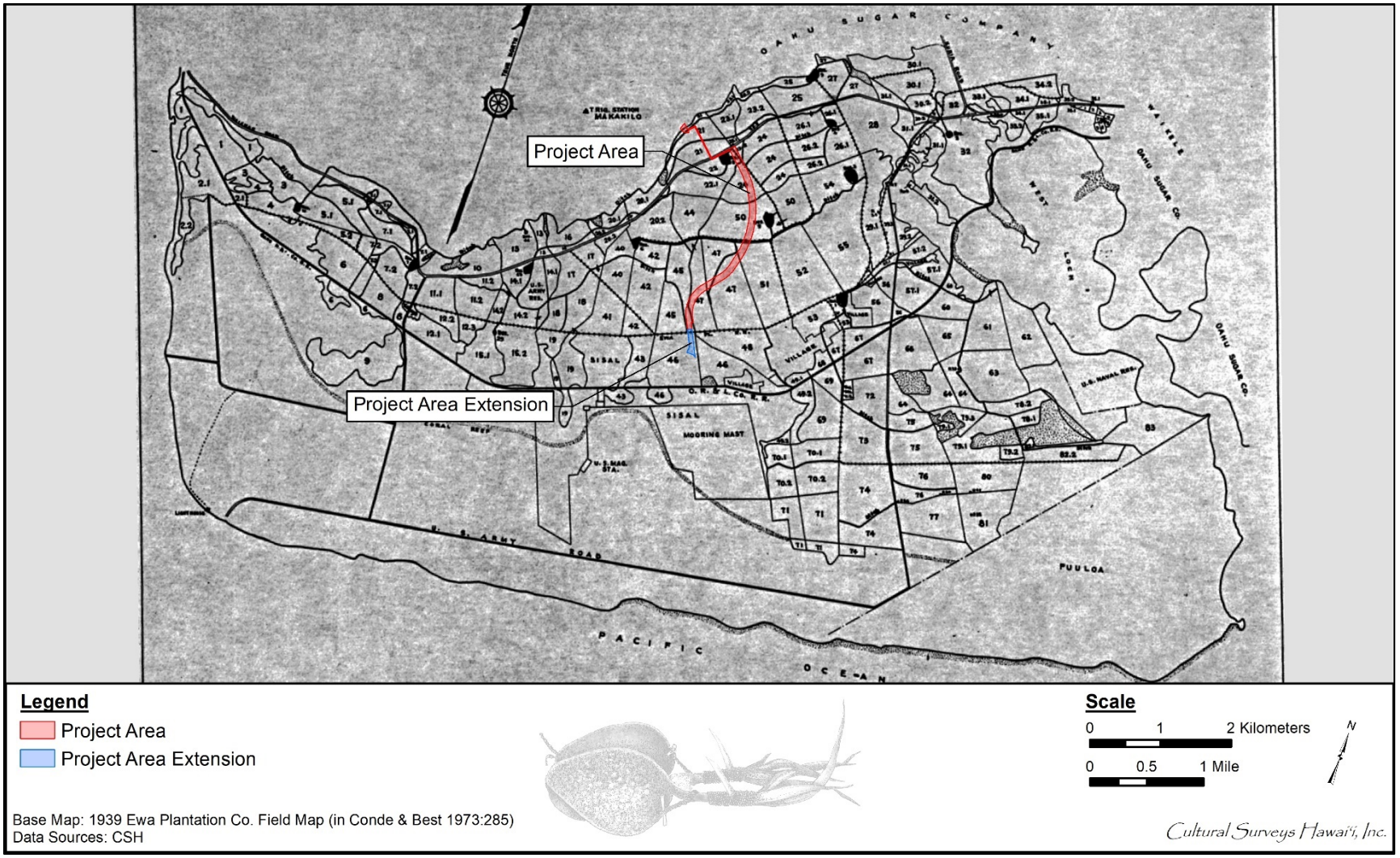

Figure 14. Portion of a 1939 Ewa Plantation Company field map showing the location of the project area as within sugarcane fields 45 and 46 (adapted from Condé and Best 1973:285)

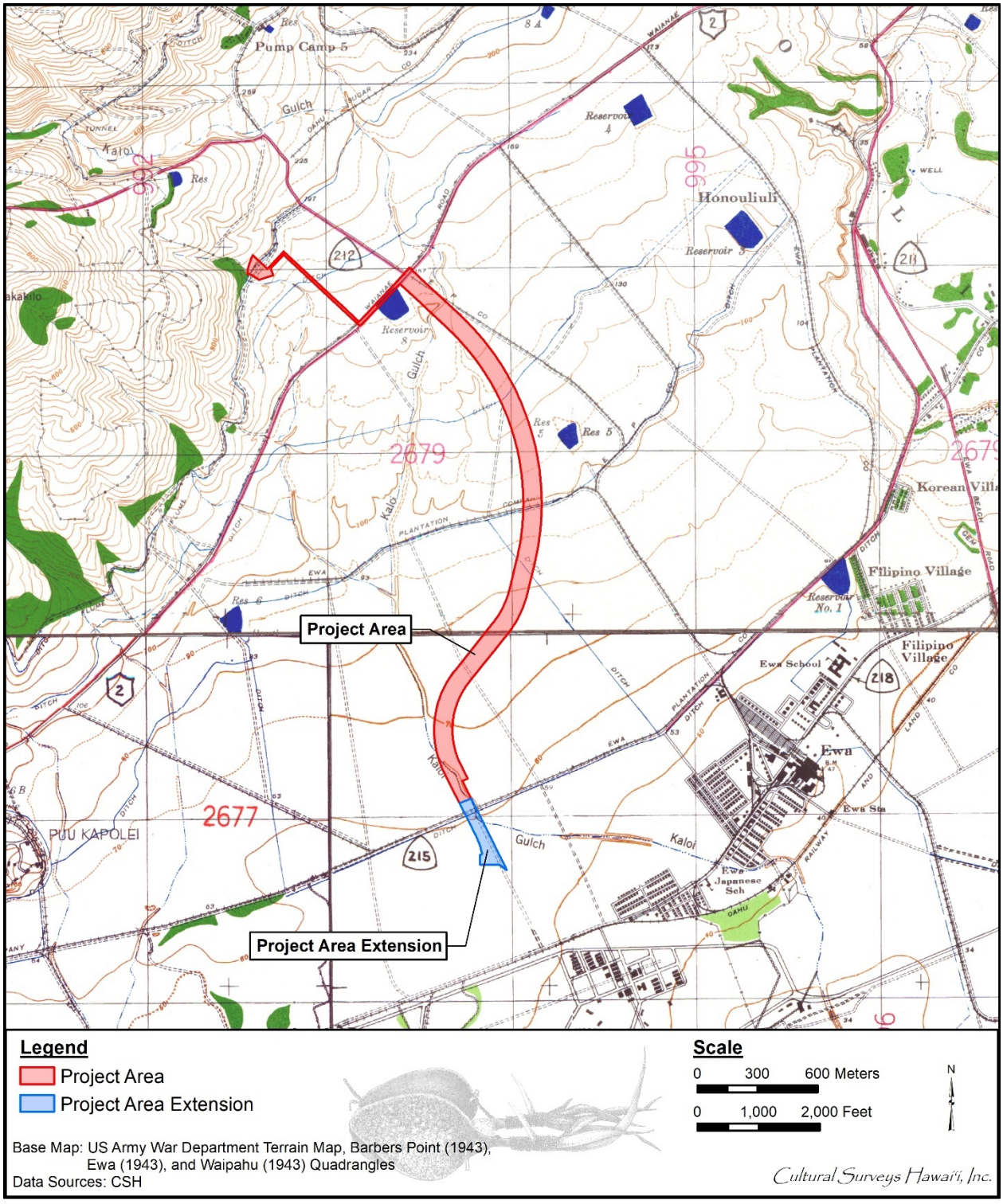

Figure 15. Portion of a 1943 U.S. Army War Department terrain map, Barbers Point, Ewa and Waipahu Quadrangles, showing the location of the current project area

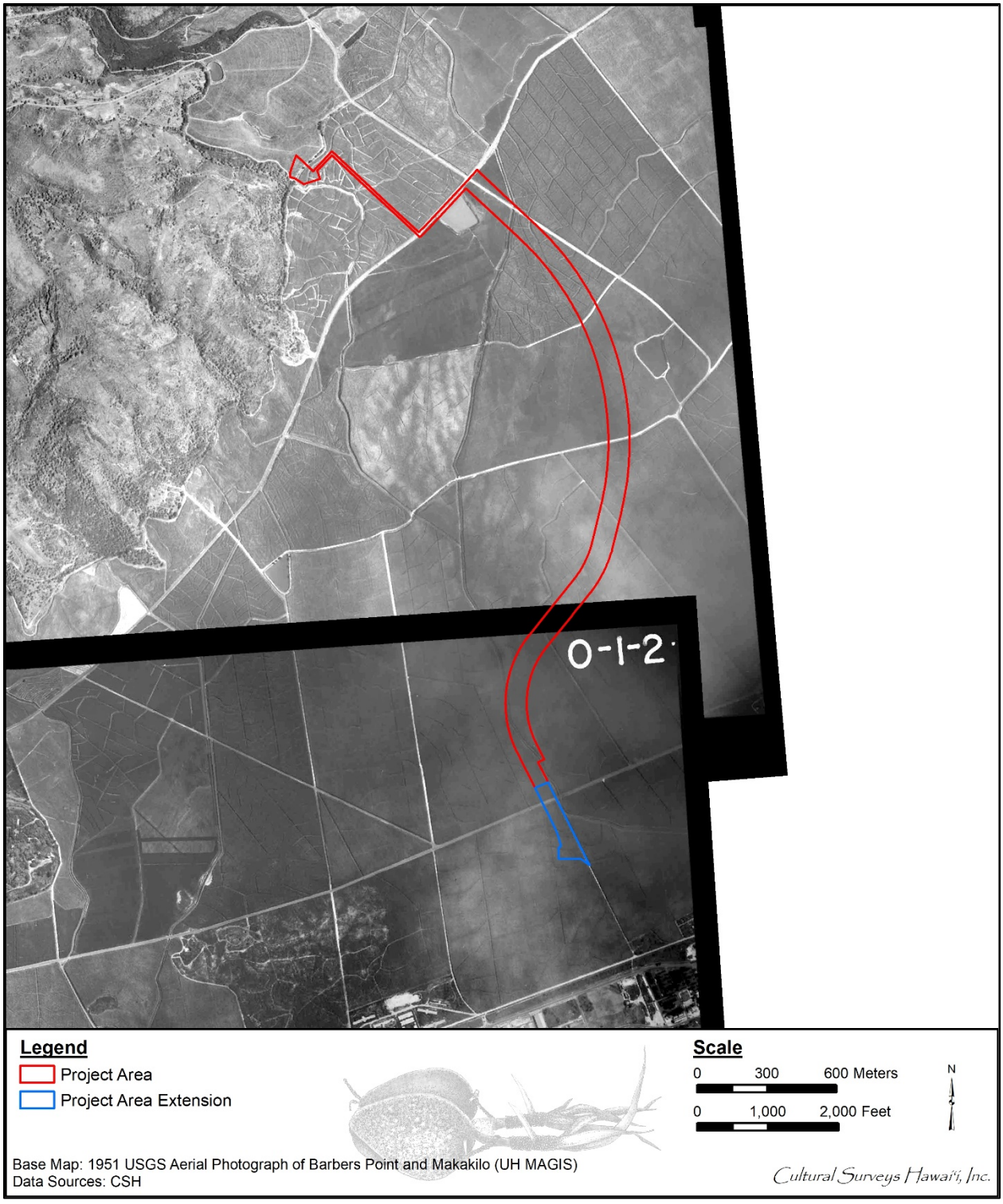

Figure 16. 1951 USGS aerial photograph of Barbers Point and Makakilo (UH MAGIS) showing the location of the current project area

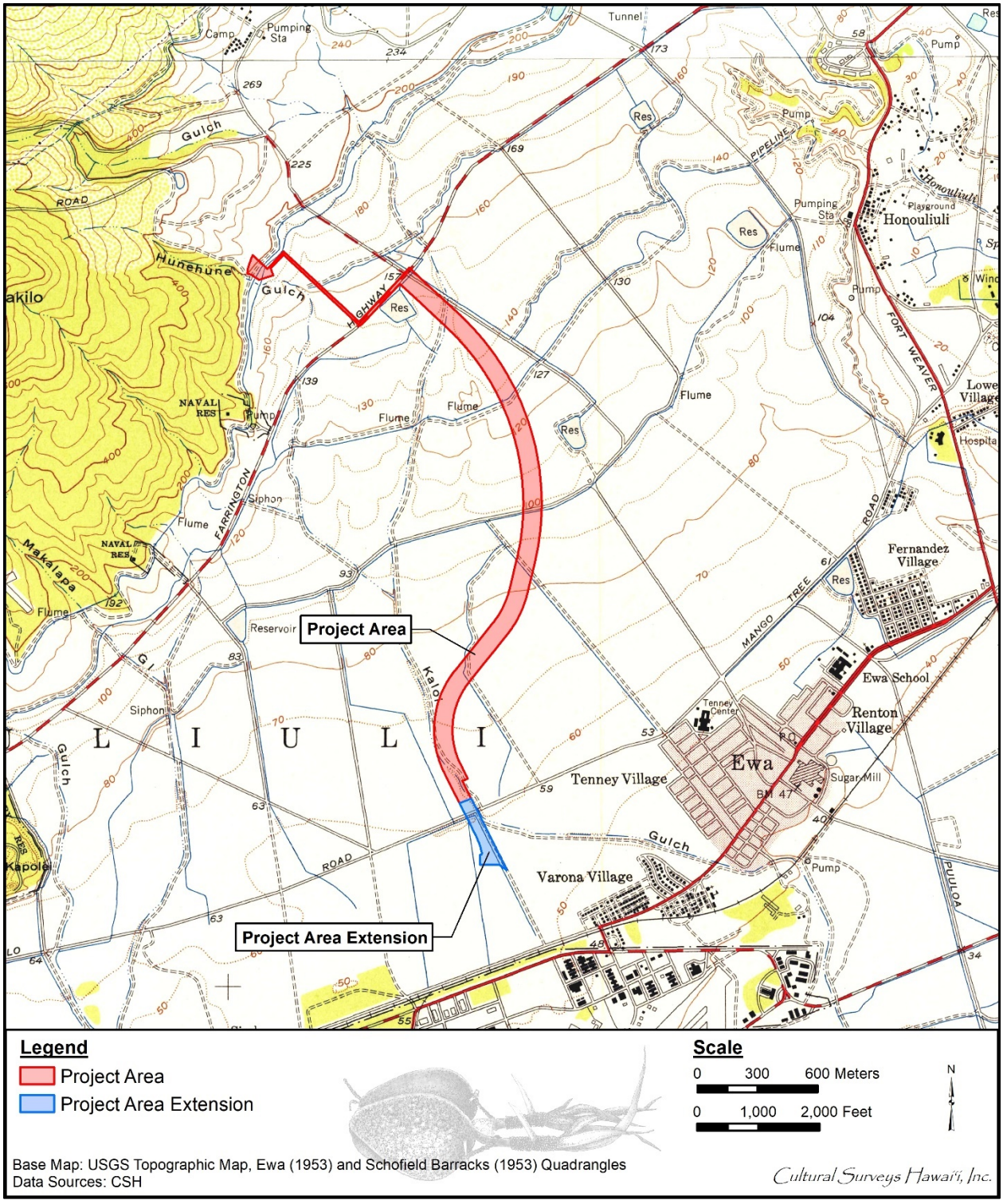

Figure 17. Portion of a 1953 Ewa and Schofield Barracks USGS topographic quadrangles, showing the location of the current project area

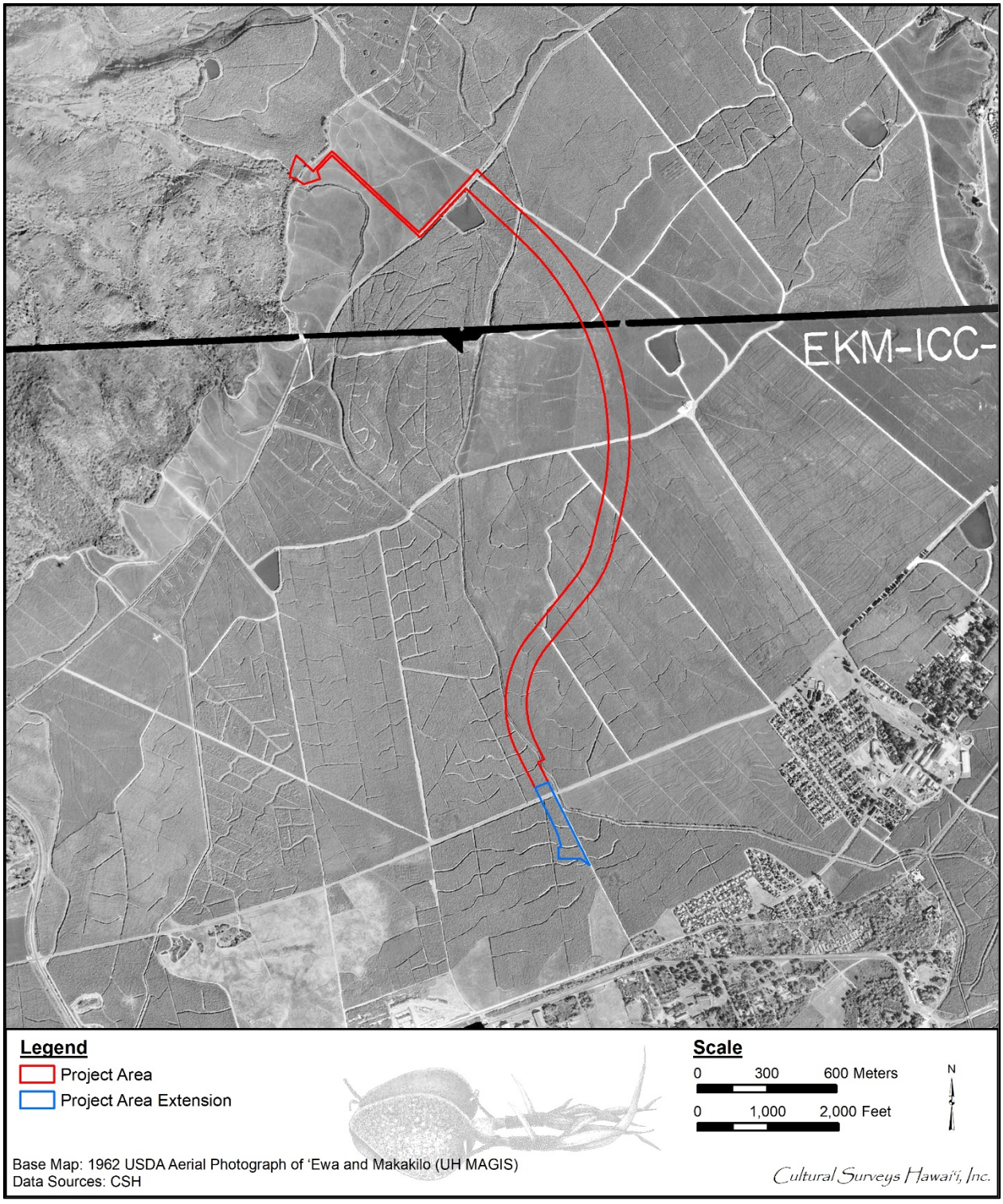

Figure 18. 1962 USDA aerial photograph of Ewa and Makakilo (UH MAGIS) showing the location of the current project area

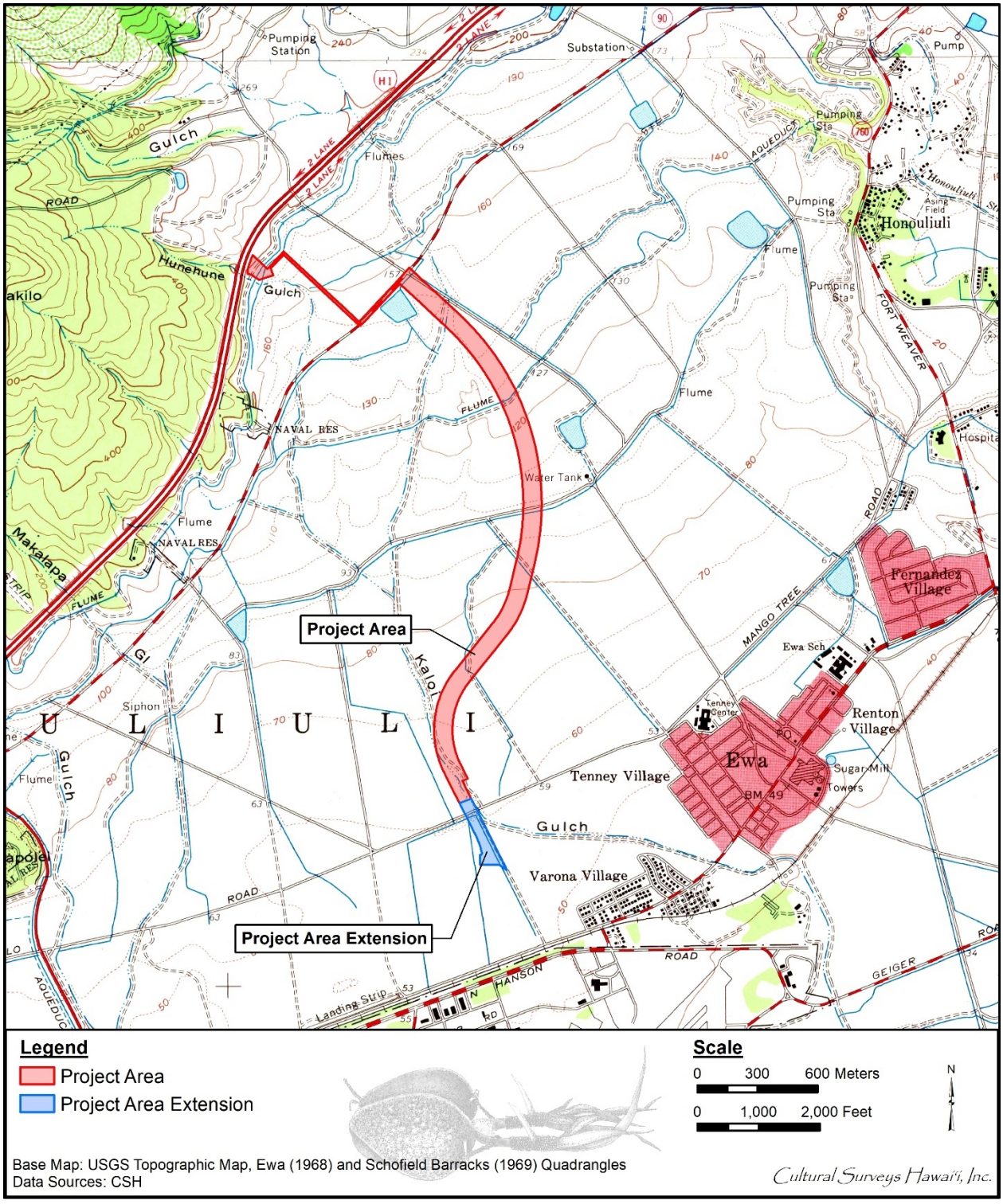

Figure 19. Portion of a 1968 Ewa and 1969 Schofield Barracks USGS topographic quadrangles, showing the location of the current project area

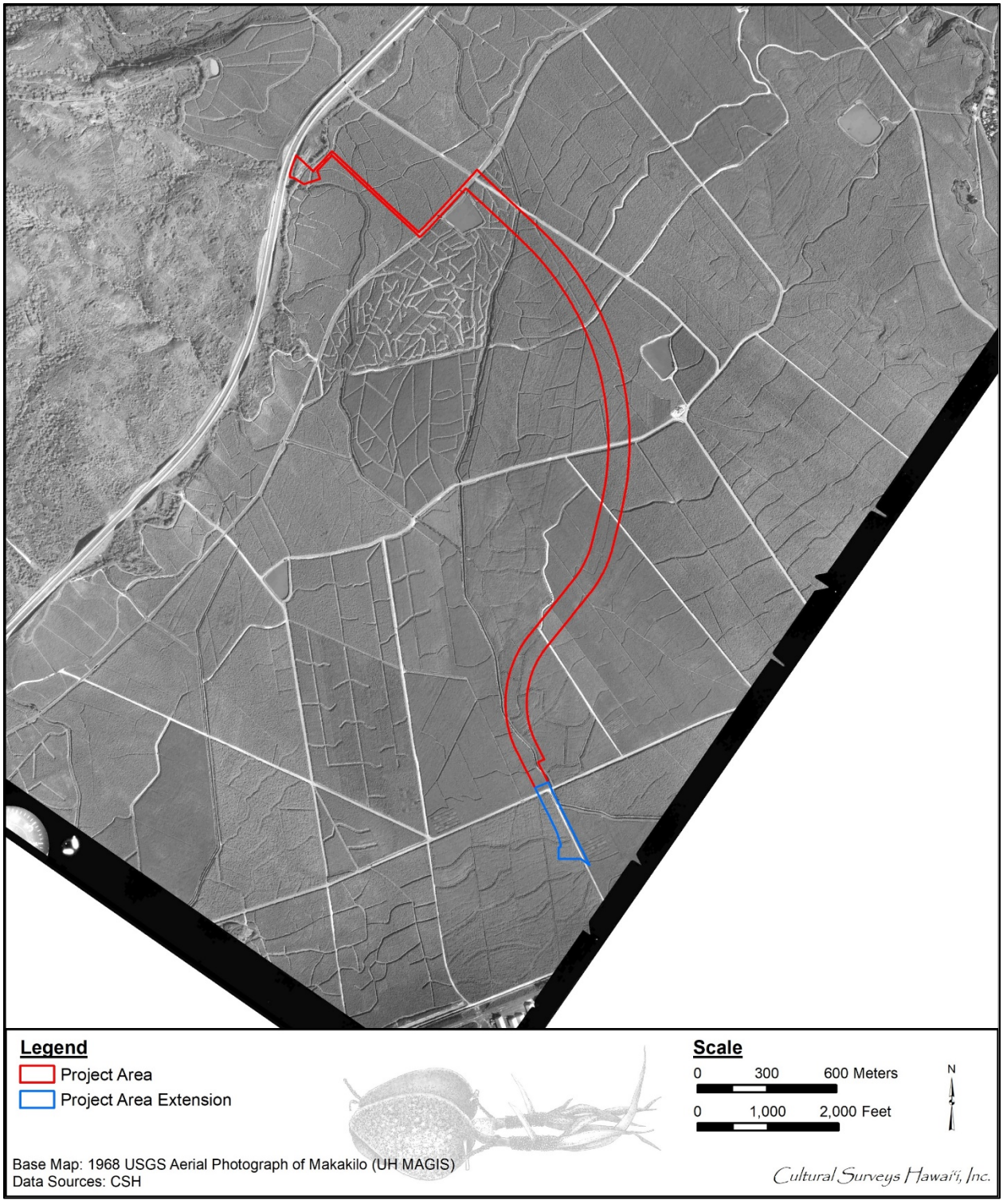

Figure 20. 1968 USGS aerial photograph of Makakilo (UH MAGIS) showing the location of the current project area

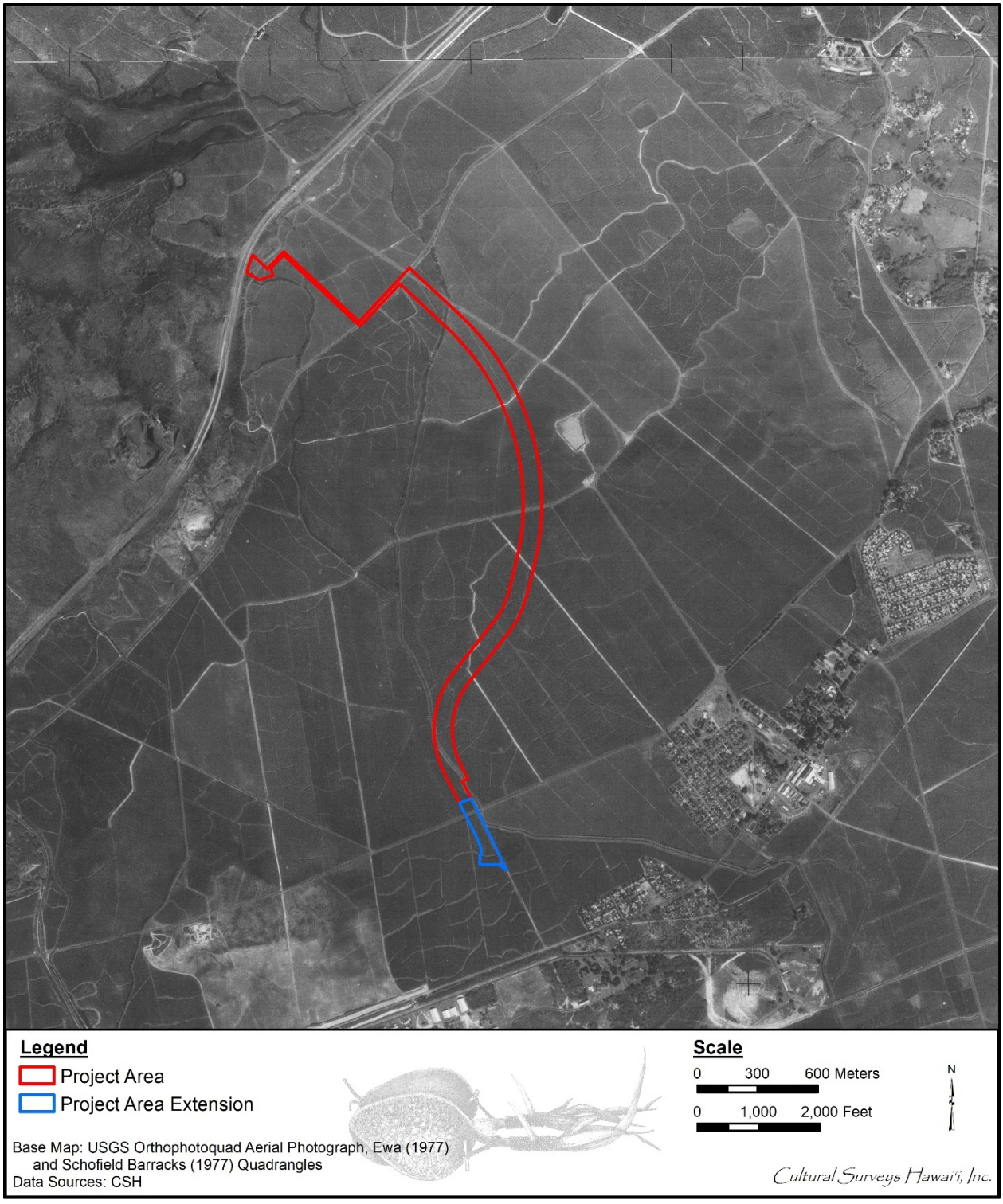

Figure 21. 1977 USGS Orthophotoquad aerial photograph, Ewa and Schofield Barracks Quadrangles, showing the location of the current project area

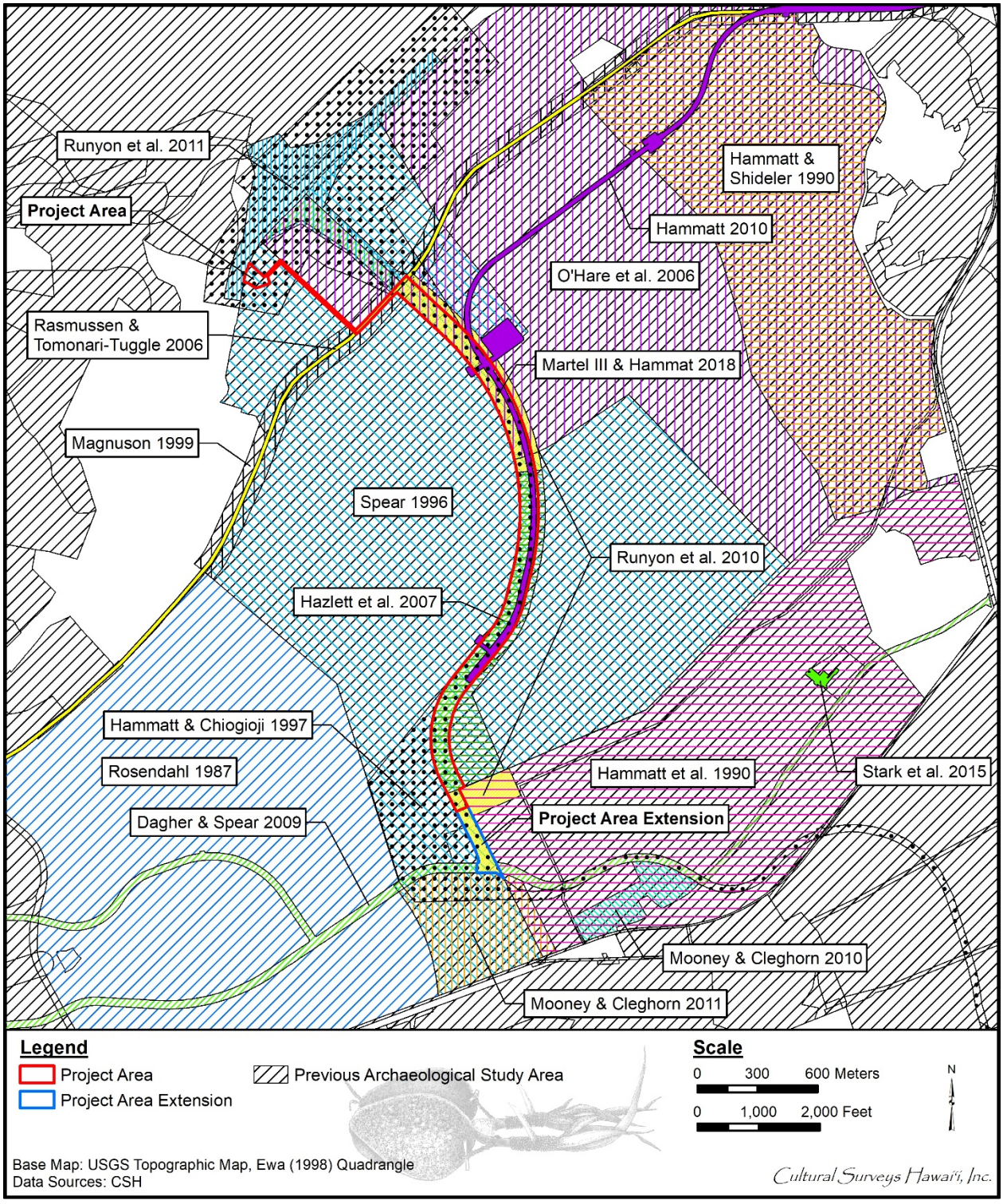

Figure 22. Previous archaeological studies in the vicinity of the project area on a 1998 Ewa USGS topographic quadrangle

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

Reference	Type of Study	Location	Results (SIHP # 50-80-12**** unless otherwise noted)
Cummins 1974	National Register of Historic Places (NRHP) Registration Form	Hawaiian Railway Society	-9708 (Waialua Agricultural Co. Engine No. 6) summary description; not depicted on Fig. 22
Knaus 1983	NRHP Registration Form	Leeward coast of O‘ahu from Hālawa Stream to Auyong Homestead Road at Nānākuli	OR&L ROW summary description; not depicted on Fig. 22
Rosendahl 1987	Reconnaissance survey	East of Ft Weaver Rd	Virtual absence of finds, except for disturbed historic artifact scatter dubbed “T-2”
Hammatt et al. 1990	Reconnaissance survey	Ewa Villages	No traditional historic properties identified; many plantation-era historic properties identified including villages, a cemetery, a reservoir, and railroad segments
Hammatt and Shideler 1990	Archaeological inventory survey	St. Francis Medical Center West	Entire study area, located on a bluff NE of flood plain of Honouliuli Stream, had been extensively disturbed, contained no surface structures or other remains, and unlikely to contain any subsurface historic properties
Cohn 1992	NRHP Registration Form	Hawaiian Railway Society	SIHP # -9761 Hawaiian Railway Society Rolling Stock summary description; not depicted on Fig. 22
Spear 1996	Reconnaissance survey	Kapolei Town	No significant findings
Hammatt and Chiogioji 1997 (a and b)	Reconnaissance survey	4.5-km North-South Rd Corridor	Documented SIHP # -9714 (OR&L ROW), several plantation-era remnants noted
Magnuson 1999	Reconnaissance survey	Farrington Hwy	Documented six bridges, a section of railroad track, and an irrigation ditch, all older than 50 years but evaluated as not significant

Reference	Type of Study	Location	Results (SIHP # 50-80-12**** unless otherwise noted)
Rasmussen and Tomonari-Tuggle 2006	Archaeological monitoring	Waiau Fuel Pipeline Corridor	Not monitored near current project area
O'Hare et al. 2006	Archaeological inventory survey	Ho‘opili, East Kapolei	Several previously recorded (Hammatt and Shideler 1990) historic properties; SIHP #s -4344 (plantation infrastructure); -4345 (railroad berm); -4346 (northern pumping station); -4347 (central pumping station); -4348 (southern pumping station); and four new features of SIHP # -4344 (a linear wall, stone-faced berm, concrete ditch, and concrete catchment)
Hazlett et al. 2007	Archaeological monitoring	Phase IA, North-South Rd	No significant findings
Dagher and Spear 2009	Literature search and field inspection	Kapolei and Makakilo, Honouliuli Ahupua'a	No significant findings in vicinity of current project area
Mooney and Cleghorn 2010	Archaeological inventory survey	Varona Village	Five newly identified plantation-era structures within SIHP # 50-80-11-9786 (Ewa Plantation Villages Historic District); SIHP #s 50-80-12-7129 (Historic Plantation House); -7130 (Historic Plantation House); -7131 (Historic Structure Foundation); -7132 (Historic Structure Foundation); and -7133 (Historic Streetlight)
Hammatt 2010	Archaeological inventory survey	HHCTCP Phase I	SIHP # 50-80-09-7751 (buried *lo‘i* [taro pon-field] deposit)
Runyon et al. 2010	Archaeological monitoring	Phase IB, North-South Rd	No significant findings

Reference	Type of Study	Location	Results (SIHP # 50-80-12**** unless otherwise noted)
Runyon et al. 2011	Archaeological monitoring	Phase IC, North-South Rd	Portion of a previously documented historic property, SIHP # 50-80-12-4664 (concrete plantation-era water diversion structure containing two sluice gates); one new historic property, SIHP # 50-80-14-7128 (burnt trash fill layer used in construction of Pālehua Rd and containing plantation-era artifacts)
Mooney and Cleghorn 2011	Archaeological inventory survey (recorded as an archaeological assessment)	Ka Makana Ali‘i mixed-use complex	No significant findings
Rewick 2012	NRHP Registration Form	OR&L alignment	SIHP # -7387 OR&L ROW and Hawaiian Railway Society Ewa Railroad Yard; not depicted on Fig. 22
Stark et al. 2015	Archaeological inventory survey (recorded as an archaeological assessment)	Ewa Elementary School, within Renton Village	No significant findings

Reference	Type of Study	Location	Results (SIHP # 50-80-12**** unless otherwise noted)
Martel III and Hammatt 2018	Archaeological literature review and field inspection	Present Kualaka‘i Parkway 16-Inch R-1 Transmission Main Project, TMKs: [1] 9-1-017:096 Kualaka‘i Parkway ROW, Farrington Hwy ROW, and [1] 9-1-018:008; this study addresses a small addendum extension to the south	One previously identified historic property (State Inventory of Historic Places [SIHP] # -4664, plantation era irrigation infrastructure) identified within Component 1 at north end of project corridor; no historic properties identified within Component 2 (long southerly portion of project area)

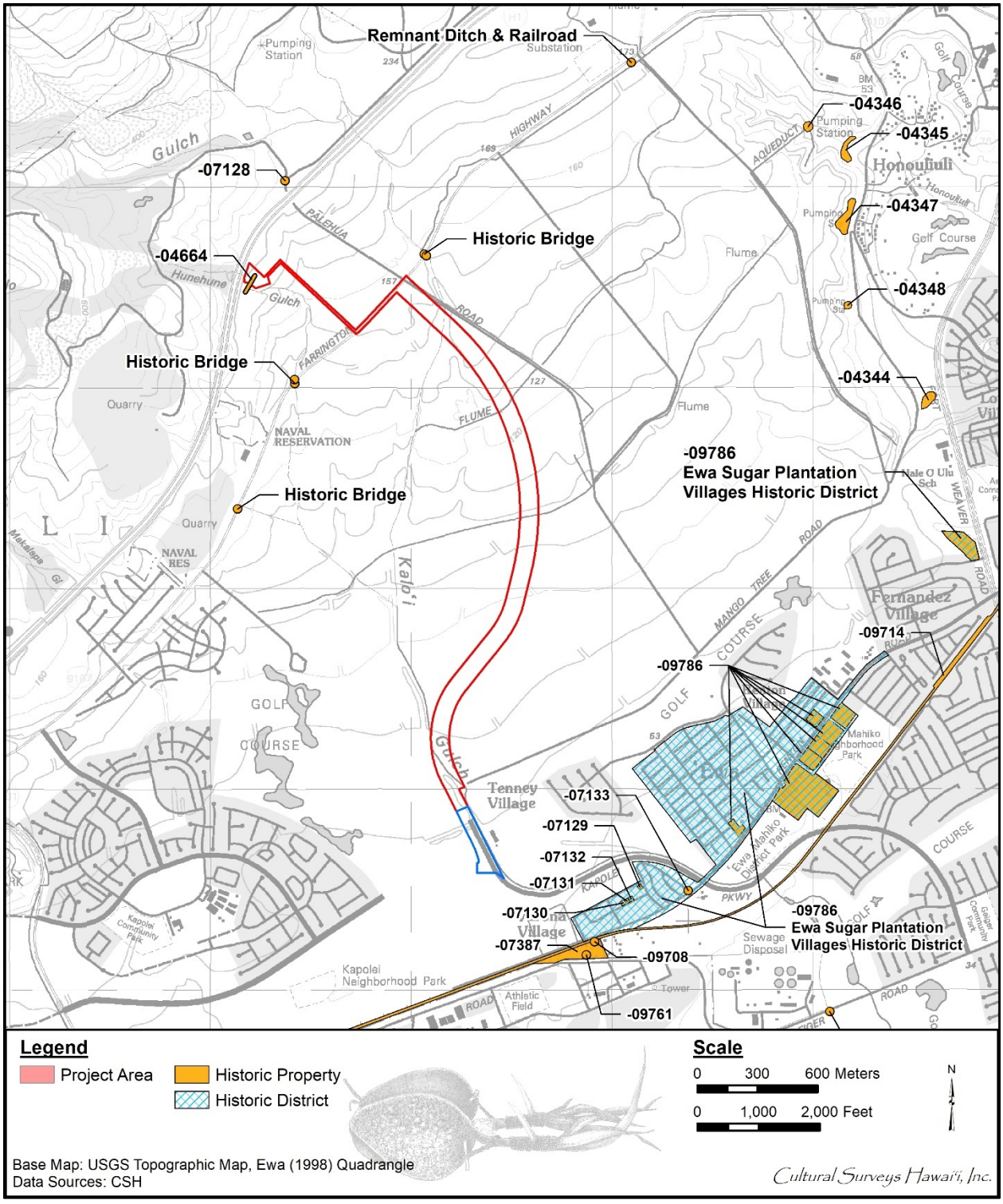

Figure 23. Previously identified historic properties in the vicinity of the project area on a 1998 Ewa USGS topographic quadrangle

Table 2. Previously identified historic properties in the vicinity of the project areas

SIHP # (50-80-12-)	Formal Type	Source	Comment
4344	Plantation irrigation features	Hammatt and Shideler 1990; O'Hare et al.2006	Sugar cane cultivation and irrigation (timeframe 1890 to 1995)
4345	Railroad berm	Hammatt and Shideler 1990; O'Hare et al.2006	Ewa Plantation railroad berm (timeframe 1890 to 1947)
4346	Pumping station	Hammatt and Shideler 1990; O'Hare et al.2006	Pumping station (northern), stone-lined well and associated features
4347	Pumping station	Hammatt and Shideler 1990; O'Hare et al.2006	Pumping station (central), stone-lined well and associated features
4348	Pumping station	Hammatt and Shideler 1990; O'Hare et al. 2006	Pumping station (southern), stone-lined well and associated features
4664	Plantation irrigation infrastructure remnants	Runyon et al. 2011	Concrete plantation-era water diversion structure containing two sluice gates
7128	Fill layer	Runyon et al. 2011	Burnt trash fill layer used in construction of Palehua Rd and containing plantation-era artifacts
7129	Historic house	Mooney and Cleghorn 2010	Varona-type late historic plantation house built in the 1950s
7130	Historic house	Mooney and Cleghorn 2010	Abandoned historic plantation house, formerly the F. Quintal residence
7131	Demolished historic outbuilding	Mooney and Cleghorn 2010	Square concrete outbuilding foundation, likely a "dirty kitchen" or outdoor kitchen; date of the structure likely 1950, as indicated by an inscription in concrete
7132	Concrete foundation	Mooney and Cleghorn 2010	Late historic square concrete outbuilding foundation
7133	Streetlamp	Mooney and Cleghorn 2010	Single historic streetlamp
7387	Train base yard	Rewick 2012 (NRHP Inventory-Nomination Form)	OR&L Base Yard, summary description for NRHP nomination
9708	Waialua Agricultural Co. Engine No. 6	Cummins 1974	Summary description for NRHP nomination

SIHP # (50-80-12-)	Formal Type	Source	Comment
9714	OR&L ROW	Knaus 1983 (NRHP Inventory-Nomination Form)	Summary description for NRHP nomination
9761	Hawaiian Railway Society Rolling Stock	Cohn 1992 (NRHP Inventory-Nomination Form)	Summary description for NRHP nomination
9786	Historic District of Ewa Plantation Villages	Moy 1995 (NRHP Inventory-Nomination Form)	Summary description for NRHP nomination
Historic Bridge, NE of depicted (No SIHP #)	Historic Bridge (Farrington Hwy)	Magnuson 1999	“Two bridges over Kalo‘i Gulch” built in 1922 by Lincoln L. McCandless, only one was in use [1999]. The bridge is a simple concrete slab one-span structure, with slender reinforced concrete abutments and railings. The abandoned bridge is reinforced concrete single arch structure with concrete railings.
Historic Bridge, central of depicted (No SIHP #)	Historic Bridge (Farrington Hwy)	Magnuson 1999	“Two bridges over Hunehune Gulch”; bridge currently [1999] in use is a simple concrete slab one-span structure with concrete abutments and railings. The abandoned bridge is located on the north side of Farrington Highway. It is a simple concrete slab one-span structure in fair condition.
Historic Bridge, southwestern of depicted (No SIHP #)	Historic Bridge (Farrington Hwy)	Magnuson 1999	“Bridge near Hawaiian Cement”; simple concrete slab one-span structure with concrete abutments and railings
Remnant Ditch and Railroad (No SIHP #)	Remnant Ditch and Railroad (Farrington Hwy)	Magnuson 1999	Short section of railroad track observed in front of the Board of Water Supply Farrington Booster, probably a remnant of the Ewa Plantation Co. sugar train railroad track in use between 1890 and 1947 and a neighboring sugarcane irrigation ditch along the south side of Farrington Hwy

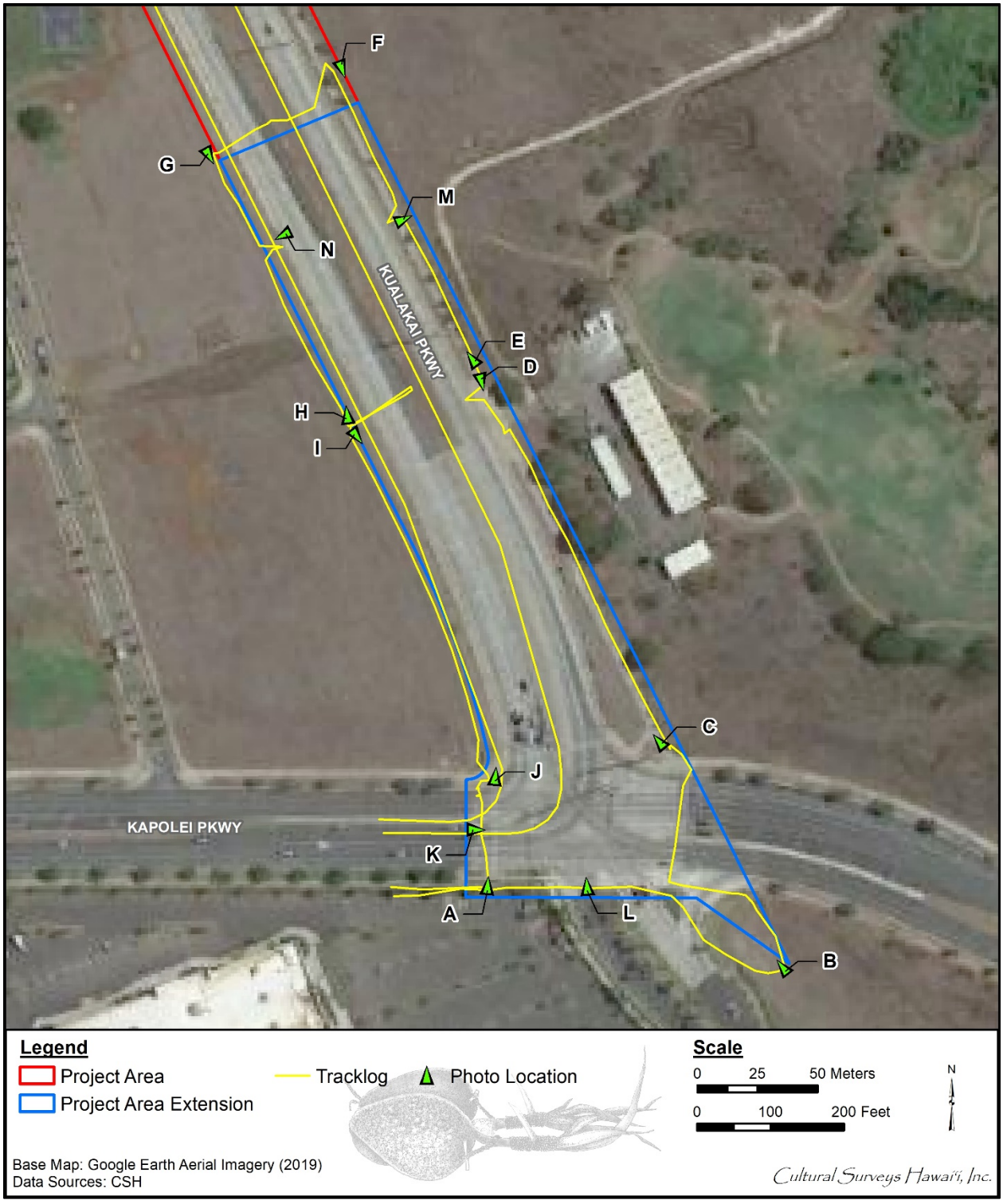

Figure 24. Archaeologist's track log with a key to the following photographs showing approximate location and direction (2019 Google Earth Aerial Imagery aerial photograph base map)

Figure 25. Photo A: General view of the project area extension from the southwest corner, Kapolei Parkway in foreground, Kualaka‘i Parkway at upper right, view to north

Figure 26. Photo B: General view of the project area extension from the southeast corner, Kapolei Parkway crossing in midground, Kualaka‘i Parkway at upper left, view to northwest

Figure 27. Photo C: General view of the southeast portion of the project area extension from just north of the Kapolei Parkway, Kualaka‘i Parkway at upper left, view to northwest

Figure 28. Photo D: General view of the southeast portion of the project area extension from near the middle of the east side, Kualaka‘i Parkway at upper right, view to southeast

Figure 29. Photo E: General view of the northeast portion of the project area extension from near the middle of the east side, Kualaka‘i Parkway at upper left, view to northwest

Figure 30. Photo F: General view of the northeast portion of the project area extension from near the northeast corner, Kualaka‘i Parkway at upper right, view to south

Figure 31. Photo G: General view of the northwest portion of the project area extension from near the northwest corner, Kualaka‘i Parkway at upper left, view to southeast

Figure 32. Photo H: General view of the northwest portion of the project area extension from near the middle of the west side, Kualaka‘i Parkway at upper right, view to northwest

Figure 33. Photo I: General view of the southwest portion of the project area extension from near the middle of the west side, Kualaka‘i Parkway at upper left, view to southeast

Figure 34. Photo J: General view of the southwest portion of the project area extension from north of the Kapolei Parkway, Kualaka‘i Parkway at right, view to north

Figure 35. Photo K: General view of the intersection of Kapolei Parkway (foreground) with the Kualaka‘i Parkway (midground) from the Kapolei Parkway median, view to east

Figure 36. Photo L: General view of the intersection of Kualaka‘i Parkway (background) with Kapolei Parkway (foreground), view to northwest

Figure 37. Photo M: View of the east side of the Kualaka‘i Parkway project area extension at the posited location of a former Ewa Plantation railroad crossing, view to northeast

Figure 38. Photo N: View of the west side of the Kualaka‘i Parkway project area extension at the posited location of a former Ewa Plantation railroad crossing, view to southwest

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Appendix A SHPD Chapter 6E-8 Historic Preservation Review for the Kualakai Parkway 16-inch R-1 Transmission Main Project

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KAPOLEI, HAWAII 96707

April 6, 2018

IN REPLY REFER TO:
Log No.: 2017.02699
Doc. No.: 1801KM07
Archaeology

Brittney Higuchi, Civil Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843
Email: bhiguchi@hbws.org

Dear Ms. Higuchi:

SUBJECT: **Chapter 6E-8 Historic Preservation Review –**
Request for Determination for Kualakai Parkway 16-inch R-1 Transmission Main Project
Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu
TMK: (1) 9-1-017:096; 9-1-018:008; Kualakai Parkway and Farrington Highway ROWs

Thank you for the request for determination regarding the Kualakai Parkway 16-inch R-1 Transmission Main Project. The submittal also includes a supporting document titled *Archaeological Literature Review and Field Inspection Report for the Kualaka‘i Parkway 16-inch R-1 Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu, TMK: [1] 9-1-017:096 Kualakai Parkway ROW; Farrington Highway ROW [1] 9-1-018:008* (Martel III and Hammatt, November 2017). The State Historic Preservation Division (SHPD) received this submittal on December 5, 2017 and requested additional information on January 22, 2018 via email (Kimi Matsushima [SHPD] to Brittney Higuchi [Board of Water Supply]). Additional information and a revised version of the literature review and field inspection was provided on March 30, 2018 via email (David Shideler [Cultural Surveys] to Kimi Matsushima [SHPD]).

The City and County of Honolulu Board of Water Supply (BWS) is the project proponent for the proposed project. The project includes two components, Component 1 and Component 2. Component 1 includes the construction of the new R-1 reservoir and Component 2 is the installation of the 10,800 ft. 16-inch main along Kualakai Parkway. The proposed project involves State owned land and totals 71.7 acres. Anticipated ground disturbance includes excavation for water mains and related appurtenances, geotechnical borings, and grading and excavation for the R-1 reservoir.

The LRFI (Martel III and Hammatt 2018) provides an overview of historical background information and previous archaeological studies. The LRFI indicates that the entire project area has been previously surveyed several times and a single historic property is present within the Component 1 area: Site 50-80-12-4664, a plantation era concrete irrigation ditch. Site 4664 was originally documented by Nakamura et al. (1993) and again by Rasmussen and Tomonari-Tuggle (2004, 2006), and Runyon et al. (2011). Site 4664 has been determined a significant historic property and eligible under Criteria A and C (Nakamura et al. 1993) and under D (Rasmussen 2006). The field inspection did not identify any other surface historic properties. Martel III and Hammatt (2018) concur with Runyon et al. (2011) that Site 4664 is significant under Criterion d, pursuant to Hawaii Administrative Rules (HAR) §13-275-6. However, they argue that the site lacks integrity and recommends no further archaeological work for the site. The LRFI also indicates that subsurface historic properties are unlikely due to previous disturbance from historical plantation activities and more recent agricultural cultivation. Therefore, the report recommends a determination of no historic properties affected.

Ms. Higuchi
April 6, 2018
Page 2

Based on the above information, the BWS has determined the proposed project will result in no historic properties affected. Pursuant to HAR §13-284-5(b)(2)(A), the **SHPD concurs** with the determination of **no historic properties affected** for the proposed project.

The document titled *Archaeological Literature Review and Field Inspection Report for the Kualaka‘i Parkway 16-inch R-1 Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu, TMK: [1] 9-1-017:096 Kualakai Parkway ROW; Farrington Highway ROW [1] 9-1-015:008* (Martel III and Hammatt, November 2017) serves to facilitate project planning and supports the historic preservation review process. Please send one hardcopy of the document, clearly marked FINAL, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office, attention SHPD Library.

Please contact Kimi Matsushima at (808) 692-8027 or at Kimi.R.Matsushima@hawaii.gov for questions regarding archaeological resources or this letter.

Aloha,

Susan A. Lebo

Susan A. Lebo, PhD
Archaeology Branch Chief

cc: David Shideler, Cultural Surveys Hawaii (dshideler@culturalsurveys.com)

Appendix B

Final Cultural Impact Assessment for the Proposed East Kapolei R-1 Reservoir and Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMKs: [1] 9-1-017:096 Kūalaka‘i Parkway Right-of-Way, Farrington Highway Right-of-Way, and [1] 9-1-018:008. Prepared for Engineering Concepts, Inc., and R. M. Towill Corporation and prepared by Li‘i Bitler, B.A., Brittany Beauchan, M.A., and Hallet H. Hammatt, Ph.D. February 2018.

Final
Cultural Impact Assessment for the Proposed East Kapolei R-1 Reservoir and Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu TMKs: [1] 9-1-017:096 Kualaka‘i Parkway Right-of-Way, Farrington Highway Right-of-Way, and 9-1-018:008

Prepared for
Engineering Concepts, Inc. and R.M. Towill Corporation

Prepared by
Li‘i Bitler, B.A.,
Brittany Beauchan, M.A.,
Kellen Tanaka, B.A.,
and
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Cultural Surveys Hawai‘i, Inc.
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(Job Code: HONOULIULI 134)

February 2018

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Management Summary

Reference	Cultural Impact Assessment for the Kualaka‘i Parkway 16-Inch R-1 Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMKs: [1] 9-1-017:096 Kualaka‘i Parkway Right-of-Way, Farrington Highway Right-of-Way, and [1] 9-1-018:008 (Bitler et al. 2018)
Date	February 2018
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: HONOULIULI 134
Agencies	State of Hawai‘i Department of Land and Natural Resources / State Historic Preservation Division (SHPD); State Office of Environmental Quality Control (OEQC); City & County of Honolulu Board of Water Supply (BWS)
Land Jurisdiction	State of Hawai‘i
Project Proponent	Engineering Concepts, Inc. and R.M. Towill Corporation, on behalf of the BWS
Project Location	The project area comprises portions of the East Kapolei 215 Reservoir access road and proposed R-1 reservoir location, Farrington Highway from an East Kapolei 215 Reservoir access road to Kualaka‘i Parkway, and Kualaka‘i Parkway from Farrington Highway to Mango Tree Road. The project area is depicted on a portion of a 2013 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle.
Project Description	The proposed project consists of two components: Component 1 involves the construction of the New East Kapolei 215 R-1 Reservoir with associated connections to Component 2, which consists of a new 16-inch transmission main that extends along Farrington Highway and Kualaka‘i Parkway. The new R-1 reservoir (Component 1) is projected to be 3.0 million gallons in capacity and will stabilize water pressures in the water system and help meet water demands during peak. The new 16-inch transmission main (Component 2) will extend from the existing R-1 system through Kualaka‘i Parkway to supply the R-1 reservoir. The project also includes initial geotechnical investigation consisting of soil borings along the proposed water line alignment at approximately 500-foot (ft) intervals and a minimum of one boring per street. Boring depth shall be a minimum of 8 ft or 30 inches below the maximum water main invert depth indicated on project plans.
Project Acreage	The project area consists of 3.9 acres (1.58 hectares) for Component 1 and 67.8 acres (27.44 hectares) for Component 2, with a total of 71.7 acres (29.02 hectares) for the entire project area.

Document Purpose	This cultural impact assessment was prepared to comply with the State of Hawai‘i’s environmental review process under Hawai‘i Revised Statutes (HRS) §343, which requires consideration of the proposed project’s potential effect on cultural beliefs, practices, and resources. Through document research and cultural consultation efforts, this report provides information compiled to date pertinent to the assessment of the proposed project’s potential impacts to cultural beliefs, practices, and resources (pursuant to the Office of Environmental Quality Control’s *Guidelines for Assessing Cultural Impacts*) which may include traditional cultural properties (TCPs). These TCPs may be significant historic properties under State of Hawai‘i significance Criterion e, pursuant to Hawai‘i Administrative Rules (HAR) §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that “have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity” (HAR §13-275-6 and §13-284-6). The document will likely also support the project’s historic preservation review under HRS §6E and HAR §13-275 and §13-284.The document is 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. 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 southeast 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. Following the Māhele of 1848, 96 individual land claims were made in the *ahupua‘a* of Honouliuli, with 72 claims being registered and awarded by King Kamehameha III to *maka‘āinana* (commoners). The 72 *kuleana* (land holding of a tenant or *hoa‘āina* residing in the *ahupua‘a*) awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, irrigated *lo‘i* (taro fields), *kula* (pasture or dry field), and house lots. 12. 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 for a total of $95,000. 13. 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). 14. The early twentieth century saw the lands of Honouliuli heavily utilized by both civilians and the U.S. military for transportation. The Barbers Point Military Reservation was established in 1921.

Results of Community Consultation	CSH attempted to contact NHOs, agencies, and community members. CSH initiated its outreach effort in August 2017 through letters, email, telephone calls, and in-person contact. CSH completed the community consultation in January 2018. Below is a list of individuals who shared their *mana‘o* (thought, opinions) and *‘ike* (knowledge) about the project area and Honouliuli Ahupua‘a: 1. Paulette Ka‘anohi Kaleikini, cultural descendant and owner of ‘Ōiwi Cultural Resources 2. Jan Becket, author, photographer, and retired teacher from Kamehameha Schools. Kona Moku Representative, Council of Hawaiian Civic Club’s Committee on the Preservation of Historic Sites and Cultural Properties 3. Shad Kāne, spokesperson for the Kalaeloa Heritage Park
Impacts and Recommendations	Based on information gathered from the cultural and historical background, and the community consultation, potential impacts were identified and the following preliminary recommendations were made. 1. Historically, the area in and around the project area was traversed by Native Hawaiians through a series of *mauka-makai* (mountians-to-sea) and cross-*ahupua‘a* trails. The current project area currently crosses over portions of these ancient trails. Despite documentary evidence of ancient Hawaiian activity in the area, previous archaeological studies have yielded no significant findings. Previous archaeological studies in the vicinity of the project area have identified historic properties associated with historic-era sugarcane operations. Despite relatively few findings in the vicinity of the project area, intact cultural deposits, including *iwi kūpuna* (ancestral human remains), may yet be encountered during ground disturbance. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. Mrs. Paulette Ka‘anohi Kaleikini, a cultural descendant for Honouliuli Ahupua‘a, recommended that culturally sensitive practices be employed, specifically that project personnel “malama [take great care as to] how [or the manner in which they engage in ground disturbance] and [also take great care in selecting the] location of digging. In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* 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. 2. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance. 3. One interviewee, Mr. Jan Becket, said he had no objection to the current project. He did feel it important to share and keep in mind that the ‘Ewa Plains once had underground water flowing to source the area, however, due to extraction, water no longer flows.

Table of Contents

List of Figures

List of Tables

Section 1 Introduction

1.1 Project Background

At the request of Engineering Concepts, Inc. and R.M. Towill Corporation, on behalf of the City & County of Honolulu Board of Water Supply (BWS), Cultural Surveys Hawai‘i, Inc. (CSH) is conducting a cultural impact assessment (CIA) for the proposed East Kapolei R-1 Reservoir and Transmission Main project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMKs: [1] 9-1-017:096 Kualaka‘i Parkway Right-of-Way (ROW), Farrington Highway ROW, and 9-1-018:008. The total project area is 29.02 hectares (71.7 acres). The project area is depicted on a portion of the 2013 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle, and a 2013 Google Earth aerial photograph (Figure 1 and Figure 2).

The proposed project will involve improvements to the BWS infrastructure for the transmission and use of R-1 (recycled) water in the ‘Ewa District of O‘ahu. According to the Department of Health (2002), *Guidelines for the Treatment and Use of Recycled Water*, R-1 water can be used for irrigation and other purposes where non-potable water can be useful. The use of R-1 water can also help preserve the drinking water supply when it is appropriate to use non-drinking water.

The project, consisting of two components (see Figure 2 through Figure 5), will construct a new R-1 reservoir and transmission piping. Component 1 (Figure 6 through Figure 8) involves the construction of the New East Kapolei 3.0-million gallon (MG) R-1 Reservoir. The reservoir tank site will require grading to sit at grade and will be located adjacent to the existing East Kapolei 215 4.0 MG Reservoir. For Component 2 (Figure 9 through Figure 14), a new 16-inch intake main will be constructed via trenching to connect the proposed East Kapolei 3.0 MG R-1 Reservoir to the end of the existing site access road.

The 16-inch transmission main will connect the new East Kapolei 3.0 MG R-1 Reservoir intake main located at the end of the existing East Kapolei 215 4.0 MG Reservoir access road on Farrington Highway. The transmission main will continue along Farrington Highway to Kualaka‘i Parkway, and from Kualaka‘i Parkway to Mango Tree Road, and will interconnect to an existing 20-inch R-1 main, a distance of approximately 10,800 linear feet (ft).

The project also includes initial geotechnical investigation consisting of soil borings along the proposed transmission line alignment at approximately 500-ft intervals and a minimum of one boring per street. Boring depth shall be a minimum of 8 ft or 30 inches below the maximum water main invert depth indicated on project plans.

1.2 Document Purpose

This cultural component was prepared to comply with the State of Hawai‘i’s environmental review process under Hawai‘i Revised Statutes (HRS) §343, which requires consideration of the proposed project’s potential effect on cultural beliefs, practices, and resources. Through document research, 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

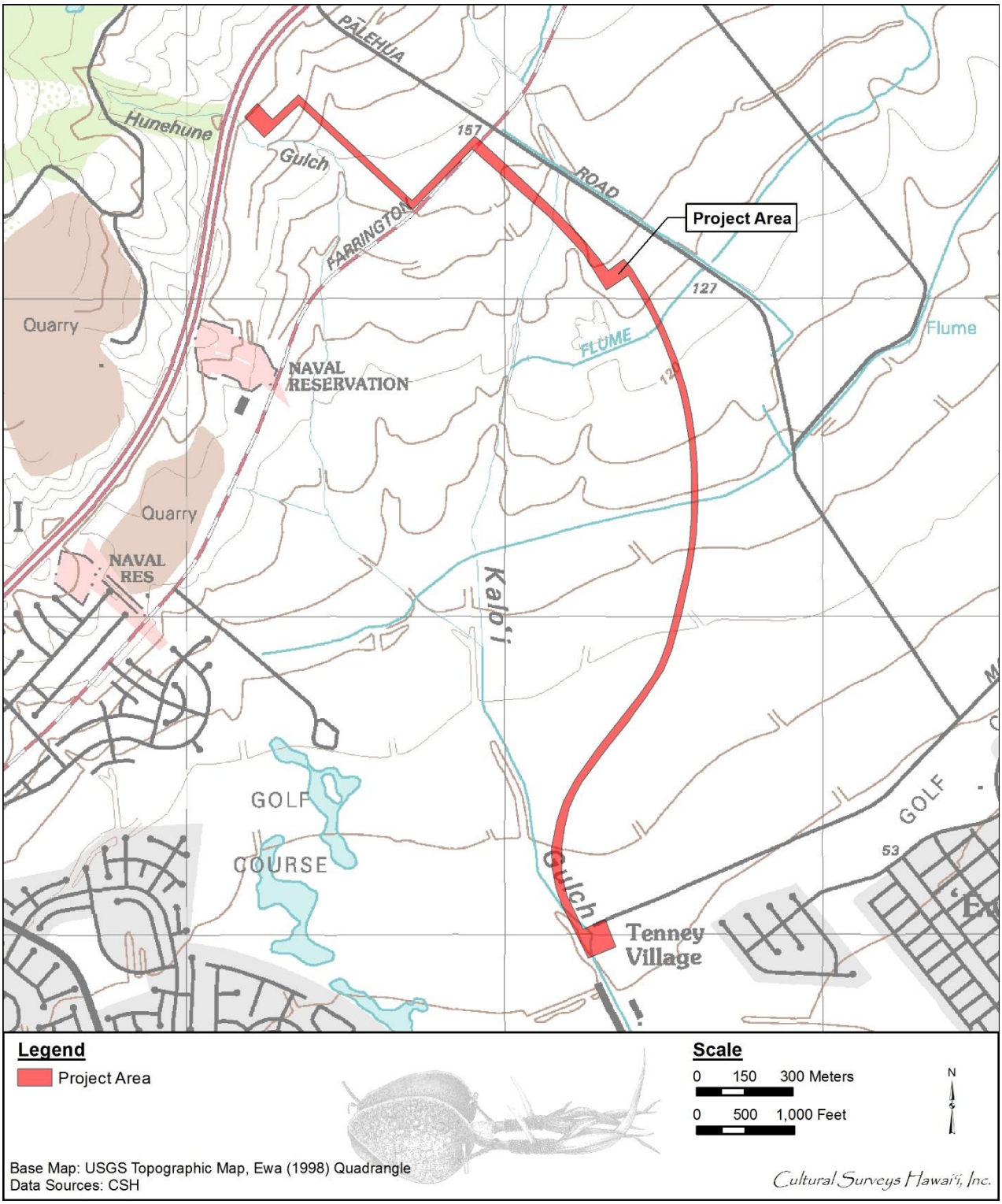


Figure 1. Portion of the of the Ewa 1998 USGS topographic quadrangle showing the project area

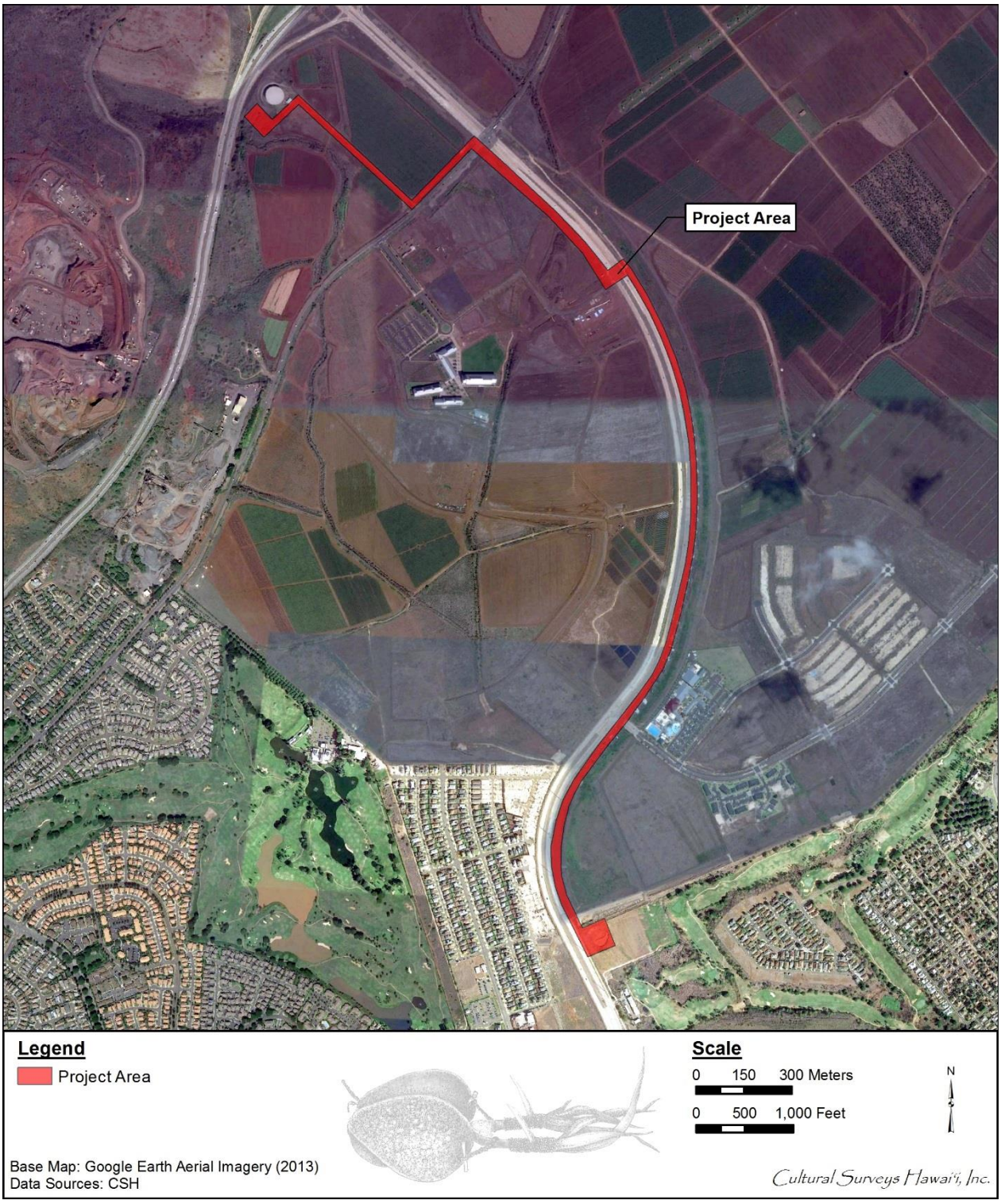


Figure 2. Portion of 2013 Google Earth Imagery showing the project area

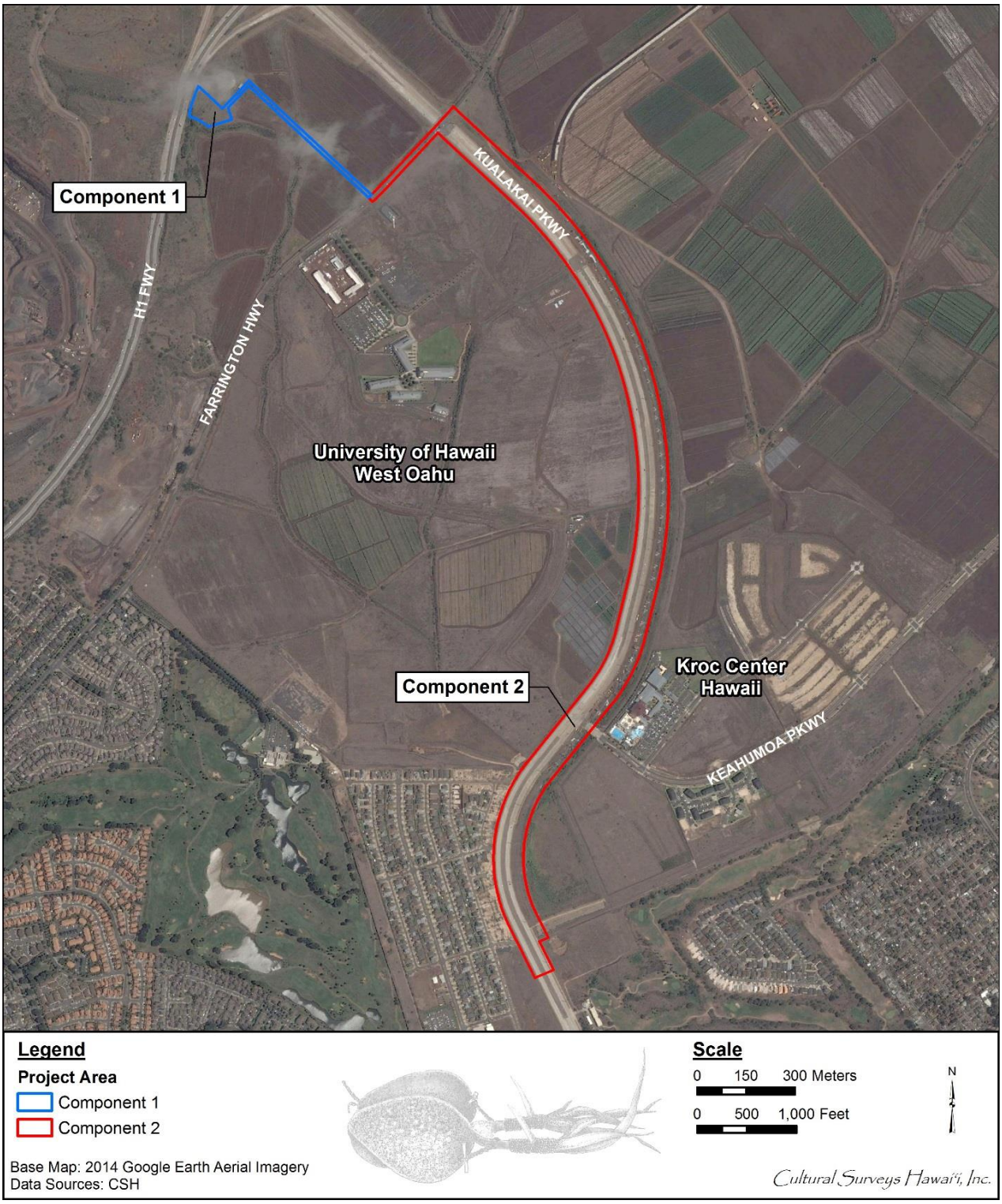


Figure 3. 2014 Google Earth Imagery of project area with component areas outlined

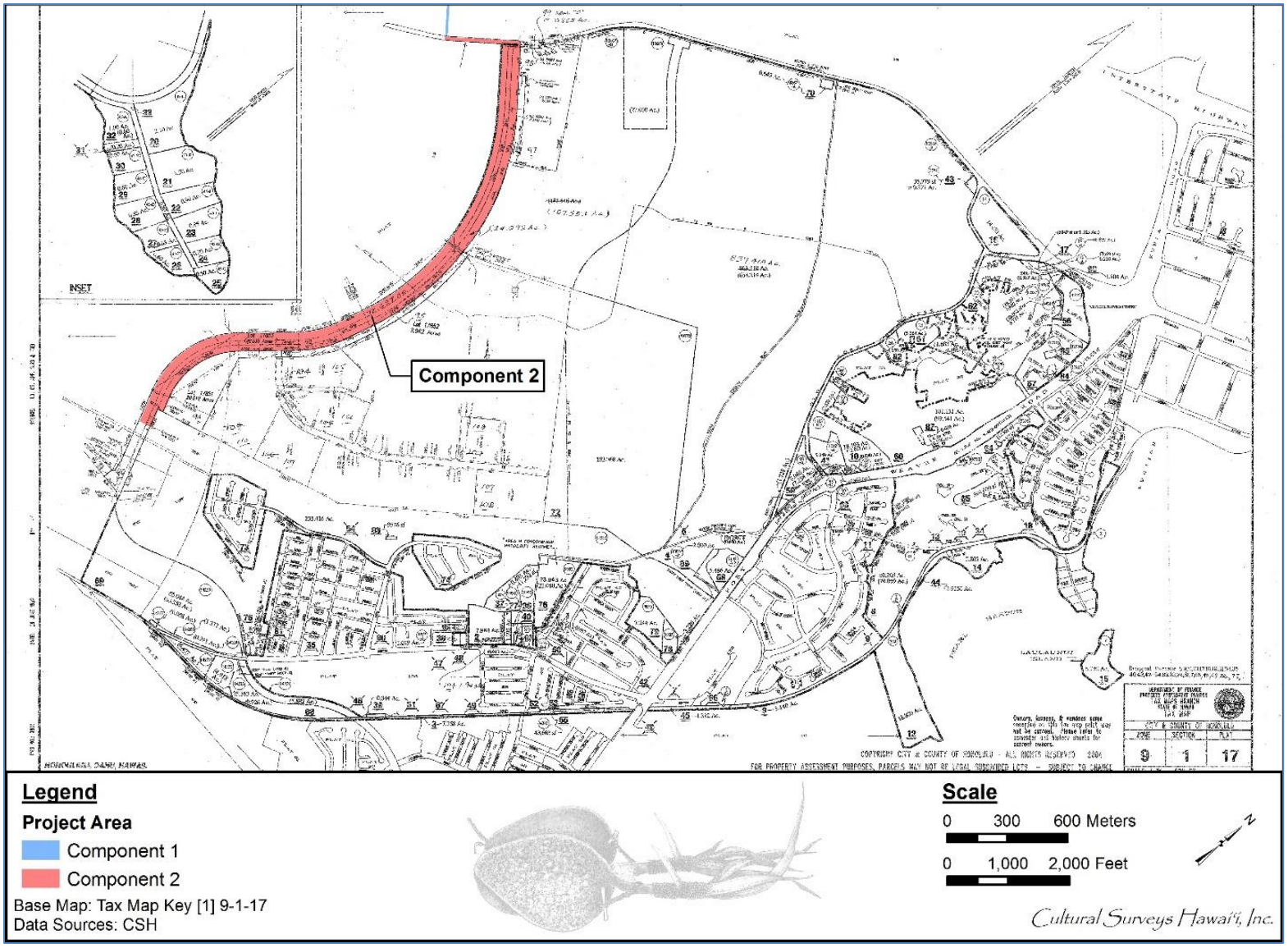


Figure 4. Tax Map Key (TMK) [1] 9-1-017 showing Component 2 of the project area (Hawai‘i TMK Service 2014)

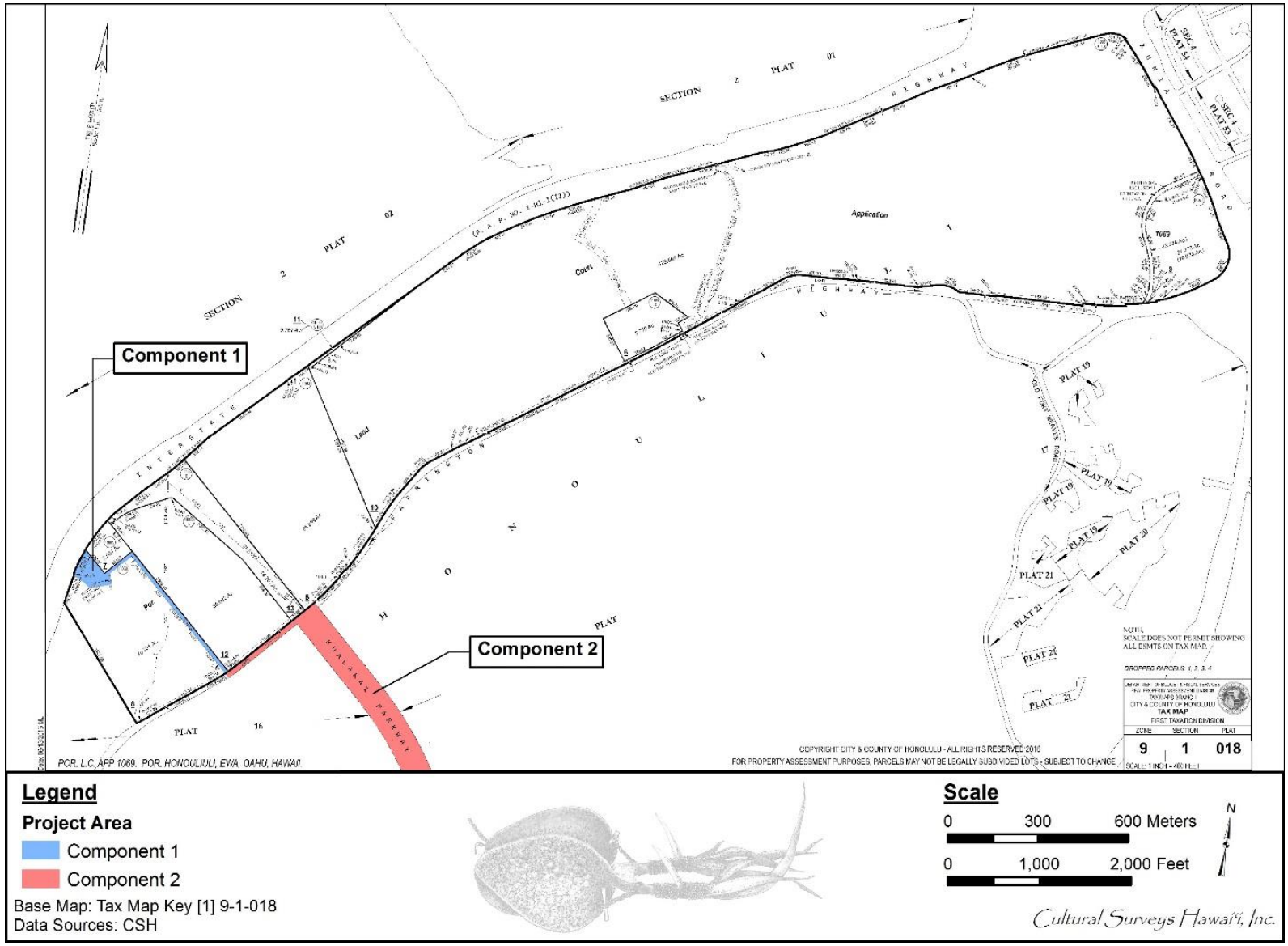


Figure 5. TMK: [1] 9-1-018 showing Component 1 and 2 of the project area (Hawai‘i TMK Service 2014)

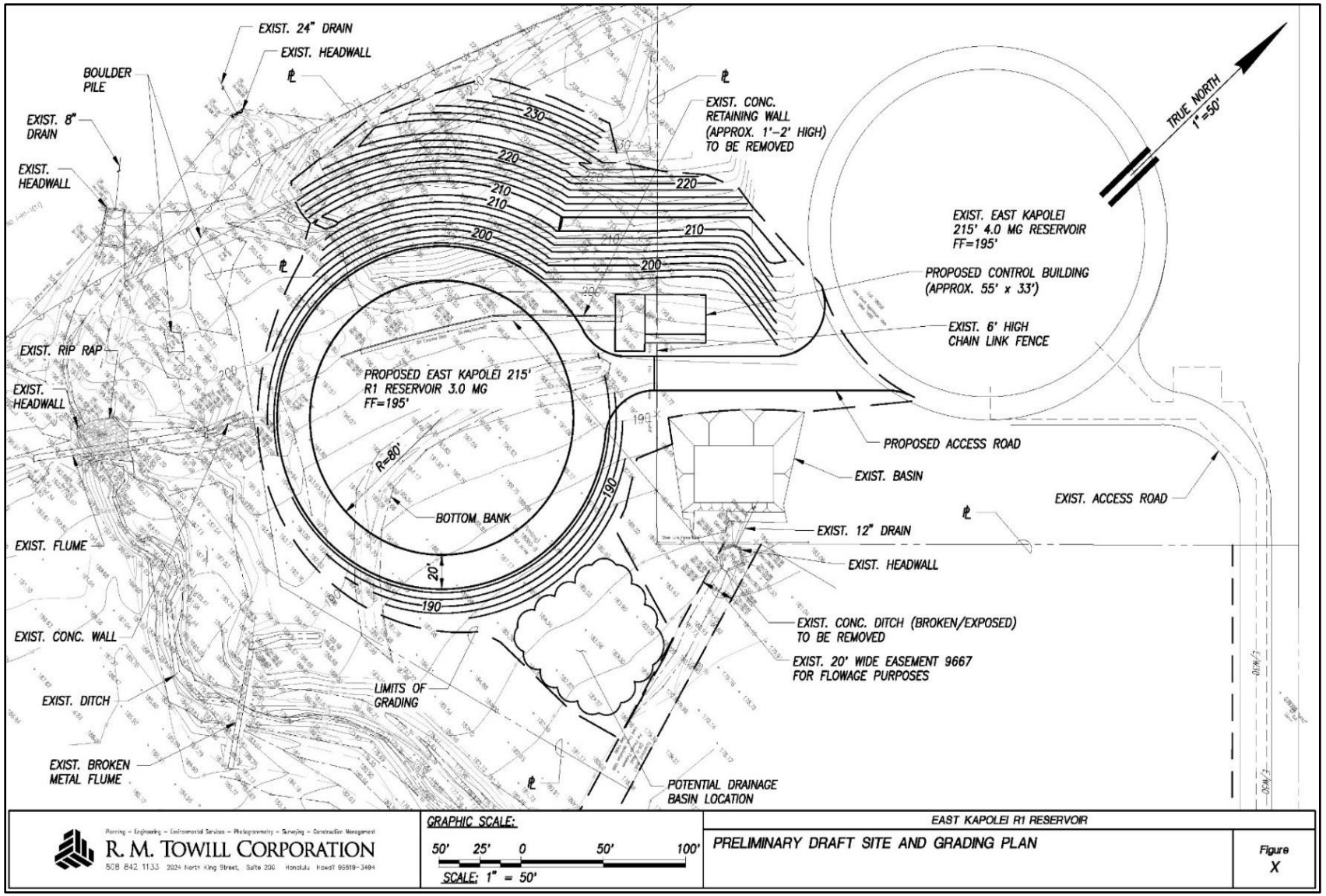


Figure 6. Component 1: grading plan for the R-1 reservoir (courtesy of client)

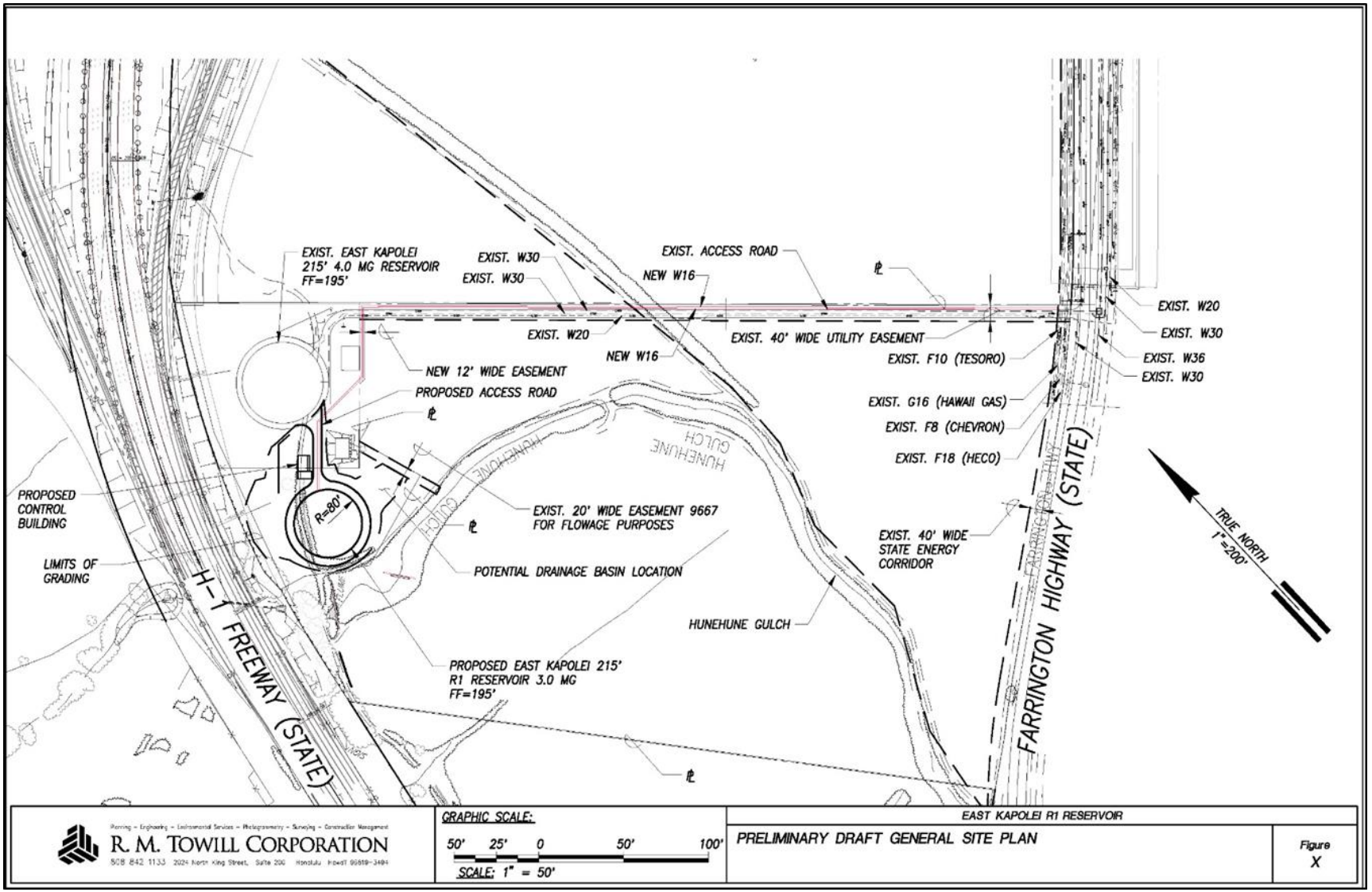


Figure 7. Component 1: general site plan for the R-1 reservoir and appurtenances (courtesy of client)

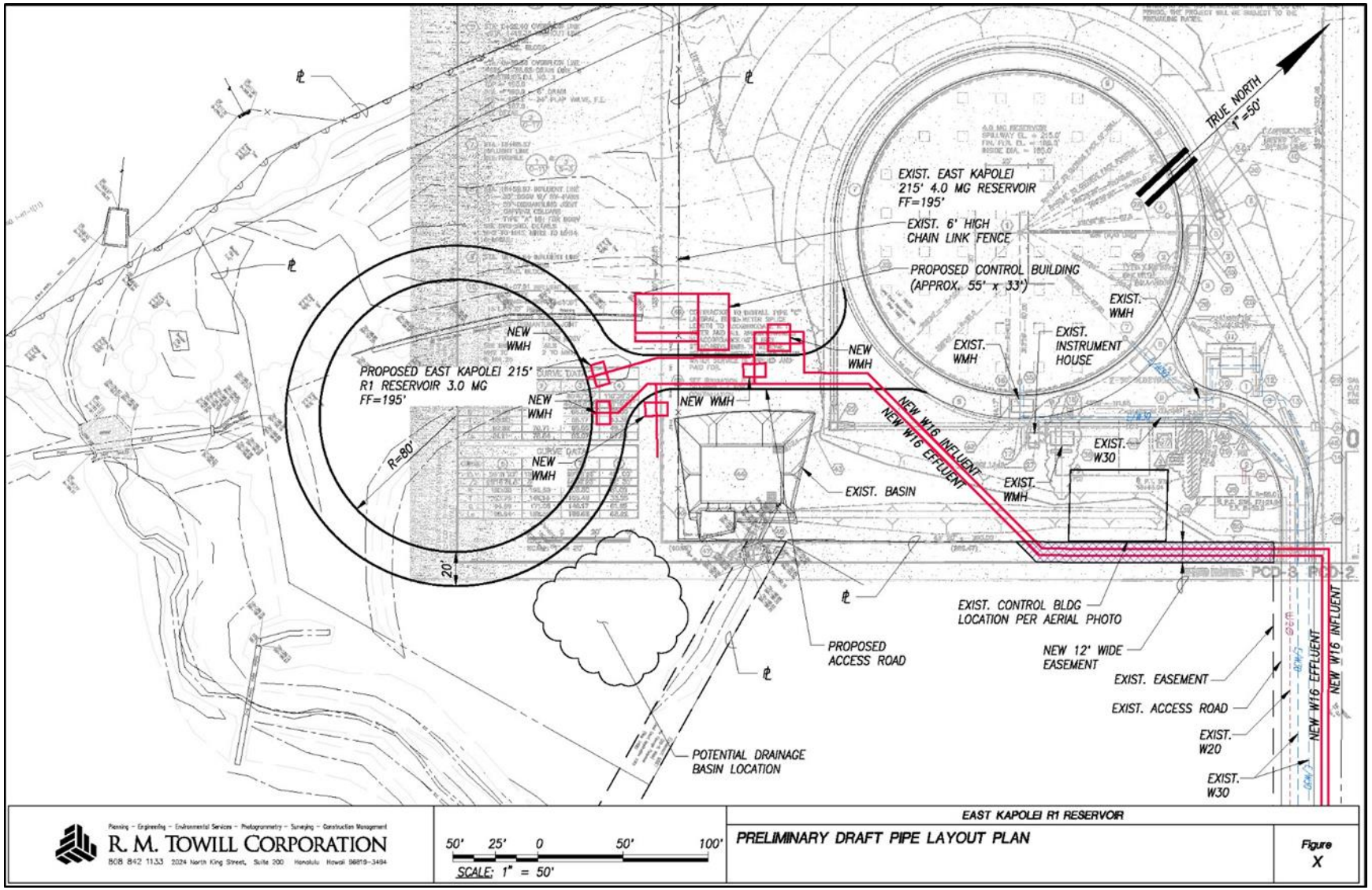


Figure 8. Component 1: proposed pipe layout plan for the R-1 reservoir and appurtenances (courtesy of client)

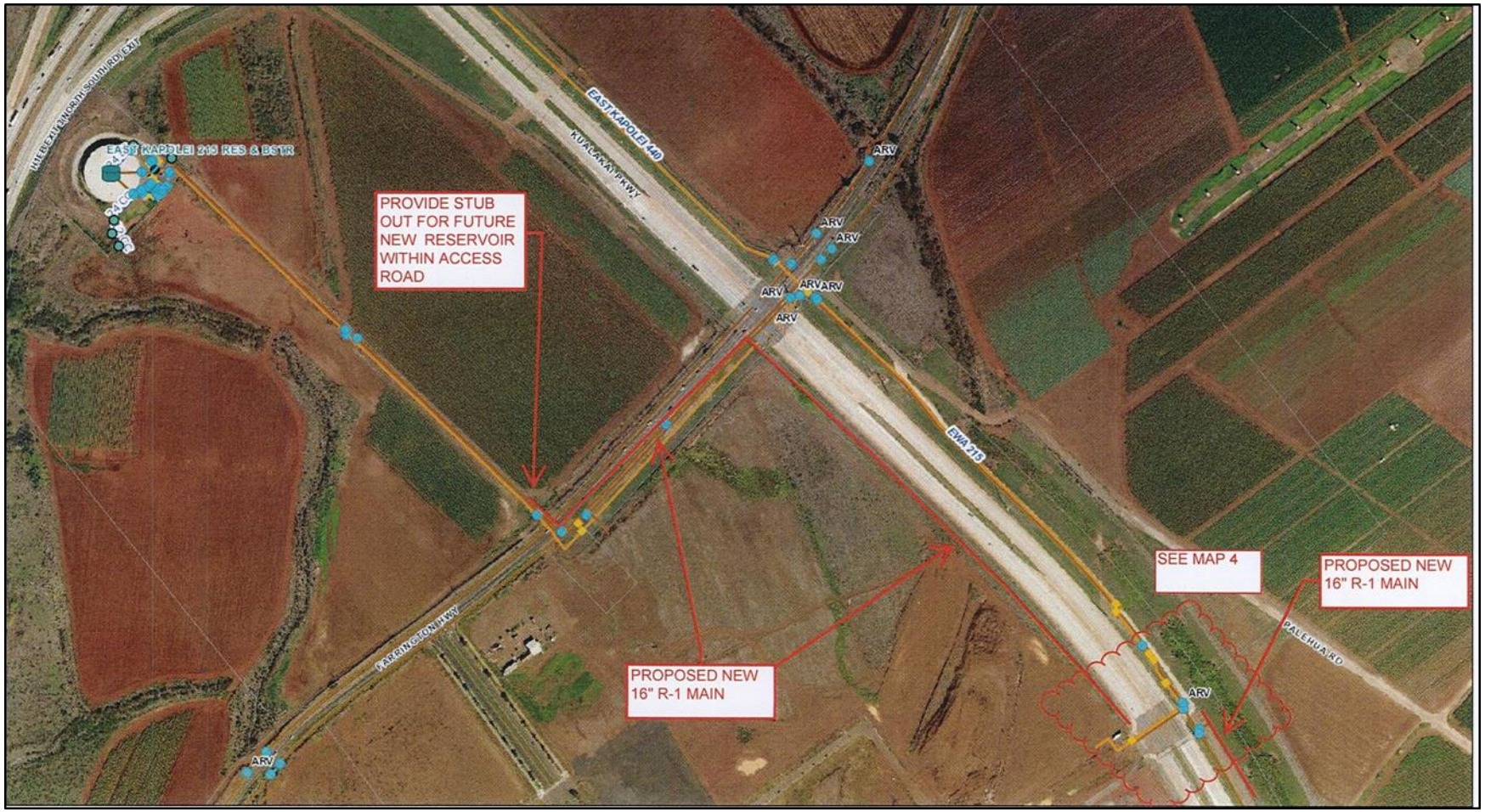


Figure 9. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map (courtesy of client)

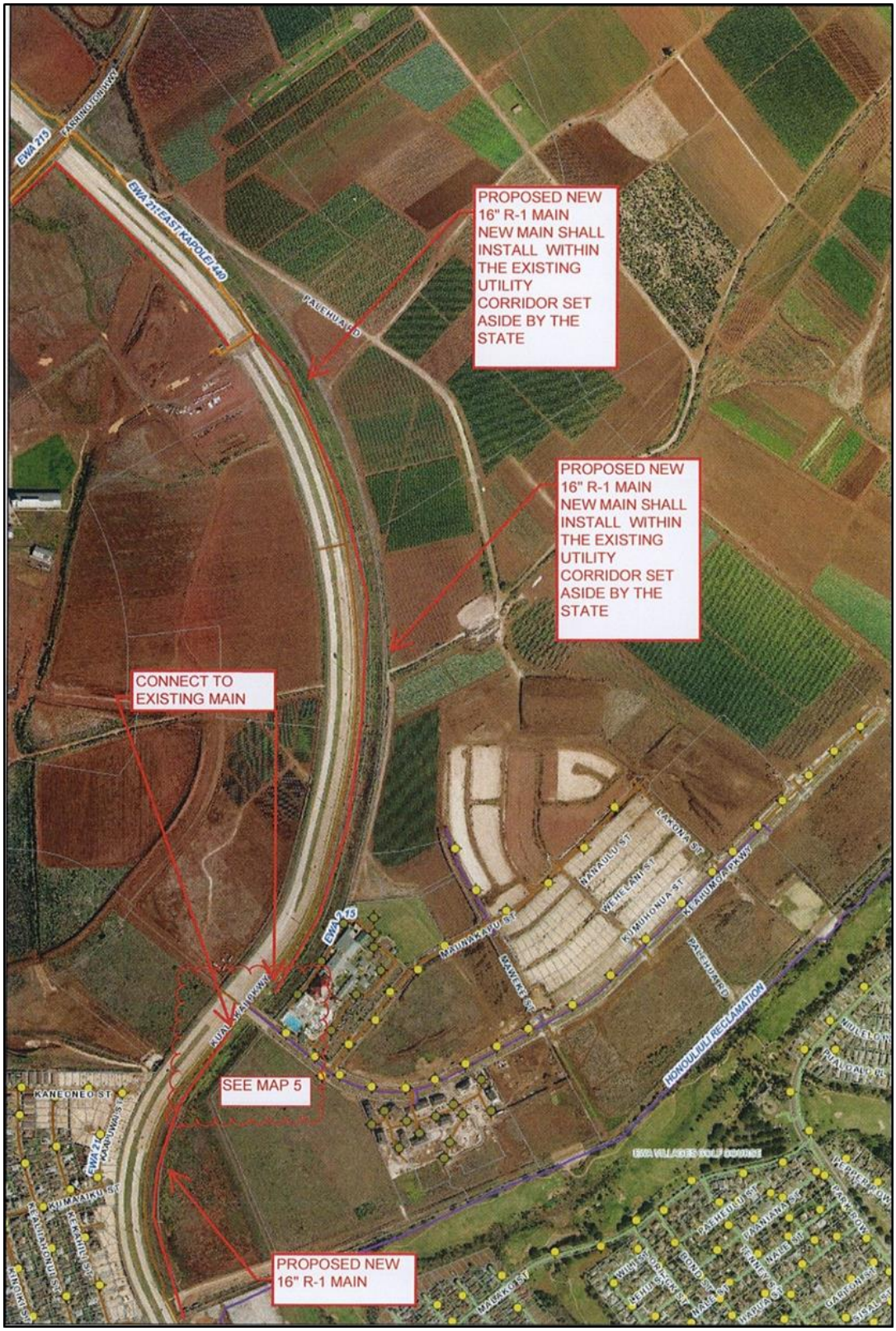


Figure 10. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 2 (courtesy of client)

Figure 11. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 3 (courtesy of client)

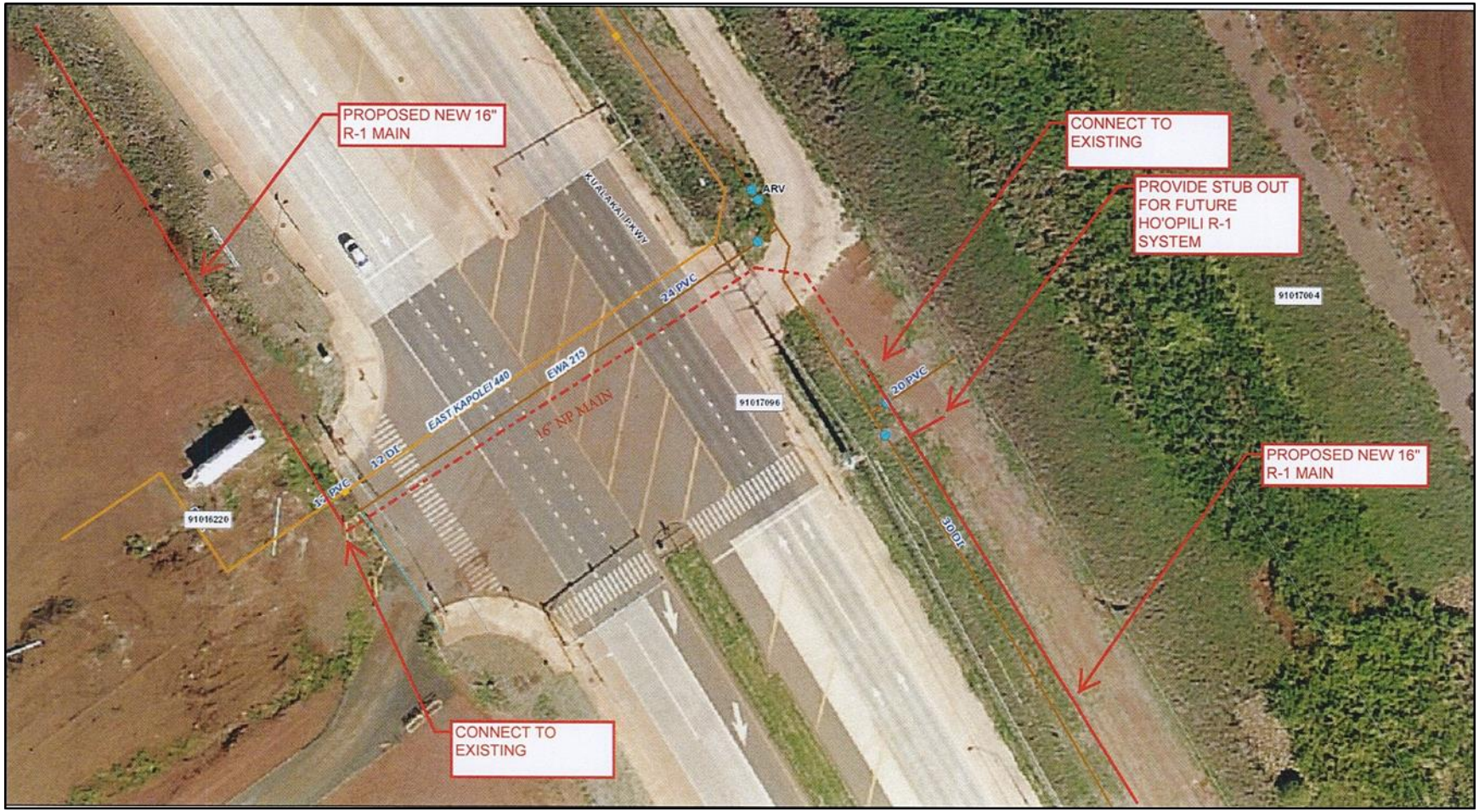


Figure 12. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 4 (courtesy of client)

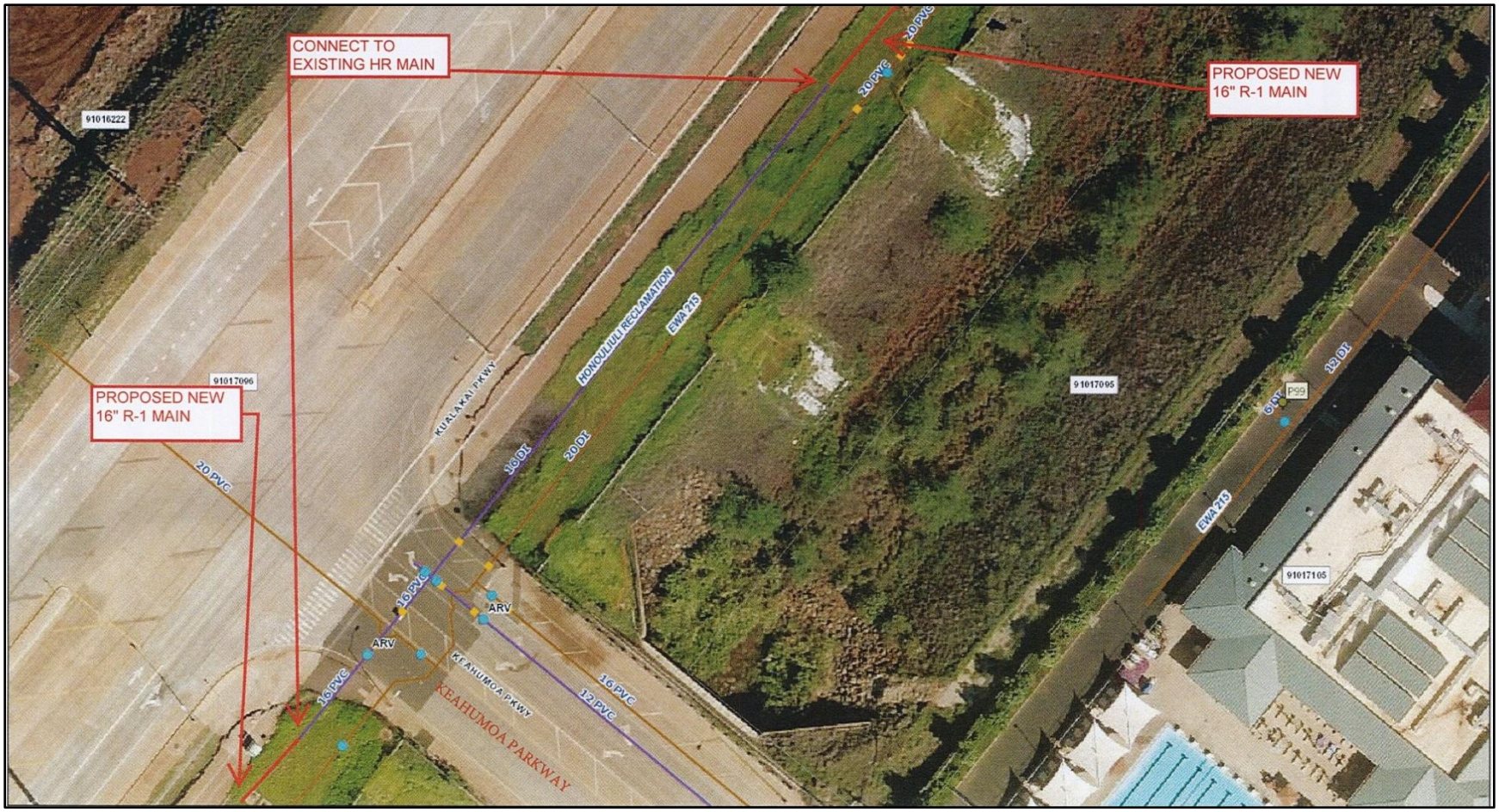


Figure 13. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map (courtesy of client)

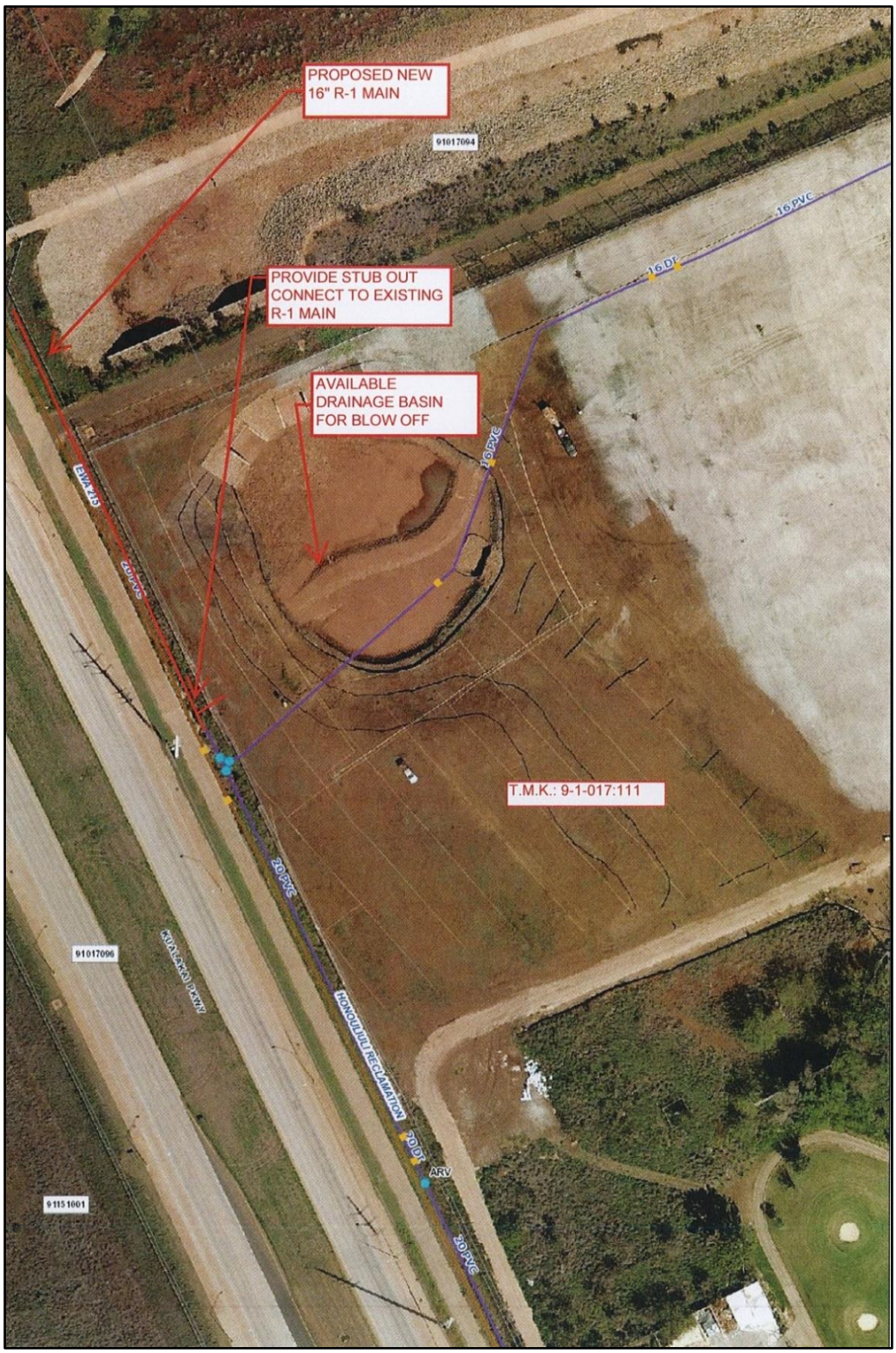


Figure 14. Component 2: Kualaka‘i Parkway 16-inch R-1 transmission main map 6 (courtesy of client)

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 impact assessment 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. Identify present and past uses of the cultural resources, practices, and beliefs associated with the parcel through interviews with person knowledgeable about the project area and its surroundings.
4. Preparation of a report that summarizes the results of these research activities and provides recommendations based on findings.

1.4 Environmental Setting

1.4.1 *Ka Lepo* (Soils)

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’s soils consist primarily of the Honouliuli series of clays (HxA, HxB) with smaller patches in the Molokai (MuB, MuC), Waialua (WkA), Waipahu (WzA), and Kunia (KyA) series of silty clays and the Ewa (EwC) series of stony silty clays (Figure 15 and Figure 16). Honouliuli Clay is described as “dark reddish-brown, very sticky and very plastic clay throughout” (Foote et al. 1972).

Soils of Honouliuli Series are described as follows:

> This series consists of well-drained soils on coastal plains on the island of O‘ahu in the ‘Ewa area. These soils developed in alluvium derived from basic igneous material. They are nearly level and gently sloping. Elevations range from 15 to 125 feet. The annual rainfall amounts to 18 to 30 inches and occurs mainly between November and April. The mean annual soil temperature is 74° F. Honouliuli soils are geographically associated with ‘Ewa, Lualualei, Mamala, and Waialua soils.
>
> These soils are used for sugar cane, truck crops, orchards, and pasture. The natural vegetation consists of kiawe, koa haole, fingergrass, bristly foxtail, and bermudagrass. [Foote et al. 1972:43]

Soils of the Molokai Series are described as follows:

> This series consists of well-drained soils on uplands on the islands of Maui, Lanai, Molokai, and Oahu. These soils formed in material weathered from basic igneous

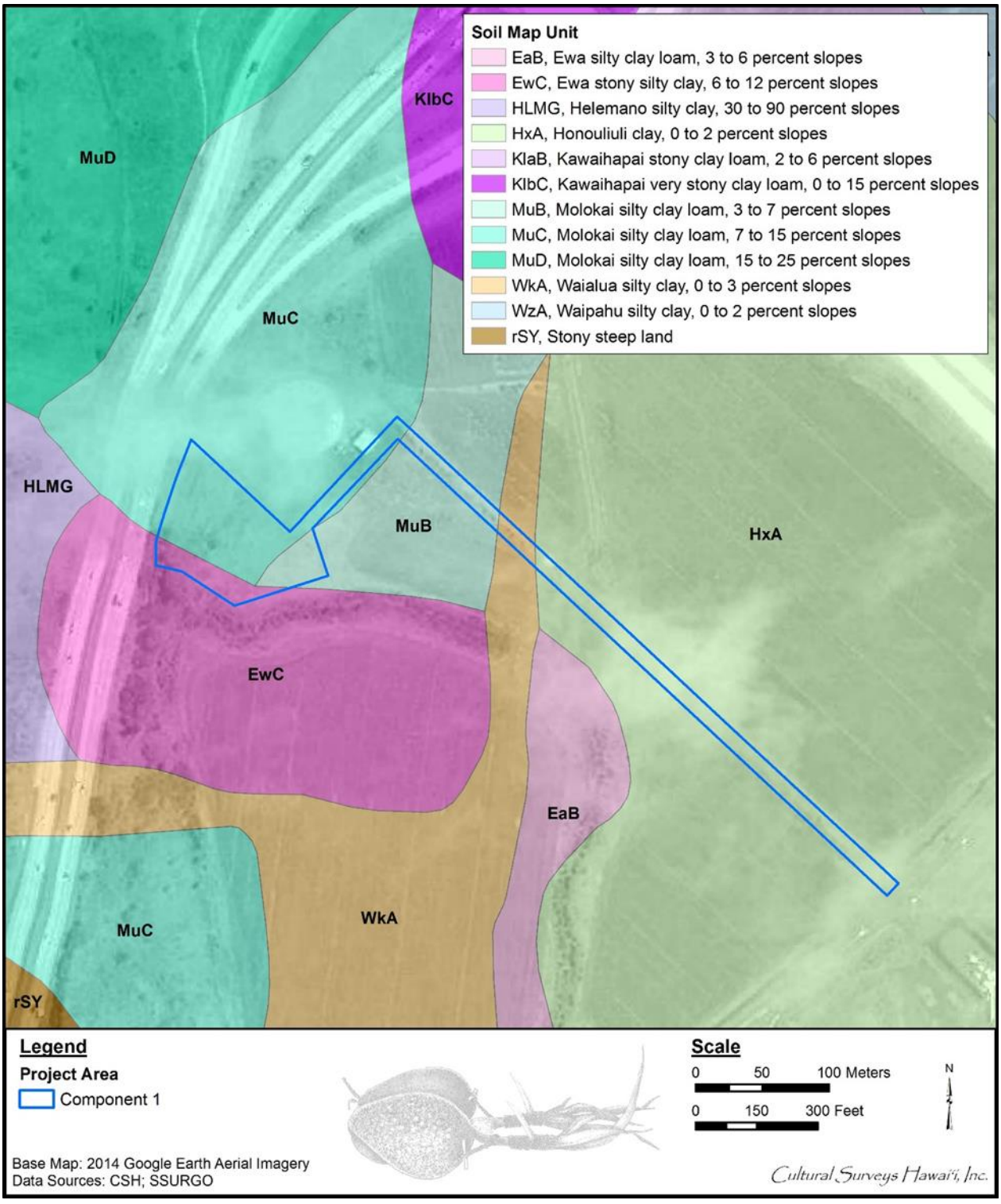


Figure 15. Portion of a 2014 Google Earth aerial photograph with overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and surrounding the Component 1 portion of the project area

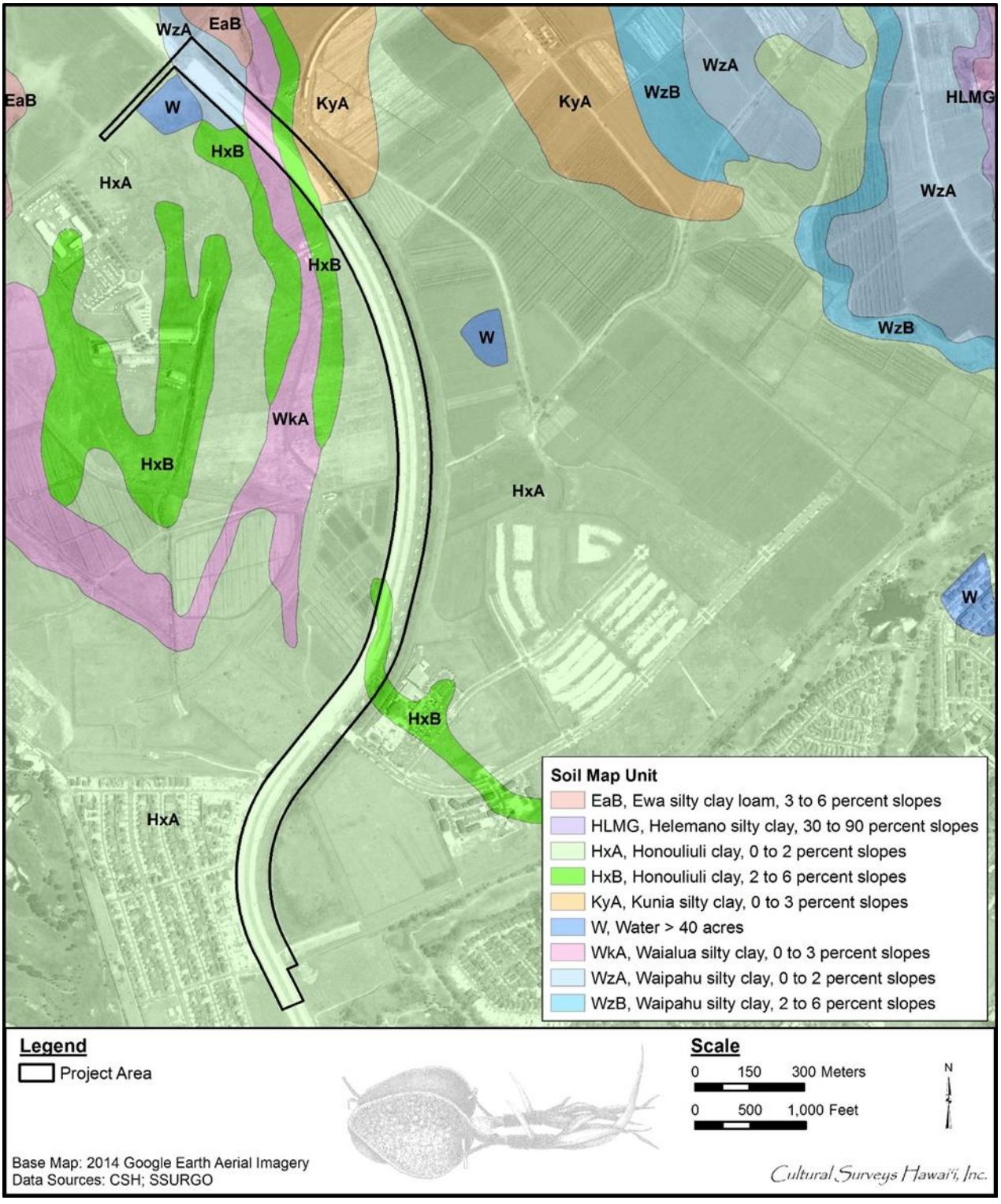


Figure 16. Portion of a 2014 Google Earth aerial photograph with overlay of *Soil Survey of the State of Hawai‘i* (Foote et al. 1972; SSURGO 2001), indicating soil types within and surrounding the Component 2 portion of the project area

> rock. They are nearly level to moderately steep. Elevations range mainly from nearly sea level to 1,000 feet but are as much as 1,500 feet on Lanai. The annual rainfall amounts to 20 to 25 inches, most of which occurs between November and April. The summers are hot and dry. The mean annual soil temperature is 73° F. Molokai soils are geographically associated with Holomua, Keahua, Lahaina, and Uwala soils.In this survey area a shallow variant of the Molokai series was mapped. This soil, Molokai silty clay loam, shallow variant, 15 to 25 percent slopes, severely eroded, is described in alphabetical order, along with other mapping units of this series.
>
> These soils are used for sugarcane, pineapple, pasture, wildlife habitat, and home sites. The natural vegetation consists of kiawe, ‘ilima, uhaloa, feather fingergrass, and buffalo grass. [Foote et al. 1972:96]

Soils of the Waialua Series are described as follows:

> This series consists of moderately well drained soils on alluvial fans; these soils developed in alluvium weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 100 feet. The annual rainfall amounts to 25 to 50 inches; most of it occurs between November and April. The mean annual soil temperature is 73° F. Waialua soils are geographically associated with Honouliuli, Kaena, and Kawaihapai soils.
>
> These soils are used for sugarcane, truck crops, orchards, and pasture. The natural vegetation is swollen fingergrass, koa haole, and uhaloa. [Foote et al. 1972:128]

Soils of the Waipahu Series are described as follows:

> This series consists of well-drained soils on marine terraces on the island of O‘ahu. These soils developed in old alluvium derived from basic igneous rock. They are nearly level to moderately sloping. Elevations range from nearly sea level to 125 feet. Rainfall amounts to 25 to 35 inches annually; most of it occurs between November and April. The mean annual soil temperature is 75° F. Waipahu soils are geographically associated with Hanalei, Honouliuli, and Waialua soils. [Foote et al. 1972:134]

Soils of the Kunia Series are described as follows:

> This series consists of well-drained soils on upland terraces and fans on the island of Oahu. These soils developed in old alluvium. They are nearly level to moderately sloping. Elevations range from 700 to 1,000 feet. The mean annual rainfall amounts to 30 to 40 inches, most of which occurs from November to April. The mean annual soil temperature is 71° F. Kunia soils occur on the foot slopes of the Waianae Range, near Schofield Barracks. They are geographically associated with Kolekole, Lahaina, and Wahiawa soils.
>
> These soils are used for sugarcane, pineapple, home sites, and military reservations. Most areas are cultivated, and the natural vegetation is not significant. [Foote et al. 1972:77]

The project area vegetation consists primarily of introduced species including exotic grasses, *koa haole* (*Leucaena leucocephala*), *klu (Acacia farnesiana)*, and castor bean plant (*Ricinus*

Communis). The only native species identified in the project area was *‘uhaloa* (*Waltheria indica*), traditionally used for medicinal purposes.

The project corridor extends across the ‘Ewa Plain, a Pleistocene reef platform overlain by alluvium from the southern end of the Wai‘anae Mountain Range. This alluvium supported commercial sugarcane cultivation for over a century. The ‘Ewa Plain is hot and dry with an average annual rainfall of 25 inches (Giambelluca et al. 2013) and an average annual temperature of 74° F (23° C) (Giambelluca et al. 2014). Despite the aridity, the area is prone to flooding. Floods of 1916, 1917, 1923, and 1927 have been well documented by archival photographs, some of which show standing water as far as the eye can see. Honouliuli Stream is the only major stream in the area, although it is located well outside the project area. Hunehune Gulch, a non-perennial stream, quickly traverses a portion of the Component 1 portion of the project area.

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 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-ku 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 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.

KAU HO‘OKAHI HANERI A	CHANT ONE HUNDRED
ME KANALIMAKUMAMĀKOLU	AND FIFTY-THREE
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 Pohakea, above Kamaoha
He lae ‘ino ‘o Maunauna	Maunauna is a dangerous escarpment
‘O Līhu‘e ke hele ‘ia	Lihu‘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‘oulumahiehie 2008:262]

1.4.3 *Ka Ua* (Rains)

Precipitation is a major component of the water cycle, and is responsible for depositing *wai* (fresh water) on local flora. Pre-Contact *kānaka* (Native Hawaiians) recognized two distinct annual seasons. The first, known as *kau* (period of time, especially summer) lasts typically from May to October and is a season marked by a high-sun period corresponding to warmer temperatures and steady trade winds. The second season, *ho‘oilo* (winter, rainy season) continues through the end of the year from November to April and is a much cooler period when trade winds are less frequent, and widespread storms and rainfall become more common (Giambelluca et al. 1986:17). Being on the leeward side of O‘ahu, ‘Ewa 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* (traditional land division) and about 1,200 mm (39 inches) in the northern region up into the Wai‘anae mountain range (Giambelluca 2013).

Each small geographic area on O‘ahu had a Hawaiian name for its own rains. 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.]

Honouliuli was no exception to this naming practice. Despite the relative lack of rainfall in this area, 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.

During Hi‘iaka’s travel through ‘Ewa she recites this affectionate *oli* (chant) as she recalls the Kai‘okia edict placed on her and Lohi‘au by Pele:

‘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

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* (native-born) 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 sinkholes 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 *Ka Lihikai a me 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* (stories), 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* (water’s edge) 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 Kūalaka‘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 Kūalaka‘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; 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” (Titcomb 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]

1.4.6 Built Environment

The portion of the project area that encompasses Component 1 includes a fallow field at the location of the planned R-1 reservoir, an extant reservoir tank and a BWS access road. The portion of the project area that encompasses Component 2 includes the heavily disturbed and graded shoulders of Farrington Highway and Kualaka‘i Parkway. The project area crosses the asphalt paved roadway in several locations. High voltage power lines cross the project area. The ongoing Honolulu High-Capacity Transit Corridor Project (HHCTCP) is adjacent to a portion of Component 2 of the project area along Kualaka‘i Parkway.

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* (oli), *mele* (songs), traditional *mo‘olelo* (stories), traditional subsistence and gathering methods, ritual and ceremonial practices, and more. Background research focuses on land transformation, development, and population changes beginning with the early post-Contact era to the present day.

Cultural documents, primary and secondary cultural and historical sources, historic maps, and photographs were reviewed for information pertaining to the study area. Research was primarily conducted at the CSH library. 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).

2.2 Community Consultation

2.2.1 Scoping for Participants

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

2.2.2 “Talk Story” Sessions

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

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

CSH also conducts group interviews, which range in size. Group interviews usually begin with set, formal questions. As the group interview progresses, questions are based on interviewees’

answers. Group interviews are always transcribed and notes are taken. Recorded interviews assist the cultural researcher in 1) conveying accurate information for interview summaries, 2) reducing misinterpretation, and 3) missing details to *mo‘olelo*.

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

2.2.3 Completion of Interview

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

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

“*I ulu no ka lālā i ke kumu*—the branches grow because of the trunk,” is an *‘ōlelo no‘eau* (#1261) shared by Mary Kawena Pukui with the simple explanation: “Without our ancestors we would not be here” (Pukui 1983:137). As cultural researchers, we often lose our *kūpuna* but we do not lose their wisdom and words. We routinely check obituaries and gather information from other community contacts if we have lost our *kūpuna*. CSH makes it a point to reach out to the *‘ohana* (family) of our *kūpuna* who have passed on and pay our respects including sending all past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference. All field activities are performed in a manner so as to minimize impact to the natural and cultural environment in the project area. Where appropriate, Hawaiian protocol may be used before going on to the study area and may include the *ho‘okupu* (offering) of *pule* (blessing), and *oli*. All participants on field visits are asked to respect the integrity of natural and cultural features of the landscape and not remove any cultural artifacts or other resources from the area.

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. However, it is also important to note that not all *ka‘ao* explicitly deal with the exploits of either gods, goddesses, or the supernatural. *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* 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 led to the Hawaiian race of *ali‘i* and *maka‘āinana*. The *ka‘ao* in and around the project area shared below are some of the oldest Hawaiian stories that have survived; they still speak to the characteristics and environment of the area and its people.

The traditions of Honouliuli 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). The collection of myths and traditions presented in this section focus near the current project area in the central portion of Honouliuli, and also areas near Pearl Harbor.

3.1.1 The Naming of Honouliuli

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:

> 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 the 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 Wai‘anae range and it landed somewhere, in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So ‘Ewa (strayed) became known by the name. The stone that strayed. [Told to E.S. by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:1]

Honouliuli also may mean “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 (lit. long hill). 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:

> This is a spot where two small hills of the Waianae range come down parallel on the boundary between Honouliuli and Nānākuli (‘Ewa and Wai‘anae). The ancient Hawaiians said the hill on the ‘Ewa side was the male and the hill on the Wai‘anae side was female. The stone was found on the Wai‘anae side hill and the place is known as Pili o Kahe (*Pili* = to cling to, *Kahe* = to flow). The name refers, therefore, to the female or Wai‘anae side hill. And that is where the boundary between the two districts runs. [Told to E.S. by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:1]

3.1.1 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 (1905:733) 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).

3.1.2 Kamapua‘a and Kamaunuaniho at 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). *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 (Oahu po‘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]

Pu‘uokapolei was also known to be the home of Kamapua‘a’s grandmother, Kamaunuaniho, one of the three migrants from Kahiki that were ancestors to the people of O‘ahu (Legend of Kamapuaa, Fornander 1919:5[2]:318; Kahiolo 1978:81, 107). Kamapua‘a, the Hawaiian pig god,

once lived in Kaluanui on the windward side of O‘ahu, but he escaped to ‘Ewa when he was pursued by the chief Olopana.

> Kamapua‘a subsequently conquered most of the island of O‘ahu, and, installing his grandmother [Kamaunuaniho] as queen, took her to Pu‘uokapolei, the lesser of the 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 (*Ka Loea Kālai‘āina*, 13 January 1900 in Sterling and Summers 1978:34) speaks of Kekeleaiku, the older brother of Kamapua‘a, who also lived on Pu‘uokapolei.

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 his grandmother.

3.1.3 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).

3.1.4 The First Breadfruit Brought from Kahiki

The chief Kaha‘i left from Kalaeloa, a coastal area in Honouliuli, 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).

3.1.5 The Traveling Mullet of Honouliuli

The story of (Ka) Ihuopala‘ai is largely 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. [Pukui 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]

3.1.6 *Mo‘o* at Maunauna

In recounting the legend of Keaomelemele (*He Mo‘olelo Ka‘ao no Keaomelemele*), Moses Manu makes a reference to a *mo‘o* 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 (*Nupepa Kuokoa* 25 April 1885).

3.1.7 Ka-lua-ōlohe Caves of Honouliuli

‘Ewa was famous for the many limestone caves formed in the uplifted coral, called the “Ewa Karst.” This 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. In traditional Hawaiian times, the areas of exposed coral outcrop were undoubtedly more extensive.

Some of these caves, called *ka-lua-ōlohe* were inhabited by the *ōlohe*, a type of people that looked like other humans but had tails like dogs (Beckwith 1940:343). These people were skilled in wrestling and bone-breaking and often hid along narrow passes to rob travelers; they were also reputed to be cannibals. One famous cannibal king, Kaupe, lived in Līhu‘e in upland Honouliuli, was an *ōlohe*.

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.

> It seems that by Kekauonohi’s orders, the coffin containing her late husband’s remains was removed to Puuloa, 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 Puuloa, 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.

3.1.8 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* (fish) became scarce they would build a *waihau heiau* (a *heiau* 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 blessed 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 1968:83]
>
> The people were also blessed with many other i‘a including *‘ōpae huna*, transparent shrimp (pariambus typicus), *‘ōpae kākala*, spiked shrimp (*caridina gracilirostris***)**, *nehu maoli*, *nehu pala*, types of anchovy, *mahamoe*, and *‘ōkupe*, types of bivalves. Some of these marine resources are no longer seem today. [Maly 2003:60]

3.1.9 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]

3.1.10 Kākuhihewa

The Hawaiian *ali‘i* were also attracted to the region of the project area. One historical account of particular interest, appearing in the newspaper *Ke Au Hou*, refers to an *ali‘i* residing in Ko‘olina, southwest 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. [Sterling and Summers 1978:41]

3.2 *Wahi Pana* (Storied Places)

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

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

As McGregor makes clear, *wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, offshore islands, and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a* or *‘ili* (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).

Place names and *wahi pana* of Honouliuli are identified on Figure 17. A table of Honouliuli place names is located in Appendix A.

3.2.1 *Heiau*

Heiau are pre-Christian places of worship. Construction of some *heiau* were elaborate and large communal structures, while others were simple earth terraces or shrines (McAllister 1933:8). *Heiau* are most commonly known to be where important ceremony took place, and are large structures with platforms or altars comprised of one or more terraces (McAllister 1933:8). Archaeologist Gilbert 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).

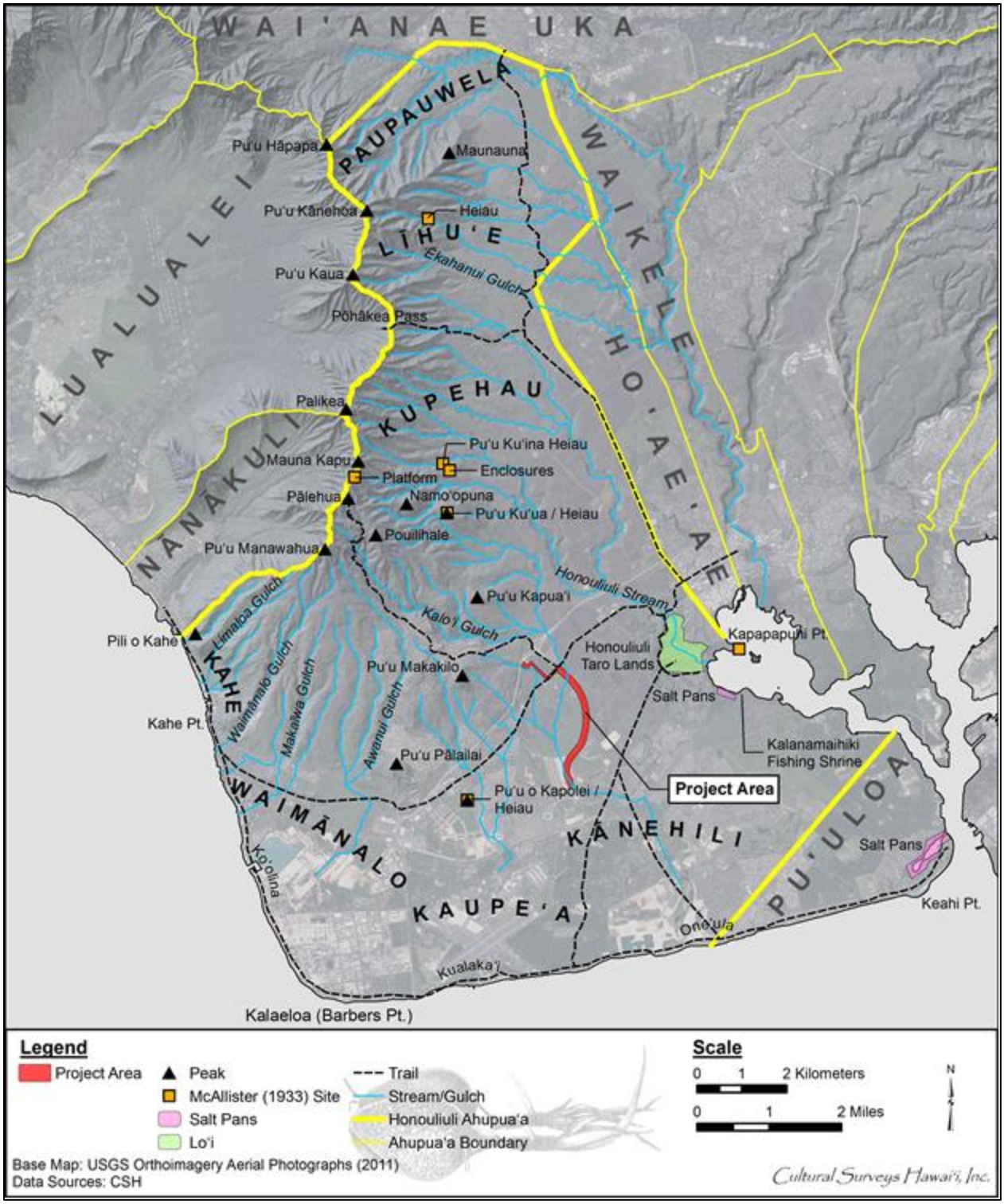


Figure 17. Place names of Honouliuli in relation to the project area overlying a 2011 USGS

Pu‘u o Kapolei Heiau

A *heiau* was once on Pu‘uokapolei, but it 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 such observations (Fornander 1919:6[2]:297). 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 Kapō (Emerson 1915:41). 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 of the sun. Fornander (1919:VI:2:292) states that Pu‘uokapolei may have been a *leina,* jumping off point associated with the wandering souls who roamed the plains of Kaupe‘a and Kānehili, *makai* (toward the sea) of the hill.

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 where it is 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* (Pukui et al. 1974:203).

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* (hula instruction) perform *oli* and *hula* (dance), 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.

3.2.1.2 Pu‘u Ku‘ua Heiau

Pu‘u Kaua Heiau located in Palikea, Honouliuli, overlooks both Honouliuli and Nānākuli 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).

3.2.1.3 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]

3.2.1.4 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 of the inability to determine size of the *heiau* or the number of terraces that once stood (McAllister 1933:107).

3.2.2 Plains of ‘Ewa

3.2.2.1 The Plain of Kaupe‘a

Several places on the ‘Ewa coastal plain are associated with *ao kuewa*, the realm of the homeless souls. Samuel Kamakau explains 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* [family or personal gods] realm (*kanaka kuleana ‘ole*) died, 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 ‘olo 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*.
>
> 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 1991:47–49]

This 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 father, Kahekili, after Kahahana became treacherous and killed the high priest Ka‘opulupulu.

E newa ai o hea make i ka lā,	Go carefully lest you fall dead in the sun,
Akua noho la i Pu‘uokapolei.	The god that dwells on Kapolei hill.
E hanehane mai ana ka lā i nā	The sun is wailing on account of the

wahine o Kamao,	women of Kamao,
Akua pe‘e, pua ‘ohai o ke kaha,	A hiding god, blossoming 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-	Thou hast spoken of by the oo-
E ka manu o Kānehili.	By the bird of Kanehili.

[Fornander 1919:6(2):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 with wandering souls and the place where the first breadfruit tree was planted by Kaha‘i at Pu‘uloa (Fornander 1919:6[2]:304).

Pukui (1983) offers this Hawaiian saying, which places the wandering souls in a *wiliwili* (*Erythrina sandwicensis*) grove at Kaupe‘a.

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.

[Pukui 1983:180]

Beckwith (1970:154) has stressed that “the worst fate that could befall a soul was to be abandoned by its *‘aumakua* (ancestral spirit) 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.

3.2.2.2 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 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 (Grapsus tenuicrustatus), pipipi shellfish (Nerita picea), 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* 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* 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]

3.2.2.3 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 *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.

The goddess Hi‘iaka passed through ‘Ewa and met women stringing *ma‘o* flowers (*Gossypium tomentosum*) to make *lei* (garland). Hi‘iaka offered a chant, making known her wish for a *lei* around her own neck which mentions Keahumoa:

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	The *lei*-stringing women of the forest
ka nahele	are festively adorned

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

3.2.3 *Nā Ala Hele*

John Papa ‘Ī‘ī described a network of Leeward O‘ahu *ala hele*, 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 [Figure 18]. [‘Ī‘ī 1959:97]

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 19) 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* trail to settlements at the southern coast, Kūalaka‘i (identified by Pukui et al. (1974:119) as a type of sea cucumber (*Tethys*) that squirts purple fluid when squeezed) and One‘ula (“red sand”).

3.3 *‘Ōlelo No‘eau* (Proverbs)

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

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

Simply, *‘ōlelo no‘eau* may be understood as proverbs. The Webster dictionary notes it as “a phrase which is often repeated; especially, a sentence which briefly and forcibly expresses some practical truth, or the result of experience and observation.” It is a pithy or short form of folk wisdom. Pukui equates proverbs as a treasury of Hawaiian expressions (Pukui 1995:xii).

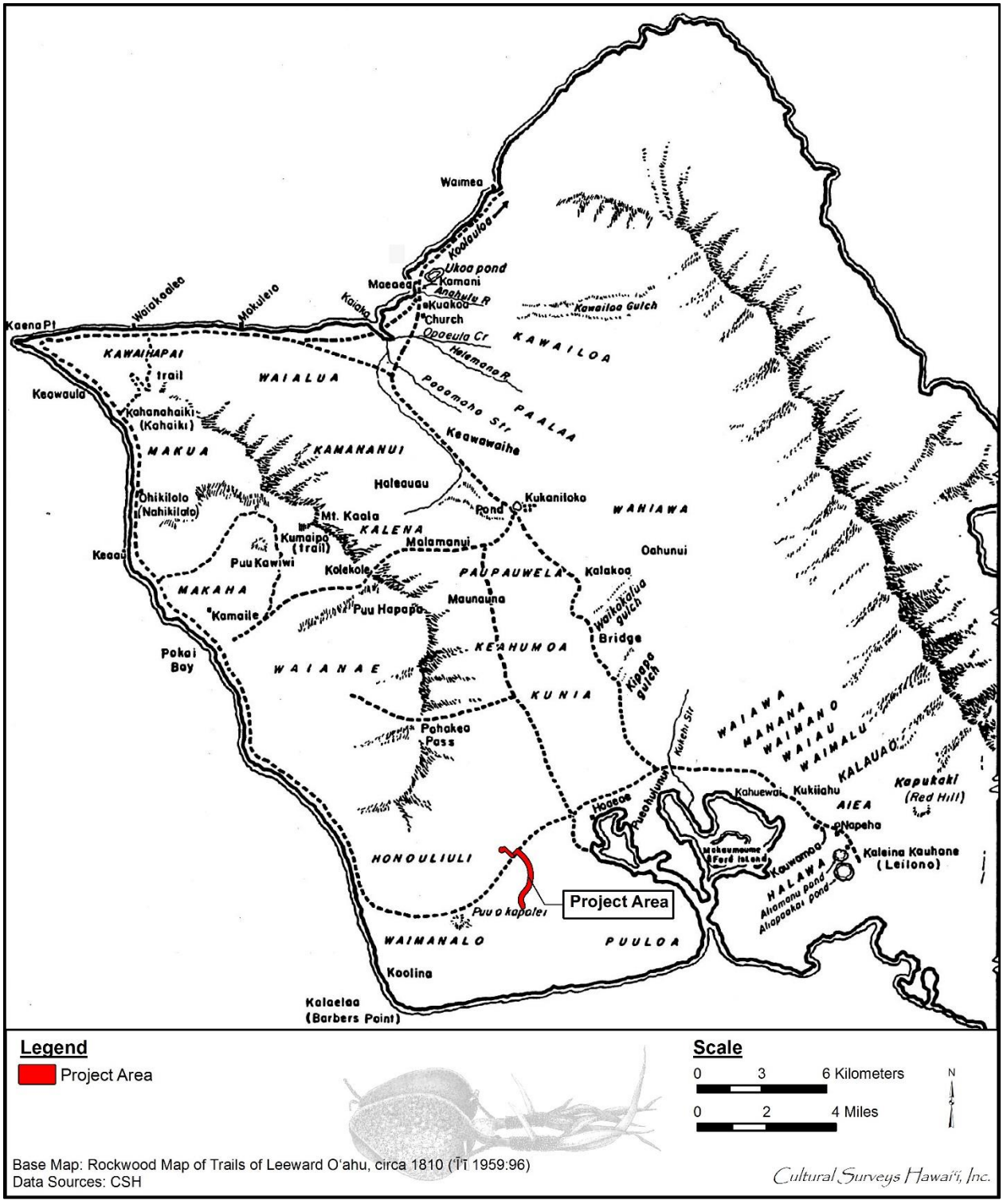


Figure 18. Portion of Rockwood map of trails of Leeward O‘ahu, ca. 1810 (‘Ī‘ī 1959)

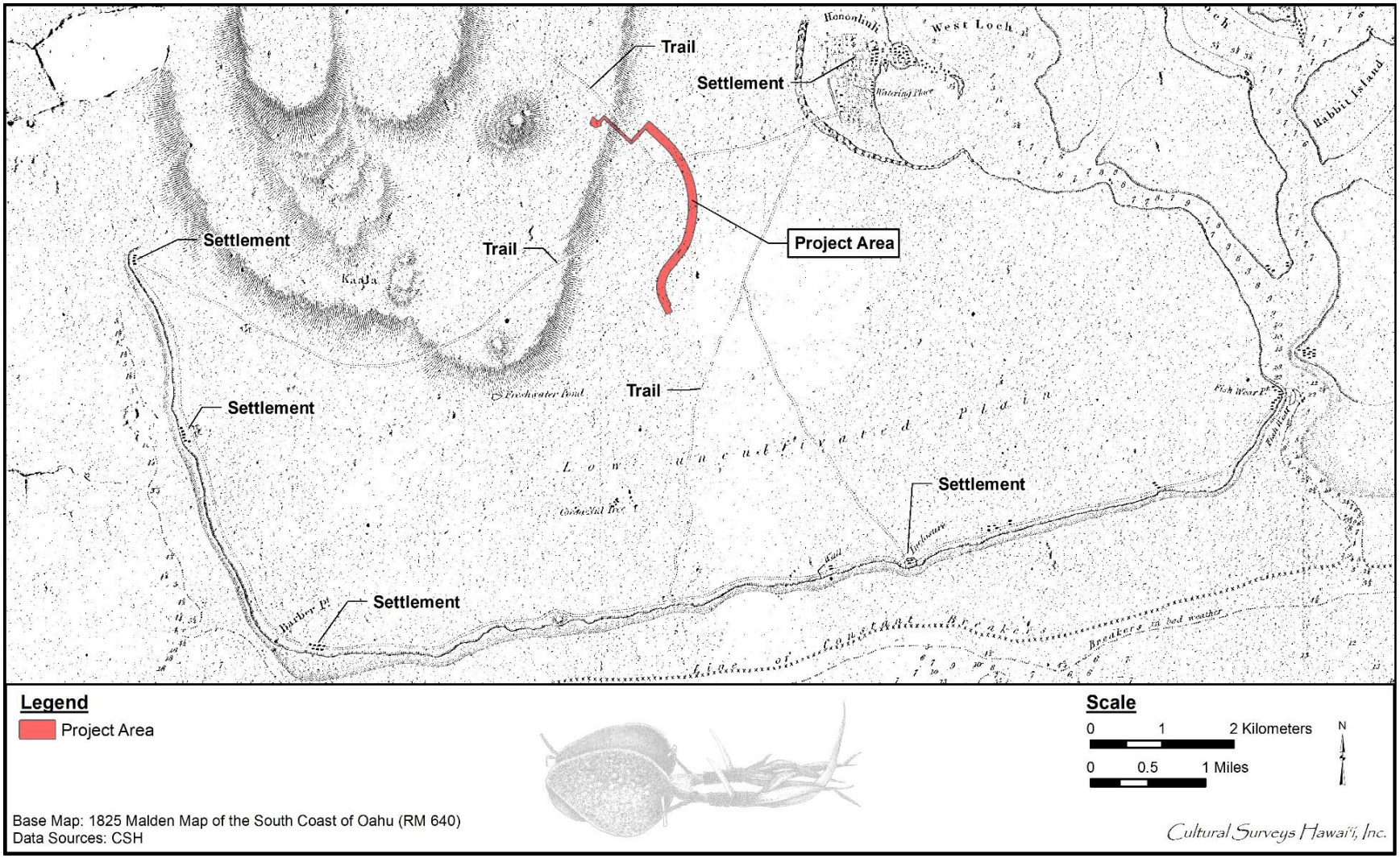


Figure 19. Portion of an 1825 Malden map of the South Coast of O‘ahu showing the location of the project area in relation to settlements and trails

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).

3.3.1 Concerning Sharks

The eastern coast of Honouliuli 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 *‘aumakua* and *mo‘olelo* which saythe people of ‘Ewa were protected by sharks. The following *‘ōlelo no‘eau* are associated with sharks.

3.3.1.1 ***‘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]

3.3.1.2 ***‘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]

3.3.1.3 ***‘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]

3.3.1.4 ***‘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]

3.3.2 Concerning the *Pipi* or Pearl Oyster 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 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.

3.3.2.1 ***‘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 (1972:471) 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.”

3.3.2.2 ***‘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]

3.3.2.3 ***‘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]

3.3.2.4 ***‘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]

3.3.3 Concerning the ‘Anae-holo of Honouliuli

The migration of the *‘anae-holo* 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]

3.3.3.1 ***‘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]

3.3.4 Concerning *Kalo* (Taro)

A rare taro 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 led to the following saying:

3.3.4.1 ***‘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 of a maiden of ‘Ewa, who, like the Kāī taro, is not easily forgotten. [Pukui 1983:305]

3.3.5 Concerning the *Ao Kuewa,* Realm of the Homeless Souls

3.3.5.1 ***‘Ōlelo No‘eau #1666***

Ka wiliwili o Kaupe‘a

The wiliwili grove of Kaupe‘a

Pukui (1983:180) offers this Hawaiian saying, which places the wandering souls in a “wiliwili” grove at Kaupe‘a, a place in Honouliuli where homeless ghosts wandered among the trees.

3.4 *Oli* (Chants)

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* (hidden meanings). 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* (gods) and *‘aumākua* (family gods) 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).”

3.4.1 *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 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.

3.4.2 Hi‘iaka and the Plains of Keahumoa

The goddess, Hi‘iaka, sister of the volcano goddess Pele, passed through ‘Ewa and met women stringing *ma‘o* flowers to make *lei*. Hi‘iaka offered a chant, making known her wish for a *lei* around her own neck:

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‘oumāhiehiemalie 2008a:287; 2008b:268]

In the chant, she mentions the plains of Keahumoa which McAllister (1933:107) references as west of Kīpapa Gulch in Waikele. It is possible Keahumoa was a general name for the flat plain *mauka* of the productive floodplain area directly adjacent to Pearl Harbor.

3.4.3 The Splendor of Kānehoa

The hill Kānehoa 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,
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, I na ia oe ke lei ia ala	My flower I said I would string into garlands. If you have it, you would have worn it.

[Fornander 1919:5(2):310–311]

3.4.4 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]

3.5 *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]

3.5.1 *Mele no Kuali‘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]

3.5.2 *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 “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 Oahu Rail and Land (OR&L) line. Dillingham also figures prominently within Honouliuli Ahupua‘a (see Section 4.5). 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

4.1 Pre-Contact to Early Historic Period

Various legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once heavily populated by pre-Contact Hawaiians. These long-settled populations of pre-Contact Hawaiians were understood to be *noho papa* (to dwell in one place for generations), established on the foundation layer (Charlot 1983:56). 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.

4.2 Early Historic Period

4.2.1 Observations of Early Explorers and Visitors

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]

During the first decades of the nineteenth century, several western visitors described the ‘Ewa landscape near Pearl Harbor. 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]

4.2.2 Missionaries

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* (land division smaller than an *ahupua‘a*) in Honouliuli, on the western border of ‘Ewa. At around 11 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 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.

4.3 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, transferred ownership of the land to her sister’s husband John Coney. John Coney later leased the land to James Dowsett and John Meek in 1871 for stock running and grazing.

During the Māhele of 1848, 96 individual land claims were made in the *ahupua‘a* of Honouliuli, with 72 claims being registered and awarded by King Kamehameha III to commoners (Table 1; Tuggle and Tomonari-Tuggle 1997:34). The 72 *kuleana* awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, irrigated *lo‘i* (taro fields), *kula* (pasture or dry field), and house lots. The awards ranged in size from 0.1 to 9.39 acres. The 1825 Malden map of the South Coast of O‘ahu (see Figure 19) shows the current project area located west of the dense cluster of LCA parcels in lower Honouliuli Gulch, known as the “Honouliuli Taro Lands.” No LCAs were recorded within the current project area.

Table 1. Land Commission Awards in Honouliuli

*LCA	Awardee	*‘Ili*		LCA	Awardee	*‘Ili*
748	Kalauhala	Panahaha, Kaaumakua		906	Kanoho	Kamoku
749	Mahina	Kaulaula		907	Luana	Kamaipipipi, Niukee
751	Kalauli	Kamoku, Polapola, Kalihikahi		910	Nunu	Kaaumakua
752	Haae	Kailikahi, Kailihai		911	Kauhailepa	Poohilo
753	Manuwa	Kamoku		914	Kamaala	Niukee, Kapapahi
754	Kaunahi	Niukee		916	Kama	Loloulu, Makau
755	Keinohana-nui	Niukee, Kailikahi, Kaakau		917	Kaulu	Kamilomilo, Kaaumakua
756	Kauouo	Kaaumakua		947	Kaopala	Loloulu, Kaulaula
758	Nihua	Niukee		960	Poopuu	Loloulu
760	Kuhemu	Kamaipipipi, Niukee, Naopala, Kailikahi		1565	Kaalauahi	Niukee, Kapapahi
761	Kinolua	Niukee, Kailikahi, Ilikahi, Palahemo		1570	Kekua	Poohilo
762	Kalama	Kaaumakua		1570-B	Paekane	Kaaumakua
763	Keliiaa, Solomona	Hiwa, Poohilo, Mauakapuoa, Uani / Maui, Polapola		1570-C	Naholowaa	Kaaumakua
765	Kamalae	Niukee, Kailikahi, Palahemo		1573	Kawahamana	Niukee, Kapapapuhi
766	Paele	Niukee, Kaluamooiki, Kailikahi		1580	Kanahuna	Kamilomilo
767	Hapauea	Niukee, Kapapahi		1580-B	Kapioho	Polapola, Kahiwapalaai
768	Pio	Kahaumakua, Niukee, Waioha		1598	Kekua	Loloulu, Kapapahi
827	Kauakahilau	Poohilo		1605-B	Nakai	Mahuna, Niukee
828	Kawahaea	Poohilo		1666	Mauwele	Poohilo
831	Kaekuna	Poohilo		1666-B	Kuahilo	Poohilo
832	Opiopio	Poohilo		1670	Moano	Loloulu, Kaaumakua
834	Oni	Poohilo, Kailikahi		1672	Makue	Kamoku, Kapapapuhi

*LCA	Awardee	*‘Ili*		LCA	Awardee	*‘Ili*
839	Kaaiawaawa	Kamilomilo, Kailikahi, Haole, Poohilo		1699	Leleiaupa	Maui, Poaiwaikele
845	Kekukahiko	Kapapahi, Niukee		1701	Alaluka	Pohilo
847	Hinaa	Poohilo		1703	Aimaikai	Kamilomilo
848	Kapule	Poohilo		1713	Healani	Niukee, Kapapuhi
869	Pue	Maui		1719	Hilea	Kaaumakua
872	Kahakuliilii	Loloulu, Paakai, Papaioua		1720	Hilinae	Polapola
874	Laamaikahiki	Polapola, Hiwa		5204	Kalama 2	Polapola
876	Nohunohu	Niukee, Nukee		5653	Kua	Maui, Polapola, Kahui
881	Kikala	Polapola		5654	Kuhiena	Maui, Poohilo
886	Kahalewai	Kamoku, Manuwa		5653-B	Kanehikili	Poohilo
892	Aoao, Samuela	Kapapahi, Niukee		5670-B	Kaohai	Kaihuopalaai, Polapola
898	Kaneaola	Polapola		5670-C	Kumupopo	Poohili, Kepoe, Loloulu, Puaaluu
901	Kuahine	Nukee / Niukee,		5950	Pihana	Kamoku
902	Haakue	Waimanalo		10933	Uia	Niukee
905	Kaimuena	Kaaumakua		11218	Kekau‘ōnohi	*Ahupua‘a* award

4.4 Mid- to Late 1800s

4.4.1 Ranching in Lower Honouliuli

In 1871, John Coney rented the lands of Honouliuli to James Dowsett and John Meek, who used the land for cattle grazing. In 1877, James Campbell purchased most of Honouliuli Ahupua‘a, except the *‘ili* of Pu‘uloa, 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), as shown in Figure 20. He let the land rest for one year and then began to restock the ranch, so that he had 5,500 head after a few years (Dillingham 1885 in Frierson 1972:14).

In 1881, a medical student providing smallpox vaccinations around the island wrote about Campbell’s property which was called the Honouliuli Ranch.

> I took a ride over the Honouliuli Ranch which is quite romantic. The soil is a deep, reddish loam, up to the highest peaks, and the country is well-grassed. Springs of water abound. The ‘ilima, which grows in endless quantities on the plains of this ranch, is considered excellent for feeding cattle; beside it grows the indigo plant, whose young shoots are also good fodder, of which the cattle are fond. Beneath these grows the manieizie grass, and Spanish clover and native grasses grow in the open; so there is abundant pasturage of various kinds here. As I rode, to the left were towering mountains and gaping gorges; ahead, undulating plains, and to the right, creeks and indentations from the sea. A wide valley of fertile land extends between the Nuuanu Range and the Waianae Mountains and thence to the coast of Waialua. There are many wild goats in this valley, which are left more or less undisturbed because they kill the growth of mimosa bushes, which would otherwise overrun the country and destroy the pasturage for cattle. [Briggs 1926:62–63]

The following excerpts were also written in 1880-1881, describing Honouliuli Ranch:

> Acreage, 43,250, all in pasture, but possessing fertile soils suitable for agriculture; affords grazing for such valuable stock. The length of this estate is no less than 18 miles. It extends to within less than a mile of the sea coast, to the westward of the Pearl River inlet. . . . There are valuable fisheries attached to this estate . . . [Bowser 1880:489]

> From Mr. Campbell’s veranda, looking eastward, you have one of the most splendid sights imaginable. Below the house there are two lochs, or lagoons, covered with water fowl, and celebrated for their plentiful supply of fish, chiefly mullet. . . . Besides Mr. Campbell’s residence, which is pleasantly situated and surrounded with ornamental and shade trees, there are at Honouliuli two churches and a school house, with a little village of native huts. [Bowser 1880:495]

Most of Campbell’s lands in Honouliuli were used exclusively for cattle ranching. At that time, one planter remarked that “the country was so dry and full of bottomless cracks and fissures that water would all be lost and irrigation impracticable” (Ewa Plantation Company 1923:6–7). In 1879, Campbell brought in a well-driller from California to search the ‘Ewa plains for water, and the well, drilled to a depth of 240 ft near Campbell’s home in ‘Ewa, resulted in “a sheet of pure water flowing like a dome of glass from all sides of the well casing” (*The Legacy of James*

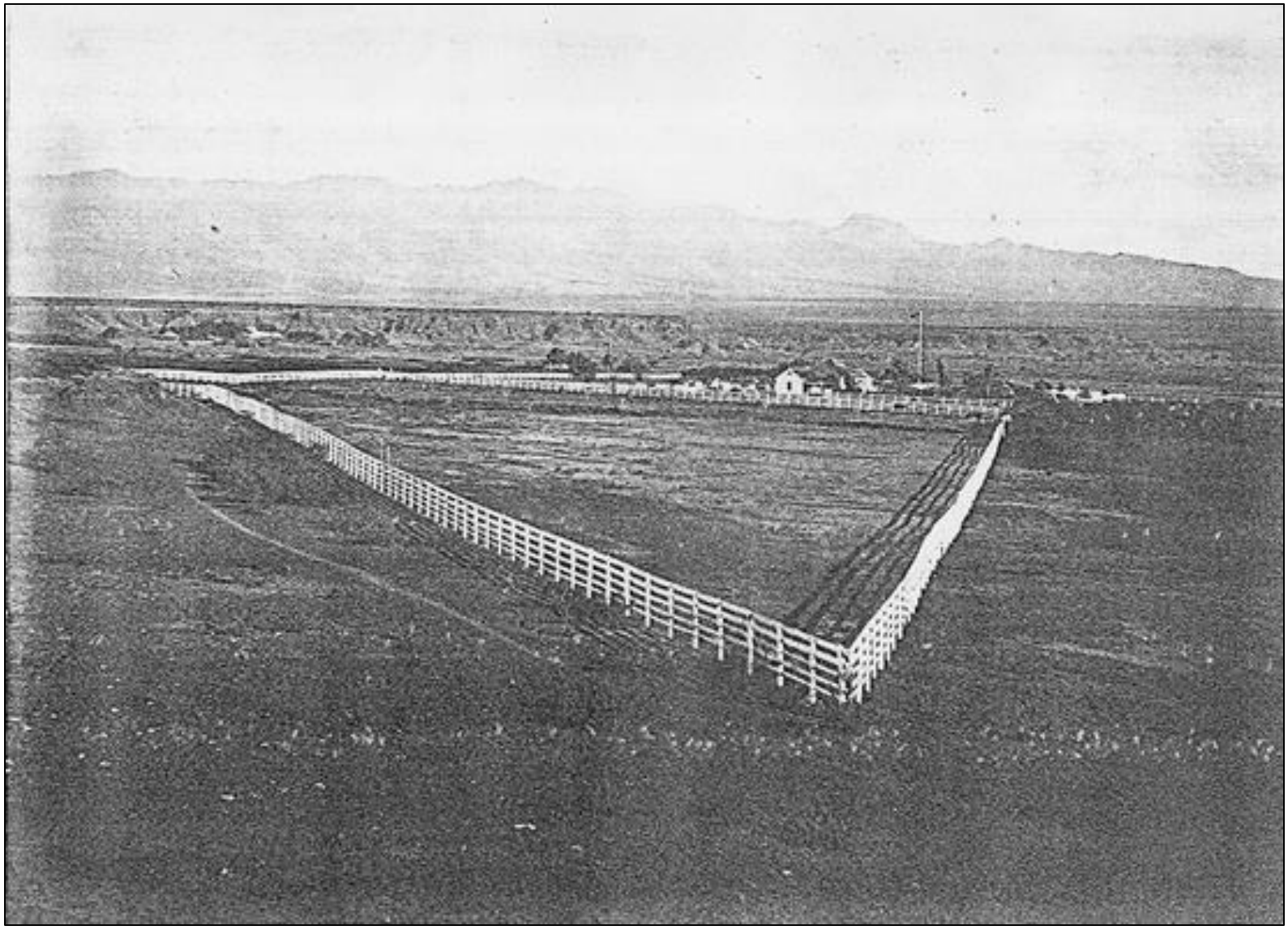


Figure 20. 1880s photograh of James Campbell’s residence on the ‘Ewa Plain (Hawai‘i State Archives)

Campbell n.d. in Pagliaro 1987:3). Following this discovery, plantation developers and ranchers drilled numerous wells in search of the valuable resource.

Following Western Contact, the landscape of the ‘Ewa plains was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species. Domesticated animals such as goats, sheep, and cattle were brought to the Hawaiian Islands by Vancouver in the early 1790s, and allowed to graze freely about the land.

It is unclear when the domesticated animals were brought to O‘ahu; however, L.A. Henke reports the existence of a longhorn cattle ranch in Wai‘ānae by at least 1840 (Frierson 1972:10). During this same time, perhaps as early as 1790, exotic vegetation species were introduced to thearea. These typically included vegetation best suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing.

4.4.2 Rice Cultivation

As the sugar industry throughout the Hawaiian kingdom expanded in the second half of the nineteenth century, the need for increased numbers of field laborers prompted passage of contract labor laws. In 1852, the first Chinese contract laborers arrived in the Islands. Contracts were for five years, and pay was $3 a month plus room and board. Following the completion of their plantation labor contracts, some Chinese immigrants began rice farming, to which they were accustomed in their native land (Figure 21). Chinese rice farmers acquired lands by leasing small plots of land for individual farms, or by forming *hui* (partnerships) with other farmers and acquiring large tracts of land (Coulter and Chun 1937:17–18). During the height of rice cultivation (ca. 1880-1920), the industry was dominated by Chinese firms that controlled the growing and milling of rice (Devaney et al. 1982:49).

The Hawaiian Islands were well-positioned for rice cultivation. A market for rice in California had developed as increasing numbers of Chinese laborers immigrated there since the mid-nineteenth century. Similarly, as Chinese immigration to the Islands also accelerated, a domestic market opened. The following excerpt describes the views of a missionary on rice cultivation at the time:

> Considerable effort has been made to induce the natives to be more industrious to cultivate the soil and particularly to try to [sic] the cultivation of rice . . . Foreigners too have begun the culture of rice in this district extensively and it was hoped their example would stimulate the natives to cultivate their own lands, but most of them choose to hire themselves to the foreigners at low wages and put their lands in the hands of the foreigners for a few dollars rather than cultivate or improve it themselves. [Mission Station Report 1862:1 in Devaney et al. 1982:49]

By 1885, 200 acres in Honouliuli were used for rice and 50 acres were used to grow bananas (*Pacific Commercial Advertiser*, 15 August 1885, summarized in Silva 1987:A-12). These rice fields were planted in former taro fields or in undeveloped swamps, such as those near the former Honouliuli taro lands. The rice fields in 1882 were described by Frank Damon, during a tour of the area:

> Towards evening we reached Honouliuli, where the whole valley is leased to rice planters . . . This was one of the largest rice plantations we visited. Sometimes two or three men only, have a few fields which they cultivate for themselves, and we

Figure 21. Waikele rice fields below the Oahu Sugar Company Mill (Hawai‘i State Archives n.d.)

> often too came upon houses where there were eight or ten men working their own land. But the larger plantations are owned by merchants in Honolulu, who have a manager acting for them. [Damon 1882:37]

Rice cultivation replaced much of the former taro lands and became widespread in the lowlands surrounding Pearl Harbor (Coulter and Chun 1937:21). The ancient taro *lo‘i* (irrigated terrace) and *‘auwai* (irrigation ditches) were modified and expanded to support rice cultivation.

> The great demand for rice land brought disused taro patches into requisition–especially because water rights attached to them. Such was the desire of the Chinese to use every piece of land to its fullest extent for paddy that they cut away the paths which the Hawaiians had used between taro patches to strips so narrow that a man could walk along them only with difficulty . . . As the demand for rice continued, it became profitable to bring into use land hitherto unused. The land most easily rendered fit for rice cultivation was swamp or marsh land of which there was a large amount in the islands. Most of such land was at or near sea level-undrained areas at the mouths of streams: lowlands, which could be reclaimed without great expense . . . lands hitherto unused became fields of waving grain. [Coulter and Chun 1937:11]

The following account describes a visit to the rice fields of ‘Aiea, north of the project area, ca. 1904:

> On the morning of June 2nd, for instance, our destination was Aiea. At ten minutes past seven we boarded the first passenger train going towards Honolulu. For a distance of eight miles the road skirts the shore and then turns landwards or *mauka* through rice and sugar plantations, Ewa Mill, Waipahu, Pearl City. We reached Aiea at eleven minutes past eight. Like all rice fields in Hawaii, this one is worked entirely by Chinamen, they alone being able to endure the conditions of location and climate necessary for the cultivation of this cereal. On one side of the railroad track was the broad, muddy inland lake or bay of salt water, Pearl Harbor; on the other side were the terraced plots or fields, flooded to a depth of several inches with water and separated by narrow raised earthen ridges on which the careful Chinaman doubtless succeeded in walking, but which many times proved treacherous to our unsteady feet. A rice plantation, laid out as it generally is on the low flats at the foot of a valley, where mountain streams empty into the sea, is an ideal collecting ground for certain kinds of algae. [Tilden 1905:134]

By the early decades of the twentieth century rice farming in the Hawaiian Islands was in decline, beset by crop diseases and cheaper prices for mainland-grown rice. Commercial agriculture in ‘Ewa became dominated by sugar with the development of the three sugar companies of ‘Ewa (Nedbalek 1984:13).

4.4.3 Pineapple

In the early decades of the twentieth century, lands in the *mauka* portion of the central and eastern sections of ‘Ewa were being acquired for pineapple cultivation. There is a record of attempted pineapple irrigation utilizing water from shallow wells in Waiawa Gulch in 1893. Later attempts were made in Waiawa and Honouliuli (Figure 22). James Dole founded the Hawaiian Pineapple Company in 1901. The previous year, Dole had purchased 61 acres of land in Wahiawa

Figure 22. First pineapple plantation in Kunia in Honouliuli ca. 1900 (University of Hawai‘i at Mānoa)

for growing pineapple. Prior to 1913, most of the upland plateau areas in Waiawa were planted in pineapple (Goodman and Nees 1991:59) and small plots along gullies; those not appropriate for sugarcane cultivation in several ‘Ewa *ahupua‘a* were planted in pineapple. Many of these small plots were cultivated by independent farmers, who sold the crops at markets or to larger companies. In 1901, the Hawaiian Pineapple Company obtained 61 acres in Waiawa through public auction. Initially, most pineapple was shipped to California for packing. In an attempt to speed up processing, save money, and produce a fresher product, a cannery was constructed in Waiawa. This cannery was constructed by the Pearl City Fruit Company but became a part of the Hawaiian Pineapple Company operations after the Pearl City Fruit Company went bankrupt. The cannery was in operation from 1905 to 1935.

4.5 Oahu Railway and Land Company (OR&L)

In 1886, Campbell and B.F. Dillingham put together the “Great Land Colonization Scheme,” which was an attempt to sell Honouliuli land to homesteaders (Thrum 1887:74). This homestead idea failed. The failure was attributed to the lack of water and the distance from ‘Ewa to Honolulu. The water problem was solved by the drilling of artesian wells, and Dillingham decided the area could be used instead for large-scale cultivation (Pagliaro 1987:4). The transportation problem was to be solved by the construction of a railroad, which B. Franklin Dillingham soon began to finance under the company name Oahu Railway and Land Company (OR&L).

During the last decade of the nineteenth century, the railroad reached from Honolulu to Pearl City in 1890, Wai‘ānae in 1895, Waialua Plantation in 1898, and Kahuku in 1899 (Kuykendall 1967:III, 100). This railroad line eventually ran across the center of the ‘Ewa Plain at the lower boundary of the sugar fields (Figure 23). 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 newly formed Ewa Plantation Company (Frierson 1972:15). Dillingham’s Honouliuli lands above 200 ft that were suitable for sugarcane cultivation were sublet to the Oahu Sugar Company. Throughout this time, and continuing into modern times, cattle ranching continued in the area, and Honouliuli Ranch, established by Dillingham, was the “fattening” area for the other ranches (Frierson 1972:15).

Operations at the OR&L began to slow down in the 1920s, when electric streetcars were built for public transportation within the city of Honolulu and automobiles began to be used by families for transportation outside the city (Chiddix and Simpson 2004:185). The build-up to World War II turned this decline around, as the U.S. military utilized the OR&L lines to transport materials to build defense projects around the island. Historians have noted that one of the most serious mistakes made by the Japanese in their 1941 attack on Pearl Harbor was their decision not to bomb the railway infrastructure. Soon after the attack, the OR&L operated 24 hours a day, transporting war materials and troops from Honolulu to the new and expanded army, naval, and air bases. The huge navy base at Pearl Harbor had its own rail lines that connected to the OR& L rail lines.

In August 1945 the war ended, and so did OR&L’s heyday as a military transport line.

> She had served her country well and proudly during the war, but operating round-the-clock on what little maintenance could be squeezed in, had taken a prodigious hit on the locomotives and track. Traffic stayed steady for a short time, but soon dropped precipitously as soldiers and sailors went home, military posts were shrunk or razed, and civilians could again get tires, gasoline and new cars. [Chiddix and Simpson 2004:257]

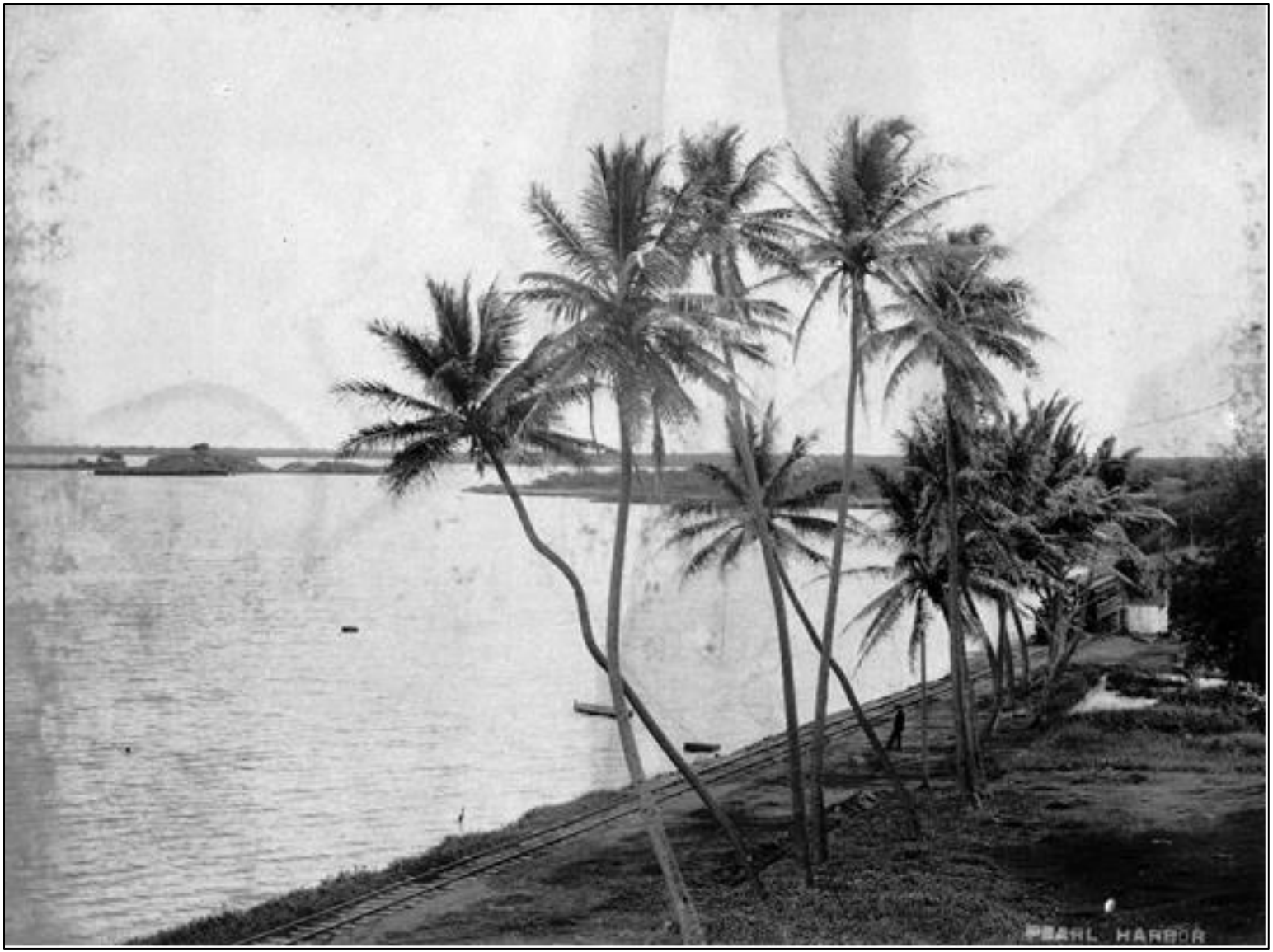


Figure 23. 1890 photograph of Pearl Harbor with OR&L railroad tracks along the coast (Honolulu Advertiser Archives)

There was no choice but to abandon the OR&L main line, and in 1946 Water F. Dillingham, son of B.F. Dillingham, wrote,

> The sudden termination of the war with Japan changed not only the character of our transportation, but cut the freight tonnage to a third and the passenger business to a little above the pre-war level. With the increased cost of labor and material and the shrinkage in freight tonnage and passenger travel, it was definite that the road could not be operated as a common carrier. With no prospect of increased tonnage, and the impossibility of increasing rates against truck competition, your management has applied to the Interstate Commerce for authority to abandon its mainline. [Chiddix and Simpson 2004:257]

After the war, most of the 150 miles or more of OR&L track were pried up, locomotives were sold to businesses on the U.S. mainland, and railway cars were scrapped. In 1947, the U.S. Navy took over a section of the OR&L track for their own use, to transport bombs, ammunition, and torpedoes from the ammunition magazines at Lualualei, West Loch in Pearl Harbor, and Waikele on OR&L's Wahiawā Branch to Pearl Harbor Naval Base (Treiber 2005:25–26). The track to Waipahu was abandoned in the 1950s, but the line from the magazines in Lualualei to the wharves in West Loch at Pearl Harbor remained open until 1968.

4.5.1 The Sugar Plantations of ‘Ewa

Although sugarcane was already being grown as long ago as the early 1800s, the industry revealed its economic potential in 1879 when the first artesian well was drilled in ‘Ewa (Ellis 1995:22). The availability of subsurface water resources enabled greater irrigation possibilities for expanding plantations besides the use of water diversions from the surrounding stream systems. This prompted the drilling of many other wells throughout the Hawaiian Islands, thereby commencing the Hawai‘i sugar plantation era. By the early 1900s, all of the main Hawaiian Islands had land devoted to sugarcane production.

Agricultural field systems, railroads, and residential areas in ‘Ewa were developed by three sugarcane companies, the Ewa Plantation Company, located largely in the *ahupua‘a* of Honouliuli and Hō‘ae‘ae in the western section of the ‘Ewa; the Oahu Sugar Company, extending in the areas upland of the Ewa Plantation Company in central ‘Ewa, including a portion of the uplands of Waiawa; and the Honolulu Plantation Company, with fields extending through Mānana to Hālawa in the eastern section of the ‘Ewa.

4.5.2 The Ewa Plantation Company

The Ewa Plantation Company was incorporated in 1890 for sugarcane cultivation (Figure 24). The first crop, 2,849 tons of sugar, was harvested in 1892. Ewa was the first all-artesian plantation, and it gave an impressive demonstration of the part artesian wells were to play in the later history of the Hawaiian sugar industry (Kuykendall 1967:III, 69). 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. When the rainy season began, they plowed ground perpendicular to the slope so that soil would be carried down the drainage ditches into the lower coral plain. After a few years, about 373 acres of coral wasteland were reclaimed in this manner (Immisch 1964:3). By the 1920s, Ewa Plantation Company was generating large profits and was the "richest sugar plantation in the world" (*Paradise of the Pacific,* December 1902:19–22 in Kelly 1985:171).

Figure 24. Ewa Plantation Company sugarcane fields, Filipino Camp area, ca. 1925 (University of Hawai‘i at Mānoa)

During the twentieth century, the Ewa Plantation Company continued to grow and, by the 1930s, encompassed much of the eastern half of Honouliuli Ahupua‘a. This growth impelled the creation of plantation villages to house the growing immigrant labor force working the fields. After the outbreak of World War II, which siphoned off much of the plantation’s manpower, along with the changeover to almost complete reliance on mechanical harvesting in 1938, there was little need for the large multi-racial (Japanese, Chinese, Okinawan, Korean, Portuguese, Puerto Rican, Hawaiian, Filipino, European) labor force that had characterized most of the early history of the plantation. The Oahu Sugar Company took control over the Ewa Plantation Company lands in 1970 and continued operations until 1995, when sugarcane production was shut down in the combined plantation areas (Dorrance and Morgan 2000:45, 50).

4.6 1900s

Before the war, the main Pearl Harbor naval yard was sufficient for a staging and storage area for the Pacific fleet, but after the Japanese attack and the beginning of World War II, additional areas were needed for supply depots and warehouses. The government procured additional land after the beginning of World War II to expand the functionality of the military bases. The Navy took all of the coastline area in eastern ‘Ewa District from the coast inland of the OR&L railroad tracks (Ching 1996:24). Waipi‘o Point, Waiawa Gulch, Pearl City (Mānana) Peninsula, Iroquois Point in Hālawa, and small areas in Honouliuli and Hō‘ae‘ae were taken over as supply depots and storage areas. The OR&L railroad had built a spur from the coast to Wahiawa in 1905, to haul cane and pineapples down to the coast and later to haul men and supplies from Pearl Harbor to Schofield Barracks in Wahiawa through Waikakalaua Gulch in Waikele. During the war, the military built a “secret railroad” from the railroad terminus at Waikakalaua Gulch to join the OR&L railroad coming around Ka‘ena Point at Hale‘iwa, thus providing a short cut from Pearl Harbor to Army facilities at Kahuku on the north shore of O‘ahu (Kneiss 1957:11–12). By 1944, the Navy had claimed close to 2,400 acres of land in the Pearl Harbor and Pearl City areas within Mānana, Waiawa, and Hālawa for use as military staging areas in the war effort (Allen 1999:234).

To this day, much of the Pearl City peninsula remains in the custody of the U.S. Navy; however, in the late 1990s, much of the rest of the previous Pearl City regions were released to the State for public use (Allen 1999:239).

4.6.1 The U.S. Military Development of Pearl Harbor

In 1876, the Reciprocity Treaty between the United States and the Kingdom of Hawai‘i concluded with the provision that Hawai‘i would not “lease or relinquish sovereignty to another country or any harbor, etc.” In 1887, the treaty was renewed and amended and allowed the United States the “exclusive right to enter the harbor of Pearl River, in the Island of Oahu, and to establish and to maintain there a coaling and repair station for the use of vessels of the United States” (Judd 1971:128).

After Hawai‘i became a territory of the United States in 1899, a Pacific base that could be used as a staging area for the Spanish-American war began to be developed. Early in the twentieth century, the U.S. Government began acquiring the coastal lands of ‘Ewa for development of a naval base at Pearl Harbor. In 1901, the U.S. Congress formally ratified annexation of the Territory of Hawaii, and the first 1,356.01 acres of Pearl Harbor land were transferred to U.S. ownership. The U.S. Navy began a preliminary dredging program in 1901, which created a 30-ft-deep entrance channel measuring 200 ft wide and 3,085 ft long. In 1908, money was appropriated for 5 miles of

entrance channel dredged to an additional 35 ft down (Downes 1953) (Figure 25). Funding for the construction of dry docks and other support facilities was also approved in 1908. In 1909, the government appropriated the entire Waipi‘o peninsula from the ‘Ī‘ī estate for the Pearl Harbor Naval Station and Shipyard.

Additional dredging to deepen and widen the channel was conducted in the 1920s. In 1931 the Navy built an ammunition depot at West Loch on a 213-acre parcel that it had bought from the Campbell Estate. Construction of a new depot in Lualualei Valley and at West Loch Harbor began in 1931.

In the early 1930s, the U.S. Navy leased 700 acres of the Campbell Estate to build Ewa Field in Honouliuli, a base with a mooring mast for Navy dirigibles. Although the mast was completed, the program was abandoned before the *Akron*, the airship designated for the mast, was built. In 1937, 18 miles of roads were built in the coastal Honouliuli area, and in 1939-1940 the U.S. bought 3,500 acres of land in this area (Landrum et al. 1997:62–67), to build several other military camps and installations, including Barbers Point Naval Air Station, at the site of the old mooring mast.

In the 1930s, an Army Air Corps airfield was established west of Rodgers Airport. The Hickam Air Force Base website offers the following brief history of this military base’s early development:

> In 1934, the Army Air Corps saw the need for another airfield in Hawaii and assigned the Quartermaster Corps the job of constructing a modern airdrome from tangled brush and sugar cane fields adjacent to Pearl Harbor on the island of Oahu. The site consisted of 2,200 acres of ancient coral reef, covered by a thin layer of soil, located between Oahu’s Waianae and Koolau mountain ranges, with the Pearl Harbor channel and naval reservation marking its western and northern boundaries, John Rodgers Airport to the east, and Fort Kamehameha on the south. The new airfield was dedicated May 31, 1935 and named in honor of Lt. Col. Horace Meek Hickam, a distinguished aviation pioneer killed Nov. 5, 1934, at Fort Crockett in Galveston, Texas. [United States Airforce 2013]

4.6.2 Hickam Air Force Base (AFB), World War II and the U.S. Military in ‘Ewa

By 1941, Pacific Naval Air Bases expenditures for new construction at Pearl Harbor were in the hundreds of millions of dollars. The Japanese attack on Pearl Harbor on 7 December 1941 damaged or destroyed much of the new construction. Reconstruction was instituted to double the Pearl Harbor’s war capacity. Military planners approved a new ammunition depot in the mountainside of Waipahu, a large new hospital in ‘Aiea, and thousands of additional changes to the Navy Yard to accommodate the new aircraft carrier task forces (Woodbury 1946:342–343). During World War II, the military used the sugar cane rail system to “haul large quantities of ammunition” (Condé and Best 1973:315).

By 1943, over 24,000 people were working at Pearl Harbor. Navy Housing Areas 1 and 2 and Civilian Housing Area 3 had grown large enough to be considered separate cities. Barracks and temporary housing for workers filled every available piece of land for miles between Pearl Harbor and the outskirts of Honolulu. A ring of huge barrage balloons was set up for the protection of the once-quiet waters of Waimomi (Pearl Harbor), which had since become one of the greatest Navy bases in the world (Downes 1953).

Figure 25. Dredging in Pearl Harbor ca. 1908 (Hawai‘i State Archives)

Before the war, the main Pearl Harbor naval yard was sufficient for a staging and storage area for the Pacific fleet, but after the Japanese attack and the beginning of World War II, additional areas were needed for supply depots and warehouses. The government procured additional land after the beginning of World War II to expand the functionality of the military bases. The Navy took all of the coastline area in eastern ‘Ewa District from the coast inland of the OR&L railroad tracks (Ching 1996:24). Waipi‘o Point, Waiawa Gulch, Pearl City (Mānana) Peninsula, Iroquois Point in Hālawa, and small areas in Honouliuli and Hō‘ae‘ae were taken over as supply depots and storage areas. The OR&L railroad had built a spur from the coast to Wahiawa in 1905, to haul cane and pineapples down to the coast and later to haul men and supplies from Pearl Harbor to Schofield Barracks in Wahiawa through Waikakalaua Gulch in Waikele. During the war, the military built a “secret railroad” from the railroad terminus at Waikakalaua Gulch to join the OR&L railroad coming around Ka‘ena Point at Hale‘iwa, thus providing a short cut from Pearl Harbor to Army facilities at Kahuku on the north shore of O‘ahu (Kneiss 1957:11–12). By 1944, the Navy had claimed close to 2,400 acres of land in the Pearl Harbor and Pearl City areas within Mānana, Waiawa, and Hālawa for use as military staging areas in the war effort (Allen 1999:234).

Hickam Air Force Base (AFB) now consists of 2,850 acres of land and facilities valued at more than $444 million (Hickam Air Force Base 2010). To this day, much of the Pearl City peninsula remains in the custody of the U.S. Navy; however, in the late 1990s, much of the rest of the previous Pearl City regions were released to the State for public use (Allen 1999:239).

4.6.3 Military Land Use in Kahe Valley

Major land use changes came to western Honouliuli Ahupua‘a when the U.S. military began development in the area. Prior to U.S. involvement in World War II, Kahe Point was identified by the U.S. military as a strategic defensive location. Bennett (2005) states,

> The Hawaiian Dept. had selected the Kahe Point area in February 1941 as a ‘strong point’ to defend against an enemy landing on the West Shore and attacking toward Pearl Harbor and Honolulu from the Waianae Pocket. The coastal plain narrowed at the point, forming a choke point; to thwart any enemy advances down the Nanakuli coast, pre-war plans were drawn up for the Second Battalion, thirty-fifth Infantry Regiment, to man rifle trenches, machine gun emplacements, and other defensive works at the point. The Kahe Strong Point was situated in the South Sector of Oahu’s two World War Two defense sectors and assigned to the twenty-fifth Infantry Division from its organization in October 1941 until it was relieved by the 27th Infantry Division in November 1942. [Bennett 2005:65]

Following the bombing of Pearl Harbor on 7 December 1941, the strategic vantage point of Kahe Point was chosen as a potential site to house one of the two 14-inch gun turrets that could be recovered from the sunken battleship USS *Arizona* (Figure 26). Lewis and Kirchner (1992) describe:

> One turret—to be known as Battery Arizona—was originally to be placed on Puu Mailiilii, just south of Waianae, on the west shore. In December, 1942, however, its proposed location was shifted southward to Kahe Point, from which its three 14-inch guns could command the entire west and south coasts from Kaena Point to Diamond Head, and add considerable firepower to the existing pair of pre-war 16-inch batteries. [Lewis and Kirchner 1992:282]

Figure 26. Wreck of the USS *Arizona* showing one of the 14-inch gun turrets partially submerged (source: Naval History and Hertiage Command)

Kahe Point and the surrounding land including Kahe Valley was taken over by the U.S. military to become the Kahe Military Reservation. “The Kahe Military Reservation eventually comprised 955 acres. The lands were commandeered by the theater commander and occupied as of October 26, 1942” (Bennett 2005:65). On 21 October 1942, Battery Arizona was named and by May 1943 a final layout design of Battery Arizona on Kahe Point was completed (Bennett 2005). Numerous complications arose through the process of constructing the battery and converting a naval gun turret into a terrestrial defensive armament. The majority of the Battery Arizona infrastructure would be subterranean, and two parallel tunnels were drilled into the slope of Kahe Ridge, lined with thick, reinforced concrete, and equipped with all of the machinery and equipment required for self-sustained operation (Bennett 2005).

With the design of the battery completed, the piece-by-piece transfer of the *Arizona’s* 14-inch gun components from Pearl Harbor to the Wai‘ānae Coast was initiated in late summer 1943. Moving the gun components from Kahe Beach to the newly constructed barbette on Kahe Point required intensive effort and planning. Participants in the project document that “special roads were built along which the turret components were moved on rollers, and that the 71-ton tubes were parbuckled from the beaches to the emplacements high above” (Lewis and Kirchner 1992:288).

Construction of Battery Arizona was halted on 1 August 1945. The battery was nearly completed with the exception of some components of its SCR-296A radar (Bennett 2005:77). The emplacement of the 14-inch guns of the USS *Arizona* at the barbette on Kahe Point was completed with an access road encircling the barbette and continuing down the southern slope of Kahe Ridge. Lewis and Kirchner (1992) summarize as follows:

> Battery Arizona, named after the ship from which its armament had come, was evidently never finished, but remained instead in a state of suspended construction during the immediate post-war years until, in the late 1940s, its guns, along with all other American seacoast weapons, were cut up for scrap. Where the Oahu turretsonce stood, there remain today only concrete-lined holes in the ground. [Lewis and Kirchner 1992:299]

Battery Arizona was abandoned by the U.S. military in 1948. Immediately following World War II, the battery was used for some time as a command post and evacuation shelter by civil defense authorities. A 1991 inspection of Battery Arizona conducted by the Corps of Engineers documented that sometime prior to 1991 vandals had broken into the subterranean tunnels and started a fire in the battery’s power room (Bennett 2005:78).

In addition to the Kahe Strong Point and the Battery Arizona described above, Kahe Point was also selected as an alternate position for four 155-mm *Grande Puissance Filloux* (GPF) guns. The alternate position was named Battery Kahe on 12 June 1942 and manned by Battery B, Fifty-fifth Coast Artillery Regiment until 1943 (Bennett 2005:77). The exact location and extent of Battery Kahe is unclear.

4.7 Previous Archaeological Research

The previous archaeological studies in the vicinity of the current project area predominantly cover relatively large parcels of land (often hundreds of acres) (Figure 27 and Table 2). It is noteworthy that nearly 100% of this western portion of the project area has been studied in prior archaeological studies. The following discussion of previous archaeological studies covers those.

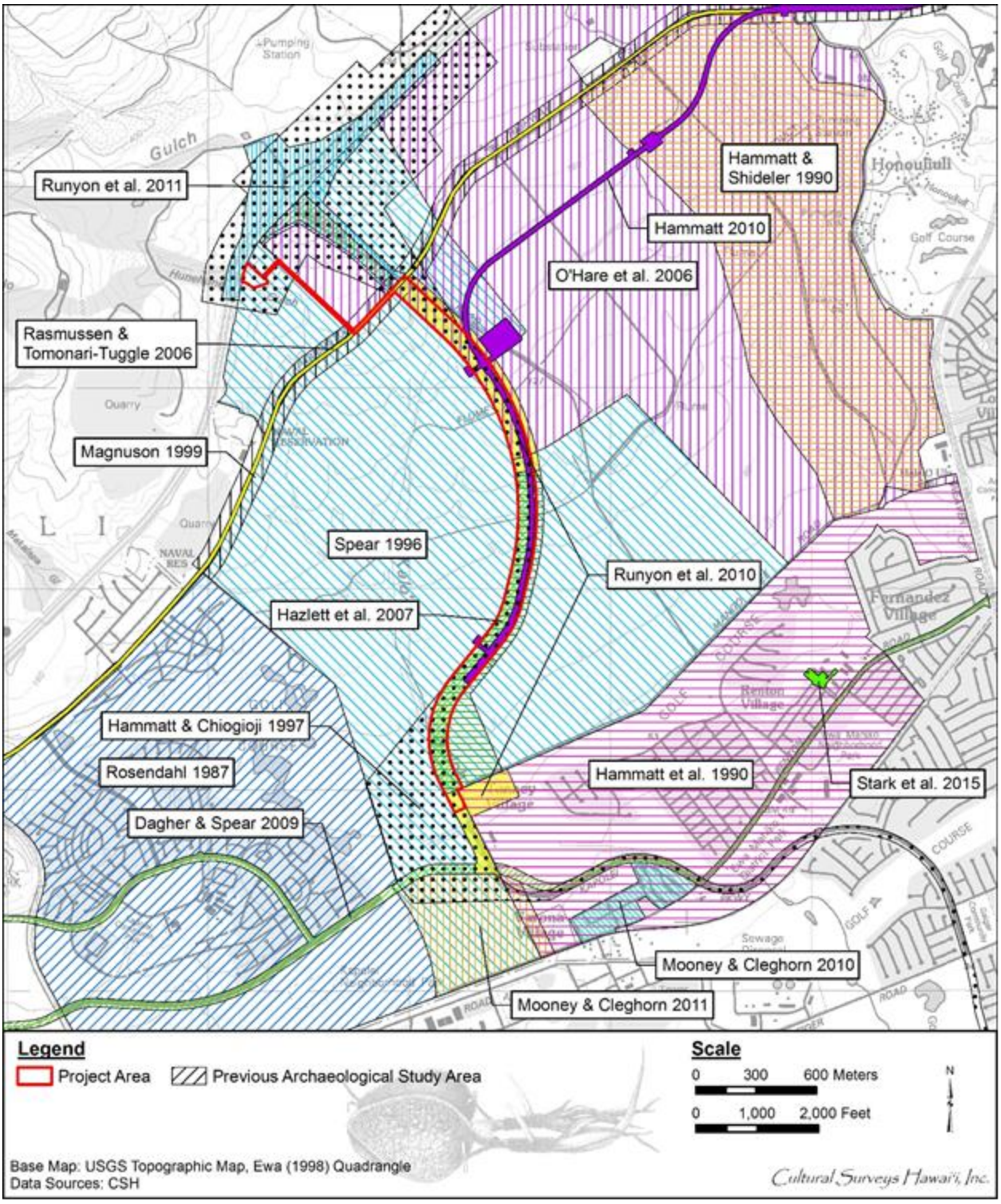


Figure 27. Portion of a 1998 Ewa USGS topographic quadrangle showing previous archaeological survey areas near the current project area.

Table 2. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results
Rosendahl 1987	Reconnaissance survey	East of Ft Weaver Rd	Virtual absence of finds, except for disturbed historic artifact scatter dubbed “T-2”
Hammatt et al. 1990	Reconnaissance survey	Ewa Villages	No traditional historic properties identified; many plantation-era historic properties identified including villages, a cemetery, a reservoir, and railroad segments
Hammatt and Shideler 1990	Archaeological inventory survey	St. Francis Medical Center West	Entire study area, located on bluff NE of flood plain of Honouliuli Stream, had been extensively disturbed, contained no surface structures or other remains, and unlikely to contain any subsurface historic properties
Spear 1996	Reconnaissance survey	Kapolei Town	No significant findings
Hammatt and Chiogioji 1997	Reconnaissance survey	4.5-km North-South Rd Corridor	Documented SIHP # 50-80-12-9714 (OR&L ROW), several plantation-era remnants noted
Magnuson 1999	Reconnaissance survey	Farrington Hwy	Documented six bridges, a section of railroad track, and an irrigation ditch, all older than 50 years but evaluated as not significant
O’Hare et al. 2006	Archaeological inventory survey	Ho‘opili, East Kapolei	Several previously recorded (Hammatt and Shideler 1990) historic properties; SIHP #s 50-80-12-4344 (plantation infrastructure); -4345 (railroad berm); -4346 (northern pumping station); -4347 (central pumping station); -4348 (southern pumping station); and four new features of SIHP # -4344 (a linear wall, stone-faced berm, concrete ditch, and concrete catchment)
Rasmussen and Tomonari-Tuggle 2006	Archaeological monitoring	Waiau Fuel Pipeline Corridor	Not monitored near current project area

Reference	Type of Study	Location	Results
Hazlett et al. 2007	Archaeological monitoring	Phase IA, North-South Rd	No significant findings
Dagher and Spear 2009	Literature search and field inspection	Kapolei and Makakilo, Honouliuli Ahupua‘a	No significant findings in vicinity of current project area
Hammatt 2010	Archaeological inventory survey	HHCTCP Phase I	SIHP # 50-80-09-7751 (buried *lo‘i* deposit)
Mooney and Cleghorn 2010	Archaeological inventory survey	Varona Village	Five newly identified plantation-era structures within SIHP # 50-80-11-9786 (Ewa Plantation Villages Historic District); SIHP #s 50-80-12-7129 (historic plantation house); -7130 (historic plantation house); -7131 (historic structure foundation); -7132 (historic structure foundation); and -7133 (historic streetlight)
Runyon et al. 2010	Archaeological monitoring	Phase IB, North-South Rd	No significant findings
Mooney and Cleghorn 2011	Archaeological inventory survey (recorded as an archaeological assessment)	Ka Makana Ali‘i mixed-use complex	No significant findings
Runyon et al. 2011	Archaeological monitoring	Phase IC, North-South Rd	Portion of previously documented historic property, SIHP # 50-80-12-4664 (concrete plantation-era water diversion structure containing two sluice gates); one new historic property, SIHP # 50-80-14-7128 (burnt trash fill layer used in construction of Palehua Rd and containing plantation-era artifacts)
Stark et al. 2015	Archaeological inventory survey (recorded as an archaeological assessment)	Ewa Elementary School, within Renton Village	No significant findings

Reference	Type of Study	Location	Results
Hawai‘i Register			Three additional historic properties found on Hawai‘i Register of Historic Places: SIHP #s 50-80-12-7387 (OR&L Base Yard); -9708 (Waialua Agricultural Co. Engine No. 6); and -9761 (railway rolling stock)

projects associated with the North-South Road project corridor, as it is the most relevant to the majority of the current project (Component 2), and then covers other studies in the vicinity by date Previously identified historic properties in the vicinity of the current project area are indicated on a map (Figure 28).

4.7.1 North-South Road Project Corridor

The proposed North-South Road corridor was divided into three portions or phases (Phase IA, IB, and IC). An archaeological reconnaissance survey of the entire 4.5-km (14,730-ft) Long Land Corridor was conducted by CSH archaeologists (Hammatt and Chiogioji 1997). Several plantation-era remnants were noted, however, no further archaeological investigation was recommended for the project area corridor. Despite the CSH recommendation, SHPD requested on-call archaeological monitoring for the North-South Road project.

The 1997 study (Hammatt and Chiogioji) noted the *makai* end of the North-South Road project corridor (Phase IA) is located approximately 300 m northwest of Varona Village (a portion of the Ewa Villages Historic District), and 400 m north of the OR&L ROW. Within the Phase IA and Phase IB study corridors, two plantation-era structures were observed. Within Phase IA, a ditch (following alongside a plantation road) was observed crossing through the study corridor approximately 1,300 m *makai* of Farrington Highway. The ditch measured approximately 2 m (6.6 ft) wide and 1.5 m (4.9 ft) deep, and was constructed of cut stone with a mortar coating. Within Phase IB, a flume remnant was observed on the west side of the study corridor, approximately 800 m south of Farrington Highway. The flume consisted of

> half-round sheet metal supported by a brick and wood framework and was raised approximately 0.6 m (2 f.) above the ground surface. The flume remnant has been wrecked and other discontinuous remnants of the flume were observed continuing west beyond the corridor. [Hammatt and Chiogioji 1997:18]

The 1997 study (Hammatt and Chiogioji) noted within the *mauka* end of the North-South Road project corridor (Phase IC), “wrecked remnants of a flume alignment were observed on both sides of Palehua Road just *makai* of the H-1 Freeway” (Hammatt and Chiogioji 1997:18). A small flume remnant that crossed Hunehune Gulch on the west end of the project corridor *makai* of H-1 was also observed. The observed flumes were not considered of historic value and were therefore not classified as historic properties during the survey investigation.

Upon completion of the North-South Road Phase IA project, an archaeological monitoring report was written (Hazlett et al. 2007). The report indicated the Phase IA North-South Road project corridor had been extensively graded and plowed repeatedly over the past century by the Ewa Plantation Company in association with sugar cultivation and associated plantation activities. The plantation-era ditch structure identified in previous archaeological studies (Hammatt and Chiogioji 1997, Chiogioji et al. 2004) was located within the project area. A portion of the ditch and nearby plantation road were removed as part of the road cutting and grading, however, “portions of the ditch continue intact for considerable distances to the east and west of the corridor” (Hazlett et al. 2007:14). No stratigraphic variations, soil anomalies, or cultural material were discovered to indicate the presence of buried land surfaces or subsurface deposits. The vast majority of all project-related excavations took place entirely within a ubiquitous dark reddish-brown (5 YR 3/2) clay loam sediment. The study recommended an on-call monitoring program consisting of weekly site visits for future construction work on the remaining phases of the North-South Road project.

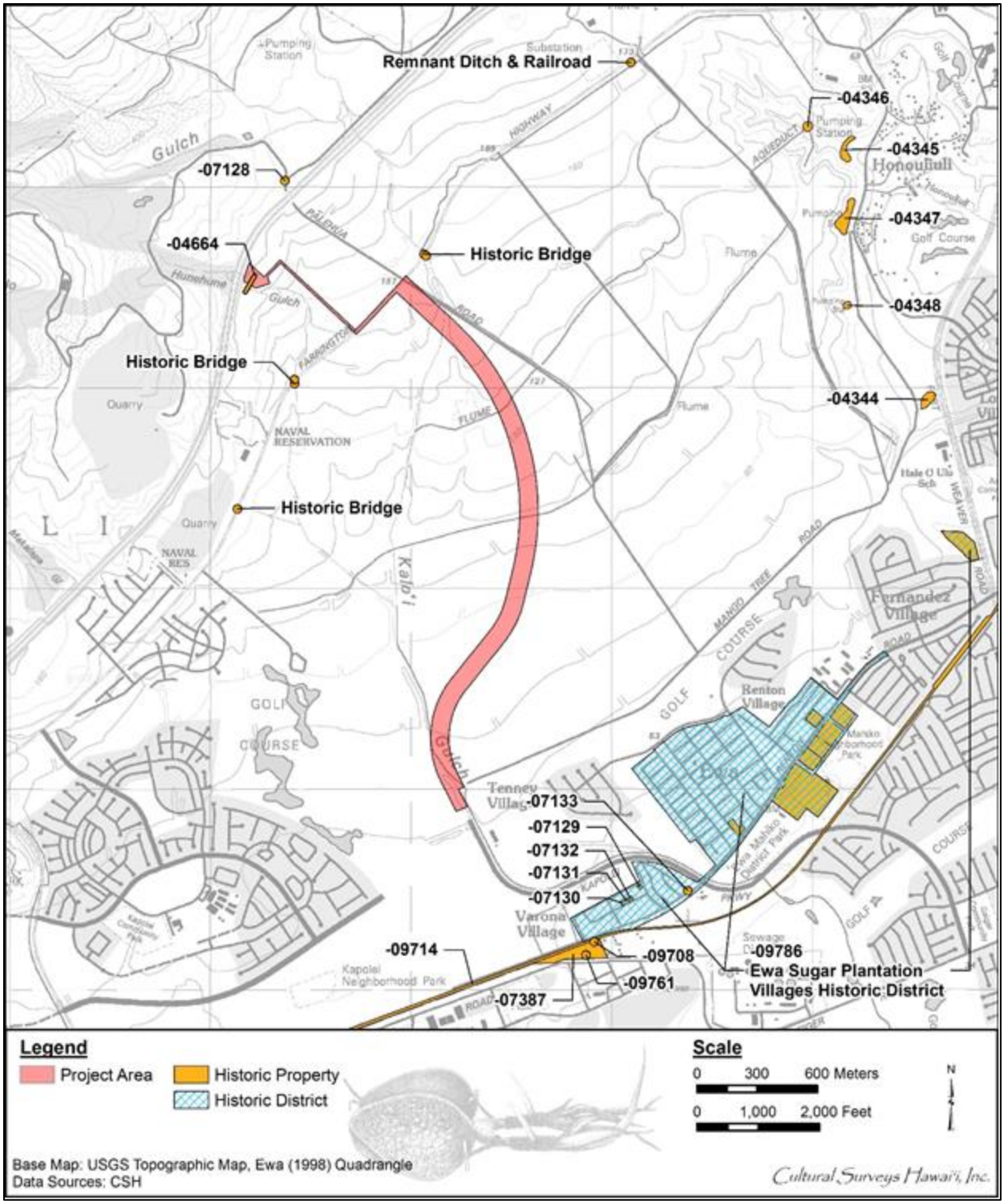


Figure 28. Portion of a 1998 Ewa USGS topographic quadrangle, showing historic properties near the current project area.

From 2007 to 2010, archaeological monitoring was conducted by CSH for Phase 1B of the North-South Road project (Runyon et al. 2010). The study was accepted by SHPD in a letter dated 29 November 2011 (LOG NO.: 2010.3892, DOC. NO.: 1111MV17). The project area consisted of two separate areas within a stretch of the North-South Road (subsequently known as Kualaka‘i Parkway) corridor. The *mauka* portion of the project area extended from Farrington Highway southeast approximately 1.09 km. The *makai* portion of the project area extended from Kapolei Parkway northward approximately 0.5 km. These portions correspond with the North and the South portions of the current project area.

Archaeological monitoring of ground disturbing activities for the roadway and associated development infrastructure produced no findings for cultural deposits. The observed stratigraphy indicated the *mauka* segment of the project area contained a thick natural stratum of clay loam sediment. The *makai* segment of the project area contained the same natural clay loam sediment overlying the coral shelf at approximately 3 m below the current ground surface.

In coordination with the SHPD, on-call monitoring initially included weekly site visits to observe ongoing construction operations and was ultimately changed to monthly site visits due to the majority of excavations being conducted through project related disturbed and redeposited sediments.

From 2007 to 2009, archaeological monitoring was conducted by CSH for Phase 1C of the North-South Road project (Runyon et al. 2011). The study was accepted by SHPD in a letter dated 29 November 2011 (LOG NO.: 2011.0626, DOC. NO.: 1111MV18). The Phase 1C portion of the North-South Road project encompassed the *mauka* and *makai* sides of a portion of H-1 and extended southward to Farrington Highway. This project area covered portions of the Component 2 portion of the current project area.

The Phase 1C portion of the North-South Road project consisted of the construction of a new highway interchange and roadway. The project included the construction of two on-ramps and two off-ramps connecting H-1 to the newly constructed North-South road and associated development infrastructure.

Two historic properties were observed during this monitoring project. A portion of a previously documented historic property, (State Inventory of Historic Places [SIHP] # 50-80-12-4664) a concrete plantation-era water diversion structure containing two sluice gates, was documented within the project area. One new historic property, (SIHP # 50-80-14-7128) a burnt trash fill layer used in the construction of Palehua Road and containing plantation-era artifacts, was observed along the southwest boundary of the project area (Nakamura et al. 1993). SIHP # 50-80-12-4664 is located within the Component 1 portion of the current project area and SIHP # 50-80-12-7128 is located in the vicinity of the H-1 freeway and outside the current project area.

4.7.1 Rosendahl 1987

In 1987, Paul H. Rosendahl, Inc. conducted a combined surface and subsurface survey of approximately 260 acres in two discontinuous parcels east of Fort Weaver Road. The northern of the two parcels extended *mauka* to the intersection of Fort Weaver Road and Farrington Highway. The main relevance of this study is in documentation of the virtual absence of finds in the vicinity. In the northern parcel, there was one heavily disturbed surface artifact collection area (designated “T-2”) relating to a pre-1900 historic habitation, consisting of a scatter of glass and ceramic vessel fragments. This artifact scatter was located outside the current project area. Given the preparation

of the study for inclusion in an environmental impact study, it is assumed the study was reviewed and found to be acceptable to allow development to proceed.

4.7.2 Hammatt et al. 1990

In 1990, CSH conducted an archaeological reconnaissance survey of an approximately 616-acre Ewa Village project (Hammatt et al. 1990). This study was conducted adjacent to and southeast of the current project area. The study found no evidence of traditional Hawaiian activity due to extensive historic disturbances, but documented many plantation-era historic properties. These plantation-era historic properties include village sites, a cemetery, a reservoir, and railroad remnants.

4.7.3 Hammatt and Shideler 1990

In 1990, CSH conducted an archaeological inventory survey for a proposed expansion of St. Francis Medical Center West on an approximately 24-acre parcel *makai* of Farrington Highway and west of Fort Weaver Road (Hammatt and Shideler 1990). This study is located outside the current project area along Farrington Highway. A pedestrian survey and background research revealed that the entire study area, located on a bluff northeast of the flood plain of Honouliuli Stream, had been extensively disturbed, contained no surface structures or other remains, and was unlikely to contain any subsurface historic properties. It is understood that the SHPD rendered a "no effect" letter for this project.

4.7.4 Spear 1996

In 1996, Scientific Consultant Services, Inc. conducted an archaeological reconnaissance and assessment of the East Kapolei Development project, *makai* of the H-1 Freeway, in the vicinity of the North-South Road corridor, and including portions of Kalo‘i and Hunehune gulches. This brief letter report addresses approximately 1,300 acres including the current project area; the East Kapolei Station and park and ride facility, and the UH West O‘ahu Station and northern park and ride facility. The study cites a 1994 SHPD letter that "clearly indicates that most of the [Spear 1996] project area has been declared to have no effect on historic sites due to the many years of commercial sugarcane production on these lands."

A limited field inspection documented in the Spear (1996) letter report did not identify any historic properties, but noted the 4 m wide and 4 m deep Kalo‘i and Hunehune gulches had been modified for cane irrigation. The study concluded that, on the basis of the SHPD letter and the field inspection, "that future development on these land parcels will have 'no effect' on historic sites, and that no further cultural resource work is required" (Spear 1996:1). While it is unclear whether there was a formal SHPD response to the Spear (1996) letter report, the conclusions seem reasonable.

4.7.5 Hammatt and Chiogioji 1997a and 1997b

In 1997, CSH conducted two similar archaeological reconnaissance surveys of a corridor that would become the "North-South Road" project, extending south from the H-1 Freeway. The earlier study (Hammatt and Chiogioji 1997a) extended south to approximately 5,300 ft inland of the ‘Ewa Beach shoreline. The later study (Hammatt and Chiogioji 1997b) was shorter in length, not extending south of the OR&L ROW. For the purposes of discussion relating to the current project, the two Hammatt and Chiogioji 1997 studies are essentially identical, with both studies addressing the current project area. It is unclear whether either of these studies was commented on by the

SHPD. A letter signed by Dr. Don Hibbard, SHPD Administrator, dated 8 March 1996 (LOG NO.: 16697, DOC. NO.: 9603NN03) on the subject of the "North-South Road Corridor Project" only expresses concern for appropriate mitigation of impact to the OR&L ROW.

Background research and a pedestrian survey for the Hammatt and Chiogioji 1997 studies revealed the entire area had been extensively graded in association with sugarcane cultivation and the construction of plantation infrastructure. The Hammatt and Chiogioji 1997a study corridor crossed two previously identified areas of archaeological concern (both located outside and to the south of the current project area): SIHP # 50-80-12-9786, consisting of the Ewa Villages Historic District; and SIHP # 50-80-12-9714, the OR&L ROW. These historic properties were not located in the vicinity of the Hammatt and Chiogioji 1997b study area. The Hammatt and Chiogioji 1997b study concluded, "No further archaeological investigation is recommended for the entire project area corridor and on-site or on-call monitoring is not justified during future construction activities" (Hammatt and Chiogioji 1997b:22).

Despite the recommendation cited above, the construction of the North-South Road project has been subjected to on-call archaeological monitoring programs by CSH. There have been no significant finds to date within the current project area.

4.7.6 Magnuson 1999

In 1999, International Archaeological Research Institute, Inc. conducted an archaeological reconnaissance survey for approximately 3.3 miles along Farrington Highway, between Golf Course Road and Fort Weaver Road, with an approximately 200-ft wide corridor on each side. This study was conducted on a portion of the current project area along Farrington Highway. This study documented six bridges, a section of railroad track, and an irrigation ditch. The report suggested these identified sites would most likely be destroyed during the highway expansion and recommended no further work for documentation. Although the sites were older than 50 years, they were evaluated as not significant for inclusion on the National Register of Historic Places.

4.7.7 O'Hare et al. 2006

In 2006, CSH conducted an archaeological inventory survey of approximately 1,600 acres for the East Kapolei project (subsequently known as the Ho‘opili project) (O'Hare et al. 2006). The study was accepted by SHPD in a letter dated 3 November 2006 (LOG NO. 2006.3670, DOC. NO. 0611amj01). The Ho‘opili project area was bounded on the east by Fort Weaver Road, *makai* by Mango Tree Road, and *mauka* by the H-1 Freeway. The study area was configured by the owner/developer interests to dove-tail with the Spear (1996) study, with the western boundary of O'Hare et al. (2006) study area following the general configuration of the east side of the Spear (1996) study. A non-contiguous portion of the O'Hare et al. (2006) study area was *mauka* of the H-1 Freeway. A portion of this study area is located adjacent to the current project area.

Several historic properties within the O'Hare et al. (2006) study area were previously identified during an archaeological survey in 1990 (Hammatt and Shideler 1990). These previously identified historic properties included SIHP #s 50-80-12-4344, plantation infrastructure; -4345, railroad berm; -4346, northern pumping station; -4347, central pumping station; and -4348, southern pumping station. Four additional archaeological features were documented by the O'Hare et al. (2006) study. These additional features, grouped under SIHP # 50-80-14-4344, include Feature D, a linear wall along the east bank of Honouliuli Stream; Feature E, a linear wall along the east bank of Honouliuli Stream; Feature F, a stone-faced berm constructed perpendicular to the orientation

of the stream; and Feature G, a concrete ditch and concrete masonry catchment basement on the west bank of Honouliuli Gulch.

No areas of concern were documented in the vicinity of the current project area by the O'Hare et al. (2006) study. While plantation irrigation features of SIHP # 50-80-14-4344 (i.e., Features D through G) were documented outside the current project area, within Honouliuli Gulch no further work was recommended and there are no preservation concerns (O'Hare et al. 2006:116–117). Portions of SIHP # 50-80-14-4344 (Features A–C) were destroyed sometime between 1990 and 2005 (O'Hare et al. 2006:73).

4.7.8 Rasmussen and Tomonari-Tuggle 2006

In 2004, archaeological monitoring was conducted along the Waiau Fuel Pipeline corridor, extending from the Hawaiian Electric Company's Barbers Point Tank Farm to the Waiau Generating Station. The Waiau Fuel Pipeline corridor follows Farrington Highway to Kunia Road, angles *makai* near Kunia Road, then continues east along the OR&L ROW near the Pearl Harbor coast. It appears no archaeological monitoring was conducted west of Waipi‘o Peninsula, as the corridor to the west had been determined to not be archaeologically sensitive.

4.7.9 Dagher and Spear 2009

In 2009, Scientific Consultant Services Hawaii conducted a literature search and field inspection for the Kapolei Computerized Traffic Control System, Phase II in Kapolei and Makakilo, Honouliuli Ahupua‘a (Dagher and Spear 2009). This project area included a portion of Component 2 of the current project area. The field inspection included not only portions of the current project area, but also outside to the east and west in a targeted effort to identify plantation-era flumes and ditches. No evidence of flumes, ditches, or other historic or cultural materials were observed.

4.7.10 Hammatt 2010

In 2010, CSH conducted an archaeological inventory survey of Construction Phase I for the Honolulu High-Capacity Transit Corridor Project, Honouliuli, Hō‘ae‘ae, Waikele, Waipi‘o, Waiawa, and Manana *Ahupua‘a*, ‘Ewa District, O‘ahu (TMK: [1] 9-1, 9-4, 9-6, 9-7 [Various Plats and Parcels]) (Hammatt 2010). The project area encompassed 7.4 miles and extended from the North-South Road in Kapolei to the University of Hawai‘i at Mānoa and Waikīkī. Only one historic property was identified during the study, SIHP # 50-80-09-7751, a subsurface *lo‘i* deposit located near the proposed Waipahu Transit Center. No sites were identified within the current project area.

4.7.11 Mooney and Cleghorn 2010

In 2010, Pacific Legacy, Inc. conducted an archaeological inventory survey of approximately 22.4 acres of Varona Village. This project area is located to the southeast of the current project area. The study aimed to identify any traditional Hawaiian historic properties due to the project area already being included within the Ewa Plantation Villages Historic District (SIHP # 80-11-9786). No traditional historic properties were identified, however, five newly documented historic properties were identified including two home sites, two outbuilding foundations, and a streetlamp.

4.7.12 Mooney and Cleghorn 2011

In 2011, Pacific Legacy, Inc. conducted an archaeological assessment for the proposed Ka Makana Ali‘i mixed-use complex. This project area is located south of the current project area. Despite the excavation of 62 backhoe trenches, no archaeological resources were encountered.

4.7.13 Stark et al. 2015

In 2015, CSH conducted an archaeological inventory survey (negative finds recorded as an archaeological assessment) for the Ewa Elementary School Building E project, within Renton Village. This project area is located to the east of the current project area. Despite the pedestrian survey and excavation of 12 backhoe trenches, findings were limited to nine historic era artifacts. No archaeological historic properties were identified and CSH recommended no further archaeological work for the project.

Section 5 Community Consultation

5.1 Introduction

Throughout the course of this assessment, an effort was made to contact and consult with Native Hawaiian Organizations (NHO), agencies, and community members including descendants of the area, in order to identify individuals with cultural expertise/and or knowledge of the *ahupua‘a* where the project areas are located. CSH initiated its outreach effort in August 2017 through letters, email, telephone calls, and in-person contact. CSH completed the community consultation in January 2018.

5.2 Community Contact Letter

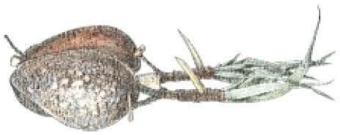
Letters (Figure 29 and Figure 30) along with a map and an aerial photograph of the project were mailed with the following text:

> At the request of Engineering Concepts, Inc. and R.M. Towill Corporation, on behalf of the City & County of Honolulu Board of Water Supply (BWS), Cultural Surveys Hawai‘i, Inc. (CSH) is conducting a Cultural Impact Assessment (CIA) for the proposed East Kapolei R-1 Reservoir and Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu Island, TMKs: [1] 9-1-017:096 Kualaka‘i Parkway Right-of-Way (ROW), Farrington Highway ROW, and [1] 9-1-018:008. The total area of potential effect (APE) is 71.7 acres (29.02 hectares). For the purposes of this study, the project’s APE is considered to be the entire approximately 71.7-acre (29.02 hectare) project area. The project area is depicted on a portion of the 2013 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle and a 2014 Google Earth aerial photograph (Figure 1 and Figure 2).
>
> The proposed project will involve improvements to the BWS infrastructure for the transmission and use of R-1 (recycled) water in the ‘Ewa District of O‘ahu. According to the Department of Health, *Guidelines for the Treatment and Use of Recycled Water* (2002), R-1 water can be used for irrigation and other purposes where non-potable water can be useful. This document can be found online at: http://health.hawaii.gov/wastewater/files/2013/06/reuse-final.pdf. The use of R-1 water can also help preserve the drinking water supply when it is appropriate to use non-drinking water.
>
> The project, consisting of two components (see Figure 2), will construct a new R-1 reservoir and transmission piping. Component 1 (the *mauka* or northwest portion on the project) involves the construction of the New East Kapolei 3.0 million-gallon (MG) R-1 Reservoir. The reservoir tank site will require grading and will be located adjacent to the existing East Kapolei 215 4.0 MG Reservoir. A new 16-inch transmission main will be constructed via trenching to connect the proposed East Kapolei 3.0 MG R-1 Reservoir to the end of the existing site access road at Farrington Highway.

Cultural Surveys Hawai‘i, Inc.
Archaeological and Cultural Impact Studies
Hallett H. Hammatt, Ph.D., President

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

Job code: HONOULIULI 134 cbitler@culturalsurveys.com www.culturalsurveys.com



October 2017

Subject: Request for Consultation, BWS R-1 Reservoir and Transmission Main Project Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu Island, TMKs: [1] 9-1-017:096

Aloha,

At the request of Engineering Concepts, Inc. and R.M. Towill Corporation, on behalf of the City & County of Honolulu Board of Water Supply (BWS), Cultural Surveys Hawai‘i, Inc. (CSH) is conducting a Cultural Impact Assessment (CIA) for the proposed East Kapolei R-1 Reservoir and Transmission Main Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu Island, TMKs: [1] 9-1-017:096 Kualaka‘i Parkway Right-of-Way (ROW), Farrington Highway ROW, and [1] 9-1-018:008. The total area of potential effect (APE) is 71.7 acres (29.02 hectares). For the purposes of this study, the project's APE is considered to be the entire approximately 71.7-acre (29.02 hectare) project area. The project area is depicted on a portion of the 2013 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle and a 2014 Google Earth aerial photograph (Figure 1 and Figure 2).

The proposed project will involve improvements to the BWS infrastructure for the transmission and use of R-1 (recycled) water in the ‘Ewa District of O‘ahu. According to the Department of Health, *Guidelines for the Treatment and Use of Recycled Water* (2002), R-1 water can be used for irrigation and other purposes where non-potable water can be useful. This document can be found online at: http://health.hawaii.gov/wastewater/files/2013/06/reuse-final.pdf. The use of R-1 water can also help preserve the drinking water supply when it is appropriate to use non-drinking water.

The project, consisting of two components (see Figure 2), will construct a new R-1 reservoir and transmission piping. Component 1 (the *mauka* or northwest portion on the project) involves the construction of the New East Kapolei 3.0 million-gallon (MG) R-1 Reservoir. The reservoir tank site will require grading and will be located adjacent to the existing East Kapolei 215 4.0 MG Reservoir. A new 16-inch transmission main will be constructed via trenching to connect the proposed East Kapolei 3.0 MG R-1 Reservoir to the end of the existing site access road at Farrington Highway.

Component 2 (the *makai* or southeast portion of the project) is a 16-inch transmission main that will connect the new East Kapolei 3.0 MG R-1 Reservoir transmission main located at the end of the existing East Kapolei 215 4.0 MG Reservoir access road on Farrington Highway Transporting R-1 water *makai*. The transmission main will continue along Farrington Highway to Kualaka‘i Parkway, and from Kualaka‘i Parkway to Mango Tree Road to the south, and will interconnect to an existing 20-inch R-1 main, a distance of approximately 10,800 linear feet.

Figure 29. Community consulation letter, page one

HONOULIULI 134 – CIA for the Proposed East Kapolei R-1 Reservoir and Transmission Main Project

Page 2

The project also includes initial geotechnical investigation consisting of soil borings along the proposed transmission line alignment at approximately 500-foot (ft) intervals and a minimum of one boring per street. Boring depth shall be a minimum of 8 ft or at 30 inches below the maximum water main invert depth indicated on project plans.

The purpose of this CIA is to gather information about the project area and its surroundings through research and interviews with individuals that are knowledgeable about this area to assess potential impacts to the cultural resources, cultural practices, and beliefs identified as a result of the planned project. We are seeking your *kōkua* and guidance regarding the following aspects of our study:

- **General history as well as present and past land use of the project area**
- **Knowledge of cultural sites which may be impacted by future development of the project area—for example, historic and archaeological sites, as well as burials.**
- **Knowledge of traditional gathering practices in the project area, both past and ongoing.**
- **Cultural associations of the project area, such as *mo‘olelo* and traditional uses.**
- **Referrals of *kūpuna* or elders and *kama‘āina* who might be willing to share their cultural knowledge of the project area and the surrounding *ahupua‘a* lands.**
- **Any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the project area.**

In advance, we appreciate your assistance in our research effort. If you are interested in participating in this study, please contact Brittany Beauchan at bbeauchan@culturalsurveys.com or Chelsey “Li‘i” Bitler at cbitler@culturalsurveys.com. We are also available by phone at (808) 262-9972. **We kindly ask for your response by, 27 October 2017.**

Mahalo nui loa,

Brittany Beauchan
Cultural Researcher

and

Chelsey Li‘i Bitler
Cultural Researcher

Figure 30. Community consultation letter, page two

Component 2 (the *makai* or southeast portion of the project) is a 16-inch transmission main that will connect the new East Kapolei 3.0 MG R-1 Reservoir transmission main located at the end of the existing East Kapolei 215 4.0 MG Reservoir access road on Farrington Highway Transporting R-1 water *makai*. The transmission main will continue along Farrington Highway to Kualaka‘iParkway, and from Kualaka‘i Parkway to Mango Tree Road to the south, and will interconnect toan existing 20-inch R-1 main, a distance of approximately 10,800 linear feet.

The project also includes initial geotechnical investigation consisting of soil borings along the proposed transmission line alignment at approximately 500-foot (ft) intervals and a minimum of one boring per street. Boring depth shall be a minimum of 8 ft or at 30 inches below the maximum water main invert depth indicated on project plans.

The purpose of this CIA is to gather information about the project area and its surroundings through research and interviews with individuals that are knowledgeable about this area to assess potential impacts to the cultural resources, cultural practices, and beliefs identified as a result of the planned project. We are seeking your *kōkua* and guidance regarding the following aspects of our study:

•General history as well as present and past land use of the project area

•Knowledge of cultural sites which may be impacted by future development of theproject area—for example, historic and archaeological sites, as well as burials.

•Knowledge of traditional gathering practices in the project area, both past andongoing.

•Cultural associations of the project area, such as *mo‘olelo* and traditional uses.

•Referrals of *kūpuna* or elders and *kama‘āina* who might be willing to share theircultural knowledge of the project area and the surrounding *ahupua‘a* lands.

•Any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the project area.

In most cases, two or three attempts were made to contact individuals, organizations, and agencies.

5.3 Community Contact Table

Below in Table 3 are names, affiliations, dates of contact, and comments from NHOs, individuals, organizations, and agencies contacted for this project. Results are presented below in alphabetical order.

Table 3. Results of Community Consultation

Name	Affiliation	Comments
Alaka‘i, Robert	Cultural Practitioner	Letter and figures sent via United States Postal Service (USPS) on 25 September 2017 Letter and figures sent via email on 11 October 2017
Alau, Maile	Executive Director, Hawai‘i Maoli	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via USPS on 11 October 2017
Amaral, Annelle	President, Association of Hawaiian Civic Clubs	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017
Becket, Jan	Author, photographer, retired teacher from Kamehameha Schools – Kona Moku Representative for the Committee on the Preservation of Historic Sites and Cultural Properties	Letter and figures sent via email on 11 October 2017 CSH reached out via telephone to discuss a possible *huaka‘i* (field trip) to cultural sites in Honouliuli on 17 October 2017. On behalf of Mr. Jan Becket, CSH reached out to various landowners for permission to visit cultural sites on 18 October 2017. CSH reached out to the following organizations and/or landowners: Blue Planet Foundation, Archery Range, and the Mālama Learning Center. CSH reached out to Mr. Jan Becket via telephone on 23 October 2017 to reschedule the *huaka‘i* due to difficulty in acquiring appropriate permissions to visit various cultural sites. *Huaka‘i* rescheduled for week of 23 October 2017. CSH attempted to reach out again to Garl Gill of the Blue Planet Foundation, and Pauline Sato of the Mālama Learning Center. Mrs. Sato provided CSH with the contact number for the area ranger, Mr. Thomas Anuheali‘i. CSH left a message for Mr. Anuheali‘i, on behalf of Mr. Jan Becket. CSH reached out to Mr. Becket via telephone on 22 October 2017 to finalize interview/*huaka‘i* time and date. On 23 October 2017, CSH accompanied Mr. Becket on a *huaka‘i* within the Kalaeloa Heritage Park. Interview conducted on 23 October 2017. 26 October 2017, CSH reached out to Mr. Becket for additional discussion regarding the project. On 27 November 2017, CSH reached out to Mr. Becket via email regarding interview summary.

Name	Affiliation	Comments
		Mr. Becket replied to CSH via email on 28 November 2017. Mr. Becket approved interview summary via email on 11 January 2018.
Bond, John	Kanehili Cultural Hui	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via USPS on 11 October 2017
Cayan, Phyllis	Intake Specialist, SHPD	Letter and figures sent via email on 11 October 2017
Crabbe, Kamana‘opono	Ka Pouhana of OHA	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via USPS on 11 October 2017
De Santos, Kahulu	Cultural Advisor, Aulani, A Disney Resort and Spa	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via USPS on 11 October 2017
Eaton, Ku‘uwainani	Hoakalei Cultural Foundation Grand-daughter of Arlene Eaton	Letter and figures sent via USPS on 25 September 2017 Letter and figures returned on 4 October 2017
Golojuch, Michael	Makakilo/Kapolei Neighborhood Board	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017(email bounced back) Letter and figures sent via USPS on 11 October 2017
Hilo, Regina	Burial Sites Specialist, SHPD	Letter and figures sent via email on 4 October 2017 Letter and figures sent via USPS on 11 October 2017
Jordan, Georgette “Jo”	44th House District Representative	Letter and figures sent via USPS on 25 September 2017 Letter and figures returned on 4 October 2017 Letter and figures sent via email on 4 October 2017 Undeliverable via email on 4 October Letter and figures sent via email on 11 October 2017 Undeliverable via email on 11 October 2017
Kai, G. Umi	President, ‘Aha Kāne	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017 Mr. Kai replied via email on 11 October 2017, and recommended CSH reach out to Mr. Shad Kāne. CSH replied via email on 12 October 2017, thanking Mr. Kai for his assistance.
Kaleikini, Ali‘ikaua	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017
Kaleikini, Haloa	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017
Kaleikini, Kala	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017
Kaleikini, No‘eau	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017

Name	Affiliation	Comments
Kaleikini, Paulette Ka‘anohi	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017 Letter and figures sent via email on 11 October 2017 Mrs. Paulette Ka‘onohi Kaleikini replied via email on 11 October 2017, noting that although she is busy, she has input to share. CSH replied to Mrs. Kaleikini regarding the CIA timeline, and added that a note will be made that she has comments to share. CSH reached out via email on 15 November 2017, following up on comments regarding the project. Mrs. Kaleikini replied via email on 16 November 2017, requesting copies of the community contact letter be resent for her review. Letters and figures sent via email on 17 November 2017. CSH attempted to follow up with Mrs. Kaleikini, and reached out via email on 29 November 2017 Mrs. Kaleikini replied via email on 2 December 2017, providing comments in regards to the current project.
Kaleikini, Tuahine	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017
Kāne, Shad	Kalaeloa Heritage and Legacy Foundation	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017 Mr. Shad Kāne replied via email on 12 October 2017, noting that he is currently in Japan, but will respond to CSH upon his return to Hawai‘i. CSh replied via email on 12 October 2017, thanking Mr. Kāne for his assistance. CSH reached out to Mr. Kāne to schedule an interview and visit to the Kalaeloa Heritage Park. Interview scheduled for 23 October 2017. Interview conducted on 23 October 2017. CSH sent Mr. Kāne an authorization and release form via email on 24 October 2017. Mr. Kāne returned signed authorization and release form on 23 October 2017. CSH reached out to Mr. Kāne regarding his interview summary on 28 November 2017. Mr. Kāne edited and approved summary on 28 November 2017. CSH replied via email on 29 November 2017 thanking Mr. Kāne for his assistance.

Name	Affiliation	Comments
Kanekoa, Mikiala	Hawaiian Language Teacher, Kapolei High School	Letter and figures sent via email on 4 October 2017 Ms. Mikiala Kanekoa replied via email on 6 October 2017 CSH replied via email on 11 October 2017 CSH reached out via telephone on 17 October 2017 and left a voice message
Keala, Jalna (Jane)	Corresponding Secretary, Association of Hawaiian Civic Clubs	Letter and figures sent via email on 4 October 2017 Letter and figures sent via email on 11 October 2017
Keaulana, Ha‘a	Cultural Advisor at Four Seasons Resort Ko Olina	Letter and figures sent via email on 11 October 2017
Keli‘inoi, Kalahikiola	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017
Keli‘inoi, Kilinahe	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017
Kruse, Kehaulani	Outrigger Enterprises, Cultural Advisor	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via USPS on 11 October 2017
Lee, Mike Kumukauoha	Kanehili Cultural Hui	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017
Lewis, Joseph Kūhiō	President, Kapolei Community Development Corporation	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017
Lomaoang, Florence and Fernando	Former neighborhood board member, long time resident	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via USPS on 11 October 2017 Responded via telephone on 27 October 2017; Mrs. Lomaoang informed CSH that she would be unable to participate in the study due to medical issues.
Lyman, Melissa	Kalaeloa Heritage and Legacy Foundation, President	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017
McKeague, Kawika	Cultural Practitioner, Honouliuli historian and longtime resident	Letter and figures sent via email on 4 October 2017 Letter and figures sent via email on 11 October 2017

Name	Affiliation	Comments
Naiwi, Dolly	President, Nanaikapono Hawaiian Civic Club	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via USPS on 11 October 2017
Paik, Linda Kaleo	‘Aha Wahine	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017
Philpotts, Douglas	Descendant of Campbell family	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017 Mr. Philpotts reached out to CSH via telephone on 21 October 2017 regarding access to Olsen Trust Palehua Ranch, LLC lands. CSH returned Mr. Philpotts call on 23 October 2017. Mr. Philpotts unable to provide permission to access, but referred CSH to previously conducted studies within Honouliuli Ahupua‘a, and the Palehua area.
Rodenhurst, Roda	President, ‘Ahahui Siwila Hawai‘i O Kapolei Hawai‘i Civic Club	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017
Schaedel, Homelani	President, Malu‘ōhai Residents Association	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017 Email undeliverable on 11 October 2017
Shibuya, Barbara		Letter and figures sent via email on 4 October 2017 Letter and figures sent via email on 11 October 2017
Shimabukuro, Maile	Senator, District 21	Letter and figures sent via USPS on 25 September 2017 Letter and figures sent via email on 11 October 2017
Soares, Moani Kaleikini	Cultural Descendant	Letter and figures sent via USPS on 11 October 2017
Solis, Ka‘ahiki	SHPD, Cultural Historian (O‘ahu)	Letter and figures sent via email on 4 October 2017 Letter and figures sent via email on 11 October 2017
Tiffany, Nettie	*Kahu*, Lanikuhonua	Letter and figures sent via USPS on 25 September 2017 Letter returned on 4 October 2017
Tupola, Andria	43rd House District Representative	Letter and figures sent via email on 11 October 2017
Wong-Kalu, Hinaleimoana K.K.	Director of Culture, Halau Lokahi Public Charter School	Letter and figures sent via USPS on 25 September 2017 Letter returned on 4 October 2017 Letter and figures sent via email on 4 October 2017

5.4 *Kama‘āina* Interviews

The authors and researchers of this report extend our deep appreciation to everyone who took time to speak and share their *mana‘o* (thoughts) and *‘ike* (knowledge) with CSH whether in interviews or brief consultations. We request that if these interviews are used in future documents, the words of contributors are reproduced accurately and in no way altered, and that if large excerpts from interviews are used, report preparers obtain the express written consent of the interviewee/s.

Interviews were conducted in accordance with Federal and State laws and guidelines with individuals knowledgable of the general history, present and past land use, traditional gathering practices (both past and ongoing), and cultural sites of the project area and Honouliuli Ahupua‘a. The following analysis of *kama‘āina* interviews is intended to facilitate the identification of potential impacts to cultural resources, ongoing cultural practices, and/or cultural sites within the project area or its immediate vicinity. As the current CIA involves the study of Honouliuli Ahupua‘a in its entirety, interviewees Jan Becket and Shad Kāne articulated the importance of considering the physical remains of Hawaiian activity (as evident at the Kalaeloa Heritage Park) in order to consider cultural impacts elsewhere in Honouliuli Ahupua‘a.

5.4.1 Email Correspondence with Paulette Ka‘anohi Kaleikini

CSH mailed and emailed letters and figures regarding the current Kualaka‘i Parkway 16-Inch R-1 Transmission Main Project to Paulette Ka‘anohi Kaleikini in October of 2017. Paulette Ka‘anohi Kaleikini and her *‘ohana* are cultural descendants of Honouliuli Ahupua‘a; Paulette Ka‘anohi Kaleikini is also the current owner of ‘Ōiwi Cultural Resources, a cultural monitoring firm.

Paulette Ka‘anohi Kaleikini emailed CSH with her comments regarding the current project on 2 December 2017:

> Aloha Brittany,
>
> On the aina of this project, there was little gravel but it was very fertile. Native Hawaiians lived there. It was the path to Kukaniloko, a very spiritual location. It was also on the way to the mountain path leading to Waianae, Mana Kapu, Mount Kala, another very spiritual location for native Hawaiians. So while the current sediments may appear disturbed and historic, native Hawaiians lived and traveled on these lands to be near the spiritual places. Some lived in these areas, others passed through. Some traveled the distance, many did not make it. Remains of theses natives have been found. Remains of natives who fought in ancient battles on the lands have also been found. While working in these areas, malama how and location of digging. The cultural layer may not be deep in some areas.
>
> Aloha Aina,
>
> Kaanohi

5.4.2 Summary of Jan Becket Interview and Site Visit

Jan Becket, a retired Kamehameha Schools teacher, is a specialist in regards to knowledge of cultural sites throughout the island of O‘ahu. As a photographer and author, Mr. Becket is well recognized for his black-and-white photographic documentation of sacred sites. He has conducted

extensive archival research on sites of cultural significance, learned from *kūpuna* (elders), and photographed many undocumented sites on O‘ahu, which resulted in a co-written book, *Pana O‘ahu* (Becket and Singer 1999). He is a member of the Committee for the Preservation of Historic Sites and Properties under the O‘ahu Council of Hawaiian Civic Clubs, and reports back to the chair of the committee (Shad Kāne) on issues concerning cultural sites in the Kona District of O‘ahu.

On 23 October 2017, Mr. Becket led CSH on a *huaka‘i* (field trip) to cultural sites within the Kalaeloa Heritage Park part of which was accompanied by Mr. Shad Kāne. The park is located off of Coral Sea Road in the *ahupua‘a* of Honouliuli on the island of O‘ahu. CSH met Mr. Becket and Mr. Kāne near Site #1753 (a multi-component site with 51 documented archaeological features, including the Kualaka‘i Trail, C-shape and L-shape enclosures, agricultural sinkholes, sinkholes, water sinkholes, burial sinkholes, and a communal religious structure). Following visitation of Site #1753, Mr. Becket led CSH further into the park, and continued by foot along a portion of the old Kualaka‘i Trail. CSH and Mr. Becket were eventually rejoined by Mr. Kāne. Mr. Becket shared that he had previously visited these sites when there was a cleared trail. Portions of the trail remain visible, but in some areas, has since become overgrown by *kiawe* (mesquite tree; *Prosopis pallida*). CSH assisted in re-marking the trail with trail tape. Mr. Becket had said that they (the Kalaeloa Heritage and Legacy Foundation) had done a lot of work to clear the area and that they had applied for a grant to buy a brush cutter to maintain the trail, but it was not awarded. Towards the end of the *huaka‘i*, Mr. Shad Kāne informed the party that it takes a lot of man-power to clear the *kiawe*, and that they continue to look for volunteers to help clear the area. Continued maintenance and clearing ensures that cultural sites are protected from overgrowth by invasive vegetation. Other vegetation in the area include *koa haole* (*Leucaena leucocephala*) and California grass (*Brachiaria mutica*).

Upon entering the *kiawe* thicket, the first site visible was a historical trench dug out of the karst in a zig-zag pattern (Figure 31 and Figure 32). Mr. Kāne shared that it was built during WWII because the Navy expected an enemy attack from the *makai* region. It was built in such a pattern so that the troops could be ready for an attack from either direction.

Soils within the region of the Kalaeloa Heritage Park consist of coral or cemented calcareous sand, or Coral outcrop (CR). 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.

CSH observed numerous pit caves or sinkholes on all sides of the trail. Mr. Becket explained that populations of Hawaiians, living in the region, used these sinkholes for agricultural purposes. In some other areas, pit caves were possibly utilized for burials. Mr. Shad Kāne later confirmed this with CSH. The first cultural features seen were two sinkholes possibly used for agriculture. Man-made modifications were observed in association with the natural sinkholes. The sinkholes were partially enclosed by a wall of coral boulders. The wall feature of the southeastern sinkhole measured approximately three courses high, and was partially infilled with coral cobbles; coral gravels were scattered on the surface, and inside of the sinkhole (Figure 33). The wall feature of

Figure 31. Close-up of sidewall of a WWII-era Trench within the Kalaeloa Heritage Park

Figure 32. Close-up of a WWII-era Trench; zig-zag pattern faintly visible in background, within the Kalaeloa Heritage Park

Figure 33. Two possible agricultural pit caves identified during the *huaka‘i* within the Kalaeloa Heritage Park

the northwestern sinkhole measured approximately three courses high. These were just two of the many sinkholes observed along either side of the trail. Another feature along the trail was a partial enclosure approximately five courses high with an adjacent sinkhole. This sinkhole, located in close proximity to the walled enclosure, appears to have functioned as an underground water source (Figure 34 through Figure 36). A large branch of a *kiawe* tree extends over part of the coral wall and the sinkhole. Mr. Becket shared that underground streams once flowed, undisturbed, throughout the ‘Ewa plains. The development of the area, spurred by historic-era sugar production and industry, led to the drilling of artesian wells. The extraction of the water impacted the local eco-system. The eco-system was forever changed by these events.

Mr. Becket continued the *huaka‘i*, by showing CSH a possible family *kuahu* (altar) (Figure 37), possibly a *pōhaku o Kāne* (Stone of Kāne). The cultural site consisted of a shrine with an upright stone fronting it. Pukui writes the following regarding the family *kuahu*:

> The family altar was the *Pōhaku o Kāne*. The Stone of *Kāne*. This, says Kamakau, “was not a *heiau*; it was a single stone monument. . . and a *kuahu* [altar] with *ti* and other greenery planted about.”
>
> There were many such stones, for each *‘ohana* (family) might have one. How did the men of the *‘ohana* obtain their *Pōhaku o Kāne*?
>
> Wrote Kamakau: “The Stone of *Kāne* was a stone pointed out by the god, not one just set up by men. Then god indicated the stone, perhaps in a dream, or in a vision, or by leading someone to the spot.”
>
> Whether or not this stone-and-greenery altar was always set up in the *hale mua* (men’s eating house) of the family compound is not clear. Its purpose, however, was surely that of a family altar where, in Hawai‘i’s tradition, only the men offered ritual food and prayers to the gods. [Pukui 1973:125-126]

The third prominent feature along the trail was a *pā* (enclosure) enclosing a possible house site. There were three sides of walls intact with one side barely visible and covered in California grass. One side of the enclosure was shorter in length than the surrounding walls, indicating the space as the entrance. The wall on the back of the enclosure remains somewhat intact (Figure 38 through Figure 40). The wall perpendicular to the side wall remains intact and is comprised of approximately six courses. Towards the middle and right side of the wall, as shown in Figure 38 and Figure 40, the roots of the *kiawe* tree have damaged the structure. There was also an upright stone at the corner of two walls (Figure 41). This upright stone may have once functioned as a god-stone. Patrick Kirch writes in his book *Feathered Gods and Fishhooks* about the significance of such a stone:

> An upright stone set in the corner of. . . [a] wall is probably a god-stone, representing *‘aumākua* deities, and suggests that this primary residence also functioned as a men’s house. [Kirch 1985:254]

Unlike other sites within the park, this feature demonstrates Hawaiian dry-stacking with no upright stones incorporated into the structure like that of Tahitian-style construction. The last of the cultural features that was seen was Site #1755. It is a four-wall enclosure with no opening for an entrance. Mr. Becket recognized it as possibly being a *heiau* or *ahu* (Figure 42). In a photo taken by Mr. Becket years prior, a prominent triangular upright stone could be seen (Figure 43). When

Figure 34. Possible habitation site with large natural pit cave located nearby. The pit cave is believed to have functioned as a well or cistern within the Kalaeloa Heritage Park

Figure 35. General view of interior of sinkhole; it is believed to have once functioned as a well or cistern, within the Kalaeloa Heritage Park

Figure 36. General view of *kiawe* extending over wall and sinkhole, within the Kalaeloa Heritage Park

Figure 37. General view of possible *pōhaku o Kāne*; note the upright stone in the background, within the Kalaeloa Heritage Park

Figure 38. General view of partially disturbed wall; heavy root disturbance from *kiawe* observed. Note the upright stone at far-left corner of the wall, within the Kalaeloa Heritage Park

Figure 39. General view of intact portion of wall, within the Kalaeloa Heritage Park

Figure 40. General view of portion of wall damaged by *kiawe* roots, within the Kalaeloa Heritage Park

Figure 41. General view of upright stone located at southeastern corner of the walled enclosure, within the Kalaeloa Heritage Park

Figure 42. Site #1755, possibly a small *heiau* or *ahu*; note the visible lack of an opening (photograph provided by Mr. Jan Becket), within the Kalaeloa Heritage Park

Figure 43. Site #1755, note the prominent triangular shaped coral boulder; this coral boulder is believed to have once been a prominent upright stone, within the Kalaeloa Heritage Park (photograph provided by Mr. Jan Becket)

CSH and Mr. Becket approached the feature, he did not recognize it due to the overgrown California grass. After circling the feature, Mr. Becket found the prominent triangular upright stone and recognized that it was the same feature he had photographed years ago. **Error! Reference source not found.** was taken by CSH while on the *huaka‘i*. The vegetation, specifically California grass, poses a threat to the distinguishability of this feature.

The vegetation was also a hindrance in finding another cultural site. Mr. Becket had previously recorded a GPS point at the location of Site #1752. Mr. Shad Kāne asked Mr. Becket to locate the site again. The area was once cleared, but has since become overgrown; Mr. Kāne has not been able to locate it since. Mr. Becket attempted to follow his GPS to the pin-pointed areas but due to the thick of *kiawe* and restriction on time, he was unable to locate the site.

In the small parcel of land that CSH covered, there was a source of water, agricultural sinkholes, a possible place of worship, and a dwelling; these features and cultural sites are indicative of past populations of *maka‘āinana* (commoners). It may be inferred that this *makai* region of Honouliuli was the site of multiple Hawaiian household clusters, largely associated with the *maka‘āinana* class. The cultural features were also indicative of a self-sustaining lifestyle. The presence of numerous upright *pōhaku* suggested the intersection of the utilitarian and the sacred. Discussion with Mr. Becket during the *huaka‘i* strengthened the notion of multiple levels of function, resulting in the conclusion that many of the sites in Honouliuli *makai* held much importance and also more than one function.

On this *huaka‘i*, the upright stones may have served as a *pōhaku o Kāne*, a god-stone, or some other function. **Error! Reference source not found.** and Figure 46 were other upright stones seen along the trail. Markings on Figure 46, were reminiscent of *makaiwa* (“mother of pearl eyes (as in an image”). *Makaiwa* is also the name given to a gulch located in the *mauka* portion of Honouliuli Ahupua‘a. Mr. Becket mentioned that he has not come across a study about upright stones yet, but believes such a study would be invaluable to Hawaiian archaeology and history.

The weather on 23 October 2017 was unlike a normal day in Kalaeloa. It was overcast with light rains for much of the day. CSH, Mr. Becket, and Mr. Shad Kāne managed to exit the thick of the *kiawe* just as heavy rains began to pour. Due to the weather, there was an inability to continue the visit to other sites. Mr. Becket also wanted to visit other sites in Pālehua, but CSH was unable to obtain permission to access those lands.

When CSH asked Mr. Becket if he had any comments or concerns about the current East Kapolei R-1 Reservoir and Transmission Main project, he said he had no objection. He did feel it important to share and keep in mind that the ‘Ewa Plains once had underground water flowing to source the area, however, due to extraction, water no longer flows.

5.4.3 Summary of Shad Kāne Interview and Site Visit

On 23 October 2017, Cultural Surveys Hawai‘i interviewed Mr. Shad Kāne after taking a *huaka‘i* (field trip) with Mr. Jan Becket around the Kalaeloa Heritage Park. Mr. Kāne is a steward for the park and spokesperson for the Kalaeloa Heritage and Legacy Foundation, a 501(c)(3) non-profit Hawaiian organization founded by members of the ‘Ahahui Siwila Hawai‘i o Kapolei (Kapolei Hawaiian Civic Club), whose purpose was, and continues to be, to preserve and protect the cultural sites within the heritage park that was once used as a naval base. The interview was conducted in a newly constructed *hale* (house) built in the same fashion as the pre-Contact features

Figure 44. General view of Site #1755, California grass is encroaching the site within the Kalaeloa Heritage Park

Figure 45. General view of upright stones along the path, within the Kalaeloa Heritage Park

Figure 46. General view of an upright stone along the path, within the Kalaeloa Heritage Park

observed at SIHP # 50-80-12-1753 within the park. Mr. Shad Kāne shared with CSH the history of the Kalaeloa Heritage Park, as well as the results of recent archaeological, cultural, and ethnological surveys within the Kalaeloa region. Mr. Kāne also reviewed the history of the area, including ancient migratory and settlement patterns.

For years, Kalaeloa was utilized as the Barbers Point Naval Air Station (NAS). The area was full of cultural sites but these were under constant attack by thorny, invasive *kiawe* (mesquite tree; *Prosopis pallida*) trees. The thickness of the brush served as an excellent buffer for their infrastructure. The Navy would often build on the footprint of their proposed project, and use the surrounding invasive vegetation as a concealing buffer. In the 1990s, the state established the Barbers Point Redevelopment Commission tasked with the responsibility of determining the future reuse of the properties of the Barbers Point NAS and to whom these lands should be conveyed with federal agencies having the first preference. The ‘Ahahui Siwila Hawai‘i o Kapolei (ASHOK) was asked to participate as a Native Hawaiian Organization and Shad Kāne was asked to represent the club on the Parks and Recreation’s Public Facilities Task Force that advised the Barbers Point Redevelopment Commission, a commission comprised of community members, landowners, and developers. These two entities worked in conjunction with International Archaeological Research Institute, Inc. (IARII), Belt Collins Hawai‘i, Ltd., the Department of Land and Natural Resources (DLNR), and the Navy Region. It was recommended by the Parks and Recreation Public Facilities Task Force that the 77 acres of the former Ammunition Storage Facility be identified as the Kalaeloa Heritage Park. The commission voted in support. In 1999, the Barbers Point NAS was closed. In 2010, the land was conveyed by the Navy to the Hawaii Community Development Authority who in turn asked ASHOK to work with the state to establish the heritage park. ASHOK recognized the time and dedication that was needed to manage the heritage park, and thus created the Kalaeloa Heritage and Legacy Foundation. Their purpose and mission remains the same today, to protect and minimize damages to the Kalaeloa cultural sites, and to create a place-based learning facility that is self-sustaining.

The field inspection conducted by IARII surveyed the land, and documented the number of cultural sites within the park limits. Rubellite Kawena Kinney Johnson, a cultural historian, was also hired to interpret the cultural use of the structures found. Their study concluded that 177 archaeological sites existed within the former lands of the Barbers Point Naval Air Station. IARII recommended that the land should become a heritage park, adding that community integration, as well as a cultural component, would be essential components in its establishment. Seventy-seven acres of land were designated as part of the heritage park. These 77 acres contained 177 archaeological sites. The Kalaeloa Heritage and Legacy Foundation was given a Right of Entry by HCDA in 2010. The Foundation identified SIHP # -1753 as the site to be cleaned and established as a visitor and educational component for the community due to its proximity to the access road. SIHP # -1753 was also selected because it had all the subsistent components/archaeological features of a family/*‘ohana* unit. It had the potential of being utilized as an educational tool for place-based or *‘āina*-based learning. SIHP # -1753 was also remarkable because it included 51 archaeological features, and 12 types of structures representing a family/*‘ohana* unit.

SIHP # -1753 of the park is landscaped and well maintained with native vegetation planted by botany students from the University of Hawai‘i West Oahu and Leeward Community College. They and IARII are partners in the clean up and restoration of the botanical resources of this ancient landscape. Within the partially disturbed area of the visitors’ center/*kauhale* (house

complex adjacent to Long Island Road) volunteers planted *niu* (*Cocos nucifera*), *loulu* (*Pritchardia martii*), *wiliwili* (*Erythrina sandwicensis*), and other plants that are doing extraordinarily well.

IARII found that SIHP # -1753 was representative of similar complexes within other areas of the park. These complexes included a water source and several other archaeological sites, including house sites, and upright stones. They concluded these sites represented a village of people living in family clusters. Similar complexes were found in other areas on the Honolulu side of Coral Sea Road, *makai* of Tripoli and the Heritage Park and on the Wai‘anae side of the park adjacent to the airport runway.

Many of the structures were built in a Tahitian fashion of dry stacking with upright stones forming a base and rubble used as fill. In other areas such as SIHP # -1747 they found structures built in a Tahitian style of construction with additions to the older structure made in a Hawaiian dry-stacking manner. This led them to believe it was subsequent generations living in the same structure and adding on as time passed. According to Mr. Kāne, the carbon-14 dating done on the West Loch shoreline wetlands by Ross Cordy dates back to AD 400 and the area appears to be among the earliest areas of settlement in Hawai‘i. The Tahitian style of construction suggests the influence of the Lō line of chiefs, who migrated from Tahiti to Hawai‘i centuries ago. The Lō Ali‘i are credited with establishing trails out of West Loch and into the Honouliuli region.

According to Kamakau, the Lō Ali‘i were described as follows:

> The chiefs of Līhu‘e, 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]

Native Hawaiian cultural historian Zepherin “Kepelino” Kahō‘āli‘i Keauokalani also wrote the following about the Lō Ali‘i:

> Their [the Lō chiefs] ancestors had the tapus of chiefs, the husband had his tapu, the wife hers, and the two tapus were combined and the children born to them guarded their tapu as chiefs. If the government lacked a chief, one was to be found there; if it lacked a chiefess, there one could be sought. See the geneaology of Kanakahialani, Mailikukahi, Kalona, Piliwale, Kukaniloko, Paakanilea, Kaakaualani, Kaau, Lale, Paokalani, Pakapakaua, and a great many chiefs of this kind called *lo* chiefs. [Beckwith 1978:196]

From Honouliuli, the Lō Ali‘i were believed to have continued toward the mountains of central O‘ahu; trails aligned *makai* to *mauka* would have allowed chiefs to move between *maka‘āinana* settlements near the ocean and high-ranking households within the mountains. A series of trails lined with upright stones connected the complexes of structures. The Kualaka‘i Trail was the most well-known of these regional trails (Figure 47). This trail leads out of Honouliuli *mauka*, to the present-day Farrington Highway, and continues up past the Grace Pacific quarry into Pālehua and the Pōhākea. Portions of the trail located *mauka* of the park have since been destroyed by historic-era agricultural activity and development. Mr. Kāne shared that approximately 300 yards of the Kualaka‘i Trail, located within the Kalaeloa Heritage Park, remains intact. In other locations the trail remains visible, however, the upright stones that once lined the path now lie horizontal.

Figure 47. Photo of a portion of the Kualaka‘i Trail in the Kalaeloa Heritage Park (CSH 2012)

Initially, the Kalaeloa Heritage and Legacy Foundation intended for the trail to be restored. It has since been decided that the trail should be left as is. Mr. Kāne shared that there is a greater appreciation for the trail in its current condition. He added that if cultural sites are to be used as educational tools, they must maintain their integrity. When something is moved or touched, the educational value of the structure is altered. Rather than restore the ancient foot trail, they chose to preserve it by clearing invasive *kiawe* and overgrowth. He also shared that this portion of the Kalaeloa area remains unique, largely due to its soils. Due to the presence of karst, the roots of the *kiawe* trees do not grow down, but grow out across the surface. The organizations' clearing and preservation methods have been shaped by these natural conditions. Clearing and preservation has also been adopted in other portions of the park, including at SIHP # -1752. Unfortunately, SIHP # -1752 has since become overgrown with *kiawe* again due to the lack of manpower to maintain the site.

IARII also recommended that certain sites within the heritage park be integrated into some educational component rather than a community one. Mr. Kāne stressed the fact that there is a strong educational component associated with the park and that any decision made does not minimize that effort. Currently, they maintain partnerships with graduate schools of the area, including the University of Hawai‘i at Mānoa, the University of Hawai‘i at West O‘ahu, and Leeward Community College. The park has been utilized by numerous students pursuing postgraduate degrees in anthropology and botany. Studies conducted by the students, and all relevant data generated from these studies, is in turn provided to the foundation and then integrated into an interpretive plan. Mr. Kāne also shared that a border of *kiawe* was constructed to separate the areas that have been rebuilt from the undisturbed areas. This border was constructed to preserve the chemical make-up of the land as well as the integrity of all potential future studies for the area.

The Kalaeloa Heritage Park has been used in several studies, including a study on the *wiliwili* (*Erythrina sandwicensis*) trees of the Kalaeloa region. There exists a famous *‘ōlelo noe‘au* that connects the *wiliwili* tree to the Honouliuli area. The *‘ōlelo noe‘au*, "*Ka wiliwili o Kaupe‘a*," refers to the *wiliwili* grove of Kaupe‘a (Pukui 1983:180). The *wahi pana* of Kaupe‘a is understood to be a wide plain and an *ao kuewa*, a realm belonging to homeless souls. In ancient times, the *kama‘āina* (native born) of both Honouliuli Ahupua‘a and ‘Ewa District made a point to avoid this place.

The *wiliwili* of the Kalaeloa area, however, are unique; they do not require soil to grow. The trees are able to grow in karst, with the roots of the tree reaching below the surface, tapping into underground supplies of freshwater. Mr. Kāne shared that when they were originally allowed access to the park in 2011, the *wiliwili* trees were either dead or had not been flowering for many years. They decided to contact the Department of Agriculture who in turn directed them to Juliana Yalegar at the University of Hawai‘i. She mapped the *wiliwili* trees in the area and discovered the trees were being attacked by invasive gall wasps (*Quadrastichus erythrinae*). She introduced a new wasp to the tree and since then most of the trees are flowering again. The Foundation has also been able to collect the seeds of this endemic tree. Yalegar also informed the Foundation they would never be able to get rid of all the gall wasps, and that the two different wasps had a symbiotic relationship, with the introduced wasp feeding off the eggs of the gall wasp.

Another recent study conducted within the park focused on historic structures and architecture. The student explained to Mr. Kāne the focus of his study: to determine how modern architecture can work to acknowledge the history of a specific place or *wahi pana*. Mr. Kāne shared that many architects today are making an effort to incorporate history into their design or aesthetic. In

discussing the student’s study, Mr. Kāne also shared a brief history of Kapolei, stating that the area was known for the rising and setting of the sun. The student integrated this traditional cultural knowledge into his architectural designs.

Consultation was concluded by reiterating the purpose of the Kalaeloa Heritage and Legacy Foundation, and its place within Honouliuli Ahupua‘a. Mr. Kāne has been caring for Kalaeloa Heritage Park, leading the effort to maintain it, and educating the community about its importance. When asked if he had any concerns about, or recommendations for, the current project, Mr. Kāne shared that he recognizes the importance of water and the need to supply fresh water to the residents of ‘Ewa District. He supports the construction of the project’s transmission line and reservoir.

5.5 Summary of *Kama‘āina* Interviews

Shad Kāne and Jan Becket were interviewed by CSH at the Kalaeloa Heritage Park, approximately 3.1 km south (*makai*) of the current project area. Mr. Becket and Mr Kāne feel that it is important to consider the physical remains of Hawaiian activity (as evident at the Kalaeloa Heritage Park) in order to consider cultural impacts elsewhere in Honouliuli Ahupua‘a.

The 77-acre park is notable for its numerous cultural sites, including a newly constructed *hale pili* (traditional dwelling). Regarding the future of the site, Mr. Kāne envisions the park as a cultural and educational resource for the community. During the consultation, Mr. Kāne discussed the history of the Kalaeloa Heritage Park, the Kualaka‘i Trail, Tahitian building traditions, ancient migratory and settlement patterns, *mo‘olelo* about the Lō Ali‘i, the *kauhale* household complex, native plants, and sinkholes. Mr. Kāne began with a discussion of the history of the Kalaeloa Heritage and Legacy Foundation, and the subsequent creation of the Kalaeloa Heritage Park. While providing the history of the Foundation’s establishment, Mr. Kāne also shared a history of the Kalaeloa and Honouliuli area. In particular, he focused on pre-Contact settlement patterns and historic land use. This exploration of Honouliuli’s history soon led into a discussion of recent archaeological, cultural, and ethnological surveys within the Kalaeloa region. Mr. Kāne shared the results of these surveys (completed by IARII and Ms. Rubellite Kawena Kinney Johnson, respectively) with CSH.

Review of survey results began with a description of the Kualaka‘i Trail. The Kualaka‘i Trail was described as both a historic property and a *wahi pana* of particular salience. Mr. Kāne identified the trail as a feature of SIHP # -1753. SIHP # -1753 is a multi-component site with 51 documented archaeological features. Archaeological features include the aforementioned Kualaka‘i Trail in addition to C-shape and L-shape enclosures, agricultural sinkholes, sinkholes, water sinkholes, burial sinkholes, and a communal religious structure. C-shape and L-shape enclosures functioned as temporary housing. Mr. Kāne stated these habitation features remain in close proximity to the ancient Kualaka‘i Trail. The locations of these features, when evaluated spatially, provide further evidence of the active exchange of resources from *kahakai* (shore) to *kuahiwi* (mountain).

The Kualaka‘i Trail bisects a portion of the heritage park; the *mauka* portion of the trail is cut off by the access road into the heritage park while the *makai* portion fades into a forest of *kiawe*. The trail would have connected *mauka* communities to the coastal communities located at Kualaka‘i and One‘ula. In this way, the trail functions as an index or sign of a fully functional *ahupua‘a* system. Under this traditional system, land remained in control of the divine, belonging

to the gods. *Ali‘i*, understood to be the living descendants of the gods and their earthly representatives, governed the use of the land. Due to the hierarchical nature of ancient Hawaiian society, wise distribution of resources was required. In turn, a system was developed whereby

> The ruling chief of an island distributed the land among his fellow chiefs, to be managed for them by *konohiki*, or land agents. People living on the land utilized its resources by consent of the district chief. In return, they paid tribute to him with the products of their labor. [Kamehameha Schools 1987]

Among the chiefs of Honouliuli, were the Lō Ali‘i. Mr. Kāne went on to describe the Lō Ali‘i, and their connections to Tahiti. These chiefs, after establishing coastal villages and many of the trails out of West Loch and into the Honouliuli region, moved *mauka* to Līhu‘e, Wahiawā, and Halemano.

Mrs. Paulette Ka‘anohi Kaleikini also discussed the importance of many of the cross-*ahupua‘a* trails. Mrs. Paulette Ka‘anohi Kaleikini and her *‘ohana* are cultural descendants of Honouliuli Ahupua‘a. Mrs. Paulette Ka‘anohi Kaleikini shared with CSH the history of Honouliuli in particular, focusing on the project area itself; she discussed how the project area was once utilized during pre-Contact times.

According to Paulette Ka‘anohi Kaleikini, topsoil near the project area was historically limited. Although limited, the area was able to be cultivated. Along with cultivated land tracts, Native Hawaiian settlements were established in the vicinity of the project area. Additionally, the project area was heavily traversed by those on pilgrimage to “spiritual places.” Mrs. Kaleikini explained,

> . . . [the project area] was the path to Kukaniloko, a very spiritual location. It was also on the way to the mountain path leading to Waianae, Mana Kapu [Mauna Kapu, nearby to Pālehua and Palikea], Mount Kala [Mount Ka‘ala], another very spiritual location for native Hawaiians. So while the current sediments may appear disturbed and historic, native Hawaiians lived and traveled on these lands to be near the spiritual places.

The “spiritual places” discussed by Mrs. Paulette Ka‘anohi Kaleikini represent an *axis mundi*. These places were generally in areas of higher elevations and understood as “sacred above all” (Eliade 1987). *Wahi pana* such as Kūkaniloko, Mauna Kapu, and Mount Ka‘ala remain inherently sacred. Such sacredness is multicausal, stemming from “hierophanic moments” (Eliade 1987:313), moments that tangibly connect the area to gods and chiefs, and arising out of the connections of *lāhui* (nation, race, tribe, people) to their *one hānau* (birth sands) and *kula iwi* (land of their ancestors). Mrs. Kaleikini’s comments also underscored the fact that “the respectable person was bound affectionately to the land by which he was sustained” (Charlot 1983:55). Many Native Hawaiians lived and traveled the lands within and around the project area. These original inhabitants, from ancient settlers of Tahitian descent to more recent descendants, drew both physical and spiritual sustenance from the land.Evidence of ancient settlers rooted in Tahitian tradition remains visible within the cultural landscape of Honouliuli. According to Mr. Kāne, many of the structures within the Kalaeloa Heritage Park exhibit some degree of Tahitian dry stacking. Typological changes and the eventual adoption of the horizontal “Hawaiian style” of stacking index a developmental period followed by expansion and long-term settlement. Efficient use of arable land and water was key to Hawaiian expansion and long-term settlement. Additionally,

populations of ancient Hawaiians would have “selected and developed” certain varieties of crops to suit environmental conditions (Abbott 1992:10).

The discussion of natural resources within the area continued with Mr. Kāne describing all the varieties of native plants utilized throughout the park. These species include *niu, loulu, wiliwili*. Of these species, the *loulu* fronds have been utilized as thatching for the Kaleloa Heritage Park’s *hale*. The *wiliwili* tree has figured prominently within *mo‘olelo* and descriptions of *wahi pana*, as well as in an *‘ōlelo no‘eau* associated with the Honouliuli area. The *wiliwili* tree has also been the focus of study for local undergraduate and postgraduate botany students.

On 23 October 2017, Mr. Becket led CSH on a *huaka‘i* to cultural sites within the Kalaeloa Heritage Park. The park is located off of Coral Sea Road in the *ahupua‘a* of Honouliuli on the island of O‘ahu. In the small parcel of land that CSH covered, there was a source of water, agricultural sinkholes, a possible place of worship, and a dwelling; these features and cultural sites are indicative of past populations of *maka‘āinana*. It may be inferred that this *makai* region of Honouliuli was the site of multiple Hawaiian household clusters, largely associated with the *maka‘āinana* class. The cultural features were also indicative of a self-sustaining lifestyle. The presence of numerous upright *pōhaku* suggested the intersection of the utilitarian and the sacred. Discussion with Mr. Becket during the *huaka‘i* strengthened the notion of multiple levels of function, resulting in the conclusion that many of the sites in Honouliuli *makai* held much importance and also more than one function.

CSH met Mr. Becket and Mr. Shad Kāne near Site #1753. Following visitation of Site #1753, Mr. Becket led CSH further into the park, and continued by foot along a portion of the old Kualaka‘i Trail. The first site observed was a historical trench dug out of the karst in a zig-zag pattern. Mr. Kāne shared that it was built during WWII because the Navy expected an enemy attack from the *makai* region. It was built in such a pattern so that the troops could be ready for an attack from either direction.

CSH observed numerous pit caves or sinkholes on all sides of the trail. Mr. Becket explained that populations of Hawaiians, living in the region, used these sinkholes for agricultural purposes. In some other areas, pit caves were possibly utilized for burials. Another feature along the trail was a partial enclosure with an adjacent sinkhole which appears to have functioned as an underground water source. Mr. Becket shared that underground streams once flowed, undisturbed, throughout the ‘Ewa plains.

Mr. Becket pointed out a possible family *kuahu*, possibly a *pōhaku o Kāne*. The cultural site consisted of a shrine with an upright stone fronting it. Another prominent feature along the trail was a *pā* enclosing a possible house site with an upright stone at the corner of two walls. This upright stone may have once functioned as a god-stone. This feature demonstrates Hawaiian dry-stacking with no upright stones incorporated into the structure like that of Tahitian-style construction. The upright stones may have served as a *pōhaku o Kāne,* a god-stone, or some other function. Markings observed on an upright stone were reminiscent of *makaiwa*. *Makaiwa* is also the name given to a gulch located in the *mauka* portion of Honouliuli Ahupua‘a.

The last of the cultural features that was seen was Site #1755. It is a four-wall enclosure with no opening for an entrance. Mr. Becket recognized it as possibly being a *heiau* or *ahu.*CSH concluded *kama‘āina* interviews by inquiring into the concerns and recommendations of interviewees. Mr. Kāne shared that he understands the need to provide safe, clean drinking water

to the growing communities of Kapolei and ‘Ewa. Because of this growing need, Mr. Kāne supports the construction of the project’s transmission line and reservoir.

Mr. Becket said he had no objection for the current project. He did feel it important to share and keep in mind that the ‘Ewa Plains once had underground water flowing to source the area, however, due to extraction, water no longer flows.

Mrs. Paulette Ka‘anohi Kaleikini made it a point to discuss the potential for subsurface finds. She remarked that subsurface finds may consist of either a “cultural layer” or culturally enriched A horizon, in addition to *iwi kūpuna*. Project personnel should be made aware of the possibility of inadvertent cultural finds, including human remains. Additionally, project personnel should take great care when engaged in ground disturbing activities. Mrs. Kaleikini explained, “Remains of natives who fought in ancient battles on the lands [such as the Battle of Kīpapa] have also been found. While working in these areas, *malama* how and location of digging.”

Section 6 Traditional Cultural Practices

Timothy R. Pauketat succinctly describes the importance of traditions, especially in regard to the active manifestation of one's culture or aspects thereof. According to Pauketat,

> People have always had traditions, practiced traditions, resisted traditions, or created traditions . . . Power, plurality, and human agency are all a part of how traditions come about. Traditions do not simply exist without people and their struggles involved every step of the way. [Pauketat 2001:1]

It is understood that traditional practices are developed within the group, in this case, within the Hawaiian culture. These traditions are meant to mark or represent aspects of Hawaiian culture that have been practiced since ancient times. As with most human constructs, traditions are evolving and prone to change resulting from multiple influences, including modernization as well as contact with other cultures. It is well known that within Hawai‘i, a "broader 'local' multicultural perspective exists" (Kawelu 2015:3) While this "local" culture is deservedly celebrated, it must be noted that it has often come into contact with "traditional Hawaiian culture." This contact between cultures and traditions has undoubtedly resulted in numerous cultural entanglements. These cultural entanglements have prompted questions regarding the legitimacy of newly evolved traditional practices. The influences of "local" culture are well noted throughout this section, and understood to represent survival or "the active sense of presence, the continuance of native stories, not a mere reaction, or a survivable name. Native survivance stories are renunciations of dominance, tragedy and victimry" (Vizenor 1999:vii). Acknowledgement of these "local" influences helps to inform nuanced understandings of entanglement and of a "living [Hawaiian] contemporary culture" (Kawelu 2015:3). This section strives to articulate traditional Hawaiian cultural practices practiced within the *ahupua‘a* in ancient times, and the aspects of these traditional practices that continue to be practiced today; however, this section also challenges "tropes of authenticity" (Cipolla 2013) and acknowledges the multicultural influences and entanglements that may "change" or "create" a tradition.

This section integrates information from Section 1.4 and Sections 3–5 in examining cultural resources and practices identified within or in proximity of the project area in the broader context of the encompassing Honouliuli landscape. Excerpts from interviews are incorporated throughout this section where applicable.

6.1 Gathering of Plant and Aquatic Resources

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 550 mm (22 inches) of rain on the coastal and inland region of the *ahupua‘a* and about 1,200 mm (39 inches) in the northern region up into the Wai‘anae mountain range (Giambelluca 2013). Despite the relative lack of rainfall in this area, there exists a traditional rain name associated with the *ahupua‘a* of Honouliuli. This rain, known as the Nāulu, is described as a sudden shower and is more commonly associated with Kawaihae, Hawai‘i and Ni‘ihau (notoriously dry locations as well) (Akana and Gonzalez 2015:187). The general lack of distinctive, traditional rain names is indicative of historic environmental conditions within the *ahupua‘a*. Due to these conditions, *maka‘āinana* living within the *ahupua‘a* were forced to modify or utilize freshwater resources in innovative ways.

No natural streams are located in the vicinity of the project area. However, fresh water remains available below the surface of Honouliuli. Dissolution “pit caves” (Mylroie and Carew 1995) or “sink holes” would accumulate water within them via a subterranean water or karst system; this water also contained nutrient-rich sediment that allowed for the cultivation of significant plant resources such as *kalo, kī,* and *noni*. McAllister documented examples of traditional agricultural activity in Honouliuli, writing that the *kama‘āina* of the *ahupua‘a* utilized the soil on the floor of caves for cultivation. At the time of his survey in 1930 both *mai‘a* (bananas) and *kō* (sugarcane) were still being cultivated within these pits. Mrs. Paulette Ka‘anohi Kaleikini revealed that although the ground surface near the project area appears limited in terms of arability, the area once was fertile. The success of plant resources may be attributed to “pit caves” or “sink holes,” such as those identified by McAllister (1933), and those alluded to by Mrs. Kaleikini.

Interviewees Jan Becket and Shad Kāne led CSH on a *huaka‘i* within the Kalaeloa Heritage Park where numerous pit caves or sinkholes were observed on all sides of Kualaka‘i Trail. Mr. Becket explained that populations of Hawaiians used these sinkholes for agricultural purposes, however, in some other areas, pit caves were possibly utilized for burials. Mr. Shad Kāne later comfirmed this with CSH. Man-made modifications were observed in association with the natural sinkholes. Another sinkhole observed in close proximity to a partial enclosure appears to have functioned as an underground water source. Mr. Becket shared that underground streams once flowed, undisturbed, throughout the ‘Ewa plains, however, the development of the area, spurred by historic-era sugar production and industry, led to the drilling of artesian wells. The extraction of the water impacted the local eco-system.

The primary water body of the Honouliuli Watershed is the “perennial/intermittent” Honouliuli Stream (O‘ahu Resource Conservation and Development Council 2013:16), which bisects the Honouliuli Gulch. The Honouliuli Gulch is located toward the east side of the plain that drains into West Loch. The major gulches for Honouliuli, from east to west along the Wai‘anae Range, are Awanui, Pālailai, Makaīwa, Waimānalo, and Limaloa. Generally, 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 for 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*. The production (and consumption) of *kalo* was vitally important to many communities of Native Hawaiians living in ‘Ewa. Captain James King, visiting Hawai‘i in 1779, noted that “the natives of these islands are, in general, above the middle size and well made; they walk very gracefully, run nimbly and are capable of bearing great fatigue” (Shintani 1993:10). Accordingly, the high level of physical activity and physical fitness described by Captain King was a normal part of Hawaiian life and was largely attributable to the availability of plant and food resources such as *kalo, ‘uala* (sweet potato; *Ipomoea batatas*), *niu, mai‘a, limu* (seaweed), and *i‘a* (fish). Besides the observed contributions to stamina and health, *kalo* was also a revered staple food, believed to have derived from the first-born son of Wakea and Papa.

> . . . the supreme god Kane ‘in the form of Wakea (a form associated with the earth) produced two sequential offspring: the first became kalo (taro) plant, the second became Hāloa, the ancestor of man . . . thus, in kinship terms, the taro is the elder

> brother and the senior branch of the family tree, mankind belongs to the junior branch, stemming from the younger brother.' [Trask 2012:75]

'Ewa was also famous for a rare taro called the "*kāī o 'Ewa*," which was grown in mounds in marshy locations (Handy and Handy 1972:471). The cultivation of this prized and delicious taro led to the saying, "*Ua 'ai i ke kāī-koi o 'Ewa*, He has eaten the Kāī-koi taro of 'Ewa" (Pukui 1983:305).

Traditional Hawaiian diets were also supplemented with ocean-based proteins. Native Hawaiians historically fished the reefs, farmed fishponds, and utilized the freshwater springs in the *ahupua'a* of Honouliuli. The lochs of Pearl Harbor were ideal for the construction of fishponds and fish traps. References to the abundance of ocean resources can be found within *mo'olelo*, *wahi pana*, and *'ōlelo no'eau* associated with Honouliuli Ahupua'a.

The *mo'olelo* "Legend of the Children" describes the coastal area of Kualaka'i as being plentiful in fish. Clark (1977:74) and Pukui et al. (1974:119) describe Kualaka'i as a type of sea cucumber (*Tethys*) that squirts purple fluid when squeezed. The *'ōlelo no'eau,* "*Kai a hali a ka makani*," translates to "the fish fetched by the wind" which describes the migration of the *'anae* that travels from the leeward coast to the windward coast of O'ahu. Mr. Shad Kāne also discussed the importance of the Kualaka'i Trail and "*kō kula 'uka, kō kula kai*," wherein "those of the uplands" exchanged food resources with "those of the sea." Mrs. Kaleikini also spoke to the importance of trails, and the ways they supported both physical and spiritual sustenance.

During community consultation, no mention was made by interviewees of current gathering practices occurring within the project area. The cultivation of native Hawaiian plants, for both cultural and educational purposes, appears to be confined to the Kalaeloa Heritage Park, located approximately 4.3 km (2.7 miles) south of the current project area.

6.2 Cultural Sites

Cultural sites, or Hawaiian *wahi pana* effectively contribute to the ways in which *kama'āina* remember and identify (Basso 1996; Holtorf and Williams 2006), and thus continue to manifest and perpetuate culture. As Cipolla (2008) makes clear,

> . . . people inherit the places that they inhabit (from the past), connections between memory, identity and landscape are usually quite strong. In this sense, space, as configured in the past (which could be the recent past) by either natural or cultural processes, ties reflexively to social relations in the present (see Bourdieu 1977; Lefevbre 1991) and, in turn, to social memories. [Cipolla 2008:199]

These social memories, in turn, work to inform world views and everyday practices. Counted among these practices, and largely subsumed under a "living contemporary culture" (Kawelu 2015:3), is the care or management of natural resources including cultural sites. There exist a myriad of cultural sites or *wahi pana* for 'Ewa Moku, however, for the *ahupua'a* of Honouliuli trails, plains, and temples were of particular importance.

Trails were and continue to be valuable resources for Native Hawaiian culture and life ways. In the past, trails were well-used for travel within the *ahupua'a* between *mauka* and *makai* and laterally between *ahupua'a*. A historical trail system existed in O'ahu that extended from Honolulu to Wai'anae and passed through Honouliuli. Interviewee Mr. Shad Kāne made note of the Kualaka'i Trail, and possible linkages between the Lō Ali'i and ancient trails leading out of West

Loch and into the Honouliuli region. Mrs. Kaleikini highlighted that trails allowed for the access of spiritual sites. These spiritual sites included Kūkaniloko in Wahiawā, Mauna Kapu in Honouliuli and Nānākuli, and Mount Ka‘ala in the Wai‘anae Mountain Range.

The *makai* region of Honouliuli was the site of multiple Hawaiian household clusters, largely associated with the *maka‘āinana* class. Mr. Becket pointed out a possible family *kuahu*, possibly a *pōhaku o Kāne*. The cultural site consisted of a shrine with an upright stone fronting it. Another prominent feature along the trail was a *pā* enclosing a possible house site with an upright stone at the corner of two walls. This upright stone may have once functioned as a god-stone. This feature demonstrates Hawaiian dry-stacking with no upright stones incorporated into the structure like that of Tahitian-style construction. Another feature observed is Site #1755, a four-wall enclosure which Mr. Becket recognized as possibly being a *heiau* or *ahu*. Other upright stones were seen along the trail. Markings observed on an upright stone were reminiscent of *makaiwa*. *Makaiwa* is also the name given to a gulch located in the *mauka* portion of Honouliuli Ahupua‘a. Another feature observed during the *huaka‘i* is a historical trench built during WWII which was dug out of the karst in a zig-zag pattern so that troops could be ready for an attack from either direction. The ‘Ewa coastal plain was also a place of spiritual significance as it was associated with the *ao kuewa*, the realm of the homeless souls. According to Samuel Kamakau, there existed three spirit realms, the *ao kuewa*, *ao ‘aumakua*, and *ke ao o milu*. Those spirits stuck in the *ao kuewa*, would wander in the *wiliwili* grove of Kaupe‘a on O‘ahu until such time that they were rescued by their *‘aumakua*. Nearby Pu‘uokapolei and Kānehili were also associated with wandering souls, as illustrated within the lament for Kahahana. To be forgotten or abandoned by one’s *‘aumakua* was a fate that most feared (Beckwith 1970:154); these wandering spirits were often malicious, so the places where they wandered, such as Kaupe‘a at ‘Ewa, were avoided.

The plain of Pukaua is also located near Pu‘uokapolei. Two distinct *mo‘olelo* are connected with this cultural site. The first of these two stories was presented within a 13 January 1900 publication of *Ka Loea Kālai‘āina*. The second *mo‘olelo* involves Hi‘iaka, and is spread across several daily publications of *Ka Hōkū o Hawai‘i* from February 1927.

In several *mo‘olelo* of ‘Ewa, mention is made of the “plain of Keahumoa.” This plain features within descriptions of nearby trails. According to John Papa ‘Ī‘ī (1959:96), this plain is opposite of the trail to Pōhākea Pass, stretching across the *ahupua‘a* of Honouliuli and Hō‘ae‘ae. It is believed that this is probably a general name for the flat plain *mauka* of the productive floodplain area directly adjacent to Pearl Harbor. Regarding these wide expanses throughout Honouliuli, Mrs. Kaleikini noted that “some [*kanaka maoli*] lived in these areas, others passed through. Some traveled the distance, many did not make it. Remains of theses natives have been found.” Mrs. Kaleikini also noted that due to the proximity of ancient settlements, and high level of human activity in proximity to the project area, intact cultural deposits, including ancestral human burials may yet be encountered during ground disturbance. As such, Mrs. Kaleikini recommended that culturally sensitive practices be employed, specifically that project personnel “malama [take great care as to] how [or the manner in which they engage in ground disturbance] and [also take great care in selecting the] location of digging.” Such action conforms to contemporary ways, or practices, of caring for natural and cultural resources.

Cultural practices within Honouliuli of late have been inspired by traditional understandings of caring for natural and cultural resources. The Kalaeloa Heritage and Legacy Foundation has adopted practices wherein the community can *mālama* cultural sites, and in turn benefit from the

knowledge inherent in such sites. Previously documented cultural sites within the Kalaeloa Heritage Park are actively cared for while also the subject of numerous university-level studies. These sites have been established as important centers for an *‘āina*-based education.

6.3 Religious Practice and Burials

Traditionally, prior to any undertaking, prayers were offered to the multitude of ancestor gods and spirits, to *akua*, *‘aumākua*, and *kupua* alike. As Mary Kawena Pukui notes, “Long before the missionaries came, Hawaiians were *haipule*, religious. Everything they did, they did with prayer” (Pukui et al. 1972:121). Formal prayers consisting of “composed, memorized, handed-down chants” (Pukui et al. 1972:123) were often associated with public ceremonies involving both the *ali‘i* and the priestly class. Those belonging to the royal and priestly classes prayed before *kuahu* (altars) and *heiau* (Pukui et al. 1972:123). According to Pukui et al. (1972:123), “these prayers were often accompanied by sacrifices to the gods, [and] embellished by ritual. . .”

It was at the *heiau*, the sacred temples, that sacrifices or offerings were made. Several *heiau* stood in Honouliuli Ahupua‘a including Pu‘u o Kapolei Heiau, Pu‘u Ku‘ua Heiau, and two unidentified *heiau* located at the foot of Pu‘u Kanehoa and Pu‘u Kuina, respectively.

In Honouliuli Ahupua‘a, chant is offered at a ceremony commemorating the changing of the seasons. 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* perform *oli* and *hula* during the ceremony (Genz et al. 2012). In Honouliuli Ahupua‘a, the ceremony occurs at a *heiau* on Pu‘uokapolei. This *heiau* is oriented so that it views the setting of the sun behind Pu‘ula‘ila‘i farther west, and maintains a line of sight extending eastward from Pu‘ula‘ila‘i, Pu‘uokapolei, toward Waikīkī and the closely associated Papa‘ena‘ena Heiau.

Mrs. Kaleikini noted that many individuals made attempts to visit spiritual locations throughout the *ahupua‘a.* Unfortunately, some of these pilgrims were unsuccessful on their journeys, their spirits passing on before reaching their desired destination. Upon death, the spirit of the recently deceased was said to leave the body and then proceed toward a leaping place (Handy and Pukui 1977:146). It was in fact the *‘aumakua* that guided the spirit to and over the *leina* (leaping place) for its leap into Pō, the world of the “unseen” (Handy and Pukui 1977:146). However, if the soul of the deceased had no place in the *‘aumakua* realm, or was abandoned by an *‘aumakua*, they were destined to wander the *wiliwili* grove of Kaupe‘a.

While the fate of one’s spirit remained in the hands of the *‘aumakua*, the body of the deceased was attended to by the living. Those who attended the dead body, preparing it for burial were considered *haumia* (defiled) (Malo 1951:97). Burial was done at night,

> . . . so that by morning the burial was accomplished. Then in the early morning all who had taken part in the burial went and bathed themselves in [the ocean] water, and on their return from the bath seated themselves in a row before the house where the corpse had been. [Malo 1951:97]

A purification ceremony was then performed by the *kahuna pule heiau* (temple priest) for all those who participated in the burial (Malo 1951:97). Burials have been encountered in the coastal areas of the *ahupua‘a*, however, no burials have been encountered within the project area nor within the vicinity of the project area.

In her comments addressed to CSH, Mrs. Kaleikini noted the remains of travelers, many of whom on journeys to visit ‘Ewa Moku’s *wahi kapu*, have been previously found. She also noted that “remains of natives who fought in ancient battles on the lands have also been found.”

Section 7 Summary and Recommendations

CSH undertook this cultural impact assessment at the request of Engineering Concepts, Inc. and R.M. Towill Corporation, on behalf of the BWS. The research broadly covered the entire *ahupua‘a* of Honouliuli, including the current project area.

7.1 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.
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* and *kō* 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 southeast 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. Following the Māhele of 1848, 96 individual land claims were made in the *ahupua‘a* of Honouliuli, with 72 claims being registered and awarded by King Kamehameha III to *maka‘āinana*. The 72 *kuleana* awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, irrigated *lo‘i, kula,* and house lots.
12. 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 for a total of $95,000.
13. 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 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).
14. The early twentieth century saw the lands of Honouliuli heavily utilized by both civilians and the U.S. military for transportation. The Barbers Point Military Reservation was established in 1921.

7.2 Results of Community Consultation

CSH attempted to contact NHOs, agencies, and community members. Below is a list of individuals who shared their *mana‘o* and *‘ike* about the project area and Honouliuli Ahupua‘a:

1. Paulette Ka‘anohi Kaleikini, cultural descendant and owner of ‘Ōiwi Cultural Resources
2. Jan Becket, author, photographer, and retired teacher from Kamehameha Schools. Kona Moku Representative, Council of Hawaiian Civic Club’s Committee on the Preservation of Historic Sites and Cultural Properties
3. Shad Kāne, spokesperson for the Kalaeloa Heritage Park

7.3 Impacts and Recommendations

Based on information gathered from the cultural and historical background, and the community consultation, potential impacts were identified and the following preliminary recommendations were made.

1. Historically, the area in and around the project area was traversed by Native Hawaiians through a series of *mauka-makai* and cross-*ahupua‘a* trails. The current project area currently crosses over portions of these ancient trails. Despite documentary evidence of ancient Hawaiian activity in the area, previous archaeological studies have yielded no significant findings. Previous archaeological studies in the vicinity of the project area have identified historic properties associated with historic-era sugar cane operations. Despite relatively few findings in the vicinity of the project area, intact cultural deposits, including *iwi kūpuna*, may yet be encountered during ground disturbance. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. Mrs. Paulette Ka‘anohi Kaleikini, a cultural descendant for Honouliuli Ahupua‘a, recommended that culturally sensitive practices be employed, specifically that project personnel “malama [take great care as to] how [or the manner in which they engage in ground disturbance] and [also take great care in selecting the] location of digging.” In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* 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.
2. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.
3. One interviewee, Mr. Jan Becket, said he had no objection to the current project. He did feel it important to share and keep in mind that the ‘Ewa Plains once had underground water flowing to source the area, however, due to extraction, water no longer flows.

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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
Kapāmuku	loko	the short wall	Pukui and Elbert 1986

Place	Type	Meaning	Source
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
Manuwaikealae	gulch		
Maui	*‘ili ‘āina*		
Maunakapu	peak	sacred mountain	Pukui et al. 1974

Place	Type	Meaning	Source
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
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

Draft Biological surveys for a proposed BWS East Kapolei reservoir and transmission line, Kapolei, O‘ahu. AECOS No. 1518. Prepared by Eric Guinther and Susan Burr. September 2017.

Biological surveys for a proposed BWS East Kapolei reservoir and transmission line, Kapolei, O‘ahu

September 15, 2017 | ***DRAFT*** | *AECOS* No. 1518

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Introduction

In order to preserve potable water sources by better serving non-potable water needs in the Kapolei area, BWS is proposing to construct a 3.0-million gallon concrete reservoir for the storage of non-potable (R-1) water at a location adjacent to an existing BWS reservoir (East Kapolei 215 Reservoir). A new 16-in transmission main will extend from an existing R-1 system along Kualakai Parkway to supply the R-1 reservoir (Figure 1).

The reservoir site is presently unused land directly adjacent (*makai*) to the H-1 Freeway. Land bordering the site on the west and south are (or have been recently) in agriculture (cropland). A narrow, man-made channel (Hunehune Gulch) separates the west side of the site from a crop field. The existing BWS potable water 215 reservoir is located behind a security fence directly to the east.

The proposed transmission line would follow the site access road to Farrington Highway, turn east to the intersection of Farrington Highway and Kualakai Parkway (formerly North-South Road), turn south and proceed within the west side r-ow of the Kualakai Parkway to the vicinity of the UH West Oahu HART (Honolulu Authority for Rapid Transportation) station (under construction), at which point it would cross Kualakai Pkwy to the east side r-ow. From the vicinity of the station, the line would proceed south to an existing R-1 system line located approximately 1300 ft north of Kapolei Parkway. Botanical surveys have been conducted over much of this route in the recent past (Char, 1997a; *AECOS*, 2010a).

AECOS Inc. was contracted by R. M. Towill Corp. to provide natural resources surveys of the proposed R-1 reservoir site (approx. 2.8 ac) and transmission main route (12,750 ft).

Figure 1. Project location map: BWS 215 reservoir and proposed transmission main.

Methods

Botanical Survey

AECOS botanis, Eric Guinther, conducted a plant survey of the East Kapolei 215 R-1 reservoir and transmission main sites on September 5, 2017 using a pedestrian or wandering transect method that entailed covering the survey area (Fig. 2) on foot and noting each plant species as it was encountered. The botanist carried a Trimble 6000 Series GNSS unit (GeoXH) to record a progress track, providing real-time feedback on location and adequacy of coverage during the survey as well as the capability to mark the position of any feature or plant of special interest or concern. Any plant not immediately recognized during the survey was photographed and/or a representative feature (e.g., a flower, fruit, or leaf) collected for later identification at the laboratory.

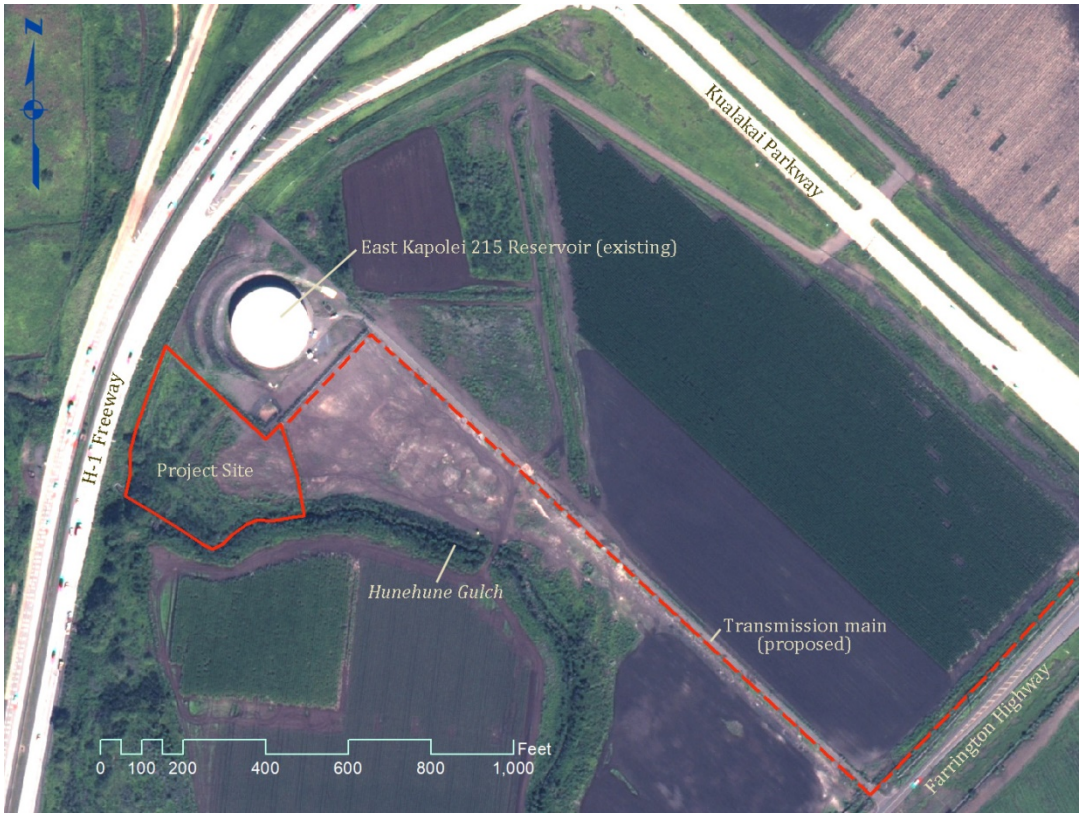

Figure 2. Survey area outlined in red and a portion of the transmission line route indicated in dashed red line.

Within the reservoir site, notes on the abundance of species were kept for reporting a rough qualitative sense of each species. Only presence/absence was used along the transmission line because no clear boundaries of an area were established. Although the survey was conducted in the dry season, conditions with respect to plant health were not seriously adverse; plants were readily identifiable by fruits and flowers.

Plant names used herein follow *Manual of the Flowering Plants of Hawai'i* (Wagner, Herbst, & Sohmer, 1990; Wagner & Herbst, 1999) for native and naturalized flowering plants, and *A Tropical Garden Flora* (Staples & Herbst, 2005) for ornamental plants. More recent name changes for naturalized plant species follow Imada (2012).

Avian Survey

Four avian count stations were established by *AECOS* biologist, Susan Burr, within the reservoir site on September 5, 2017; a single six-minute avian point-count was made at each station. Field observations were accomplished with the aid of Leica 10 x 42 BA binoculars and by listening for vocalizations, although proximity of the project area to the H-1 freeway and Kualakai Parkway made audial detection difficult.

Avian counts were conducted between 10:00 am and 12:15 pm. Time not spent at point-count stations was used to search the area for species and habitats not detected during the point-counts and any additional species observed are listed as "incidental sightings". Weather conditions were ideal, with no rain, unlimited visibility, and light winds from the east northeast. The avian phylogenetic order and nomenclature used in this report follows the *Checklist* of *North and Middle America Birds* by American Ornithological Society (AOS, 2017).

Terrestrial Mammals Survey

The survey of mammals on September 5, 2017 was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally of all terrestrial vertebrate mammalian species detected within the project area was kept along with notes of general abundances.

Results

Vegetation

The proposed site is mostly low to moderately sloping open field covered by grasses and other herbaceous plants and scattered small shrubs (Figure 3). A fallow crop field adjacent on the south supports a mix of mostly ruderal shrubs, dominated by Russian thistle (*Salsola tragus*) and marked by extensive areas of bare ground. A moderately dense growth of *koa haole* (*Leucaena leucocephala*) scrub borders the banks of dry Hunehune Gulch. This scrub growth extends across the steeper north side of the property, mixed into an open-canopy forest of *kiawe* (*Prosopus pallida*). The site rises steeply in the northeast corner up to a small knoll over-looking the H-1 freeway.

Figure 3. Site vegetation: grassy field with in foreground, *kiawe* savannah with *koa haole* scrub mid-ground.

Nearly all of the r-o-w proposed for the transmission line is regularly maintained (mowed) ground up to any fence bordering the roadways. Only along the BWS access road does any substantial amount of vegetation occur (Figure 4). Because the east side of Kualakai Parkway borders the HART

guideway, an especially broad and leveled verge extends between the parkway pavement and a security fence bordering a large drainage canal (Kaloʻi Ditch) beyond. Plants all along the transmission line route are decidedly ruderal in character.

Figure 4. BWS access road to East Kapolei 215 reservoir looking towards Farrington Hwy., showing vegetation along upper transmission line route.

Flora

A total of 49 species of plants were identified from the survey area, 28 of which were recorded as present on the R-1 reservoir site; 41 species were observed along the proposed transmission route. Twenty-one species were common to both areas. All of the plants, with the exception of three species, are common, naturalized (non-native) species. Three indigenous species (plants native to Hawaiʻi and elsewhere) occur in the survey areas: *ʻuhaloa* (*Waltheria indica*) is common throughout the area; *ʻilima* (*Sida fallax*) and *kīpūkai* (*Heliotropum curassavicum*) were represented in this survey by single plants seen along the transmission route. Although the existing fenced 215 Reservoir site was not accessed, plants observed from outside the fence were the same as those in the

open areas of the survey site, with the exception of a border of ornamental oleander (*Nerium oleander*) planted along the fence in the southwest corner of the site.

Table 1 - Flora for BWS parcel, Kapolei, O'ahu.

Family Species	Common name	Status	Abundance SITE	 MAIN	Notes
	FLOWERING PLANTS DICOTYLEDONS				
ACANTHACEAE					
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	R	--	
AIZOACEAE					
Trianthema portulacastrum L.	---	Nat	--	✓	
AMARANTHACEAE					
Amaranthus spinosus L.	*pakai kukū*, spiny amaranth	Nat	--	✓	
ASCLEPIDACEAE					
Stapelia gigantea N.E. Brown	giant toad plant	Nat	R	--	
ASTERACEAE (COMPOSITAE)					
Pluchea carolinensis (Jacq.) G. Don	sourbush	Nat	U	✓	
Sonchus oleraceus L.	sow thistle	Nat	--	✓	
Tridax procumbens L.	coat buttons	Nat	U	✓*	
Verbesina encelioides (Cav.) Benth. & Hook.	golden crown-beard	Nat	--	✓	
Xanthium strumarium L.	*kīkānia*, cocklebur	Nat	--	--	
BORAGINACEAE					
Heliotropum curassavicum L.	*kīpūkai*	**Ind**	--	✓	
CHENOPODIACEAE					
Atriplex suberecta Verd.	---	Nat	---	✓	
Salsola tragus L.	Russian thistle	Nat	U	✓	
CONVOLVULACEAE					
Ipomoea obscura (L.) Ker-Gawl.	---	Nat	O	✓	
CUCURBITACEAE					
Cocinia grandis (L.) Voigt	scarlet-fruited gourd	Nat	R	✓	
Momordica charantia L.	wild bitter melon	Nat	--	✓	
EUPHORBIACEAE					
Euphorbia hirta L.	garden spurge	Nat	--	✓	
Euphorbia prostrata L.	prostrate spurge	Nat	--	✓	
Ricinus communis L.	*pā'aila*, castor bean	Nat	--	✓	
FABACEAE					
Albizia saman F. Muell.	monkeypod	Nat	R	✓	
Chamaecrista nictitans (L.) Moench	*laukī*, partridge pea	Nat	Ru	--	
Crotalaria incana L.	fuzzy rattlepod	Nat	O	✓	
Crotalaria pallida Aiton	smooth rattlepod	Nat	Ou	✓	

Table 1 (continued).

Family Species	Common name	Status	Abundance SITE	 MAIN	Notes
FABACEAE (continued)					
Desmanthus pernambucanus (L.) Thellung	virgate mimosa	Nat	C	✓	
Indigophera hendecaphylla Jacq.	creeping indigo	Nat	Ua	✓	
Leucaena leucocephala (Lam.) deWit	*koa haole*	Nat	C	✓*	
Macroptilium atropurpureum (DC.) Urb.	---	Nat	Ca	✓	
Macroptilium lathyroides (L.) Urb.	cow pea	Nat	O	--	
Pithecellobium dulce (Roxb.) Benth.	*'opiuma* (juv.)	Nat	--	✓	
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	*kiawe*	Nat	Oc	--	
LAMIACEAE					
Hyptis pectinacea (L.) Poit.	comb hyptis	Nat	R	--	
Leonotis nepetifolia (L.) R. Br.	lion's ear	Nat	--	✓	
MALVACEAE					
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	Nat	R	✓	
Malachra alceifollia Jacq.	---	Nat	--	✓	
Malvastrum coromandelianum (L.) Garcke	false mallow		R	✓	
Sida ciliaris L.	---	Nat	Ua	✓	
Sida fallax Walp.	*'ilima*	**Ind**	--	✓	
Sida spinosa L.	prickly sida	Nat	U	✓	
Waltheria indica L.	*'uhaloa*	**Ind**	C	✓	
NYCTAGINACEAE					
Boerhavia coccinea Mill.	false *alena*	Nat	--	✓	
PASSIFLORACEAE					
Passiflora foetida L.	running pop	Nat	U	✓	
SOLANACEAE					
Nicandra physalodes (L.) Gaertn.	apple of Peru	Nat	U	--	
MONOCOTYLEDONES					
POACEAE (GRAMINEAE)					
Bothriochloa barbinodes (Lag.) Herter	fuzzy top	Nat	--	✓	
Cenchrus ciliaris L.	buffelgrass	Nat	AA	✓*	
Chloris barabata (L.) Sw.	swollen fingergrass	Nat	Oa	✓	
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	--	✓*	
Megathyrsus maximus (Jacq.) B.K. Simon & W.L. Jacobs	Guinea grass	Nat	AA	✓*	
Melinus repens (Willd.) Zizka	Natal redtop	Nat	--	✓	
Setaria verticillata (L.) P. Beauv.	*mau'u pilipili*, bristly foxtail	Nat	--	✓	
Sorghum bicolor (L.) Moench	--	Nat	--	✓	

Table 1 (continued).

Legend to Table 1:

Status = distributional status

Ind = indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.

Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

Abundance = occurrence ratings for plants on property in March 2008

R – Rare - only one or two plants seen.

U - Uncommon - several to a dozen plants observed.

O - Occasional - found regularly, but not abundant anywhere.

C - Common - considered an important part of the vegetation and observed numerous times.

A - Abundant - found in large numbers; may be locally dominant.

AA - Abundant - very abundant and dominant; defining vegetation type.

Lowercase letters following qualitative rating of abundance indicate localized abundance is greater than occurrence rating. For example, Ra would be a plant encountered in onty one or two places, but numerous where encountered.

✓ - Observed along the proposed pipeline route.

✓* - Most abundant of plants observed along proposed pipeline route.

Avian Survey

During the point-count surveys, we identified 21 individual birds of 6 species repesenting 8 families (Table 2). All species detected are alien to the Hawaiian Islands. Zebra Dove (*Geopelia striata*) was the most common species observed at the project site. Japanese White-eye (*Zosterops japonicus*) and Common Myna (*Acridotheres tristis*) were observed at two count stations and Spotted Dove (*Streptopelia chinensis*), House Sparrow (*Passer domesticus*), and Common Waxbill (*Estrilda astrild*) were observed at one station each. Gray Francolin (*Francolinus pondicerianus*), Mourning Dove (*Zenaida macroura*), Red-vented Bulbul (*Pycnonotus cafer*), and Red-crested Cardinal (*Paroaria coronata*) were only recorded as incidental observations.

Table 2. List of bird species observed and their relative abundance at the project site during the September 5, 2017 survey.

Scientific name	Common name	Status	10-min Counts Sta. 1	Sta. 2	Sta. 3	Sta. 4	***RA†***
		GALLIFORMES					
		PHASIANIDAE – Pheasants & Partridges					
Francolinus pondicerianus Gmelin	Gray Francolin	A	--	--	--	--	I-1

Table 2 (continued).

Scientific name	Common name	Status	10-min Counts Sta. 1	Sta. 2	Sta. 3	Sta. 4	***RA†***
	COLOMBIFORMES						
	COLUMBIDAE – Pigeons & Doves						
Zenaida macroura L.	Mourning Dove	A	--	--	--	--	I-1
Streptopelia chinensis Scopoli	Spotted Dove	A	--	1	--	--	0.25
Geopelia striata L.	Zebra Dove	A	--	5	1	1	1.75
	PASSERIFORMES						
	PYCNONOTIDAE – Bulbuls						
Pycnonotus cafer L.	Red-vented Bulbul	A	--	--	--	--	I-2
	ZOSTEROPIDAE – White-eyes						
Zosterops japonicus Temminck & Schlegel	Japanese White-eye	A	2	--	2	--	1.00
	STURNIDAE – Starlings						
Acridotheres tristis L.	Common Myna	A	2	--	1	--	0.75
	THRAUPIDAE – Tanagers						
Paroaria coronata J. F. Miller	Red-crested Cardinal	A	--	--	--	--	I-1
	PASSERIDAE – Sparrows						
Passer domesticus L.	House Sparrow	A	--	--	--	3	0.75
	ESTRILDIDAE – Estrildid Finches						
Estrilda astrild L.	Common Waxbill	A	--	--	--	3	0.75

Legend to Table 2

† ***RA*** Relative abundance – number of birds detected divided by number of count stations.

Status = distributional status for the Hawaiian Islands:
A Alien – Introduced to the Hawaiian Islands by humans.

Mammalian Survey

No mammals were observed during our survey. However several well-worn trails cross the grassland, possibly made by wild pig (*Sus scrofa*). We observed sign of domesticated dog (*Canus lupus familiaris*).

Discussion

Botanical Resources

No plants of any particular concern were noted during our survey at either the proposed reservoir site or along the transmission line route. Indeed, with the exception of the ubiquitous *'uhaloa*, no other native plants were observed on the reservoir site, and only two other very common native species were recorded as rare along the transmission line route. These results reflect the highly disturbed nature of the entire area with respect to remnant native vegetation.

At one time, the endangered plant, *ko'oloa 'ula* (*Abutilon menziesii*) was reported over an area where the proposed transmission line is proposed to cross (Char, 1997a,b; HFDC, 1998; *AECOS*, 2010a,b, 2011). A reserve for this species has been set aside nearby. No species listed as state or federally endangered or threatened (HDLNR, 1998; USFWS, 2017) are present in the project area.

Avian Resources

The findings of the avian survey are consistent with what would be expected in a highly disturbed area at this elevation on the 'Ewa Plain (*AECOS*, 2005a, 2013; Bruner, 2005). The majority of birds we observed in the project area are naturalized, urban-dwelling birds. Of the ten species observed (including incidental observations), six (Mourning Dove, Spotted Dove, Zebra Dove, Red-vented Bulbul, Common Myna, and Japanese White-eye) are listed as injurious species—animals known to be harmful to agriculture, aquaculture, indigenous wildlife or plants, or constitute a nuisance or health hazard (HDLNR, 2015). Gray Francolin is an introduced game bird. No species listed as state or federally endangered or threatened (HDLNR, 2015; USFWS, 2017) are present. The project is not expected to adversely impact avian resources recorded from project area.

The Migratory Bird Treaty Act (MBTA) offers protection to several species of birds that occur on O'ahu, including seabirds and shorebirds. No known nesting colonies of any of the O'ahu resident seabird species occur on, or within close proximity of, the project area. Several species of seabirds might over-fly the area, but there are no resources present in the project area that would be utilized by seabirds. Pacific Golden Plover or *kōlea* (Pluvialis fulva), an indigenous migratory shorebird, might regularly visit the tank location. Pacific Golden Plover is not a listed species, but an indigenous migratory shorebird species that nests in the high Arctic during the late spring and summer months,

and spends winter months in Hawai'i and elsewhere in the tropical Pacific. In Hawai'i, these birds tend to associate with open areas, particularly lawns and fields with short or sparse vegetation. Broad verges adjacent to the east side of Kualakai Parkway might provide suitable loafing and feeding habitat for this species.

The *pueo* or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) is an endangered (state-listed only, on O'ahu), endemic sub-species and known from undeveloped lands *mauka* (upland) of the project site (David & Guinther, 2013). This native owl might nest in the grassy field and hunt over the proposed reservoir site.

Mammalian Resources

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or *'ōpe'ape'a* as it is known locally, all terrestrial mammals currently fond on the Island of O'ahu are alien species, and most are ubiquitous. The Hawaiian hoary bat or *'ōpe'ape'a* (*Lasiurus cinereus semotus*) is the only Endangered Species Act (ESA)-listed terrestrial mammal in Hawai'i.

Given the paucity of documented records of this species from the 'Ewa Plain, the chance that bats use resources in the project area are extremely low. Additionally, very few suitable roosting sites (trees in excess of 4.6 m or 15 ft) for Hawaiian Hoary bat are present on the property. A few modest *kiawe* trees are present, but these spiny trees are unlikely to be of interest to Hawaiian hoary bat.

The findings of the mammalian survey are consistent with the location of the property and the habitats present on or adjacent to the site. Although no rodents were recorded in our survey, some, if not all, of the four established Muridae found in Hawai'i—roof rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), black rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus musculus domesticus*)—could use various resources within the Project area. All of these introduced rodents are deleterious to native ecosystems and native species. No mammalian species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs were detected during the course of this survey (DLNR, 2015; USFWS, 2015).

Critical Habitat

No federal Critical Habitat exists for any species at the Project site. Thus, modification of habitats on all or any part of the site will not result in an impact

to federally designated Critical Habitat. There is no equivalent statute under state law.

Jurisdictional Waters

No wetlands or perennial streams occur in the Project area. Hunehune Gulch is a man-made ditch constructed to convey run-off between agricultural fields from a small watershed draining the east slope of Puʻu Makakilo (*mauka* of the H-1; *AECOS*, 2005b). This normally dry ditch is tributary to Kaloʻi Gulch, a conveyance that eventually dissipates flow into large detention basins and the limestone substrate of the 'Ewa Plain; Kaloʻi has been declared jurisdictional and not jurisdictional at times in the past. The ditch marks the western parcel boundary and would not be disturbed by the proposed reservoir construction.

Recommendations

- Prior to the start of grubbing/grading of the reservoir site, a qualified biologist should complete a survey of the area to be disturbed to be sure that no nesting *pueo* are present. In the event that a nest is located, BWS must contact DLNR for instructions before starting any clearing work.

- If construction activity is to be undertaken after sunset, all associated lights should be well-shielded, and where large flood/work lights are used, these should be placed on poles that are high enough to allow the lights to be pointed directly downward. Avoiding night-time work during the peak of seabird fallout between September 15 and December 15 can minimize adverse impacts to listed seabird species that might overfly the project vicinity.

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Appendix D

Correspondence for Transfer of Land in Tax Map Key: (1) 9-1-018: Por. 008 from the Board of Land and Natural Resources to the BWS for Construction and Operation of the East Kapolei 215 R-1 3.0 MG Reservoir and 16-Inch Transmission Main Project.

DAVID Y. IGE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 2, 2020

Ref: EO 4307

Ernest Y.W. Lau, P.E.
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
530 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Lau:

Subject: Disposition of a Portion of State Land Situate at Honouliuli, Ewa, Oahu for the Board of Water Supply East Kapolei 215' R-1 Recycled Water Reservoir, TMK (1) 9-1-018: portion of 008

Thank you for your letter dated May 15, 2020 regarding the subject matter.

During the conference call with Mr. Barry Usagawa and Mr. Michael Matsuo of your office and your consultant on April 13, 2020, we discussed various aspects, including compliance of Chapter 343, Hawaii Revised Statutes regarding environmental assessment of the project.

We concur that Board of Water Supply will be the accepting authority for the preparation, acceptance and filing of the environmental assessment of the project.

If you have further questions, please feel free to contact Barry Cheung at 587-0430 or email at barry.w.cheung@hawaii.gov.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Administrator

BOARD OF WATER SUPPLY

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

May 15, 2020

Ms. Suzanne Case, Chair
State of Hawaii
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, Hawaii 96809

Attention: Mr. Russell Tsuji

Dear Ms. Case:

Subject: Disposition of a Portion of State Land Situate at Honouliuli, Ewa, Oahu, Hawaii, Tax Map Key: 9-1-018: 008 for the Board of Water Supply East Kapolei 215' R-1 Recycled Water Reservoir

Thank you for your consideration of the transfer of a portion of the subject property to the Board of Water Supply (BWS) for the proposed East Kapolei 215' 3.0 million gallon R-1 recycled water reservoir. The reservoir will increase R-1 recycled water uses by providing adequate volume and service pressures for irrigation demands of developments in the Ewa area, including State projects.

Initially, discussion with your staff and BWS resulted in a recommended action to convey the recycled water reservoir site to BWS through the issuance of a direct lease to BWS. The lease concept was based on a previous Board of Land and Natural Resources approval dated January 13, 2012 to lease state lands in East Kapolei for income generation. We understand that after a re-evaluation, the Department of Land and Natural Resources (DLNR) is open to pursue transferring the recycled water reservoir site to BWS by Governor's Executive Order (EO). We support transfer by EO because historically the State has employed this method to convey State lands to BWS for public benefit.

In keeping with the original intent of the lease, we propose an alternative means of compensation through a Water System Facilities Charge impact fee dollar credit equal to a mutually agreeable appraised value of the 2.0-acre recycled water reservoir site. We understand DLNR supports this concept and noted that they have several parcels in the East Kapolei area that require potable and nonpotable water. The impact fee credit will be specific to this project area and is similar to State impact fee credits for well sources dedicated to BWS.

Additionally, we request your concurrence that BWS will be the accepting authority for the preparation, acceptance and filing of the project's Hawaii Revised Statutes, Chapter 343 Environmental Assessment based on the intent of the transfer of land title from DLNR to BWS. The subject parcel is currently zoned agriculture and is not in the State Conservation District.

We appreciate your written concurrence of our request and if you have any questions, please contact Barry Usagawa, Water Resources Program Administrator at 748-5900.

Very truly yours,

ERNEST Y.W. LAU, P.E.
Manager and Chief Engineer

cc: Land
B. Usagawa

No Log #

Project Teleconference Notes
East Kapolei 215 R-1 Reservoir and Transmission Main Project
Kapolei, Island of O'ahu, Hawai'i

Date:	April 13, 2020, 9:00 am	
Location:	Teleconference, Host: RMTC/Honolulu Board of Water Supply	
Attendees:	BWS:	Barry Usagawa, Water Resources Program Administrator Mike Matsuo, Land Administrator
	DLNR:	Russell Tsuji, Land Division Administrator Barry Cheung, O'ahu Land Agent; Ian Hirokawa, Special Projects Coordinator
	RMTC:	Brian Takeda, Planning Project Manager; Kelly Staples, Planner; Walter Chong, P.E., Civil Project Manager

Items of Discussion:

- Requirements for transfer of land in Tax Map Key: (1) 9-1-018: Por. 008 from DLNR to BWS for construction and operation of the new East Kapolei R-1 Reservoir and Transmission System
- Environmental documentation requirements pursuant to HRS, Chapter 343 based on use of Clean Water State Revolving Funds (SRF) for construction; Assignment of authorized/ accepting agency
- Project Schedule

Summary of Discussion Points:

1. Transfer of Land from DLNR to BWS
    - Barry U. started the discussion. The BWS and its consultant, RM Towill, has prepared a preliminary Draft EA for the East Kapolei 215 R-1 Reservoir and Transmission Main project involving a R-1 recycled water reservoir on a portion of the State-owned TMK (1) 9-1-018: 008. This site is next to an existing BWS-owned potable reservoir on adjacent TMK (1) 9-1-018:007. In order to use the R-1 Reservoir site the BWS initiated discussion with DLNR for the conveyance of the approximately 2-acre R-1 reservoir site.
    - DLNR staff initially recommended to BLNR the conveyance of the R-1 reservoir site via a the issuance of a direct lease to BWS. The lease concept was based on a previous BLNR approval dated January 13, 2012 to lease State lands in East Kapolei for income generation. But, at its September 25, 2015 meeting, the Board of Land and Natural Resources (BLNR) decided not to pursue the direct lease option. Thus, DLNR is now thinking that the conveyance may be by Governor's Executive Order. BWS supports this because historically the State has used this method to convey State lands to BWS for public benefit. BWS also suggested that possibly it can work out a MOA/MOU with DLNR whereby it could provide to the State impact fee credits equal to the assessed value of the reservoir site as part of the EO (such a proposal would required approval by the BWS Manager and Chief Engineer). DLNR supports this concept and noted that they have several parcels in the East Kapolei area that require a water connection.
    - Mike Matsuo discussed the mechanism for the land transfer. The first step will be to subdivide the R-1 reservoir site from TMK 9-1-018:008 through the City Department of Planning and Permitting. Then, because 9-1-018:008 is Land Court property, will have to petition Land Court to approve the subdivision. Ian H indicated that they may have

deregistered the parcel from Land Court. Mike asked Barry C and Ian H to confirm this and to send BWS any Land Court order deregistering the parcel.

- Related comments included:
  - Barry U indicated that the BWS potable water reservoir was paid for by the Department of Hawaiian Home Lands and the University of Hawaii for use by their respective developments in the area
  - The existing potable reservoir has two easements: (1) 9668 for road and utility purposed, and (2) 9667 for flowage/drainage easement.
  - It is likely that Easement 9667 could be used for runoff from the R-1 Reservoir site. Following construction of the R-1 Reservoir, the site will have the same storm water runoff volumes as the pre-construction condition.
  - DLNR is currently preparing a Master Plan for their parcels in the area, which includes TMK 9-1-018:008. However, they master planned around the R-1 reservoir site, by carving it out from the larger parcel 008. BWS needs to ensure that the R-1 Reservoir site plan is consistent with the DLNR-carved out R-1 reservoir site.site
  - DLNR also mentioned that they are working to exchange a 10-acre portion of parcel 008 that includes a portion of Easement 9668 with D.R. Horton for lands near the Kapolei rail transit station. Thus, may need to determine the impact this will have on the access road to the existing potable reservoir and new R-1 reservoir sites. BWS asked DLNR to provide map showing the 10-acre land area to be exchanged with D.R. Horton.
  - Outside of the R-1 reservoir site, land identified by DLNR would be used by developers, who would require water from BWS.
  - Because the new R-1 reservoir site would involve revenue generation, the land transfer will require formal negotiation between DLNR and BWS. BWS will initiate a letter request to DLNR.
  - DLNR initially considered selling the R-1 reservoir site to BWS; however, there are legislative issues with doing so. For land transfers under an EO there would be no cost for the preparation or processing.
  - DLNR will make a decision to appraise the value of their land based on either existing agricultural zoning or anticipated Transit Oriented Development zoning. Once the appraised value is agreed upon, the value can be memorialized in the EO or a separate agreement.
  - The land transfer requires the preparation of a final subdivision map including a legal description with metes and bounds, and documentation of the legal access for appraisal and approval by BLNR. BWS indicated that RM Towill had started to prepare the subdivision map, but never did. Walter was asked to check on the status of the subdivision map.
  - DLNR and BWS agreed to develop the design first before finalizing the subdivision map in the event additional land or easements are required. RM Towill indicated that the influent/effluent main may need an easement as it will go outside the boundaries of the existing potable reservoir site.

- Barry C indicated that the EO process can be initiated as long as the design is finalized. At that time, DLNR can also issue a construction Right of Entry so construction of the R-1 reservoir can begin. Barry C also confirmed tha a new easement for the R-1 reservoir influent/effluent main will have to be done through a separate action from the EO.
- The design for the R-1 reservoir is tentatively scheduled to start in 2021 and is expected to take 2-years to complete. Preparation of the final subdivision map can wait until near the end of the design phase to ensure the size of the lot will not change.
- For the purposes of completing the project EA, BWS will prepare a letter request to DLNR for it to provide a response and indicate its requirements for the transfer of land title. This information will be documented in the EA.

2. Assignment of Authorized Accepting Agency

   • Barry U. next discussed identifying the appropriate authorized/accepting agency for the filing and publication of the HRS, Chapter 343 EA. The authorized or accepting agency is normally the landowner, or it can be the public agency with jurisdiction over the use of the land. The project in this instance would be managed or under jurisdiction of BWS, but is presently owned by DLNR, with the understanding that DLNR will transfer the land to BWS through EO under conditions acceptable to both parties.

   • The project funding source is from the Clean Water State Revolving Fund (SRF), a low interest loan program administered by the U. S. Environmental Protection Agency (EPA) and delegated and managed in Hawai‘i, by the Department of Health, Wastewater Branch. The DOH provides guidance in the preparation of EA documentation generally using the State’s own environmental regulatory process such as the HRS, Chapter 343 regulations. Therefore, the EA does not need to follow NEPA guidelines and in fact the EA was scoped to meet Chapter 343, HRS.

     The authorized/accepting agency under this arrangement is normally the landowner or DLNR, who would be responsible for filing and publishing the EA through the Office of Environmental Quality Control. However, in this instance DLNR and BWS initiated discussions for the transfer of title, with BWS eventually assuming jurisdiction and responsibility for the operation of the R-1 Reservoir and Transmission system. DLNR added that it would also not usually sign-off on accepting responsibility for an EA when the responsibility for the land use would more appropriately rest with another agency.

   • Based on the preceding discussion and as noted above in Item 1, the BWS letter request to DLNR will add that pursuant to the transfer of land from the DLNR to BWS for the purpose of constructing and operating the East Kapolei R-1 Reservoir and Transmission system, that the preparation, acceptance and filing of the project’s HRS, Chapter 343 EA shall be borne by the BWS.

3. Next steps going forward:

   A. RMTC to prepare summary meeting notes outlining the discussion at today’s meeting.

   B. BWS to follow-up with DLNR as required to negotiate the terms and conditions of an agreement for the transfer of a portion of TMK: (1) 9-1-018: 008.

   C. BWS to submit a letter to DLNR asking them to (1) provide their requirements for the transfer of land title for the subject project through an EO and to indicate that BWS will offer impact fee credits rather than pay annual lease rents; and (2) acknowledge that BWS will be the accepting

authority for the HRS, Chapter 343 EA based on the intent to transfer the R-1 reservoir site to BWS.

K:\plan\23029-00 EKAPOLEI R1 RESERVOIR\PROJ MGR\BWS-DLNR Meeting 041320 Notes_bt_ks.docx

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

May 7, 2015

Ms. Suzanne Case, Chair
Board of Land and Natural Resources
State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Ms. Case:

Subject: Disposition of a Portion of State Land Situate at Honouliuli, Ewa, Oahu, Hawaii, bearing Tax Map Key 9-1-018:008

We respectfully request the appropriate disposition of the above referenced property.

The Board of Water Supply (BWS) is planning to construct on the subject property a three (3) million gallon storage tank that will improve the reliability of our R-1 recycled water system. BWS has already performed a topographic survey of the subject property and found it to be suitable for the proposed storage tank. Copies of the topographic map and proposed subdivision map are attached for your reference.

BWS staff has already met with your Land Division staff on this matter. While we prefer to lease the subject property from the State, we understand that the final decision on the conveyance mechanism is a matter for the Board of Land and Natural Resources.

If you have any questions, please contact Michael Matsuo of our Land Division at 748-5951.

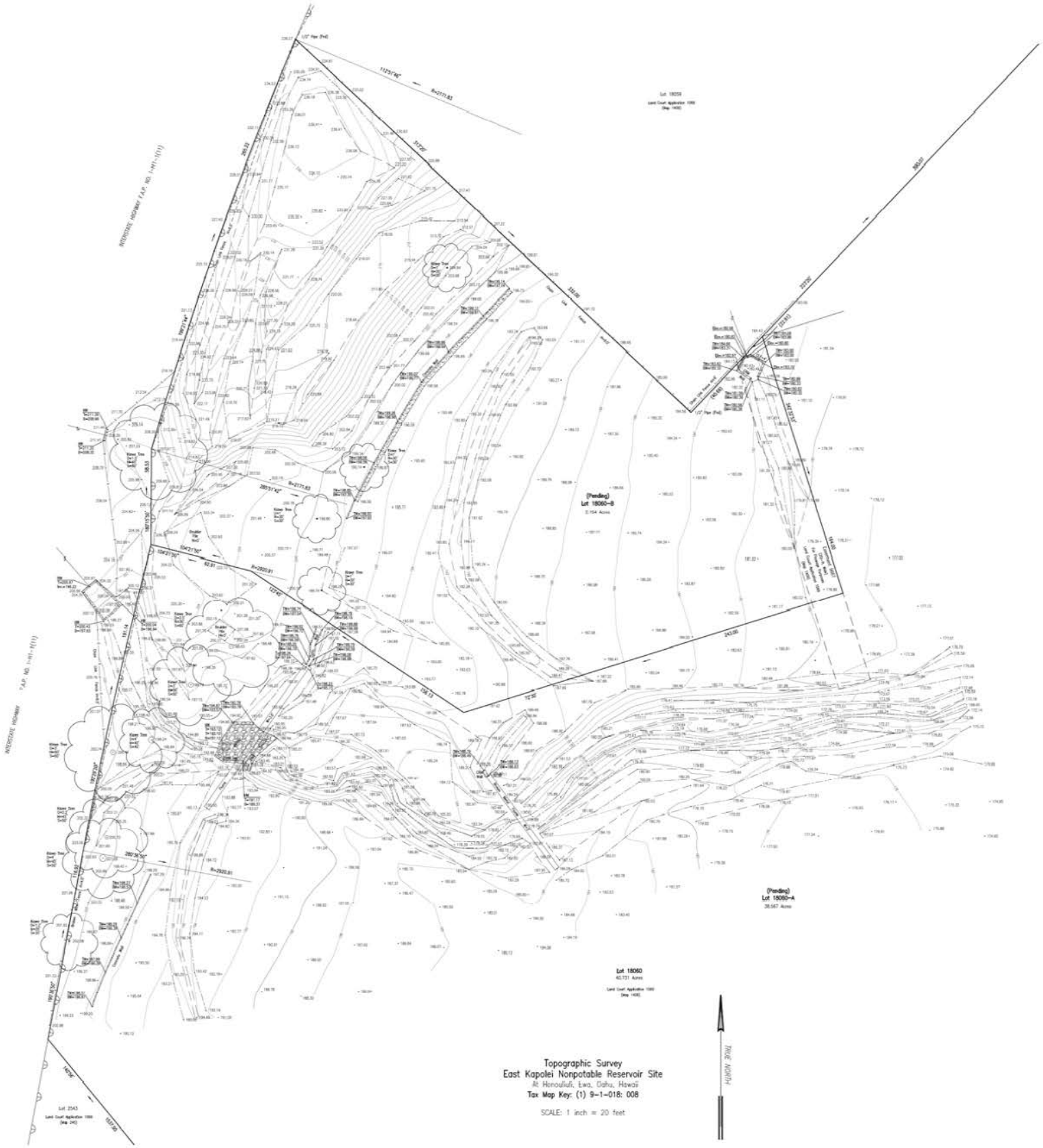
Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachment

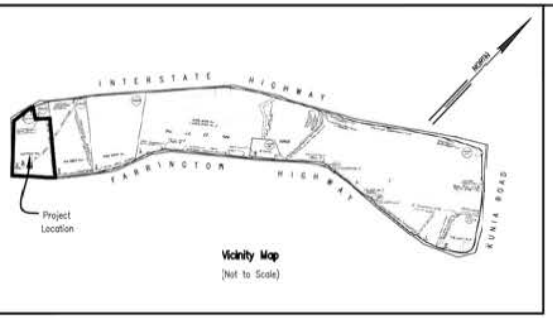
Cc: Russell Y. Tsuji, DLNR Land Division
Barry Cheung, DLNR Land Division

Cc: ✓B. Usagawa
S. Muraoka
M. Matsuo



Topographic Survey
East Kapolei Nonpotable Reservoir Site
At Honouliuli, Ewa, Oahu, Hawaii
Tax Map Key: (1) 9-1-018: 008

SCALE: 1 inch = 20 feet

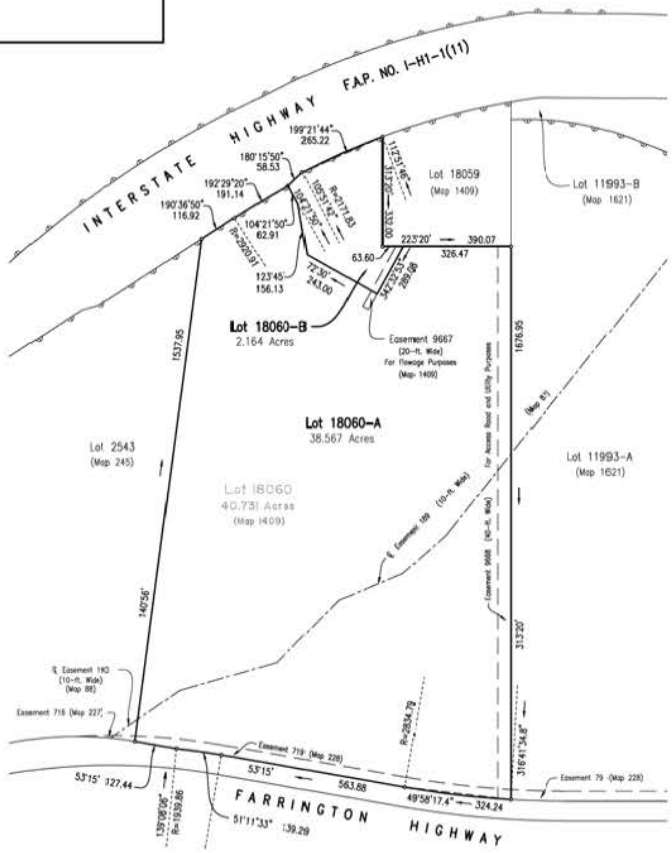


Vicinity Map
(Not to Scale)

PROPOSED
LAND COURT
STATE OF HAWAII
LAND COURT APPLICATION 1069

SUBDIVISION OF LOT 18060 AS SHOWN ON MAP 1409 INTO LOTS 18060-A AND 18060-B

AT HONOULIULI, EWA, OAHU, HAWAII
TAX MAP KEY: (1) 9-1-18: 08



NOTES:

Azimuths are referred to Government Survey Triangular Station "KAPUAI NEW" △

Denotes no access permitted

Zoning (LUO): Ag-1

Flood Zone: D

Owner: State of Hawaii –
Department of Land and Natural Resources

Property Address: Farrington Highway

R. M. TOWILL CORPORATION

2024 North King Street Suite 200
Honolulu, Hawaii 96819
January 27, 2015

This work was prepared by me or under my direct supervision

4/30/16
Don L.M. Akita Expiration Date
Licensed Professional Land Surveyor
Certificate Number 12749

WR BU

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 29, 2012

Mr. William J. Aila Jr., Chairperson
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii, 96809

Dear Mr. Aila:

Subject: Request to Acquire State Land for the East Kapolei 215' Recycled Water Reservoir, TMK: 9-1-18: Portion of 08, Kualakai Road, H-1 Freeway and Farrington Highway, East Kapolei, Oahu, Hawaii

Thank you for your response of May 24, 2012. In consideration of your philosophy of utilizing public lands for income production to fund and support Department of Land and Natural Resources (DLNR), operations and programs, we would like to negotiate the purchase of the 2.5 acre site of State owned agricultural zoned land for the proposed East Kapolei 215' recycled water reservoir. The site is bounded by Kualakai Parkway, H-1 Freeway and Farrington Highway (see attached maps).

The reservoir will provide a significant public benefit by facilitating the expansion of recycled water service to State lands in East Kapolei including the Department of Hawaiian Home Lands, University of Hawaii West Oahu Campus and other East Kapolei developments. Consistent volume and pressurized recycled water is necessary to expand recycled water service and conserve high quality potable water. Elevated storage will reduce the need of on-site receiving tanks and booster pumps for each individual recycled water service reducing costs to these State projects. Currently, recycled water service is limited to varying water pressures and irrigation schedules depending on the operations of the on-demand pumps at our Honouliuli Water Recycling Facility.

Reservoir sites are difficult to site as only specific elevations are feasible. Visual impact mitigation and infrastructure costs are also important considerations. The property just east of the existing East Kapolei 215' potable reservoir bounded by Kualakai Parkway and the H-1 off-ramp to Kualakai Parkway would be highly visible from the roadways and difficult to screen from view. Sites mauka of the H-1 Freeway would be very expensive due to the extensive excavation necessary to achieve the target spillway elevation of 215-feet.

With your concurrence, we would like to meet to negotiate a mutually agreeable purchase agreement. We look forward to your favorable response on our land acquisition request.

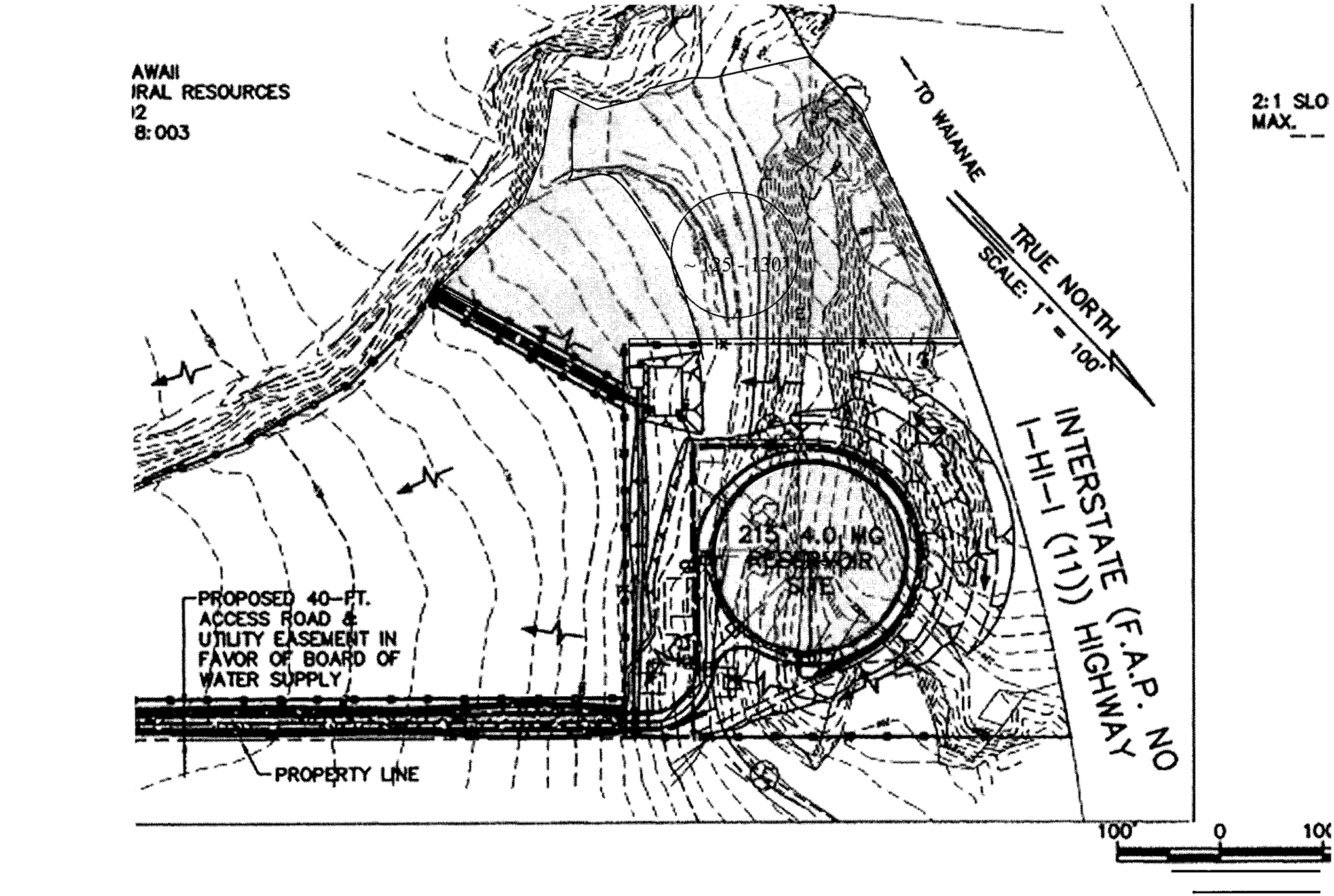
If you have any questions, please contact me at 748-5061.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Enclosures

BU:ko
cc: Legal Counsel, Finance, Land


AWAII
IRAL RESOURCES
12
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TO WAIANAE
TRUE NORTH
SCALE: 1" = 100'
2:1 SLO
MAX.
~1351-1301
215' 4.0 MG
RESERVOIR
SITE
PROPOSED 40-FT.
ACCESS ROAD &
UTILITY EASEMENT IN
FAVOR OF BOARD OF
WATER SUPPLY
PROPERTY LINE
INTERSTATE (F.A.P. NO
I-HI-1 (11)) HIGHWAY
100'
0
10(

MAP 1409

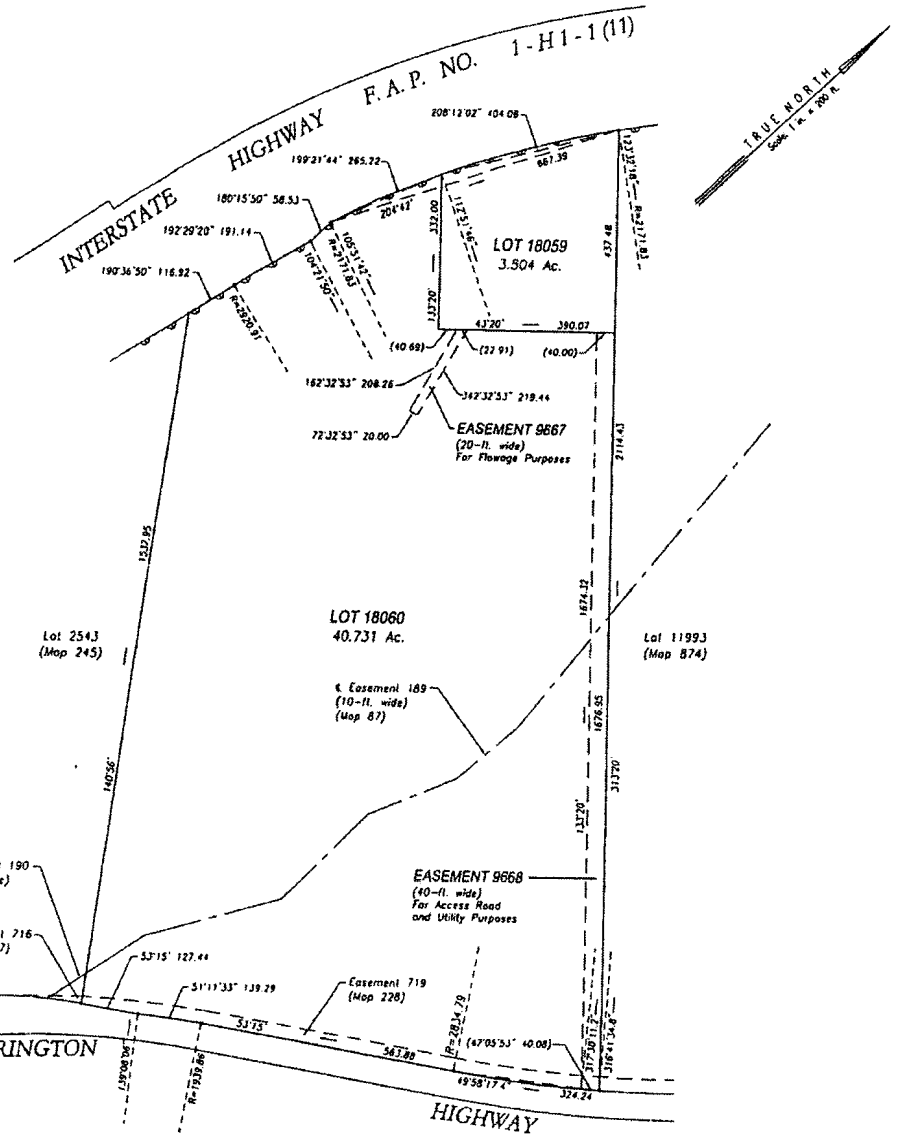


EXHIBIT "B"

NOTES:
AREA OF EASEMENTS:
EASEMENT 9667 = 0.098 AC.
EASEMENT 9668 = 1.539 AC.

DENOTES NO ACCESS PERMITTED.

TMK: 9-1-18: 03

LAND COURT
STATE OF HAWAII
LAND COURT APPLICATION 1069

SUBDIVISION OF LOT 11992
AS SHOWN ON MAP 874
INTO LOT 18059 AND LOT 18060
AND DESIGNATION OF EASEMENTS 9667 AND 9668
AFFECTING LOT 18060

AT HONOULIULI, EWA, OAHU, HAWAII

735 Bishop Street, Suite 330
Honolulu, Hawaii 96813
September 19, 2006

KEVIN K. KEA
LICENSED PROFESSIONAL LAND SURVEYOR
No. 10928
HAWAII, U.S.A.

ACE LAND SURVEYING LLC
Kevin K. Kea
Licensed Professional Land Surveyor
Certificate No. 10928
Land Court
Certificate No. 286
Exp. 4/10

OWNER: STATE OF HAWAII, by its Board of Land and Natural Resources
TRANSFER CERTIFICATE OF TITLE: 490,888

AUTHORIZED AND APPROVED BY ORDER OF THE JUDGE
OF THE LAND COURT DATED SEPTEMBER 10, 2008
BY ORDER OF THE COURT.

Pauline Hanawahine
REGISTRAR OF THE LAND COURT

filed May 6, 2008
Janis Shiroma, Clerk

Appendix E

Pre-Assessment Consultation Letters for Hawai‘i Revised Statutes, Chapter 343

DEPARTMENT OF COMMUNITY SERVICES
CITY AND COUNTY OF HONOLULU
925 DILLINGHAM BOULEVARD, SUITE 200•HONOLULU, HAWAII 96817
PHONE: (808) 768-7762 • FAX: (808) 768-7792
www.honolulu.gov/dcs

RICK BLANGIARDI
MAYOR

ANTON C. KRUCKY
DIRECTOR

AEDWARD LOS BANOS
DEPUTY DIRECTOR

November 25, 2022

Brian Takeda, Planning Project Manager
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawai'i 96819

Dear Mr. Takeda:

SUBJECT: DRAFT Environmental Assessment
East Kapolei 215 R-1 3.0 Million Gallon Reservoir and
16-Inch Transmission Main
TMKs: (1) 9-1-017:096; (1) 9-1-018:007 and 008;
Farrington Highway Right-of-Way (no TMK); Kapolei Parkway
Right-of-Way (no TMK), Kapolei, Hawai'i 96707

Thank you for your notice of a Draft Environmental Assessment (DEA) being prepared for the above-named project.

Our review indicates that the proposed project is located approximately one mile from several properties in Ewa Villages that the Department of Community Services leases out for the provision of special needs housing. We ask that this project take into consideration the health, safety, accessibility, and long-term wellbeing of people living nearby and/or involved with activities in the surrounding neighborhood.

Thank you for providing us the opportunity to comment on this matter.

Sincerely,

Anton C. Krucky
Director

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

RICK BLANGIARDI
MAYOR

DAWN B. SZEWCZYK, P.E.
DIRECTOR AND CHIEF ENGINEER

WARREN K. MAMIZUKA
ACTING DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 22-366

November 30, 2022

R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819-3470

Attention: Brian Takeda, Planning Project Manager

Dear Mr. Takeda:

Subject: Pre-Assessment for an Environmental Assessment
East Kapolei 215 R-1 – 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project
TMK: 9-4-059:, 9-1-018:007 & 008, 91-017:096

Thank you for the opportunity to review the subject project.

We have no comments at this time, as we do not have any facilities or easements on the subject properties. However, please note that Kualaka'i Parkway is under the jurisdiction of the State Department of Transportation and Farrington Highway to the west of Kualakai Parkway is under the jurisdiction of the City and County of Honolulu.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at (808) 768-3697.

Sincerely,

for Dawn B. Szewczyk, P.E.
Director and Chief Engineer

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 308, KAPOLEI, HAWAII 96707
TELEPHONE: (808) 768-3486 ● FAX: (808) 768-3487 ● WEBSITE: http://envhonolulu.org

RICK BLANGIARDI
MAYOR

ROGER BABCOCK, JR., Ph.D., P.E.
DIRECTOR

MICHAEL O'KEEFE
DEPUTY DIRECTOR

IN REPLY REFER TO:
PRO 22-085

December 2, 2022

VIA EMAIL

Mr. Brian Takeda
Planning Project Manager
R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Takeda:

SUBJECT: East Kapolei 215 R-1 3.0 Million Gallon (MG) Reservoir and 16-Inch Transmission Main Project, Kapolei, Ewa District, Oahu, Hawaii, Environmental Assessment (EA) Pre-Assessment

We have reviewed your letter dated November 15, 2022, regarding the subject project. We have the following questions and comments:

1. We understand there are more than one R-1 distribution systems starting at the Board of Water Supply's Honouliuli Water Recycling Facility, each with its own pump system. Which system or systems will this new Reservoir be connected to?

2. We are particularly interested in the systems which provide R-1 water to our facilities at the Honouliuli Wastewater Treatment Plant (WWTP), and to the City golf courses, and how the proposed improvements will change the R-1 pump systems, the controls for the pumps, and any other benefits or impacts. Can the system for delivering R-1 to the WWTP be modified so that R-1 in excess of the WWTP's needs may no longer be released to the WWTP effluent outfall? There should be a plan for discontinuing the discharge of R-1 to the outfall in consideration of the secondary treatment upgrades being made at the WWTP, and the need to efficiently maximize the beneficial use of the R-1 water.

3. Please include information on the proposed schedule for the improvements, including the schedule for any changes to the systems that provides R-1 water to the WWTP or to the City golf courses.

Should you have any questions, please call Jack Pobuk, Civil Engineer, at (808) 768-3464 or email jpobuk@honolulu.gov.

Sincerely,

Roger Babcock, Jr., Ph.D., P.E.
Director

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

RICK BLANGIARDI
MAYOR

HAKU MILLES, P.E.
ACTING DIRECTOR

BRYAN GALLAGHER, P.E.
ACTING DEPUTY DIRECTOR

December 5, 2022

SENT VIA EMAIL

Brian Takeda
Briant@rmtowill.com

Dear Mr. Takeda:

Subject: HRS, Chapter 343, EA Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-inch Transmission Main Project, Kapolei, Ewa District, Oahu, Hawaii TMks: (1) 9-4-059: (Portions of) (1) 9-1-018: 007 and 008, (1) 9-1-017: 096 Kualakai Parkway Right-Of-Way, and Farrington Highway and Kapolei Parkway ROWs (No TMKs Assigned) Environmental Protection Agency Clean Water State Revolving Fund Project Priority List Number C150051-77

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

Should you have any questions, please contact me at (808) 768-8481.

Sincerely,

Bryan Gallagher
for Haku Milles, P.E.
Acting Director

HM:cf (892225)

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

RICK BLANGIARDI
MAYOR

SHELDON K. HAO
FIRE CHIEF

JASON SAMALA
DEPUTY FIRE CHIEF

December 5, 2022

Mr. Brian Takeda
Planning Project Manager
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Takeda:

Subject: Environmental Assessment Preassessment
East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16 Inch Transmission Main Project
Kapolei, Hawaii
Tax Map Keys: 9-4-059: (Portions of), 9-1-018: 007 and 008
9-1-017: 096 Kualakai Parkway Right of Way (ROW)
Farrington Highway and Kapolei Parkway ROWs

In response to your letter received November 17, 2022, regarding the abovementioned subject, the Honolulu Fire Department (HFD) reviewed the submitted information and requires that the following be complied with:

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2018 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1, as amended.)

   A fire department access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2018 Edition, Section 18.2.3.2.1.)

2. Fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3.

3. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Sections 18.3 and 18.4.

4. Submit civil drawings to the City and County of Honolulu's Department of Planning and Permitting and route them to the HFD for review and approval.

5. The abovementioned provisions are required by the HFD. This project may necessitate that additional requirements be met as determined by other agencies.

Should you have questions, please contact Acting Battalion Chief Kendall Ching of our Fire Prevention Bureau at 808-723-7154 or kching3@honolulu.gov.

Sincerely,

CRAIG UCHIMURA
Acting Assistant Chief

CU/MD:bh

JOSH B. GREEN, M.D.
GOVERNOR

KEITH T. HAYASHI
SUPERINTENDENT

STATE OF HAWAI`I
DEPARTMENT OF EDUCATION
KA 'OIHANA HO'ONA'AUAO
P.O. BOX 2360
HONOLULU, HAWAI`I 96804

OFFICE OF FACITIES AND OPERATIONS

December 6, 2022

Brian Takeda
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Re: Environmental Assessment (EA) Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project, Kapolei, Ewa Distrist, Oahu, Hawaii Tax Map Keys;(TMKs): (1)9-4-059: (Portions of) (1)9-1-018: 007 and 008, (1)9-1-017: 096 Kualakai Parking Right-Of-Way (ROW), and Farrington Highway and Kapolei Parkway ROWs (No TMKs Assigned) Environmental Protection Agency (EPA) Clean Water State Revolving Fund (CWSRF) Project Priority List (PPL) Number C150051-77

Dear Mr. Takeda:

Thank you for your letter dated November 15, 2022. Based on the information provided, the proposed Project will not impact Hawaii State Department of Education facilities.

Thank you for the opportunity to comment. Should you have any questions, please contact Cori China of the Facilities Development Branch, Planning Section, at (808) 781-5080 or via email at cori.china@k12.hi.us.

Sincerely,

Roy Ikeda
Interim Public Works Manager
Planning Section

RI:ctc

c: Facilities Development Branch

From:	Justin Medeiros
To:	Brian Takeda; Greg Kawachi
Cc:	HT-Plan Reviews; hiwasaki@hbws.org; Sean Cross; Kelly Staples
Subject:	RE: EA Pre-assessment for E Kapolei 215 R-1 3.0 MG Resorvoir and 16-Inch Transmission Main Project
Date:	Wednesday, December 7, 2022 5:16:02 PM
Attachments:	Letter from R.M. Towill - 11-15-22.pdf

Hi Brian,

I have taken a look at the attached work proposal for the new transmission main in Kapolei. Please note that Hawaiian Telcom has underground and aerial infrastructure and cables along the entirety of the work area. A one-call will need to be made before digging commences in order to locate the utilities. I do not have any additional comments at this time. Please let me know if you have any questions.

Thank you,

Justin Medeiros
Network OSP Engineer
Hawaiian Telcom

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

RICK BLANGIARDI
MAYOR

ARTHUR J. LOGAN
CHIEF

KEITH K. HORIKAWA
RADE K. VANIC
DEPUTY CHIEFS

OUR REFERENCE EO-GK

December 12, 2022

SENT VIA EMAIL

Mr. Brian Takeda
Briant@rmtowill.com

Dear Mr. Takeda:

This is in response to your letter dated November 15, 2022, requesting input on the Environmental Assessment Pre-Assessment for the proposed Board of Water Supply's East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project in Kapolei.

Based on the information provided, the Honolulu Police Department does not have any comments or concerns at this time.

If there are any questions, please call Major Gail Beckley of District 8 (Kapolei, Waianae) at (808) 723-8400.

Thank you for the opportunity to review this project.

Sincerely,

GLENN HAYASHI
Assistant Chief of Police
Support Services Bureau

JOSH GREEN
GOVERNOR
STATE OF HAWAII
Ke Kia'āina o ka Moku'āina 'o Hawai'i

SYLVIA J. LUKE
LT. GOVERNOR
STATE OF HAWAII
Ka Hope Kia'āina o ka Moku'āina 'o Hawai'i

WILLIAM J. AILA, JR
CHAIRMAN, HHC
Ka Luna Ho'okele

TYLER I. GOMES
DEPUTY TO THE CHAIRMAN
Ka Hope Luna Ho'okele

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
Ka 'Oihana 'Āina Ho'opulapula Hawai'i
P. O. BOX 1879
HONOLULU, HAWAII 96805

December 14, 2022

In reply refer to:
PO-22-287

Sent by electronic mail: BrianT@rmtowill.com

R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawai'i 96819
Attention: Brian Takeda

Subject: Environmental Assessment Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon Resevoir and 16-Inch Transmission Main Project, Kapolei, O'ahu, Environmental Protection Agency Project Priority List Number C150051-77

Dear Mr. Takeda,

The Department of Hawaiian Home Lands (DHHL) acknowledges receiving the request for comments on the above-cited project. After reviewing the project description for the planned construction and improvements, we note that these upgrades will help to provide service to DHHL's homestead communities and commercial properties in the Kapolei Region. However, we request that our 'Ewa Moku homestead lessees and commercial lessees be given adequate notification about the project, anticipated construction-related traffic, noise and air quality disturbances, and impact to their daily needs such as water service.

The DHHL currently has about 8,154 acres of land on O'ahu and anticipates adding to our land inventory. The Department's O'ahu Island Plan notes that unconstrained lands will be used to fulfill our top priority for homestead development for native Hawaiian beneficiaries. We ask that the Board of Water Supply continue to engage the Department about projects that could affect DHHL's near- and long-term developments.

Mahalo for the opportunity to provide comments. If you have any questions, please call Pearlyn Fukuba, at (808) 620-9279 or contact via email at pearlyn.l.fukuba@hawaii.gov.

Aloha,

William J. Ailā Jr., Chairman
Hawaiian Homes Commission

c: DHHL Land Development Division
DHHL Land Management Division

JOSH GREEN, M.D.
GOVERNOR

EDWIN H. SNIFFEN
DIRECTOR

Deputy Directors
DREANALEE K. KALILI
TAMMY L. LEE
ROBIN K. SHISHIDO
ROSS M. HIGASHI

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

IN REPLY REFER TO:

DIR 1113
STP 8.3517

December 14, 2022

VIA EMAIL: Briant@rmtowill.com

Mr. Brian Takeda
Planning Project Manager
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Takeda:

Subject: Early Consultation for Draft Environmental Assessment (EA)
East Kapolei 215 R-1 3.0 Million Gallon (MG) Reservoir and
16-Inch Transmission Main Project
Kapolei, Oahu, Hawaii
Tax Map Key: (1) 9-1-018: 007 and 008, and (1) 9-1-017: 096

Thank you for your letter dated November 15, 2022, requesting Hawaii Department of Transportation's (HDOT) review and comments on the subject project. HDOT understands the City and County of Honolulu, Board of Water Supply is proposing improvements to the existing water reservoir and operation facility and creating additional non-potable water source at the adjacent site to serve the Kapolei community.

The proposed work includes, but not limited to the construction of a new 3.0 MG R-1 reservoir, control building for operations, installation of a 16-inch transmission main (1,900 feet) extending along the property's access roads, modification to the existing draining system and various associated utilities as required.

HDOT has the following comments:

Airports Division (HDOT-A)

1. The proposed transmission line and reservoir are approximately 1.2 miles and 3.0 miles, respectively, from the property boundary of Kalaeloa Airport (JRF). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

2. Federal Aviation Administration (FAA) regulation requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

3. Standing water has the potential to become a wildlife attractant, which can become a hazard to aircraft operations. The HDOT-A recommends the project incorporate measures to minimize hazardous attractants in compliance with the FAA Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On Or Near Airports. If the project results in a wildlife attractant, these hazards shall be immediately mitigated by the developer upon notification by the HDOT-A and/or FAA.

Highways Division (HDOT-HWY)

In the absence of a site plan at this time, the primary access point appears to be on Farrington Highway (west of the intersecting Kualakai Parkway, State Route 8930), via a private access road.

1. A full evaluation in the Draft EA should be provided on whether the expanded facility (new and existing), drainage concerns or daily operations will have any local impacts to the State highway facilities.

2. The HDOT-HWY, Right-of-Way Branch should be consulted on any permits required for work along the State right-of-way.

3. The Applicant should coordinate with HDOT-HWY on the project construction schedule to minimize possible conflicts with our scheduled highway and maintenance projects in the area.

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

Sincerely,

EDWIN H. SNIFFEN
Director of Transportation

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honolulu.gov/dpp

RICK BLANGIARDI
MAYOR

DAWN TAKEUCHI APUNA
DIRECTOR DESIGNATE

JIRO A. SUMADA
DEPUTY DIRECTOR

December 16, 2022

2022/ELOG-2379 (lli)
2274501

Mr. Brian Takeda
Planning Project Manager
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819-3470

Dear Mr. Takeda:

SUBJECT: Hawaii Revised Statutes Chapter 343 Environmental Assessment (EA), Pre-Assessment for East Kapolei 215 R-1 3.0 MG Reservior and 16-inch Transmission Main Project (Project), Tax Map Keys 9-1-017: 096, 9-1-018: 007 and 008, and portion of 9-4-059: 001, Ewa, Oahu, Hawaii

Thank you for your letter dated November 15, 2022, notifying us of the preparation of a Draft EA.

We have reviewed the document and have the following comments for the preparation of the Draft EA.

1. The Draft EA should discuss the proposed Project's consistency with:

   A. The Oahu General Plan (2021).

   B. The Ewa Development Plan (July 2013, amended 2020).

   C. The development standards for each of the applicable zoning districts of the four tax map parcels as follows:

      1) 9-4-059: 001: R-5 Residential

      2) 9-1-018: 007: AG-1 Limited Agricultural

      3) 9-1-018: 008: AG-1 Limited Agricultural

4) 9-1-017: 096: AG-1 Limited Agricultural

2. The Draft EA should describe and analyze potential impacts from activities proposed to occur within the entirety of the Project footprint, inclusive of transmission lines, access points, and construction base yards.

3. The Draft EA should also identify all permits required for Project activities.

4. All four of the affected parcels are located within Flood Zone D. The Draft EA should explain how the Project will identify the applicable flood data, and any design or mitigation measures to ensure public safety, environmental protection, and protection of sensitive resources such as wetlands and streams that may be present in the Project vicinity.

Should you have any questions, please contact Lisa Leonillo Imata at (808) 768-8041 or lisa.imata@honolulu.gov, or Lin Wong at (808) 768-8018 or lwong@honolulu.gov.

Very truly yours,

Dawn Takeuchi Apuna
Director Designate

DTA:tc

United States Department of the Interior

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

In Reply Refer To:
2023-0017867-S7-001

December 16, 2022

Mr. Brian Takeda
R.M. Towill Corporation
2024 N. King Street, Suite 200
Honolulu, Hawai‘i 96819

Subject: Technical Assistance for the Proposed East Kapolei 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project, Kapolei, O‘ahu

Dear Mr. Takeda:

Thank you for your letter of November 15, 2022, requesting a species list and guidance in preparation of your environmental assessment for the proposed East Kapolei 3.0 Million Gallon (MG) Reservoir and 16-Inch Transmission Main Project, on the island of O‘ahu. The proposed site and area of disturbance is located in TMKs (1) 9-1-018:007 and 008 (State Board of Land and Natural Resources), Farrington Highway Right of Way (ROW) (no TMK assigned) (State), Kūalaka‘i Parkway right of way (ROW) [TMK (1) 9-1-017:096] (State); and Kapolei Parkway ROW (no TMK assigned) (State). The project construction area including areas for staging, storage, construction access, entry, and activities including grading, is approximately 77.8 acres.

The proposed East Kapolei 3.0 MG R-1 reservoir site will be located adjacent to the existing Board of Water Supply (BWS) 4.0 MG portable water reservoir. A new control (operations) building will be located to the northeast of the proposed R-1 reservoir. A 20-foot-wide perimeter road will encircle the R-1 Reservoir to allow operations personnel to inspect, maintain and repair the structure and ancillary equipment. A new 1,900 linear feet (lf) 16-inch intake main will be constructed via trenching along the existing BWS East Kapolei 215 Reservoir access road to connect to Farrington Highway. The 16-inch R-1 transmission main will then continue along Farrington Highway to Kūalaka‘i Parkway, and from Kūalaka‘i Highway to Kapolei Parkway to the south to interconnect with an existing 16-inch R-1 main, a distance of approximately 12,000 lf.

Modification of the existing onsite drainage patterns will be required to accommodate the proposed tank. A drainage system will be designed to safely convey both storm water runoff and tank overflow/washout drainage to a new 24-inch diameter storm drain for offsite disposal.

Storm water runoff will be collected in grated drain inlets, a graveled cut-off swale, and a concrete swale for conveyance to the existing drainage system. A potential drainage basin location has been designated in the southeast corner of the proposed reservoir site. The major elements of the proposed project are listed below:

- 3.0 MG capacity reinforced concrete reservoir or tank;
- 20-foot wide, asphalt concrete-paved access road from the eastern boundary to the reservoir;
- Existing 6-ft tall chain link fence;
- Influent and Effluent lines;
- 1,900 lf intake main to connect the proposed reservoir to the end of the existing access road at Farrington Highway;
- 12,000 lf 16-inch R-1 transmission main (Farrington Highway to Kūalakaʻi Parkway, and Kūalakaʻi Highway to Kapolei Parkway);
- 55-ft x 33-ft control (operations) building;
- 5 new water manholes;
- Approximately 24-inch diameter reservoir overflow/washout line;
- Existing onsite drainage system improvements, including a 3-ft wide concrete swale, graveled cut-off swale, and grated drain inlets;
- Onsite instrumentation piping improvements for the operation of the new reservoir, as required; and
- Temporary erosion control measures, including installation of silt fencing around existing drain inlets, as required.

This letter has been prepared under the authority of and in accordance with provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.), as amended (ESA). We have reviewed the information you provided and pertinent information in our files, as it pertains to federally listed species in accordance with section 7 of the ESA. Our data indicate the following federally listed species may occur or transit through the vicinity of the proposed project area: the endangered ʻōpeʻapeʻa (Hawaiian hoary bat, *Lasiurus cinereus semotus*); endangered ʻuaʻu (Hawaiian petrel, *Pterodroma sandwichensis*), endangered Hawaiʻi distinct population segment (DPS) of ʻakēʻakē (band-rumped storm-petrel, *Hydrobates castro*), and threatened ʻaʻo (Newell's shearwater, *Puffinus auricularis newelli*) (hereafter collectively referred to as Hawaiian seabirds); and the endangered plant *Abutilon menziesii* (koʻoloaʻula, red ilima).

Hawaiian hoary bat

The Hawaiian hoary bat roosts in both exotic and native woody vegetation across all islands and will leave young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet or taller are cleared during the pupping season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. Hawaiian hoary bats forage for insects from as low as 3 feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing.

To avoid and minimize impacts to the endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project design:

- Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

Hawaiian seabirds

Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.

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

- Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

Endangered Plants

Abutilon menziesii likely occurred within lowland dry grassland, shrubland, and forest. However, it currently persists within highly degraded communities dominated by alien plants. On Oʻahu *A. menziesii* occurs on substrate composed of limestone characterized by sinkholes and coralline rubble with thin soils and pockets of humus.

The proposed activities of the East Kapolei MG Reservoir and 16-Inch Transmission Main Project were occupied by a population of *Abutilon menziesii*. The State of Hawaiʻi Habitat Conservation Plan (HCP) for *A. menziesii* at Kapolei of March 2004, and the U.S. Fish and Wildlife Service (Service) Biological Opinion issued by our office on August 5, 2004 (1-2-2004-F-123), outlines conservation measures for *A. menziesii.* The development of the property has been considered in the Service's Biological Opinion. However, the BWS will have to obtain the Certificate of Inclusion from the Hawaiʻi Department of Transportation. The BWS (and any subsequent landowners who agree to accept transfer of the Certificate of Inclusion) must agree to and implement the terms of the HCP.

We appreciate your efforts to conserve protected species. If you have questions regarding this response, please contact Charmian Dang, Fish and Wildlife Biologist (phone: 808-792-9400,

email: Charmian_Dang@fws.gov). When referring to this project, please include this reference number: 2023-0017867-S7-001.

Sincerely,

JINY KIM

Digitally signed by JINY KIM
Date: 2022.12.16 11:59:50 -10'00'

Acting Island Team Manager
O‘ahu, Kaua‘i, Northwestern Hawaiian Islands, and American Samoa

United States Department of the Interior

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

Subject: IPaC generated official species list for the Pacific Islands Fish and Wildlife Office

Dear Action Agency or Applicant:

The Pacific Islands Fish and Wildlife Office (PIFWO) is transitioning to the Information for Planning and Consultation (IPaC) online portal, https://ipac.ecosphere.fws.gov/ for federal action agencies and non-federal agencies or individuals to obtain official species lists, including threatened and endangered species, designated critical habitat, and avoidance and minimization measures to consider in your general project design. IPaC has been used by continental USFWS offices to provide official species lists and avoidance and minimization guidance since 2017. Using IPaC expedites the process for species list distribution. Obtaining a species list in IPaC is relatively straightforward and takes minimal time to complete. Step by step instructions are included below.

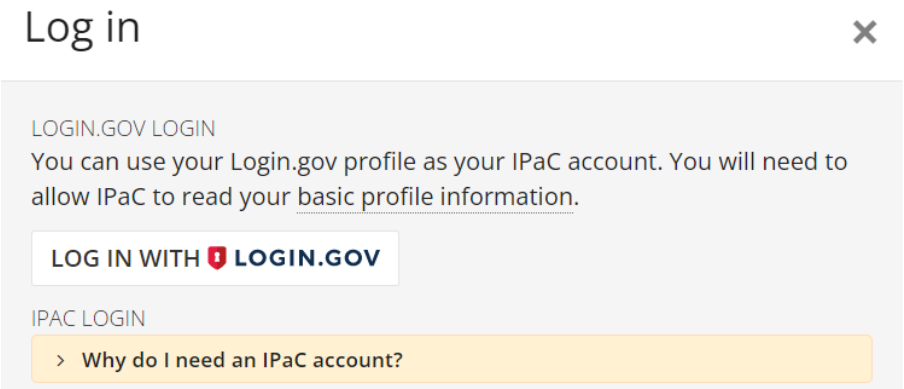
Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of your species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change the species list. Verification can be completed by visiting the IPaC website at regular intervals during project planning and implementation. An updated list may be requested through the IPaC system by completing the same process used to obtain the initial species list.

We hope this process provides efficiencies to our partners in obtaining a species list. For federal action agencies, it also opens additional IPaC functionality that the PIFWO office is still working on, such as the use of Determination Keys for informal section 7 programmatic consultations. We will let our agency partners know when that functionality becomes available.

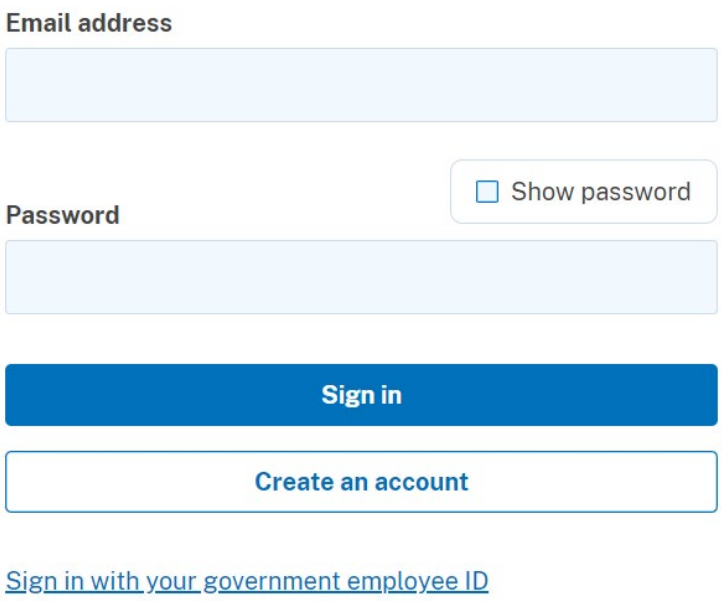
If you have questions about a species list obtained through the IPaC system or need assistance in completing an IPaC species list request, please contact the Service at 808-792-9400 or via email at pifwo_admin@fws.gov. We appreciate your efforts to conserve listed species across the Pacific Islands.

Instructions for Action Agencies and partners to obtain an official species list in IPaC

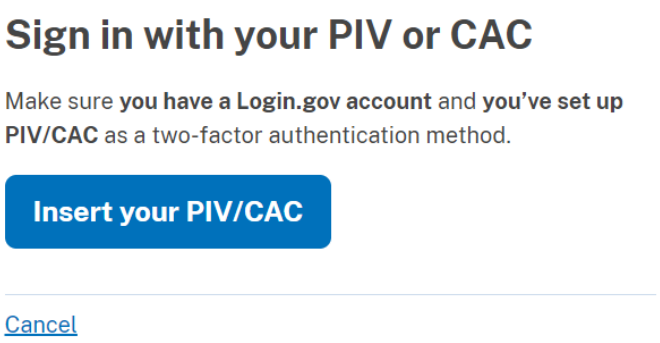
- Navigate to https://ipac.ecosphere.fws.gov/
- You can get an unofficial species list without logging in. However, if you want an official species list you will need to log in first using your Login.gov account. If you don't have an IPaC account, they are easy to create.



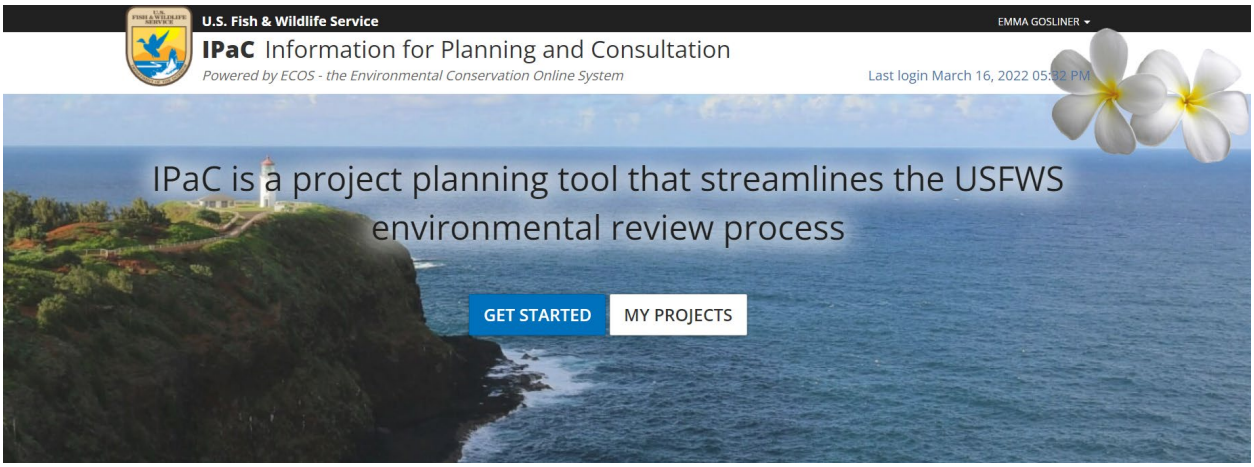
Select Log in with Login.gov and sign in using your email and password.



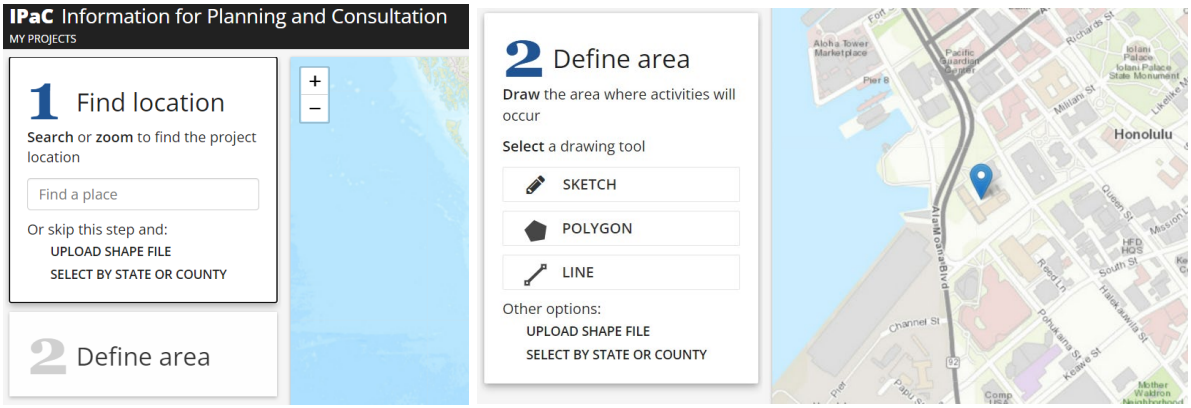
If you have a PIV or CAC card, you can sign in using that method as well.

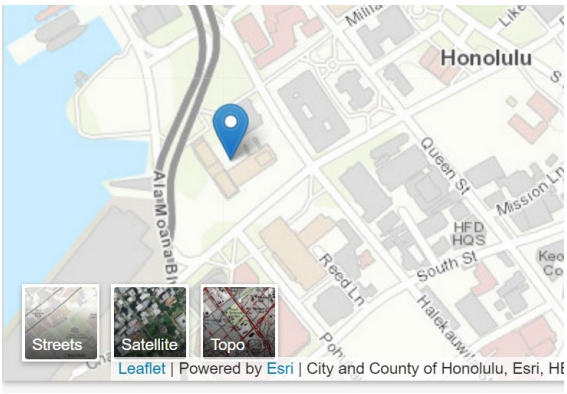


- Once you log in, select "Get Started".

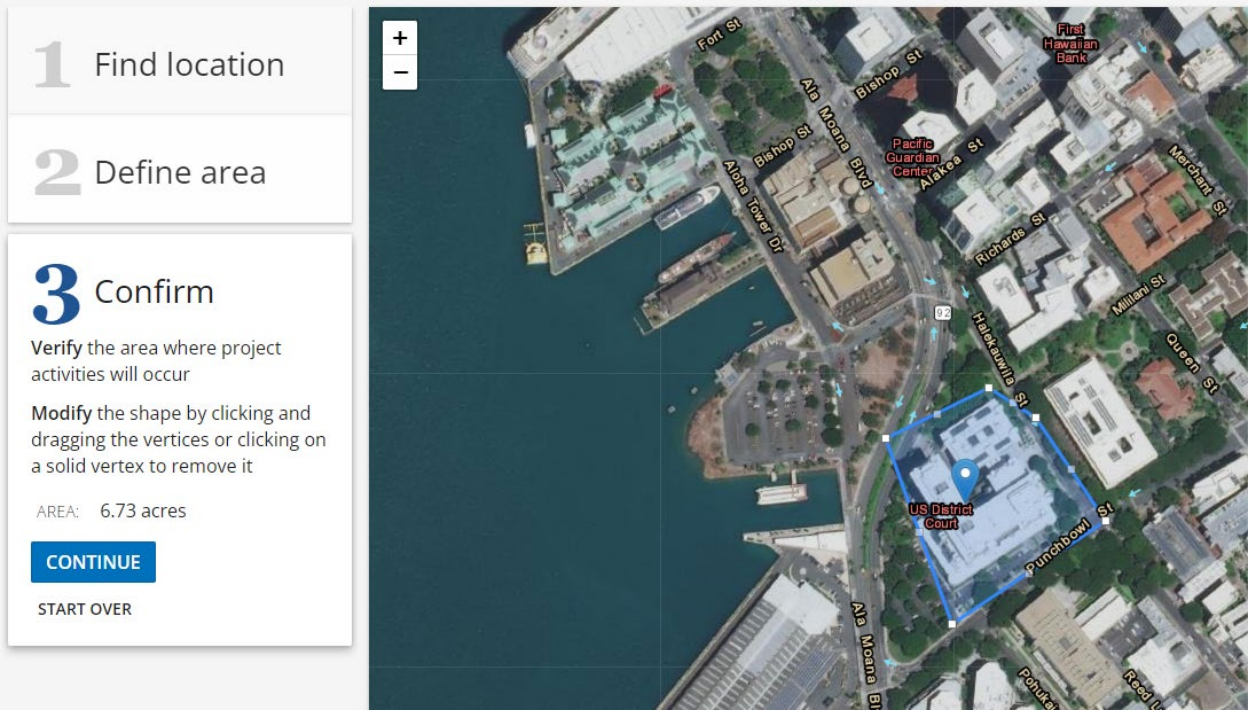


- Define the action area: Identify the location of the proposed action by uploading an existing shapefile or by entering an address or coordinates of the action area. Once identified on the map, you can manually draw the action area using the drawing tools.



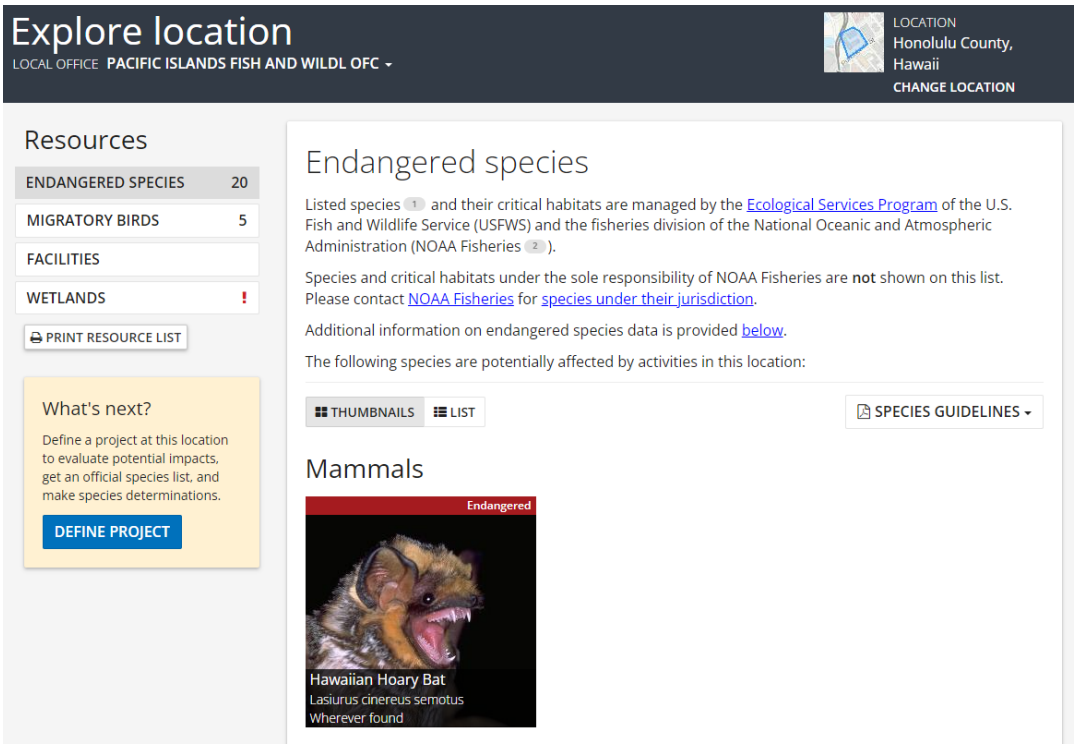


To help identify your action area you can choose between multiple base maps available.

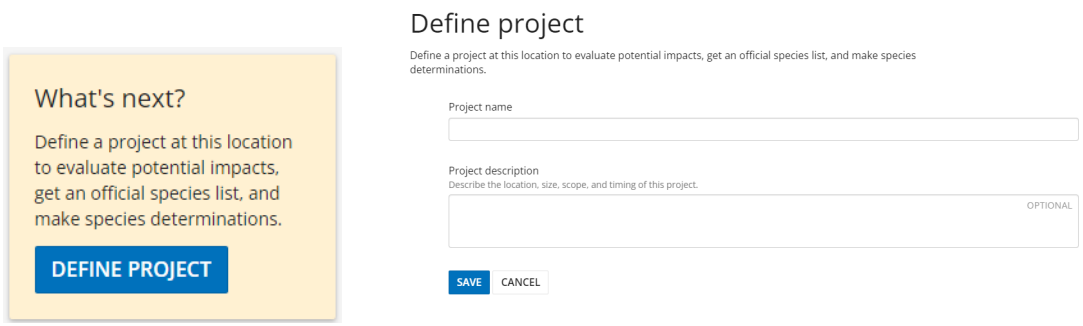


Press continue when you have finished drawing or uploading the action area location.

- The species information on the page that follows is not official. However, it identifies the project County, local Fish and Wildlife Field Office, species covered under NOAA Fisheries as well as Migratory Bird Treaty Act species. The list can be viewed in Thumbnail or List format.
- Once the species list populates you will see images of the species that may occur on, near, or transgress across your project. Click on SPECIES GUIDELINES on your top right to see Avoidance and Minimization measures to incorporate into your General Project Design Guidelines.

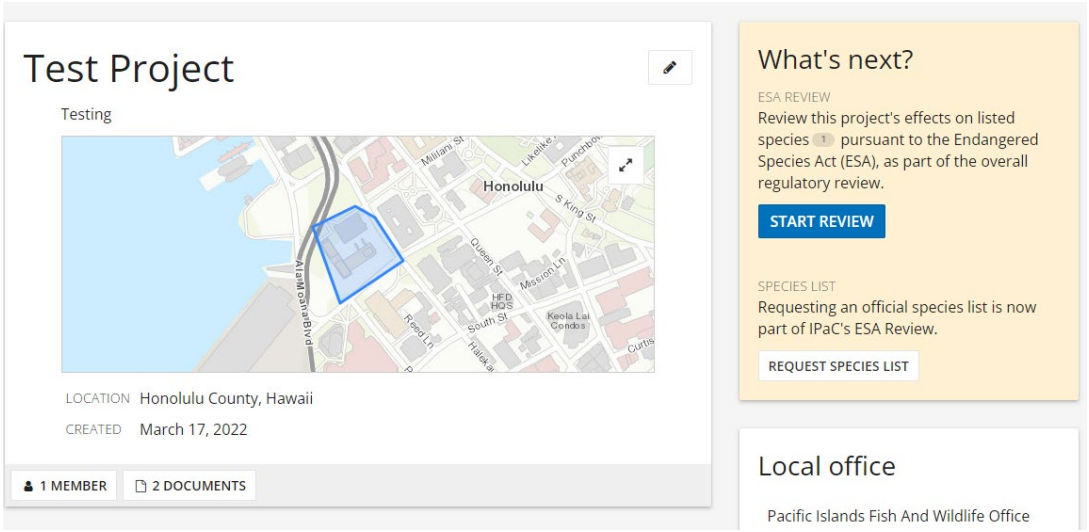


- Continue with the following steps to comply with the requirements of ESA section 7 to obtain an **official species list**.
- Select Define Project

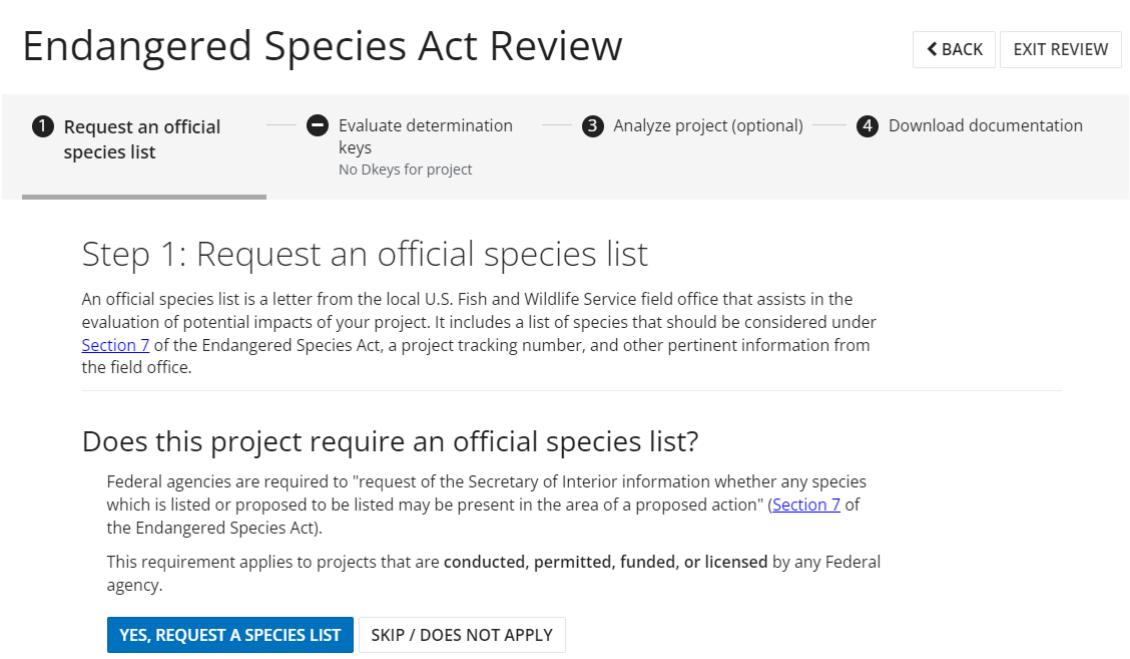


Enter the Project Name and a brief description of the project (a description is not mandatory, but recommended for future coordination with the Service). Click SAVE at bottom of page.

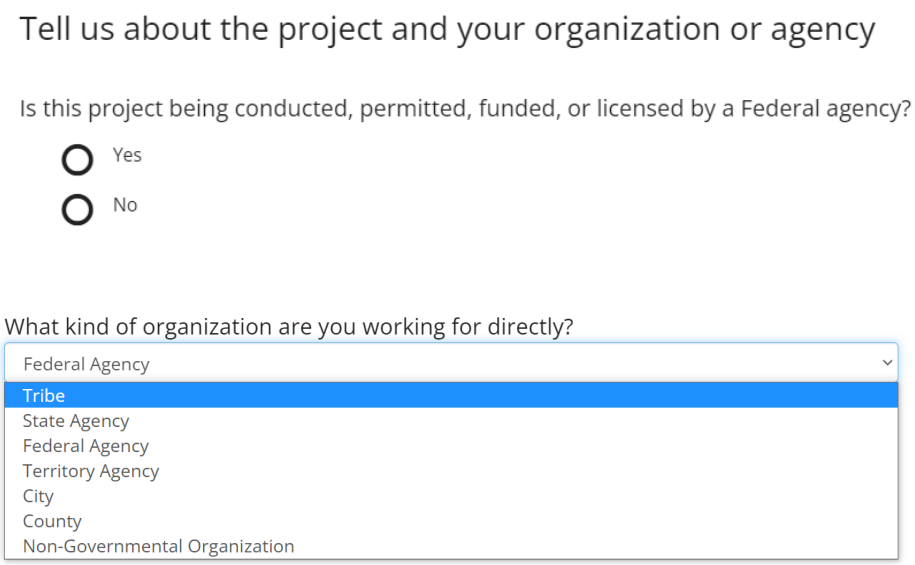
- At the bottom of the What's next box on the right, click Request Species List



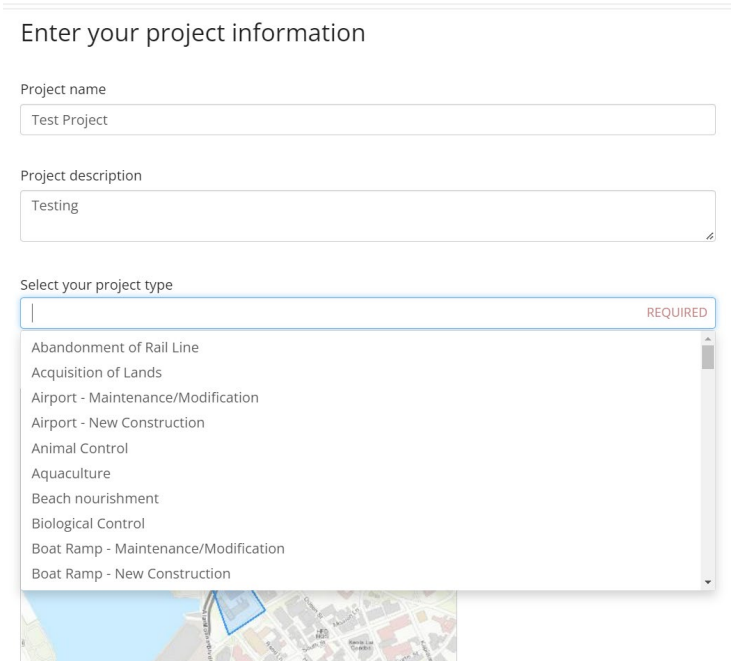
- on the following screen, click Yes, Request Species List



- Fill out the contact information for yourself or your agency. Contractors, state partners, and any other project proponents may request a species list and should be covered using the dropdown menus.



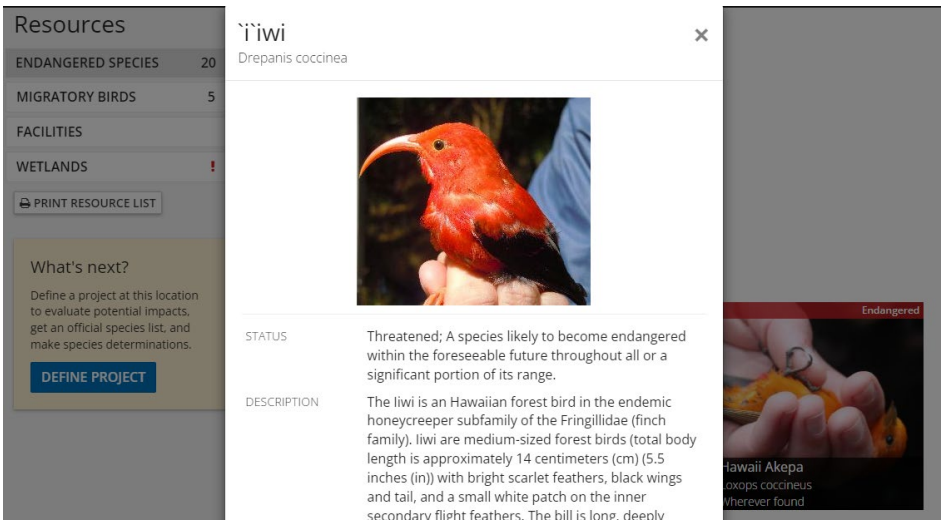
- From the pull-down menu for Classify Type of Project, select the project type that best fits the proposed action.



- Once all required sections are filled out, press SUBMIT OFFICIAL SPECIES LIST REQUEST

- An Official Species List should be generated and available for download in a couple of seconds.

- If you need additional information on a species, click on their name that is hot-linked to their species information page. A brief overview of the species' status, description and critical habitat will appear as well as a link to their ECOS species profile.



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

December 16, 2022

LD 0518

R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, HI 96819

Via email: Briant@rmtowill.com

Dear Sirs:

SUBJECT: **Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project**
Kapolei, 'Ewa District, Island of Oahu
TMK: (1) 9-4-059; Portions of TMK: 9-1-018:007 &-008; 9-1-017:096 Kualaka'i Parkway ROW, and Farrington Highway Parkway ROWs (no TMKs assigned)

Thank you for the opportunity to review and comment on the subject project. The Land Division of the Department of Land and Natural Resources (DLNR) distributed copies of your request to DLNR's various divisions for their review and comment.

Enclosed are responses/comments received from our (a) Engineering Division and (b) Land Division, Oahu District. Should you have any questions, please feel free to contact Barbara Lee via email at *barbara.j.lee@hawaii.gov*. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Attachments
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 02, 2022

LD 0518

MEMORANDUM

FROM: ~~TO:~~

DLNR Agencies:
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division *(via email: DLNR.engr@hawaii.gov)*
_X_ Div. of Forestry & Wildlife *(via email: rubyrosa.t.terrago@hawaii.gov)*
___Div. of State Parks
_X_ Commission on Water Resource Management *(via email: DLNR.CWRM@hawaii.gov)*
___Office of Conservation & Coastal Lands
_X_ Land Division – Oahu District *(via email: barry.w.cheung@hawaii.gov)*

TO: ~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*

SUBJECT: **Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project**

LOCATION: Kapolei, 'Ewa District, Island of Oahu, Hawaii
TMK: (1) 9-4-059; Portions of: TMK: 9-1-018:007 &-008. 9-1-017:096 Kualaka'i Parkway ROW, and Farrington Highway Parkway ROWs (no TMKs assigned)

APPLICANT: **RM Towill Corporation on behalf of Honolulu Board of Water Supply**

Transmitted for your review and comment is information on the above-referenced project. Please review the attached information and submit any comments by the internal deadline of **December 15, 2022** to *barbara.j.lee@hawaii.gov* at the Land Division.

If no response is received by the above due date, we will assume your agency has no comments at this time. Should you have any questions about this request, please contact Barbara Lee at the above email address. Thank you.

BRIEF COMMENTS:

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

Signed:
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: Dec 8, 2022

Attachments
Cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji

Ref: Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project
Location: Kapolei, ʻEwa District, Island of Oahu, Hawaii
TMK(s): Portions of (1) 9-1-018:007 &-008; (1) 9-1-017:096 (Kūalakaʻi Parkway ROW); and Farrington Highway Parkway ROWs (no TMKs assigned)
Applicant: RM Towill Corporation on behalf of Honolulu Board of Water Supply

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). Be advised that 44CFR, Chapter 1, Subchapter B, Part 60 reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood zones subject to NFIP requirements are identified on FEMA's Flood Insurance Rate Maps (FIRM). The official FIRMs can be accessed through FEMA's Map Service Center (msc.fema.gov). Our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT) could also be used to research flood hazard information.

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

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7139.
- Kauai: County of Kauai, Department of Public Works (808) 241-4849.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: Dec 8, 2022

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

December 02, 2022

LD 0518

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division *(via email: DLNR.engr@hawaii.gov)*
_X_Div. of Forestry & Wildlife *(via email: rubyrosa.t.terrago@hawaii.gov)*
___Div. of State Parks
_X_Commission on Water Resource Management *(via email: DLNR.CWRM@hawaii.gov)*
___Office of Conservation & Coastal Lands
_X_Land Division – Oahu District *(via email: barry.w.cheung@hawaii.gov)*

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: **Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon Reservoir and 16-Inch Transmission Main Project**
LOCATION: Kapolei, 'Ewa District, Island of Oahu, Hawaii
TMK: (1) 9-4-059; Portions of: TMK: 9-1-018:007 &-008. 9-1-017:096 Kualaka'i Parkway ROW, and Farrington Highway Parkway ROWs (no TMKs assigned)
APPLICANT: **RM Towill Corporation on behalf of Honolulu Board of Water Supply**

Transmitted for your review and comment is information on the above-referenced project. Please review the attached information and submit any comments by the internal deadline of **December 15, 2022** to *barbara.j.lee@hawaii.gov* at the Land Division.

If no response is received by the above due date, we will assume your agency has no comments at this time. Should you have any questions about this request, please contact Barbara Lee at the above email address. Thank you.

BRIEF COMMENTS:

Land Division is discussing with BWS the final configuration of the easement needed for this project. We will hold off any request until the final configuration is known.

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

Signed: *Patti Miyashiro* BC
Print Name: Patti Miyashiro
Division: DLNR/Land Div/ODLO
Date: Dec 13, 2022

Attachments
Cc: Central Files

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
711 KAPIOLANI BOULEVARD, SUITE 1600
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

RICK BLANGIARDI
MAYOR

J. ROGER MORTON
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

11/22-893066

December 16, 2022

Mr. Brian Takeda, Planning Project Manager
R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Takeda:

SUBJECT: Hawaii Revised Statutes (HRS), Chapter 343, Environmental Assessment (EA) Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon (MG) Reservoir and 16-Inch Transmission Main Project, Kapolei, Ewa District, Oahu, Hawaii
Tax Map Keys (TMKs): (1) 9-4-059: (Portions of) (1) 9-1-018: 007 and 008, (1) 9-1-017: 096 Kualakai Parkway Right-O-Way (ROW), and Farrington Highway and Kapolei Parkway ROWs (No TMKs Assigned)
Environmental Protection Agency (EPA) Clean Water State Revolving Fund (CWSRF) Project Priority List (PPL) Number C150051-77

Thank you for the opportunity to provide written comments regarding the Hawaii Revised Statutes (HRS), Chapter 343, Environmental Assessment (EA) Pre-Assessment for East Kapolei 215 R-1 3.0 Million Gallon (MG) Reservoir and 16-Inch Transmission Main Project, Kapolei, Ewa District, Oahu, Hawaii; Tax Map Keys (TMKs): (1) 9-4-059: (Portions of) (1) 9-1-018: 007 and 008, (1) 9-1-017: 096 Kualakai Parkway Right-O-Way (ROW), and Farrington Highway and Kapolei Parkway ROWs (No TMKs Assigned); Environmental Protection Agency (EPA) Clean Water State Revolving Fund (CWSRF) Project Priority List (PPL) Number C150051-77. We have the following comments.

1. Draft Environmental Assessment (DEA). The applicant shall submit the completed DEA to the Department of Transportation Services (DTS) for review.

2. Rail Stations. Applicant shall coordinate the construction activities/installed underground utilities with the Honolulu Authority for Rapid Transportation (HART) in the vicinity of the University of Hawaii West Oahu Rail Transit Station, on both sides of Kualakai Parkway.

3. Street Usage Permit. A street usage permit from the DTS shall be obtained for any construction-related work that may require the temporary closure of any traffic lane, sidewalk, bicycle lane, or pedestrian mall on a City street. Impact mitigation to transit operations shall be included in the permit application/plan.

4. Bus Stops. The project site is in the immediate vicinity of bus stops. Please coordinate roadway improvements with DTS – Transportation Mobility Division (TMD). Contact DTS-TMD at TheBusStop@honolulu.gov

5. AM/PM Peak Periods. The applicant shall minimize disruption to the AM and PM peak hour traffic on Farrington Highway.

6. Pedestrian and Bicycle Access. The project site is in the immediate vicinity of sidewalks and bikeways. The applicant shall minimize disruption to these pedestrian and bicycle facilities.

Should you have any questions, please contact Greg Tsugawa, of my staff, at (808) 768-6683.

Very truly yours,

J. Roger Morton
Director