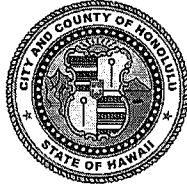


DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

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RICK BLANGIARDI
MAYOR



DAWN TAKEUCHI APUNA
DIRECTOR DESIGNATE

JIRO SUMADA
DEPUTY DIRECTOR

January 18, 2023

2022/ED-27(LM)

Ms. Mary Alice Evans
State of Hawaii
Office of Planning and Sustainable Development
Environmental Review Program
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

Dear Ms. Evans:

SUBJECT: Chapter 25, Revised Ordinances of Honolulu
Draft Environmental Assessment (DEA)
Project: Cluster Development at Pohakupuna
Applicant: Jinshi Development
Agent: Lorena Yamamoto (Roy K. Yamamoto Architect, AIA, Inc.)
Location: 91-603 Pōhakupuna Road - Ewa Beach
Tax Map Key: 9-1-28: 040

With this letter, the Department of Planning and Permitting hereby transmits the DEA and Anticipated Finding of No Significant Impact for the Cluster Development at Pohakupuna at the above site in the 'Ewa District on the Island of Oahu, for publication in the February 8, 2023, edition of *The Environmental Notice*.

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

Should you have any questions, please contact Laura Mo, of our Urban Design Branch, at (808) 768-8025 or via email at laura.mo@honolulu.gov.

Very truly yours,


Dawn Takeuchi Apuna
Director Designate

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

Project Name: Cluster Development at 91-603 Pōhakupuna Road

Applicable Law: Chapter 25, Revised Ordinances of Honolulu

Type of Document: Draft Environmental Assessment - Anticipated Finding of No Significant Impact (AFONSI)

Island: Oahu

District: Ewa

TMK: (1) 9-1-028: 040

Permits Required: Special Management Area Use Permit, Building

Applicant or Proposing Agency:

Jinshi Development Hawaii, Ltd.
1188 Bishop Street, Unit 2003
Honolulu, Hawaii 96813

Approving Agency or Accepting Authority:

Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813
Laura Mo - Land Use Permits Division
(808) 768-8025, laura.mo@honolulu.gov

Consultant:

Lorena Yamamoto
1580 Makaloa Street, Suite 788
Honolulu, Hawaii 96706
(808) 942-3666 ext. 16, lorena@rkyarchitect.com

Status: Draft, AFONSI

Project Summary:

The proposal consists of the the following actions: (a) development of 21 units of market rate housing and affordable housing units, and (b) common area amenities (pool, pavilion, and picnic areas). The new structures will comply with all land use requirements, including yard, height, and shoreline setback; and be elevated so that the living area is above the base flood elevation.

DRAFT ENVIRONMENTAL ASSESSMENT

Cluster Development

for

Jinshi Development Hawaii, Ltd.

at

91-603 Pōhakupuna Rd.

'Ewa Beach, Hawai'i 96706

TAX MAP KEY: 9-1-028:040

Roy K. Yamamoto Architect, AIA, Inc.

Architecture & Planning

1580 Makaloa Street, Suite 788

Honolulu, Hawai'i 96814

AGENT

SUBMITTAL DATE

November 22, 2022

Table of Contents

I.	Introduction	1
	Project Information Summary	1
A.	Project Site	2
B.	Overview of the Planned Project	2
C.	Purpose of the Environmental Assessment	2
D.	Permits and Approvals Required.....	2
E.	Agencies, Organizations and Individuals Contacted in Pre-Consultation	3
II.	Project Description	10
A.	PROJECT LOCATION & CHARACTERISTICS.....	10
	Location	10
	Ownership.....	10
	Adjacent Land Uses	10
	Existing On-Site Land Uses	10
B.	PURPOSE OF THE PROJECT	10
C.	DESCRIPTION OF THE PROJECT	11
D.	PROJECT UTILITIES AND INFRASTRUCTURE.....	11
	Water	11
	Sewer	11
	Storm Drainage	13
	Solid Waste Disposal	13
	Other Utilities.....	13
	Access, Roadways, and Parking.....	13
E.	CONSTRUCTION CHARACTERISTICS	14
	Landscape Management.....	14
	Excavations	14
	General Construction	14
III.	Environmental Setting, Potential Impacts, and Mitigation Measures	15
A.	CLIMATE.....	15
	Existing Conditions.....	15
	Anticipated Impacts and Proposed Mitigation	15
B.	TOPOGRAPHY	15

Draft Environmental Assessment
Cluster Development at Pōhakupuna

Existing Conditions.....	15
Anticipated Impacts and Proposed Mitigation	15
C. SOILS AND GEOLOGIC CONDITIONS	19
Existing Conditions.....	19
Anticipated Impacts and Proposed Mitigation	19
D. SHORELINE CONDITIONS	21
Existing Conditions.....	21
Anticipated Impacts and Proposed Mitigation	21
E. CLIMATE CHANGE AND SEA LEVEL RISE	22
Existing Conditions.....	22
Anticipated Impacts and Mitigation	22
F. NATURAL HAZARDS.....	22
Existing Conditions.....	22
Anticipated Impacts and Proposed Mitigation	26
G. FLORA AND FAUNA.....	26
Existing Conditions.....	26
Anticipated Impacts and Proposed Mitigation Measures	27
H. HISTORICAL AND ARCHAEOLOGICAL RESOURCES	28
Existing Conditions.....	28
Anticipated Impacts and Proposed Mitigation	29
I. CULTURAL RESOURCES	29
Existing Conditions.....	29
Anticipated Impacts and Proposed Mitigation	29
J. VISUAL RESOURCES.....	30
Existing Conditions.....	30
Anticipated Impacts and Proposed Mitigation	30
K. AIR QUALITY AND NOISE	30
Existing Conditions – Air Quality.....	30
Existing Conditions – Noise	30
Anticipated Impacts and Mitigation Measures – Air Quality	31
Anticipated Impacts and Proposed Mitigation – Noise	31
L. SOCIO-ECONOMIC CHARACTERISTICS	31
Existing Conditions.....	31

Anticipated Impacts and Proposed Mitigation	32
M. UTILITIES AND INFRASTRUCTURE	32
Existing Conditions	32
Anticipated Impacts and Proposed Mitigation	32
N. ACCESS, ROADWAYS, AND TRAFFIC CONDITIONS	33
Existing Conditions	33
Potential Impacts and Proposed Mitigation	34
O. PUBLIC SERVICES	35
Existing Conditions and Anticipated Impacts	35
P. POTENTIAL CUMULATIVE AND SECONDARY IMPACTS	36
IV. ALTERNATIVES TO THE PROPOSED PROJECT	37
A. ALTERNATIVE A – SUBDIVISION	37
B. ALTERNATIVE B – EIGHT DWELLINGS	37
C. ALTERNATIVE C – TWO DWELLINGS	37
D. ALTERNATIVE D - NO-ACTION ALTERNATIVE	37
V. Plans and Policies	39
A. HAWAI'I STATE PLAN	39
B. HAWAI'I 2050 SUSTAINABILITY PLAN	54
C. HAWAI'I STATE LAND USE DISTRICT GUIDELINES	55
D. HAWAI'I COASTAL ZONE MANAGEMENT PROGRAM	55
E. HAWAI'I WATER QUALITY STANDARDS	61
F. CITY AND COUNTY OF HONOLULU GENERAL PLAN	61
G. CITY AND COUNTY OF HONOLULU LAND USE ORDINANCE GUIDELINES	65
H. ‘EWA DEVELOPMENT PLAN	66
I. CITY AND COUNTY OF HONOLULU SPECIAL MANAGEMENT AREA	67
J. SHORELINE SETBACKS	68
VI. Findings Supporting the Anticipated Determination	71
A. ANTICIPATED DETERMINATION	71
B. REASONS SUPPORTING THE ANTICIPATED DETERMINATION	71
C. SUMMARY	73
VII. List of Agencies, Organizations and Individuals Receiving Copies of the EA	73
VIII. List of References	77

List of Figures

Figure		Page
1-1	Project Location Map	4
1-2	Special Management Area	5
1-3	TMK Parcel Map	6
1-4	SLUD Map	7
1-5	City & County of Honolulu Zoning Map	8
1-6	'Ewa Development Plan Map	9
2-1	Proposed Site Plan	12
3-1	Topography	17
3-2	Sea Level Rise	18
3-3	Soil Map	20
3-4	Flood Zone	24
3-5	Tsunami Evacuation Zone	25
4-1	Alternative Site Plans	38
5-1	Shoreline Survey Map	70

List of Tables

Table		Page
7-1	Agencies, Organizations and Individuals Receiving Copies of the EA	72

Appendices

Appendix A	Conceptual Drawings
Appendix B	Site Photos
Appendix C	Cultural Impact Assessment
Appendix D	Transportation Assessment
Appendix E	Coastal Hazard Assessment
Appendix F	Limited Flooding Analysis of Hurricane and Tsunami Impacts of Undetermined Flood Areas

I. Introduction

This Environmental Assessment (EA) has been prepared in accordance with the requirements of Chapter 343, Hawai'i Revised Statutes (HRS) and Hawai'i Administrative Rules (HAR), Title 11, Chapter 200, Department of Health, which set requirements for the preparation of environmental assessments. This EA is also prepared pursuant to and in compliance with Chapter 25, Special Management Area (SMA), Revised Ordinances of Honolulu (ROH), which provides for the regulation of land uses in the SMA. The proposed area of use is located within the SMA and will require the approval of an SMA Use-Major Permit application, which requires an EA as a prerequisite to the application.

Project Information Summary

APPLICANT:	Jinshi Development Hawaii, Ltd. 1188 Bishop St., Unit 2003 Honolulu, HI 96813 Contact: (808) 388-3096
RECORDED FEE OWNER:	Golden Lion 'Ewa Beach LLC
APPROVING AGENCY:	Department of Planning & Permitting City and County of Honolulu 650 South King Street, 7 th Floor Honolulu, Hawaii 96813
TAX MAP KEY:	9-1-028:040 (<i>Figure 1-3</i>)
AGENT:	Roy K. Yamamoto Architect, AIA, Inc. 1580 Makaloa Street, Suite 788 Honolulu, Hawaii 96814 Contact: Lorena Yamamoto (808) 942-3666 ext. 16
LOCATION:	91-603 Pōhakupuna Road, 'Ewa Beach, O'ahu (<i>Figure 1-1</i>)
LOT AREA:	2.74 acres
ZONING:	R-5 Residential District (<i>Figure 1-5</i>)
STATE LAND USE:	Urban District (<i>Figure 1-4</i>)
SPECIAL MANAGEMENT AREA:	Within the SMA (<i>Figure 1-2</i>)
'EWA DEVELOPMENT PLAN:	Residential and Low-Density Apartment (<i>Figure 1-6</i>)

FLOOD ZONE:	Zone D (Undetermined) (<i>Figure 3-4</i>)
EXISTING USE:	Vacant
ANTICIPATED DETERMINATION:	Finding of No Significant Impact (FONSI)

A. Project Site

The subject property is a 2.74-acre vacant lot, bordered by low-density residences to the north, east, and west. A rocky shoreline fronting the Pacific Ocean defines the southern edge of the parcel. The property is located in ‘Ewa Beach on the Island of O‘ahu (*Figure 1-1*). The project site is situated within the City & County of Honolulu designated SMA (*Figure 1-2*).

B. Overview of the Planned Project

Jinshi Development Hawaii envisions a residential cluster development consisting of 21 units of market rate housing that will include some affordable housing units. The project will utilize 2.74 acres of vacant, developable, and underutilized lands to provide additional housing in the ‘Ewa District, which has been designated by the City and County of Honolulu as a key place for future population growth on the Island of O‘ahu.

C. Purpose of the Environmental Assessment

In accordance with the requirements of Hawai‘i Revised Statutes (HRS) Chapter 343, an EA is being prepared for the project because of its location within the City & County of Honolulu designated SMA. This EA will comply with Hawai‘i’s Environmental Review process and is also prepared pursuant to and in compliance with the Revised Ordinances of Honolulu (ROH) Chapter 25, SMA, which provides for the regulation of land uses in the SMA.

The project will require the approval of an SMA Use Permit Major (SMP). The purpose of the SMP is to preserve, protect, and where possible, to restore the natural resources of the coastal zone of Hawai‘i. Pursuant to HRS Chapter 205A-5, State and County agencies are required to enforce the Coastal Zone Management (CZM) objectives and policies defined in HRS Chapter 205A-2. A review of the project’s conformance with SMA and CZM objectives is provided in the EA.

The EA examines the potential environmental impacts of the project and seeks agency and public comment on subject areas that should be addressed. The City and County of Honolulu Department of Planning and Permitting (DPP) is the approving agency.

D. Permits and Approvals Required

In addition to the acceptance of the SMP and Final EA/FONSI by the DPP, several other approvals may be required from the County and State to implement the proposed action, some of which include:

- Certified Shoreline Survey (Department of Land and Natural Resources, DLNR)
- Building permits for buildings, electrical, plumbing, and sidewalk/driveway work

Draft Environmental Assessment
Cluster Development at Pōhakupuna

- Grading, grubbing and stockpiling permits
- Water system (Board of Water Supply)
- Sewer connection
- Driveway connection permits

The application for the SMP will be completed and processed, pursuant to Chapter 25 Revised Ordinances of Honolulu. The SMA review and approval process will be conducted by the City DPP, with permit approval granted by the Honolulu City Council. Public hearings will include the SMA Public Hearing held by DPP in the 'Ewa Beach community, and the City Council review process.

E. Agencies, Organizations and Individuals Contacted in Pre-Consultation

Organizations and members of the community were consulted in the preparation of this Draft EA. The proposed development was discussed at a meeting of the 'Ewa Neighborhood Board on July 11, 2019. The only concern mentioned was the heavy equipment on a small street and the safety of the area residents. The project was presented at a very preliminary stage of the design so it is due for another update presentation.

The Department of Planning and Permitting was also consulted as accepting authority for this proposed action. Further discussion is detailed in *Section VII*.

Draft Environmental Assessment
Cluster Development at Pōhakupuna



Figure 1-1

Project Location Map



Figure 1-2

Special Management Area



Figure 1-3

Project TMK Parcel



Figure 1-4

State Land Use District

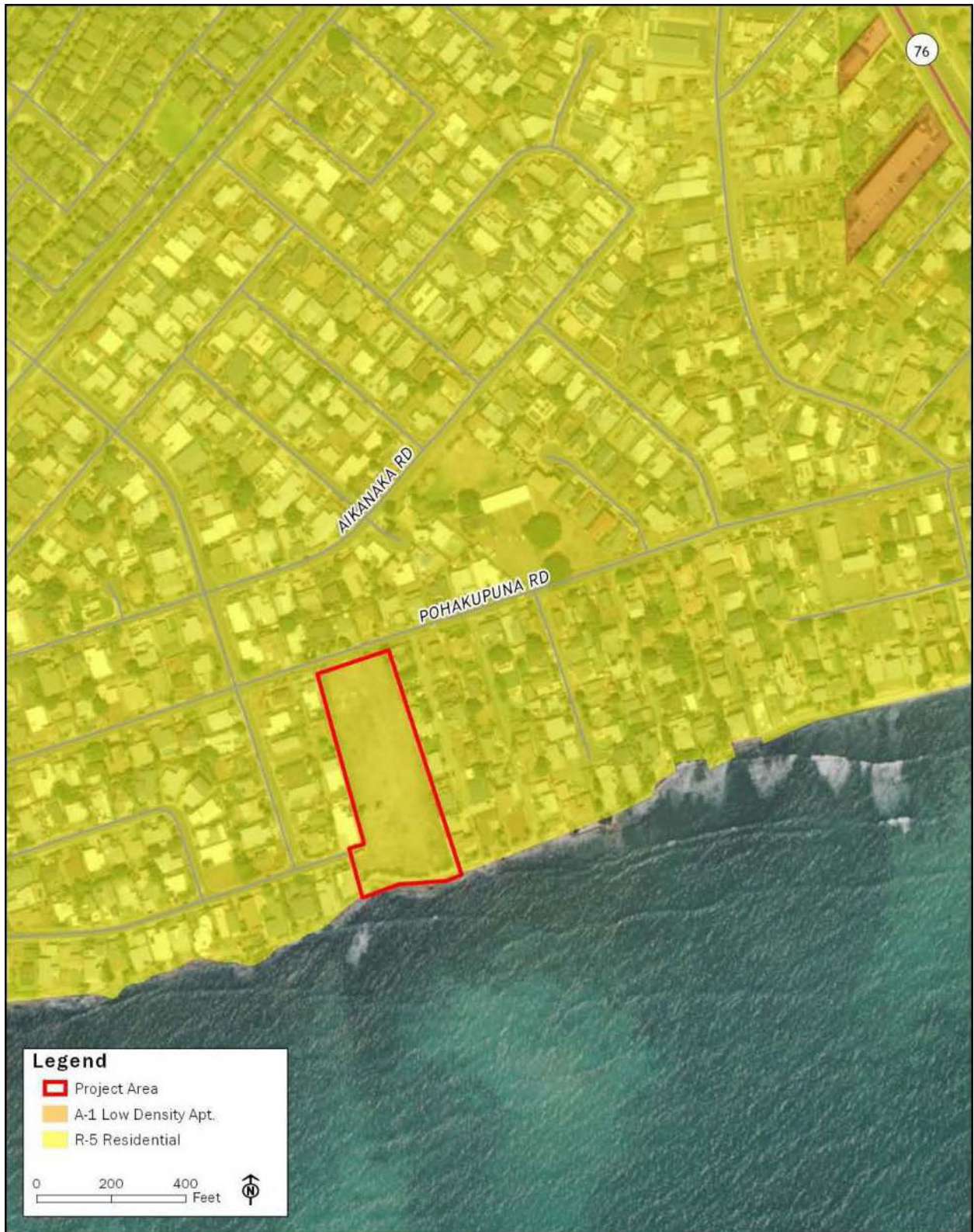


Figure 1-5

City and County of Honolulu Zoning

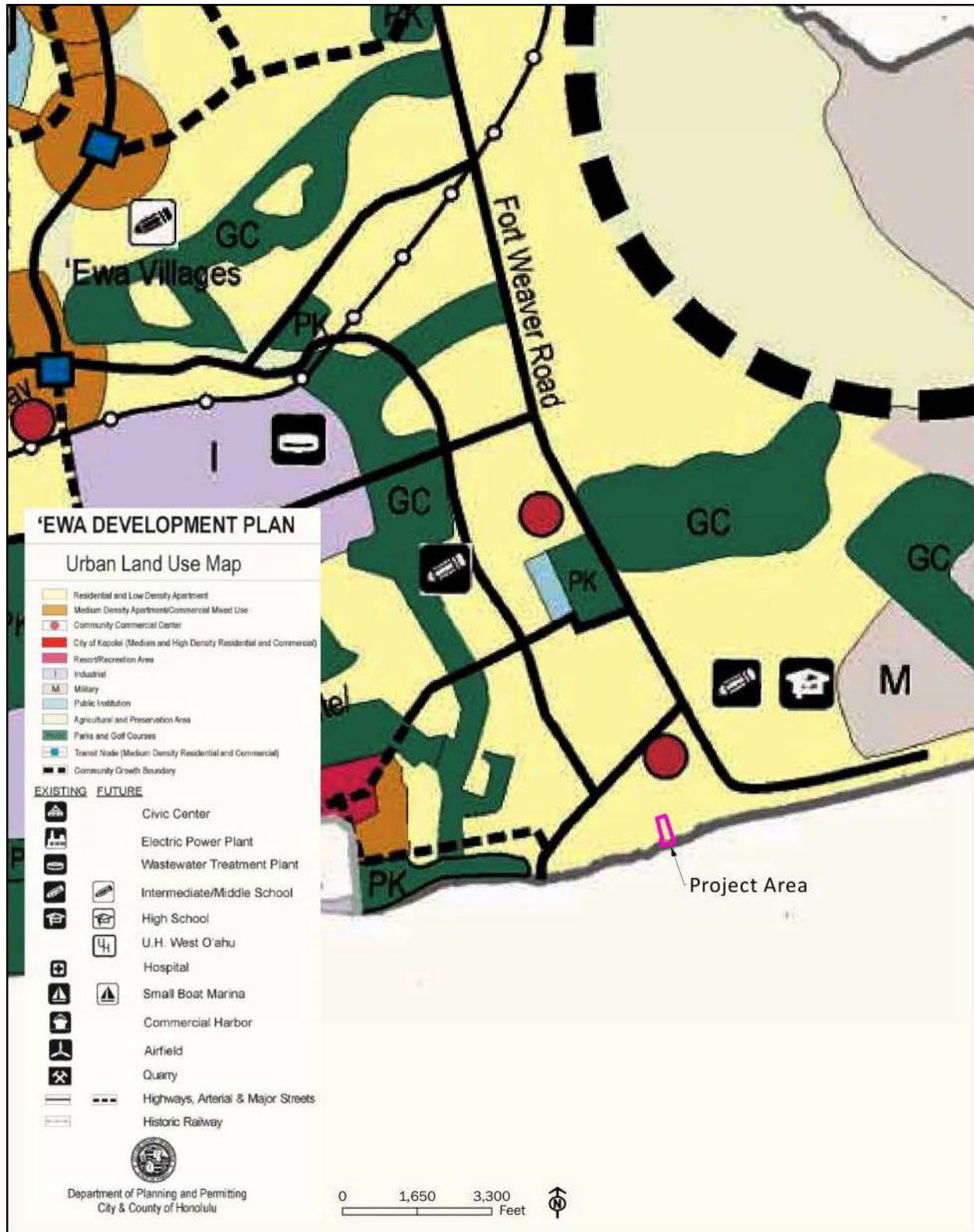


Figure 1-6

'Ewa Development Plan

II. Project Description

A. PROJECT LOCATION & CHARACTERISTICS

Location

The subject property is located in the 'Ewa District on the island of O'ahu. The site consists of a 2.74-acre parcel, located on the makai side of Pōhakupuna Road, identified as T.M.K. (1) 9-1 028:040 (*Figure 1-3*). The property is situated at the southern part of 'Ewa Beach, approximately seven (7) miles south of Waipahū Town.

The project is within the State Land Use Urban District and City and County of Honolulu R-5 Residential Zoning District (*Figure 1-4, Figure 1-5*). The 'Ewa Development Plan represents planned development for the project site and surrounding area to be residential and low-density apartment (*Figure 1-6*).

Ownership

The property was purchased in 2018 by Golden Lion 'Ewa Beach LLC.

Adjacent Land Uses

Surrounding land uses include single-family residential areas to the north, east, and west. The Pacific Ocean expands beyond the southern edge of the property, which is defined by a rocky shoreline. Under Chapter 23 of the Revised Ordinances of Honolulu (ROH), the shoreline setback is generally established 40 feet inland from the certified shoreline. At the recommendation of DPP from the 21-day review, the project does not include any proposed use within an 80-foot shoreline setback and dwellings are setback 120 feet from the shoreline.

The characteristics of the property and surrounding area are suitable for the proposed development. The homes in the proposed cluster development are appropriately scaled to the surrounding area, and the design and planned use of the development is reflective of the character or surrounding neighborhoods.

Existing On-Site Land Uses

The project site consists of 2.74 acres of vacant, unused land in a residential area located makai of Pōhakupuna Road. This urban land situated in a residential neighborhood is a prime spot for residential development.

B. PURPOSE OF THE PROJECT

The purpose of a cluster development is to achieve orderly development by providing adequate infrastructure, safe and efficient streets, and light and air, while preventing congestion of population, and serving the needs of residents of the community. Jinshi Development Hawaii envisions a cluster development that can provide both market-priced and affordable housing units. The project will

utilize 2.74 acres of vacant, developable, and underutilized lands to provide additional housing in the 'Ewa District, which has been designated by the City and County of Honolulu as a key place for future population growth on the Island of O'ahu.

C. DESCRIPTION OF THE PROJECT

Jinshi Development Hawai'i plans to build a residential development that can efficiently utilize appropriate lands in 'Ewa Beach to provide both market-priced and affordable housing units. The planned development includes 21 units - a mixture of 6 duplexes, 2 triplexes and 3 single-family homes, that are designed to reflect the character of the surrounding neighborhood. Prices will be comparable and suitable for the area's working class and will also include affordable homes. *Figure 2-1* provides a site plan for the proposed development. Although no significant environmental impact is anticipated, Jinshi Development Hawai'i will follow proper protocol and guidelines to minimize any adverse environmental impact that could be caused by the project.

D. PROJECT UTILITIES AND INFRASTRUCTURE

Overall existing conditions, impacts, and mitigation measures on utilities and infrastructure are discussed in greater detail in *Section III* of this document. The following section describes the physical characteristics of these site utilities with the addition of the new improvements.

Water

The Honolulu Board of Water Supply (BWS) currently provides potable water to the project site. The existing BWS distribution system includes a 12-inch water main along Pōhakupuna Road and a 6-inch at Pupu Street. There are no private water facilities currently on the site.

The proposed water system will connect to the existing 12-inch water main along Pōhakupuna Road. The water system will consist of a new 4-inch PVC C900 water main, one (1) water meter, and a backflow preventer. All units will be serviced using a 1-inch lateral with shut-off valve.

Sewer

There is an existing 8-inch sewer main within Pōhakupuna Road that runs east to Muumuu Place and connects to the existing 36-inch sewer main. There are also three existing 6-inch laterals to the property from the 8-inch main in Pōhakupuna Road. There is one additional 6-inch lateral from the Pupu Street sewer.

The City and County of Honolulu has granted a Private Sewer Connection Permit (2020/SCA-1510, dated 11/17/2020) based on the development of 24 units (now 21 units). There are no existing on-site wastewater facilities.

The proposed development will discharge approximately 13,300 Gallons Per Day (GPD) into the existing 8-inch sewer system along Pōhakupuna Road. The sewer system serving the proposed cluster development will consist of a new 6" sewer main and one sewer manhole.



Figure 2-1

Site Plan

Storm Drainage

There is no existing on-site underground drainage system and no drainage system along Pōhakupuna Road. Runoff that flows through the property and enters Pupu Street is conveyed by rolled curb into catch basins and discharged into the City's underground drainage pipe system. The runoff generated from the undeveloped site is approximately 2.2 cubic feet per second (CFS).

The storm drainage system will be designed in accordance with the City & County of Honolulu's Storm Drainage Standards, dated August 2017. The runoff generated from the proposed developed site will be approximately 8.3 CFS. Runoff generated on the project site will be treated in accordance with the City & County of Honolulu's Rules Relating to Water Quality, dated July 14, 2017.

An Erosion and Sediment Control Plan (ESCP) will be developed, and best management practices will be implemented throughout the construction of the project. In addition to the ESCP, a National Pollutant Discharge Elimination System (NPDES) permit for storm water associated with construction activities will be obtained. Subsequently, a Storm Water Pollution Prevention Plan (SWPPP) will be created and maintained throughout the project.

Solid Waste Disposal

Although waste collection is provided in the area by the City and County of Honolulu, the proposed development will be serviced by a private collection company. The proposed trash/recycling enclosure is located next to the Pavilion, adjacent to the fire truck hammerhead so there should be ample space for collection trucks to maneuver.

Solid waste collected in 'Ewa Beach is disposed of at Covanta Honolulu (H-POWER), the City's refuse-to-energy plant at the Campbell Industrial Park; at the City and County of Honolulu, Department of Environmental Services; or at the 'Ewa Convenience Center for Refuse and Recycling located about 2.6 miles from the project area.

Other Utilities

Electrical service is provided by Hawaiian Electric Company, Inc. (HECO), through overhead power lines along Pōhakupuna Road. There are three proposed locations for pad mounted transformers, one near the mauka side of the property, one next to the pavilion near the makai side and one near the middle of the site.

Access, Roadways, and Parking

The property is fronted on the north by Pōhakupuna Road, a City 50-foot wide right-of-way, with a 20-foot wide, two-lane, asphalt concrete pavement road. It is an east-west, two-lane undivided roadway without sidewalks, curbs, gutters, or on-street parking; however, passenger vehicles were observed parked on the unpaved roadway shoulders during field visits and in Google Street View photos.

There is a secondary access to the south-west corner of the property via Pupu Street, a City 44-foot wide right-of-way with a 26-foot wide, two-lane, asphalt concrete pavement road, including concrete rolled curbs on both sides. Pupu Street also does not have sidewalks.

On-site parking at the project site will be restricted to driveways, garages/carports, and marked guest parking spaces. On-street parking will be prohibited to maintain 22 feet of clearance for fire and emergency access. Per the Revised Ordinances of Honolulu, the City and County of Honolulu requires each single-family detached dwelling unit to provide one (1) off-street parking space per 1,000 square feet of floor area (excluding carport or garage). Based on the parking requirements, the project is required to provide 51 parking spaces.

E. CONSTRUCTION CHARACTERISTICS

Landscape Management

The existing lot is mostly flat and covered by low weedy types of grasses and other scrub vegetation. The proposed project includes clearing of the existing vegetation. Minor grading and grubbing will be carried out on the property to prepare for new development and landscaping.

If the residential project design for the site includes use of the shoreline setback area, including low level landscaped walls or concrete walkways, a Shoreline Setback Variance (SSV) permit will be required. Submittal of an SSV Application requires a current certified shoreline survey. The SSV process includes a public hearing held by DPP, and approval by the DPP Director and Honolulu City Council. The SSV is typically processed concurrently with the SMP.

Excavations

The site is generally level, however, the topography will be modified to accommodate the new construction. Fill will be provided to ensure the site is above the sea level rise projections. Earthwork on-site will generally consist of adjustments to site grades to allow for construction of buildings, roadways and pathways, drainage swales, and open spaces. Fill will be placed, and earth layers will be cut, as required, to allow construction to progress.

General Construction

The general construction of housing will include the formation and placement of concrete footings and foundations, roadway base course and paving, the installation of mechanical equipment, the installation of electrical wiring and equipment, plumbing, general carpentry work, painting, and other trades and work typically associated with construction projects.

During construction at the site, construction activity hours (7:00 am to 6:00 pm) and applicable noise regulations as per Title 11, Chapter 46, of the Honolulu Administrative Rules 11-46 will be met.

The project will comply with National Pollution Discharge Elimination System (NPDES) permit requirements for construction activity. A NPDES permit for discharge of storm water associated with construction activities will be obtained for the site. The requirements of the approved NPDES permit

and erosion control plan will be adhered to during construction as appropriate. Construction, grading and drainage plans for the project will be submitted to appropriate agencies for review and approval.

III. Environmental Setting, Potential Impacts, and Mitigation Measures

This section describes the existing environmental setting and identifies possible impacts of the proposed project. Strategies to mitigate those potential impacts are also identified.

A. CLIMATE

Existing Conditions

The climate at the project site is typical of the climate that characterizes most of the State of Hawai'i. The area features mild and semi-tropical climate with slight seasonal variations. Average annual temperature in the 'Ewa Beach area ranges between 63 degrees Fahrenheit to 88 degrees Fahrenheit, with temperatures usually falling between the low 70's to mid-80's. Precipitation in the area is light, with annual rainfall averaging approximately 18 inches – the majority of which occurs between November and March.

Winds from the northeast, known as trade winds, are the most predominant over the Hawaiian Islands. Winds in the project vicinity generally range between 8 to 18 miles per hour. In the winter, there is a shift in the wind patterns characterized by the arrival of the westerly and southerly winds. Westerly winds are typically characterized by strong winds and high wave activity.

Anticipated Impacts and Proposed Mitigation

The project will not have any effect on climatic conditions, thus no mitigation measures are required.

B. TOPOGRAPHY

Existing Conditions

The subject property consists of a vacant lot that is generally level (*Figure 3-1*). The existing elevations on the Project Site, mauka of the shoreline range from 4.47 feet to 6.89 feet. The existing elevations at the shoreline range from 4.93 feet to 6.15 feet. The existing elevations within the 60-foot shoreline setback area range from 4.47 feet to 6.15 feet. The existing elevations within the proposed development area range from 4.64 feet to 6.89 feet. There is no discernible drainage gradient and no unique topographic features on the project site.

Anticipated Impacts and Proposed Mitigation

To accommodate construction of new buildings and support necessary infrastructure, some earthwork such as excavation, grading, grubbing, and stockpiling will be required. There will be 10 cubic yards of excavation and 7,100 cubic yards of embankment (fill) to raise the grade to 6.75 feet

Draft Environmental Assessment
Cluster Development at Pōhakupuna

to 9.00 feet on the Project Site. Finish floor elevations will be from 7.50 feet to 9.00 feet. See *Appendix A, Conceptual Plans*.

This fill is being provided to ensure the height above the 3.2-foot sea level rise will vary from location to location. According to the [PaciOOS](#) website, given the existing grades along our property and comparing that with the 3.2-ft sea level rise projections, the site should be at least 0.4-ft above the 3.2-ft sea level rise, after grading (*Figure 3-2, PACIOOS Sea Level Rise*). Further discussion on sea level rise and anticipated impacts and proposed mitigation on topography is detailed in the *Coastal Hazard Assessment Report, Appendix E*.

Erosion control practices will comply with Federal, State, and County regulations. A City Grading, Grubbing, and Stockpiling permit will be obtained. Grading operations may be used to balance the existing material on-site and will avoid transporting existing material off-site to the extent possible. Storm water quality and water quantity control will be implemented to comply with City and State grading and drainage standards. The project will comply with the National Pollution Discharge Elimination System (NPDES) permit requirements for construction activity. A NPDES permit for discharge of storm water associated with construction activities will be obtained for the site. The requirements of the approved NPDES permit and erosion control plan will be adhered to during construction as appropriate. Construction, grading and drainage plans for the project will be submitted to appropriate agencies for review and approval.



Figure 3-1

Topography

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 Cluster Development at Pōhakupuna

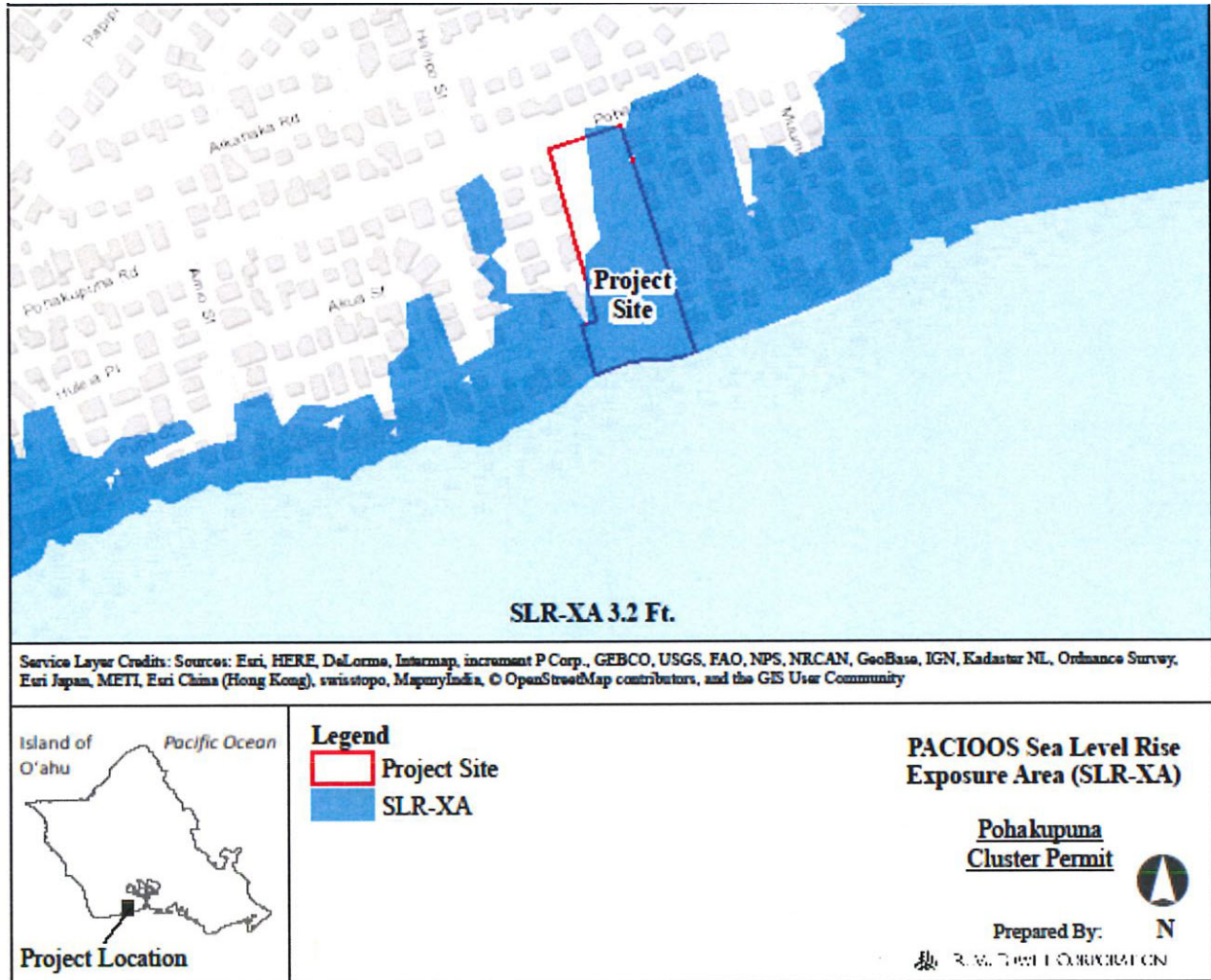


Figure 3-2

Sea Level Rise

C. SOILS AND GEOLOGIC CONDITIONS

Existing Conditions

The entire project site and a large part of the surrounding area consists of soil classified as Coral Outcrop (Cr) (*Figure 3-3*). This soil type contains coral and cemented calcareous sand. Coral reefs were formed in shallow ocean water at a previous time when ocean levels were higher. Coral outcrops can be found exposed at the ocean shore, on the coastal plains, and at the foot of the uplands. Approximately 80 to 90 percent of the coral outcrop is made from coral reef. The remaining 10 to 20 percent consists of a thin layer of red soil in cracks, crevices, and depressions within the coral outcrop. Vegetation on this type of soil varies but typically consists of introduced species of kiawe, koa haole, and fingergrass. Permeability is rapid and the hydrologic soil group is Type "A".

In April 2003, a Visual Soil Reconnaissance was conducted for the subject property by Ernest K. Hirata & Associates, Inc. The visual reconnaissance showed a relatively thin soil cover consisting of crushed coralline gravel, coralline sand, and basalt gravel over the site. The underlying coral stratum was estimated to range from a dense to hard condition.

Anticipated Impacts and Proposed Mitigation

The findings of the soil survey and visual site reconnaissance concluded that the subject property could generally be developed with residential structures. The shoreline area fronting the project site is rocky and lacks a beach; therefore, beach erosion is not a concern in this area. Preparation of the land for construction is anticipated to produce only minimal disturbances to the ground and some limited soil loss. Since the lot is vacant and level, clearing, grading, and compacting will be insignificant.

Construction Best Management Practices (BMPs) will be implemented to mitigate potential adverse environmental impacts that may occur as a result of the project. Construction BMPs such as sediment traps, silt fences, dust fences, stabilized construction entrances, and truck wash-down areas, will be applied as appropriate. A watering program will be implemented to minimize soil loss through fugitive dust particulate emission levels from construction sites. Additionally, bare soil areas after construction will be covered by planting or pavement as quickly as possible. As compared to the existing undeveloped site, with its exposed soils, the project is anticipated to reduce the amount of soil erosion and silt runoff from the property.



Figure 3-3

Soil Map

D. SHORELINE CONDITIONS

Existing Conditions

The project site from a hardened shoreline back approximately 600 feet to Pōhakupuna Road. The shoreline in this area of 'Ewa Beach consists of three to six-foot-high beachrock (limestone) scarp. Small pockets of sand occur at the bottom of the scarp in some areas of 'Ewa Beach, however, no

sand occurs in the rubble fronting the project site. The intertidal area is typically a solid flat limestone platform that extends into the near shore waters mixed with coralline and limestone rubble. The project site sits on a low-lying, flat coral and limestone rubble platform that is generally about five to six feet above mean sea level across the entire lot.

The offshore area, extending out about 500 feet, is comprised of a hard, coralline substrate set on an extremely flat slope that is on the order of 100:1. Most of the substrate is cemented, but loose boulders are scattered on its surface. The few interruptions to this otherwise flat bathymetry are comprised of boulders and dead coral heads. The only sand is found in small depressions and in other localized wave-protected areas. The sand is typically very coarse and is entirely coralline in origin. There is no evidence of significant longshore transport of sand occurring in front of the parcel of to either side.

Anticipated Impacts and Proposed Mitigation

Improvements on the property are not anticipated to adversely impact the health of shoreline or marine resources. All development and operational activities will occur inland of the shoreline. During the construction period, erosion will be minimized through compliance with the City and County's grading ordinance and the applicable provisions of the DOH's Water Quality Standards (Title 11, Chapter 54, HAR) and Water Pollution Control requirements (Title 11, Chapter 55, HAR). Additionally, standard construction BMPs will be employed to minimize impacts. No significant storm drainage runoff to coastal water is anticipated as a result of the proposed residential development.

Under Chapter 23, ROH, a shoreline setback is generally established 40 feet inland from the certified shoreline. This project, however, has an 80 foot setback for uninhabited improvements and 120 foot setback for dwellings to meet cluster housing regulations as indicated in the 21 day review letter. Development within the shoreline setback is prohibited and any use of this area requires approval of a Shoreline Setback Variance (SSV) or Minor Shoreline Structure Permit (MSS). The purpose of the shoreline setback is for the City to protect and preserve the natural shoreline, public pedestrian access, and open space along the shoreline. The project does not include any proposed use within the 80 foot shoreline setback.

The project will comply with relevant requirements regarding public shoreline access and shoreline setbacks. Public shoreline accessways at intervals of approximately one-half mile should be provided for private developments. Since there is an existing public access easement located to the east of the site through a private roadway off Pōhakupuna Road, the proposed development is not required to include a public shoreline access. While a direct public path towards the shoreline may not be

provided though the subject site as part of the project design, use and access of the public shoreline area should be maintained.

E. CLIMATE CHANGE AND SEA LEVEL RISE

Existing Conditions

Rapid anthropogenic climate change is a well-established fact within the scientific community. As a result of climate change, oceans are warming and acidifying, ice sheets and glaciers are melting, and sea levels are rising. A recent study by a University of Hawai'i (UH) team of researchers predicts that tropical regions will experience drastically warmer climates by the year 2047.

In addition to rising temperatures, sea level rise is a notable concern for coastal communities such as 'Ewa Beach. The global annual sea level rise averaged over the last century was roughly two millimeters, with previous studies indicating that this rate is now approaching three millimeters and may accelerate in the coming decades. According to the UH School of Ocean and Earth Science and Technology (SOEST), while predicting future sea level rise is challenging because of unknown parameters, research shows that global mean sea level may reach approximately one foot by midcentury and 2.5 to 6.2 ft by the end of the century.

Anticipated Impacts and Mitigation

The project will not contribute to adverse impacts relating to existing climate change and sea level rise, nor will it significantly contribute to additional greenhouse gas emissions and overall long-term climate changes. However, as sea level rise and climate change are a threat to coastal communities in general, it may have a future impact on the condition and use of the project site.

In accordance with the Mayor's Directive 18-2, all projects must be reviewed with consideration of the Hawai'i Sea Level Rise Vulnerability and Adaptation Report. The report specifies that 3.2 feet of sea level rise (SLR) could occur as early as year 2060, which would be within the life span of the proposed structures. A flood analysis was conducted by EKNA Services, Inc. to assess the undetermined areas on the property (*Appendix F*). According to the analysis, an SLR of 3.2 ft would result in increased inundation on the property during both hurricane and tsunami events. The proposed development grading plan, however, would keep the finished floor elevations (FFE) for the units above the predicted flood elevation. Since the FFE at all units are 9.00' or more, nearly all units should be out of harm's way according to the flood elevations shown in both the tsunami and hurricane calculations with 3.2 ft SLR.

F. NATURAL HAZARDS

Existing Conditions

Hurricanes and Tropical Storms

Hurricanes and tropical storms are both categorized as tropical cyclones, which are warm-core storms that originate over tropical waters with well-defined centers of closed surface wind

circulation. A hurricane is a tropical cyclone which sustains surface winds of 64 knots (74 mph) or more. Tropical storms are categorized as an organized system of strong thunderstorms with defined circulation and maximum sustained winds of 39-73 mph (National Oceanic and Atmospheric Administration [NOAA], 2015).

Hurricanes are relatively rare events in the Hawaiian Islands. Records show that strong wind storms have struck all major Hawaiian Islands. The first officially recognized hurricane in Hawaiian waters was Hurricane Hiki in August 1950. Since that time, five hurricanes have caused serious damage in Hawai'i: Nina (1957), Dot (1959), 'Iwa (1982), Estelle (1986), and 'Iniki (1992).

However, with rising global temperatures, Hawai'i is expected to experience a higher incidence of tropical storm events. In most recent history, Tropical Storm Olivia made landfall on Maui and Lāna'i in 2018, causing considerable flooding, power outages, and road and school closures.

Earthquakes

Based on the 2015 United States Geological Survey (USGS) International Building Code (IBC) Seismic Design Map, the project site could experience up to 0.15 earthquake ground motion accelerations (g-force). This represents the lower limits of probable force experienced by the island of O'ahu during a seismic event.

Flooding

Most of the subject site is located within FEMA flood Zone D defined as: "Areas in which flood hazards are undetermined, but possible" (*Figure 3-4*). A flood analysis was conducted by EKNA Services, Inc. to assess the undetermined areas on the property (*see Appendix F*).

A very small portion of the subject property directly abutting the shoreline is in FEMA flood zone VE and BFE determined (EL 7). Flood zone VE corresponds to areas subject to inundation by the 1-percent annual chance flood event with additional hazards due to storm-induced velocity wave action.

Tsunami Inundation

The sudden displacement of the ocean floor (earthquakes), landslides, or volcanism can generate tsunamis, which are a series of waves that can reach speeds of up to 600 mph. Upon reaching a coastline, a tsunami can become a wall of water reaching heights of 30 ft or more and capable of moving inland several hundred feet. Known major tsunami events in Hawai'i include the areas of East Hawai'i (1946, 1960, 1975) and North Shore O'ahu (1952, 1957).

The project area is located entirely within the Tsunami Evacuation Zone (*Figure 3-5*).

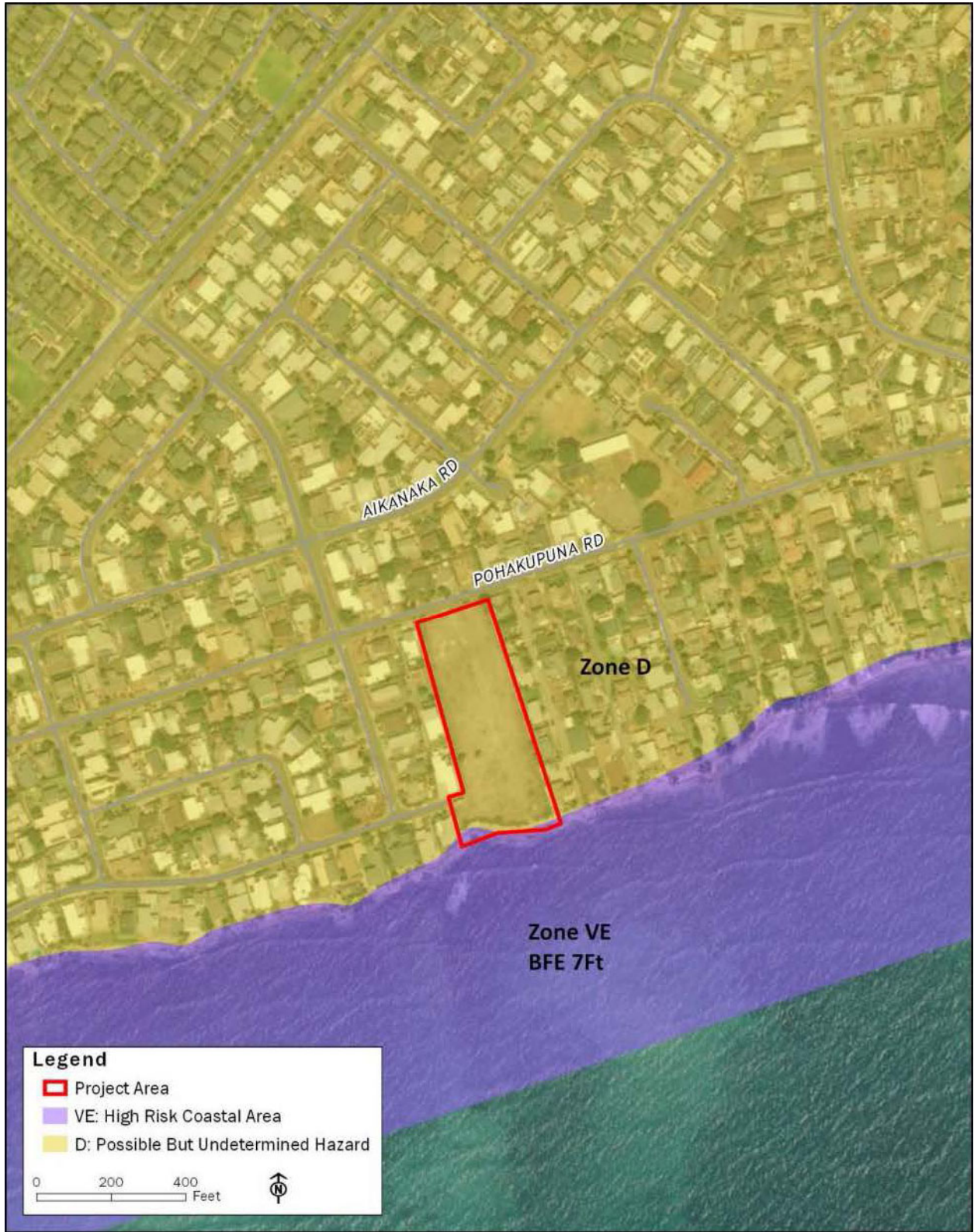


Figure 3-4

Flood Zone Map

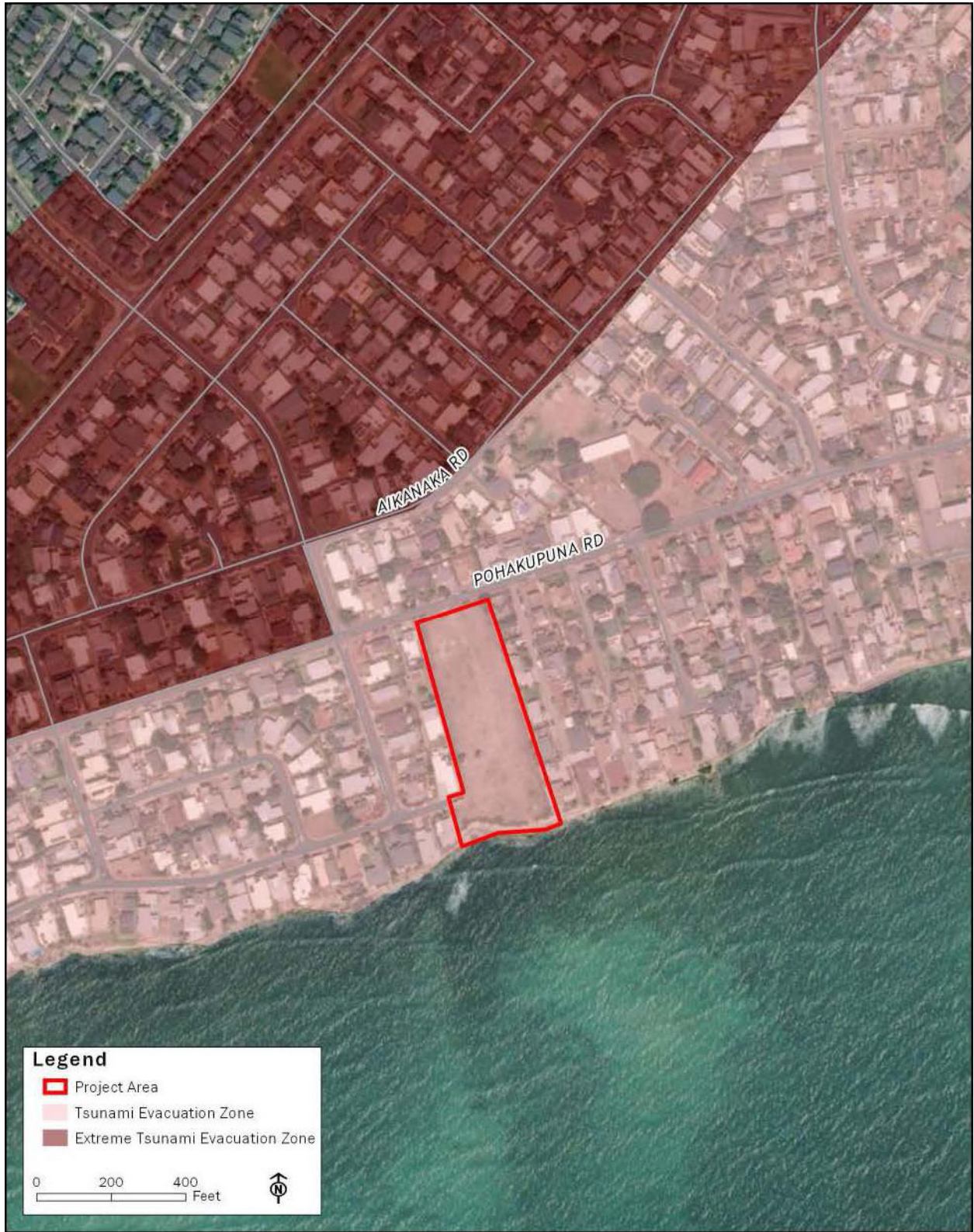


Figure 3-5

Tsunami Evacuation Zones

Anticipated Impacts and Proposed Mitigation

Hurricanes and Tropical Storms

The effects of past storm events have caused minimal to no damage in the project area. The future threat of hurricanes in the 'Ewa Beach area cannot be precisely calculated, although the frequency of hurricane threats may increase with climate change and warming ocean waters. According to the flood analysis though, inundation from hurricane flood should not affect the proposed development as the finish floor elevations would be higher than the projected flood elevation (see *Appendix F*).

When a hurricane is approaching a coastal location, early evacuation is standard mitigation to address the possibility of accompanying storm surge with high winds. The National Weather Service provides guidance and when necessary, during an event, issues a hurricane watch when a storm is expected to make landfall within 36 hours. A hurricane warning is issued when landfall is likely within 12 to 24 hours.

Earthquakes

All buildings for the project will be constructed in compliance with regulatory controls to meet City and County of Honolulu Building Code requirements as appropriate to IBC seismic probabilities.

Flooding

Climate change is causing sea level rise relative to land elevation and could amplify near-term vulnerability to storm surge and increases long-term flood and inundation risk. The portion of the project site that is in the VE flood zone is within 40 feet from the certified shoreline so no structures are allowed to be built within this zone. The proposed development grading plan, utilizing a filled based, will keep the FFE of the units above the predicted flood elevation. A proposed underground stormwater detention vault underneath the pavilion will manage any excess stormwater runoff from the developed site and potential for flooding in areas surrounding the project site will be minimized.

Tsunami Inundation

A powerful tsunami is likely to be devastating to coastal structures. Given the project's coastal location, it can be assumed that buildings could be damaged or demolished by a tsunami.

Mitigation of a tsunami should be concentrated on early warning systems and effective evacuation measures to preserve life. Mitigation methods to protect property in such an event involves the proposed filled base to raise units above the inundation level. There will also be no units built within 120 feet of the shoreline to minimize impact from the shoreline wave runup.

G. FLORA AND FAUNA

Existing Conditions

The project site is situated within a developed residential neighborhood in 'Ewa Beach on the island of O'ahu. Due to the urban environment of the Project site, endangered species are unlikely to occupy the property.

The project site has a variety of introduced vegetation species that form a grassy ground cover with low shrubs and two mature trees (mango and a money tree). No native vegetation exists on the project site. Several small koa haole trees are found around the site perimeter, and dry land field grasses and weed species are found throughout the open areas of the site.

There are no federally designated critical habitats within the immediate vicinity of the project area. However, according to the U.S. Fish and Wildlife Service, the federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Endangered Hawaiian petrel (*Pterodroma sandwichensis*), threatened Newell's shearwater (*Puffinus auricularis newelli*), endangered Band-rumped storm-petrel (*Oceanodroma castro*), and seabird species protected under the Migratory Bird Treaty Act of 1918, the Wedge-tailed Shearwater (*Ardenna pacificus*) and White Terns (*Gygis alba*) (collectively referred to as Hawaiian Seabirds), and White Terns (*Gygis alba*) may occur within the vicinity of the project area.

The threatened green sea turtle is known to inhabit the waters off 'Ewa Beach, though no turtle nesting is known to exist in the project area. The endangered humpback whale has been sighted in the offshore area, however, this is one of the lowest density sighting areas in the State.

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

Hawaiian seabirds may traverse the project area at night during the breeding season (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.

Anticipated Impacts and Proposed Mitigation Measures

The proposed development is not expected to impact endangered or threatened plant or animal species at the project site or in the 'Ewa Beach area. While temporary disturbance of wildlife during construction is possible, mitigation measures will be implemented to minimize impacts.

To avoid and minimize impacts to Hawaiian hoary bats, woody plants greater than 15 ft. in height will not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). In addition, barbed wire will not be used for fencing on the site.

No large trees exist in the project area, therefore, potential impacts to nesting white terns are not anticipated. Still, Hawaiian seabirds may traverse the project area at night during the breeding season (March 1 to December 15). While no seabird nestings are located within the project site, use

of outdoor lights could pose a potential impact to birds, as lighting can disorient seabirds which can result in their downing or harm. To avoid and minimize potential project impacts to seabirds, outdoor lights will be shielded as appropriate. Efforts will be made to turn off lights when human activity is not occurring in the lighted area. In addition, construction activities will be minimized during nighttime hours, particularly during the seabird fledging period, September 15 through December 15.

Sealed containers for waste will be used to avoid attracting unwanted predators. Post-construction, covered trash receptacles and bait stations for rodents and mongoose will be used to minimize predator presence.

H. HISTORICAL AND ARCHAEOLOGICAL RESOURCES

The project area lies within the ahupua'a of Honouliuli in the moku of 'Ewa and is part of the unique geological feature known as the 'Ewa Plain (or the 'Ewa Karst). Oral histories tell of the traditional importance of the mauka or upland areas of Honouliuli Ahupua'a. Being one of the largest traditional Hawaiian land units on O'ahu, Honouliuli served as a crossroads to many points east (towards Pearl Harbor and Honolulu), west (towards Wai'anae) and north (towards Wahiawā and Waialua).

An Archaeological Assessment of the project site is being conducted by Cultural Surveys Hawai'i, Inc. (CSH). Findings are included as *Appendix C*.

Existing Conditions

The survey was conducted for TMK: (1) 9-1-028:040. The purpose of the survey was to determine the presence, nature, and extent of archaeological resources in the project area; evaluate their significance; and ensure compliance with the National Historic Preservation Act of 1966, as amended, Chapter 6E of Hawai'i Revised Statutes, and the guidelines established by the State Historic Preservation Division (SHPD).

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 or archaeological resources may be affected by the project and, based on findings, consider cultural resource management recommendations.

Based on the findings of literature review and field inspection, the Project is in an area that was sparsely populated in both the pre-Contact and early post-Contact times. Various early historic maps show a coastal trail and various ranching walls extending through the project area, but no evidence of these features is discernible in the project area as the project area has been previously heavily graded and disturbed in the twentieth century.

Previous archaeological studies have found various pre-Contact historic properties, such as habitation, agricultural, and mound complexes to the north and west of the project area, primarily centered around One'ula beach park, located one (1) mile away from the subject property. However, there have not been very many studies in the residential area surrounding the project area. Human remains have been found in the coastal dunes and in pit caves to the west of the One'ula area. No human remains have been previously identified within 800 m of the project area.

The pedestrian inspection verified the findings of the background research. The project area appears to have been extensively graded and previously disturbed. Remnants of historic structures which, based on historic maps and photographs, were erected between 1933 and 1950, and demolished by 1980. These include concrete structures that have been heavily disturbed and are in remnant condition. No evidence of the coastal trail, ranching walls, “Station X,” or any pre-Contact to early post-Contact structures or deposits were observed.

Anticipated Impacts and Proposed Mitigation

The results of the Archaeological Assessment indicate that the potential to encounter historic properties, including human remains, at the project site is low. There is no evidence of traditional Hawaiian archaeological historic properties on the surface, including remnants of any coastal trails, agricultural or habitation complexes, and mound complexes. There are no structures on the project site, and therefore no potential issues with architectural historic properties, which would concern the SHPD architecture branch. The remnants of the mid-twentieth century structures still extant (broken concrete slab and potential cesspool remnants) likely do not possess the integrity necessary to be considered a significant historic property.

Based on the lack of archaeological resource findings, archaeological monitoring is not recommended. If any previously unidentified historic sites or remains are encountered during site work and construction phases, all work in the immediate area will cease and an archaeologist from SHPD will be notified. Work in the area will be suspended until further recommendations are made for the appropriate treatment of cultural materials.

I. CULTURAL RESOURCES

Cultural Surveys Hawai'i, Inc. (CSH) conducted a cultural impact assessment (CIA) for the Project. The findings of the assessment are included as *Appendix C*.

Existing Conditions

It is anticipated that there are no historic sites at the project location. Prior agricultural use and residential development on the property support the likelihood that no significant historic sites are present at the project site.

Anticipated Impacts and Proposed Mitigation

The project site does not include known archaeological sites or sites of cultural or historic significance. Therefore, the proposed residential development is not anticipated to produce harmful impacts to historical or cultural resources.

If any previously unidentified historic sites or remains are encountered during site work and construction phases, all work in the immediate area will cease and an archaeologist from SHPD will be notified. Work in the area will be suspended until further recommendations are made for the appropriate treatment of cultural materials.

J. VISUAL RESOURCES

Existing Conditions

The project site is located in the 'Ewa District on the island of O'ahu. There are no significant views identified on the property in both the 'Ewa Development Plan and the City's Coastal View Study (1987).

While the 'Ewa Development Plan does seek to preserve open space and views, it does not prohibit residential development on this privately-owned parcel.

Anticipated Impacts and Proposed Mitigation

Although structures developed on this lot will interrupt the line of sight to the ocean at some locations in the surrounding neighborhood, landscaping and maintenance of the lot is expected to enhance the overall visual quality of the neighborhood.

The topography of the site will not be significantly modified by new landscaping or the construction of new buildings. Aesthetic quality of the area will be maintained and improved with new buildings, and new landscaping, and control over overgrown grasses and weeds.

K. AIR QUALITY AND NOISE

Existing Conditions – Air Quality

The State Department of Health (DOH), Clean Air Branch (CAB) has established the State Ambient Air Quality Standards (SAAQS) to ensure that State and Federal air quality standards are met. These standards account for seven major air pollutants: carbon monoxide (CO), nitrogen oxides (NOX), ozone (O3), particulate matter smaller than 10 microns (PM10), particulate matter smaller than 2.5 microns (PM2.5), sulfur oxides (SOX), and lead. The DOH-CAB regularly samples ambient air quality at monitoring stations throughout the State, and annually publishes this information. On O'ahu, there are six (6) monitoring stations.

Air quality in the State of Hawai'i continues to be one of the best in the nation, and criteria pollutant levels remain well below SAAQS. According to the Annual Summary Hawai'i Air Quality Data, air quality monitoring data compiled by the DOH indicates that the established air quality standards for all monitored parameters are consistently met throughout the State and on the island of O'ahu. Air quality of the project site is primarily affected by air pollutants from natural and/or vehicular sources. Natural sources of air pollution that may affect the air quality of the study area include ocean sea spray, aeroallergens from plants, and wind-blown dust from bare soil areas.

Existing Conditions – Noise

Title 11, Chapter 46, or the Hawai'i Administrative Rules defines maximum permissible sound levels which are intended to protect, control, and abate noise pollution from stationary sources and construction, industrial, and agricultural equipment. As detailed below, maximum permissible sound

levels in various zoning districts are set for excessive noise sources during the day (7 a.m. to 10 p.m.) and night (10 p.m. to 7 a.m.) at the property line where the activity occurs.

- Class A – Residential, conservation, preservation, public space, open space, or similar type zones – 55 decibel (dBA) (day) and 45 dBA (night)
- Class B – Multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type zones – 60 dBA (day) and 50 dBA (night)
- Class C – Agriculture, country, industrial, or similar type zones – 70 dBA (day) and 70 dBA (night)

Noise generated by activities at the existing project site is relatively minimal and are consistent with noise levels found in other nearby residential areas. There are natural noises in the project area due to wind and the ocean waves. Existing background ambient noise levels within the project area are largely attributed to motor vehicle traffic along Pōhakupuna Road and the surrounding neighborhood.

Anticipated Impacts and Mitigation Measures – Air Quality

Fugitive dust generation from vehicle movement and clearing and grubbing activities are expected to be the primary sources of short-term air quality impacts resulting from construction activities for the project. On-site/off-site emissions from moving construction equipment and commuting construction workers will also be present on site.

State of Hawai'i Air Pollution Control regulations prohibit visible emissions of fugitive dust from construction activities at the property line. A dust control program will be implemented to control dust from construction activities. Fugitive dust emission will be controlled through the mitigation measures such as watering active work areas, using wind screens, keeping adjacent paved roads clean, covering open-bodied trucks and limiting the area to be disturbed at any given time.

Anticipated Impacts and Proposed Mitigation – Noise

There will be short term noise generated during the construction; however, noise levels are not expected to adversely affect residents near the project site. Construction activities will comply with the provisions of the regulations for community noise control. The contractor will be required to obtain a noise permit if the noise levels from construction activities are expected to exceed allowable levels. Heavy vehicles traveling to and from project sites will comply with the State's administrative rules for vehicular noise control. Over the long term, the project will not affect ambient noise levels.

L. SOCIO-ECONOMIC CHARACTERISTICS

Existing Conditions

The project site is located within the Census Tract 084.02 in 'Ewa Beach, which is in the 'Ewa District along the Leeward coast of O'ahu. 'Ewa Beach has a population of approximately 15,000 people and 3,021 households. In 2019, the median household income was \$100,151, and the median value of owner-occupied housing was \$551,200. Approximately 8.0 percent of the population live below the poverty line.

Anticipated Impacts and Proposed Mitigation

The proposed improvements at the Pōhakupuna project site are not expected to have negative impacts on the residential population of the area.

It can be expected that the development of the parcel at Pōhakupuna will have some short-term economic benefits resulting from the construction of the facilities. Construction will be completed by a local contractor.

Long-term economic benefits will also result from the provision of additional housing to support new residents in the area. Additionally, Public revenues will be generated in the form of property taxes, State General Excise Tax, and personal Income Tax.

M. UTILITIES AND INFRASTRUCTURE

Existing Conditions

Water

The Honolulu Board of Water Supply (BWS) currently provides potable water to the project site. The existing BWS distribution system includes a 12-inch water main along Pōhakupuna Road and a 6-inch at Pupu Street. There are no private water facilities currently on the site.

Sewer

There is an existing 8-inch sewer main within Pōhakupuna Road that runs east to Muumuu Place and connects to the existing 36-inch sewer main. There are also three existing 6-inch laterals to the property from the 8-inch main in Pōhakupuna Road. There is one additional 6-inch lateral from the Pupu Street sewer.

Storm Drainage

There is no existing on-site underground drainage system and no drainage system along Pōhakupuna Road. Runoff that flows through the property and enters Pupu Street is conveyed by rolled curb into catch basins and discharged into the City's underground drainage pipe system. The runoff generated from the undeveloped site is approximately 2.2 cubic feet per second (CFS).

Electric

Electrical service is provided by Hawaiian Electric Company, Inc. (HECO), through overhead power lines along Pōhakupuna Road.

Anticipated Impacts and Proposed Mitigation

The project improvements at Pōhakupuna are anticipated to increase daily water demands by approximately 17,800 gallons per day (GPD) for domestic use. Water efficient fixtures will be installed, and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Low-flow plumbing fixtures will be installed in

bathrooms to assist in maximizing water efficiency within the buildings and reduce the burden on municipal water supply and wastewater systems.

Landscape irrigation conservation BMPs endorsed by the Landscape Industry Council of Hawaii will be used to maintain the open areas in the project site. This includes designing irrigation system with sprinklers spaced with head to head coverage or better; using water conservation irrigation components such as rotary nozzles, pressure regulated spray heads and valves, rain switches and high efficiency nozzles; installing check valves; incorporating compost; and using non-potable water.

Wastewater flows from the Pōhakupuna improvements are anticipated to discharge approximately 13,300 Gallons Per Day (GPD) into the existing 8-inch sewer system along Pōhakupuna Road. The sewer system serving the proposed cluster development will consist of a new 6" sewer main and one sewer manhole.

N. ACCESS, ROADWAYS, AND TRAFFIC CONDITIONS

A Transportation Assessment was conducted for the proposed residential development by Fehr & Peers (January 2019). The findings of the assessment are included in *Appendix D*.

Existing Conditions

Primary access to and from the project site is provided on Pōhakupuna Road. Pōhakupuna Road is owned and maintained by the City and County of Honolulu. It is an east-west, two-lane undivided roadway without sidewalks or on-street parking; however, passenger vehicles were observed parked on the unpaved roadway shoulders during field visits and in Google Street View photos. This roadway provides a local connection between Fort Weaver Road and Papipi Road. The posted speed limit for this roadway is 25 miles per hour. Other roads in the project vicinity are similar two-lane undivided roadways with posted speed limits of 25 miles per hour.

Traffic conditions are generally light on Pōhakupuna Road and the other neighborhood streets surrounding the project site. The beach front community between Papipi Road and the ocean contains several hundred homes, which are served by the two collector streets, Papipi Road and Pōhakupuna Road. Traffic conditions are busiest during the weekday commuter periods of early morning and late afternoon. There is a regular weekend traffic period consisting of vehicles traveling to and from One'ula Beach Park.

The 'Ewa Beach area is generally car-dependent – most people get around by personal automobiles, with an average of 1.97 automobiles per household and annual household Vehicle Miles Travelled (VMT) of 20,030. No separate bicycle or pedestrian facilities are provided in the project vicinity. Pedestrians and bicyclists must share the roadway with vehicles, or pedestrians may walk along the unpaved shoulder.

Public transit is currently available through TheBus, and approximately eight (8) percent of 'Ewa Beach residents use transit regularly to commute to work. TheBus Route 44 operates on Pōhakupuna Road in the vicinity of the site and provides service between the southeast corner of the 'Ewa Beach community (at Popoi Road) and Waipahu Town Center. The closest bus stop is located approximately 340 feet west of the project site, with a second stop located roughly 1,200 feet east

of the site. At the west stop, a shelter, bench, and concrete pad are provided for Waipahu-bound transit patrons. Additional bus service in the nearby area is provided via Routes: 42, PH7, and Route E - Country Express 91.

The future rail corridor can be expected to enhance transit options when it becomes operational, but the route does not run directly through 'Ewa Beach, and the City and County of Honolulu's plans for Transit-Oriented Development (TOD) are currently concentrated on neighborhoods within a half-mile radius of the new rail transit stations. The nearby rail stations in East Kapolei and Waipahu are approximately four (4) to six (6) miles away from the project site.

Potential Impacts and Proposed Mitigation

Based on a proposed cluster development of 19 (now 21) single-family detached residential dwelling units, the project's vehicle trip generation was estimated using the Trip Generation Manual published by the Institute of Transportation Engineers (ITE 10th Edition).

The Project is forecast to generate 180 daily new vehicle trips to Pōhakupuna Road, including 14 trips during the AM peak hour and 19 trips during the PM peak hour. Based on observed traffic and the forecasted trip generation, the proposed project is not expected to have an adverse effect on traffic. The estimated peak hour project trips are not expected to significantly increase delay along the corridor.

The project is proposed to have one (1) point of access on Pōhakupuna Road. The main project driveway from Pōhakupuna Road is proposed with a 22-foot cross-section, which will allow for adequate travel in both directions. Access to the dwelling units will be adequate for all modes of traffic including service vehicles, refuse collection trucks and emergency vehicles, including adequate turnaround space for a fire truck.

Parking

On-site parking will be restricted to driveways, carports/garages, and marked guest parking spaces. On-street parking will be prohibited to maintain 22 feet of clearance for fire and emergency access. Per the Revised Ordinances of Honolulu, the City and County of Honolulu requires each single-family detached dwelling unit to provide one (1) off-street parking spaces per 1,000 square feet of floor area (excluding carport or garage). Based on the parking requirements, the project is required to provide 51 parking spaces.

The proposed project includes four (4) duplexes ranging from 1,928 to 2,846 square feet per unit and two (2) triplexes which are around 1,880 square feet per unit. Each unit will include a 500-square-foot carport/garage to accommodate two (2) parked vehicles. If required, a third parking space will be located either on the unit's driveway or one of the stalls off the main driveway. The remaining ten (10) spaces along the main driveway will be for guest parking. Altogether, a total of 51 off-street parking spaces is required to serve the project and 61 spaces will be provided. Therefore, the project exceeds the parking requirement for the proposed use.

While the project is not expected to have significant traffic impacts, the following mitigation measures are recommended, and will be adhered to, for optimal traffic conditions during construction:

- Construction activities and construction material or waste should be located and stored away from vehicular traffic. Sight lines for drivers on the roadway should be carefully maintained.
- Trucks delivering construction material and disposing of construction waste should be scheduled on weekdays during times of non-peak commuter periods (9:00 AM to 3:00 PM).

O. PUBLIC SERVICES

Existing Conditions and Anticipated Impacts

Medical Facilities

The closest hospital is approximately 5 miles away at the Queen's Medical Center – West O'ahu in the northern part of 'Ewa Beach near Waipahu. Other major hospitals include Pali Momi Medical Center in Aiea just over 12 miles away from the project site, and both The Queen's Medical Center and Straub Medical Center in Honolulu just over 20 miles away.

Small medical clinics are available closer to the project site. Venture Medical 21 is located 0.7 miles away from the project site, and the 'Ewa Beach Medical Clinic is located 0.9 miles away.

Educational Facilities

There are five elementary schools ('Ewa Beach Elementary, Pohakea, Keone'ula, Ka'imiloa, and Holomua) located within three miles of the project site.

The nearest intermediate schools are 'Ilima Intermediate School located 0.9 miles away from the project site and 'Ewa Makai Middle School 1.3 miles away. The nearest high schools are James Campbell High School located 0.9 miles away and Kapolei High School five miles away.

The project will have no effect on existing educational facilities.

Recreational Facilities

Existing recreational resources near the proposed development include 'Ewa Beach Community Park 0.6 miles away, One'ula Beach Park one (1) mile away, and Pu'uloa Beach Park 1.6 miles away. The narrow rocky shoreline fronting the project site is occasionally used by the public for fishing and gathering. Public access to the shoreline is presently available via existing shoreline access right-of-way connections in the Project vicinity. Approximately 1,600 feet to the west of the project site is a public shoreline access connection, located off Pupu Street at the end of Pōhakupuna Place.

Cluster development of the project site must comply with associated leisure and recreational requirements such as the park dedication. For single family or two-family dwelling units, the park dedication requirement is 350 sf per unit multiplied by the number of units in the project. Therefore, with 21 units, a total of 7,350 square feet of land will be required to meet park dedication requirements. Details of the Park Dedication rules can be found in the Park Dedication Rules and

Regulations of the City and County of Honolulu. The Project will comply with all relevant requirements.

Police and Fire Services

The Pōhakupuna site falls within HPD's District 8. The main station for this district is in Kapolei approximately six (6) miles from the project site. The nearest fire station is one (1) mile away at Fire Station 24 in 'Ewa Beach.

There is an existing fire hydrant along Pōhakupuna Road, directly across from the project site. The driveway shall be fire apparatus accessible, with a minimum width of 20-feet and a 110-foot-wide (minimum) hammerhead turnaround with 20-foot radius.

The proposed residential development will not affect police services in the area and fire protection access and firefighting support requirements for the facilities will be satisfied.

Refuse

Although solid waste collection for the project area is provided by the City and County of Honolulu, service for the project will be provided by a private collection company. 'Ewa Refuse Convenience Center is a landfill providing drop-off services for disposal. It is located 2.6 miles from the project site.

P. POTENTIAL CUMULATIVE AND SECONDARY IMPACTS

Cumulative impacts are the result of incremental effects of an activity when combined with other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Minor but collectively significant actions over a period of time can result in cumulative impacts to a place.

The project site has been previously disturbed through agriculture and residential uses. The project improvements will take place in existing development footprints, and as a result, are not anticipated to generate significant cumulative impacts on site.

Short-term construction-related impacts on the environment will be generated by the project, and mitigation measures will be implemented to minimize these impacts. Construction related impacts will be temporary and will be in the immediate vicinity of the project site. Federal, State, and County environmental regulations will be met throughout the construction and operation of the project.

Secondary effects are impacts that are associated with an activity but do not result directly from the activity. Overall, the project will have beneficial secondary impacts on the Pōhakupuna neighborhood as it will provide landscaping and regular upkeep to an otherwise vacant lot. It will also provide much needed additional housing and can be expected to have a positive impact on the local economy.

IV. ALTERNATIVES TO THE PROPOSED PROJECT

A. ALTERNATIVE A – SUBDIVISION

This alternative involves subdivision of the property into 14 lots. Although this option was considered, with a subdivision alternative, open space is not maximized so there is no common open space nor space for recreation amenities. There would also be a wider street system which could contribute to a lack of visual interest and loss of individual lot identity.

B. ALTERNATIVE B – EIGHT DWELLINGS

Eight dwelling units would be the maximum number of dwellings allowed without requiring a Cluster permit or Subdivision action. With the generous amount of space between the units in this alternative, the lot would not reach the full potential to meet current housing needs (*Figure 4-1*).

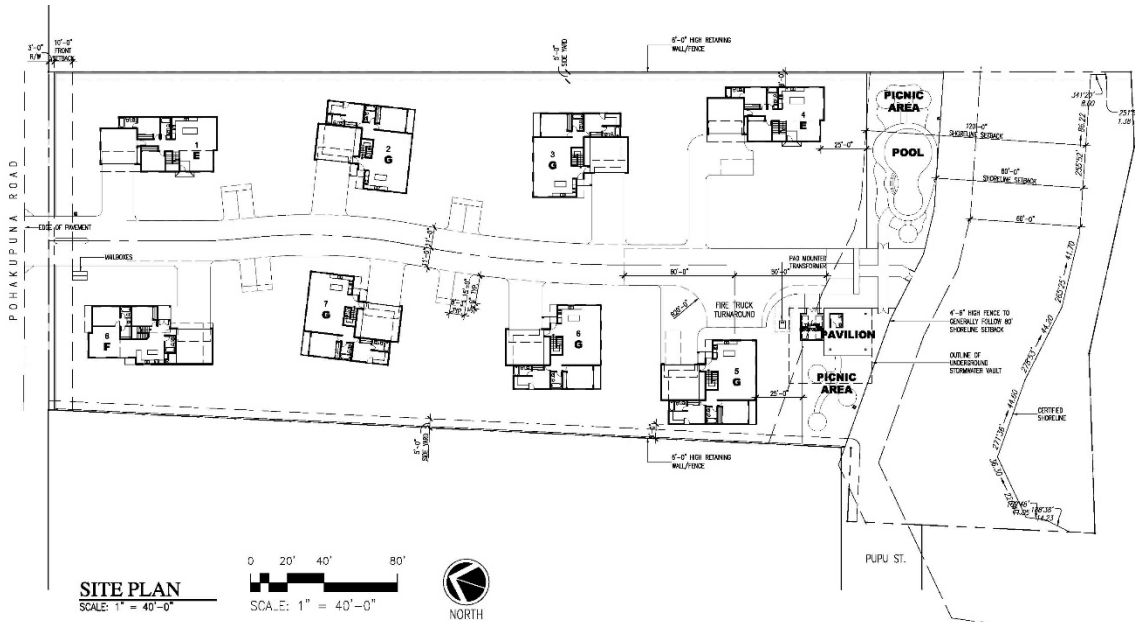
C. ALTERNATIVE C – TWO DWELLINGS

The two dwelling alternative is the maximum number of dwellings allowed if the site is found to be in certain flood hazard areas. This option would severely underutilize the property (*Figure 4-1*).

D. ALTERNATIVE D - NO-ACTION ALTERNATIVE

The No-Action Alternative is the baseline against which all other alternatives are measured. “No-action” refers to the future site conditions that would result should the project not proceed. This alternative would forego implementation of the proposed improvements and the property will remain as vacant, underutilized land.

EIGHT UNIT ALTERNATIVE



TWO UNIT ALTERNATIVE

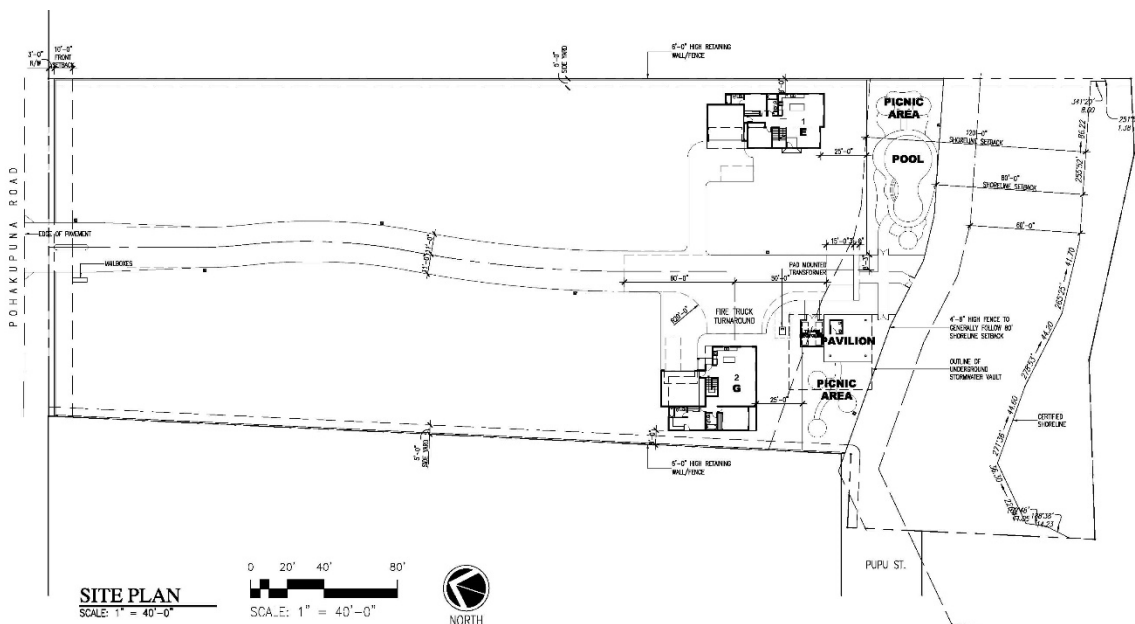


Figure 4-1

Alternative Site Plans

V. Plans and Policies

In this chapter, the project's consistency with applicable land use policies set forth in the Hawai'i State Plan, Hawai'i 2050 Sustainability Plan, State Land Use Law, State Coastal Zone Management Program, Hawai'i Water Quality Standards, City and County of Honolulu General Plan, City and County of Honolulu Land Use Ordinance, 'Ewa Development Plan, the City and County of Honolulu Special Management Area Guidelines, and Shoreline Setback rules are discussed.

A. HAWAII STATE PLAN

The Hawai'i State Plan establishes a statewide planning system that provides goals, objectives, and policies that detail priority directions and concerns of the State of Hawai'i; these will be discussed as they relate to the project.

It is the goal of the State, under the Hawai'i State Planning Act (Chapter 226, HRS), to achieve the following:

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai'i present and future generations.
- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
- Physical, social, and economic well-being, for individuals and families in Hawai'i, that nourishes a sense of community responsibility, of caring, and of participation in community life (Chapter 226-4, HRS).

Specific objectives and policies of the State Plan that pertain to the project are as follows:

Section 226-5 Objectives and Policies for population

- (a) 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.
- (b) To achieve the population objective, it shall be the policy of this State to:
 - (1) Manage population growth statewide in a manner that provides increased opportunities for Hawai'i's people to pursue their physical, social, and economic aspirations while recognizing the unique needs of each country;
 - (2) Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs and desires;
 - (3) Promote increased opportunities for Hawai'i's people to pursue their socio-economic aspirations throughout the islands;
 - (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;
 - (5) Encourage federal actions and coordination among major governmental agencies to promote a more balanced distribution of immigrants among the states, provided that such actions do not prevent the reunion of immediate family members;
 - (6) Pursue an increase in federal assistance for states with a greater proportion of foreign immigrants relative to their state's population; and

- (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 Project conforms to the State's objectives and policies regarding population. The Project will utilize available vacant, developable, and underutilized State urban lands for housing. The proposed residential development will provide additional housing opportunities in the 'Ewa District on O'ahu, which has been designated by the City and County of Honolulu as a key place for future population growth on the Island of O'ahu. Yet, the Project is small enough in scale that it will not have any substantial impact on population growth statewide.

The Project will follow recommended guidelines to effectively manage land and water resources with population growth. The proposed residential development will meet applicable affordable housing requirements described in Ordinance 18-10, ROH, and it will comply with associated cluster development rules and standards, as well as other relevant rules and regulations as discussed in this DEA.

The increased provision of housing in the area supports residents' socio-economic aspirations and well-being since it will provide high quality housing opportunities attractive to skilled workers. It will also provide much needed affordable housing units in the area.

Section 226-6 Objectives and Policies for the economy—in general:

- (a) Planning for the State's economy in general shall be directed toward achievement of the following objectives:
 - (1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai'i's people, while at the same time stimulating the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.
 - (2) A steadily growing and diversified economic base that is not overly dependent on a few industries and includes the development and expansion of industries on neighbor islands.
- (b) To achieve the general economic objectives, it shall be the policy of this State to:
 - (1) Promote and encourage entrepreneurship within Hawai'i by residents and nonresidents of the State;
 - (2) Expand Hawai'i's national and international marketing, communication, and organizational ties, to increase the State's capacity to adjust to and capitalize upon economic changes and opportunities occurring;
 - (3) Promote Hawai'i as an attractive market for environmentally and socially sound investment activities that benefit Hawai'i's people;
 - (4) Transform and maintain Hawai'i as a place that welcomes and facilitates innovative activity that may lead to commercial opportunities;
 - (5) Promote innovative activity that may pose initial risks, but ultimately contribute to the economy of Hawai'i;
 - (6) Seek broader outlets for new or expanded Hawai'i business investments;
 - (7) Expand existing markets and penetrate new markets for Hawai'i's products and services;
 - (8) Assure that the basic economic needs of Hawai'i's people are maintained in the event of disruptions in overseas transportation;
 - (9) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives;
 - (10) Encourage the formation of cooperatives and other favorable marketing arrangements at the local or regional level to assist Hawai'i's small scale producers, manufacturers, and distributors;

- (11) Encourage labor-intensive activities that are economically satisfying, and which offer opportunities for upward mobility;
- (12) Encourage innovative activities that may not be labor-intensive but may otherwise contribute to the economy of Hawai'i;
- (13) Foster greater cooperation and coordination between the government and private sectors in developing Hawai'i's employment and economic growth opportunities;
- (14) Stimulate the development and expansion of economic activities which will benefit areas with substantial or expected employment problems;
- (15) Maintain acceptable working conditions and standards for Hawai'i's workers;
- (16) Provide equal employment opportunities for all segments of Hawai'i's population through affirmative action and nondiscrimination measures;
- (17) Stimulate the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited;
- (18) Encourage businesses that have favorable financial multiplier effects within Hawai'i's economy, particularly with respect to emerging industries in science and technology;
- (19) Promote and protect intangible resources in Hawai'i, such as scenic beauty and aloha spirit, which are vital to a healthy economy;
- (20) Increase effective communication between the educational community and the private sector to develop relevant curricula and training programs to meet future employment needs in general, and requirements of new or innovative potential growth industries in particular; and
- (21) Foster a business climate in Hawai'i – including attitudes, tax and regulatory policies, and financial and technical assistance programs –that is conducive to the expansion of existing enterprises and the creation and attraction of new business and industry.

Discussion: The proposed residential development is complementary to the State's objectives and policies for the general economy. The Project will provide new housing in an area designated by the City and County of Honolulu for urban development and residential use. The proposed use is consistent with both State and County land use districts and zoning designations.

This additional housing is expected to match new residents with appropriate local jobs because the Project will provide high quality housing and living conditions that are attractive to skilled workers. It will also provide much needed affordable housing units in the area. Moreover, construction of the proposed development will offer both labor-intensive and non-labor-intensive jobs over the short-term to medium-term as the Project is developed and completed. Long-term economic benefits of the Project include increased tax revenues for the City.

Construction Best Management Practices (BMPs) will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project. The planned design of new buildings and improved landscaping at the project site are compatible with the surrounding environment and will bolster the scenic beauty of the area.

Section 226-11 Objectives and Policies for the physical environment—land-based, shoreline, and marine resources.

- (a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:
 - (1) Prudent use of Hawai'i's land-based, shoreline, and marine resources; and
 - (2) Effective protection of Hawai'i's unique and fragile environmental resources.

- (b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:
- (1) Exercise an overall conservation ethic in the use of Hawai'i's natural resources;
 - (2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems;
 - (3) Take into account the physical attributes of areas when planning and designing activities and facilities;
 - (4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage;
 - (5) Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions;
 - (6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawai'i;
 - (7) Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion; and
 - (8) Pursue compatible relationships among activities, facilities, and natural resources.
 - (9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.

Discussion: The proposed use of the property is consistent with the State's objectives and policies regarding land-based, shoreline, and marine resources. The Project aims to provide new housing in an area designated by the State and County for urban development and residential use. The characteristics of the property and surrounding area are suitable for the proposed development.

The project is not anticipated to pose threats to Native Hawaiian endangered plant or animal species and habitats, and project construction is not expected to result in substantial impacts to environmental and marine resources. Construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project. The planned design of new buildings and improved landscaping at the project site are compatible with the surrounding environment and will bolster the scenic beauty of the area.

The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site. Under Chapter 23, ROH, the shoreline setback is generally established 40 feet inland from the certified shoreline. Development within the shoreline setback is prohibited and any use of this area requires approval of a Shoreline Setback Variance (SSV) or Minor Shoreline Structure Permit (MSS). The purpose of the shoreline setback is for the City to protect and preserve the natural shoreline, public pedestrian access, and open space along the shoreline. It is also a secondary policy of the City to reduce hazards to property from coastal floods. To meet the objectives of the cluster housing regulations, DPP has requested a minimum setback for uninhabited improvements to be at least 80 feet from the shoreline. Also, dwellings should be set back at least 120 feet in order to preserve open space and natural features of the site.

The Project will comply with relevant requirements regarding public shoreline access and shoreline setbacks. Public shoreline access ways at intervals of approximately one-half mile should be provided for private developments. Since there is an existing public access easement located to the east of the site through a private roadway off Pōhakupuna Road, the proposed development is not required to include a public shoreline access. While a direct public path towards the shoreline may not be provided through the subject site as part of the project design, use and access of the public shoreline area should be maintained.

Section 226-12 Objectives and Policies for the physical environment—scenic, natural beauty, and historic resources.

- (a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawai'i's scenic assets, natural beauty, and multicultural/historical resources.
- (b) To achieve the scenic, natural beauty, and historic resources objectives, it shall be the policy of this State to:
 - (1) Promote the preservation and restoration of significant natural and historic resources;
 - (2) Provide incentives to maintain and enhance historic, cultural, and scenic amenities;
 - (3) Promote the preservation of views and vistas to enhance the landscapes, and other natural features;
 - (4) Protect those special areas, structures, and elements that are an integral and functional part of Hawai'i's ethnic and cultural heritage; and
 - (5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Discussion: The Project is in alignment with the State's objectives and policies regarding scenic, natural beauty, and historic resources. The design of proposed buildings will be reflective of the surrounding environment and new landscaping can be expected to bolster the natural beauty of the surrounding neighborhood.

There are no scenic view sheds identified in the project vicinity in either the 'Ewa Development Plan or the City's Coastal View Study (1987). Existing scenic views at the property include views of the Pacific Ocean to the south. While the current vacant lot does afford a view of the ocean from Pōhakupuna Road just mauka of the property, the development of the proposed development is not considered an infringement on the area's scenic resources since it will follow the development characteristics of surrounding land uses and will be consistent with State and County land use and zoning designations.

The potential for the existence of historically significant structures or artifacts, including human remains, on the property is low. The proposed residential development is unlikely to adversely impact any existing cultural or historic resources at the property.

Section 226-13 Objectives and policies for the physical environment—land, air, and water quality.

- (a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:
 - (1) Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources; and
 - (2) Greater public awareness and appreciation of Hawai'i's environmental resources.
- (b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:
 - (1) Foster educational activities that promote a better understanding of Hawai'i's limited environmental resources;
 - (2) Promote the proper management of Hawai'i's land and water resources;
 - (3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters;
 - (4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people;
 - (5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters;
 - (6) Encourage design and construction practices that enhance the physical qualities of Hawai'i's communities;
 - (7) Encourage urban development near existing services and facilities; and

- (8) Foster recognition of the importance and value of the land, air, and water resources to Hawai'i's people, their cultures and visitors.

Discussion: The Proposed use of the property is in alignment with the State's objectives and policies regarding land, air, and water quality. The Project is not expected to adversely affect Hawai'i's land, air, and water resources. Nevertheless, protective measures will be carried out to address potential impacts to the physical environment that may occur because of the Project. Construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project.

The proposed residential development is appropriately scaled to the surrounding area, which includes low-rise single-family homes. The proposed development is reflective of the character of surrounding neighborhoods, and the planned design of new buildings and improved landscaping at the project site will bolster the scenic beauty of the area.

Section 226-14 Objectives and policies for facility systems—in general

- (a) Planning for the State's facility systems in general shall be directed towards the achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.
- (b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:
 - (1) Accommodate the needs of Hawai'i's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans;
 - (2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities;
 - (3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user; and
 - (4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

Discussion: The Project supports the State's objectives and policies regarding facility systems in Hawai'i. The proposed development is not expected to adversely impact water, transportation, waste disposal, or energy and telecommunication systems. Construction will follow proper protocol and guidelines to achieve the State's objectives. The proposed development design supports the prudent use of resources to the extent possible.

Section 226-15 Objectives and policies for facility systems—solid and liquid wastes

- (a) Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:
 - (1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes; and
 - (2) Provision of adequate sewerage facilities for physical and economic activities.
- (b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:
 - (1) Encourage adequate development of sewerage facilities that complement planned growth;
 - (2) Promote re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic; and
 - (3) Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.

Discussion: The proposed improvement on the Pōhakupuna property is consistent with the State's objectives and policies regarding solid and liquid wastes. The Project is not expected to adversely

impact water or waste disposal systems. Proper maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes will be upheld by the Project. Throughout construction, the developer, Jinshi Development Hawai'i, Ltd., will promote re-use and recycling to reduce solid and liquid wastes.

There are no existing on-site wastewater facilities at the property. The development will require individual infrastructure systems for each respective unit. The developer will ensure that appropriate infrastructure and waste management facility systems are in place.

Section 226-16 Objectives and policies for facility systems--water

- (a) 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.
- (b) To achieve the facility systems water objective, it shall be the policy of this State to:
 - (1) Coordinate development of land use activities with existing and potential water supply;
 - (2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs;
 - (3) Reclaim and encourage the productive use of runoff water and wastewater discharges.
 - (4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use;
 - (5) Support water supply services to areas experiencing critical water problems; and
 - (6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.

Discussion: The Project supports the State's objectives and policies for facility systems in Hawai'i with regard to water. The proposed improvements include the necessary infrastructure and facility systems to provide water to accommodate the domestic needs associated with a cluster development.

The existing Board of Water Supply (BWS) distribution system includes a 12-inch water line along Pōhakupuna Road and a 6-inch line in Pupu Street. There are no private water facilities currently on the site. An easement in favor of the BWS will be required for the service connection since Jinshi Development Hawai'i, Ltd. intends on creating a private driveway with no master water meter within the right-of-way, that require the units to be individually metered.

Jinshi Development Hawai'i, Ltd. will follow proper protocol and guidelines to achieve the State's objectives and policies for the provision and management of water resources regarding facility systems. The proposed development design supports the prudent use of resources to the extent possible.

Section 226-18 Objectives and policies for facility systems--energy

- (a) Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:
 - (1) Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;
 - (2) Increased energy security and self-sufficiency through the reduction and ultimate elimination of Hawai'i's dependence on imported fuels for electrical generation and ground transportation;
 - (3) Greater diversification of energy generation in the face of threats to Hawai'i's energy supplies and systems;
 - (4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use; and

- (5) Utility models that make the social and financial interests of Hawai'i's utility customers a priority.
- (b) To achieve the energy objectives, it shall be the policy of this State to ensure the short- and long-term provision of adequate, reasonably priced, and dependable energy services to accommodate demand.
- (c) To further achieve the energy objectives, it shall be the policy of this State to:
 - (1) Support research and development as well as promote the use of renewable energy sources;
 - (2) Ensure that the combination of energy supplies and energy-saving systems is sufficient to support the demands of growth;
 - (3) Base decisions of least-cost supply-side and demand-side energy resources options on a comparison of their total costs and benefits when a least-cost is determined by a reasonably comprehensive, quantitative, and qualitative accounting of their long-term, direct and indirect economic, environmental, social, cultural, and public health costs and benefits;
 - (4) Promote all cost-effective conservation of power and fuel supplies through measures, including:
 - i) Development of cost-effective demand-side management programs
 - ii) Education
 - iii) Adoption of energy-efficient practices and technologies
 - iv) Increasing energy efficiency and decreasing energy use in public infrastructure
 - (5) Ensure, to the extent that new supply-side resources are needed, that the development or expansion of energy systems uses the least-cost energy supply option and maximizes efficient technologies;
 - (6) Support research, development, demonstration, and use of energy efficiency, load management, and other demand-side management programs, practices, and technologies;
 - (7) Promote alternate fuels and transportation energy efficiency;
 - (8) Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications;
 - (9) Support actions that reduce, avoid, or sequester Hawai'i's greenhouse gas emissions through agriculture and forestry initiatives;
 - (10) Provide priority handling and processing for all state and county permits required for renewable energy projects;
 - (11) Ensure that liquefied natural gas is used only as a cost-effective transitional, limited term replacement of petroleum for electricity generation and does not impede the development and use of other cost-effective renewable energy sources; and
 - (12) Promote the development of indigenous geothermal energy resources that are located on public trust land as an affordable and reliable source of firm power for Hawai'i.

Discussion: The Project supports the State's objectives and policies regarding energy. The proposed development is not anticipated to adversely affect energy systems, and any population growth associated with the Project will have negligible impact on the State's energy consumption.

The Proposed improvements associated with the Project will provide dependable and efficient energy systems capable of supporting the needs of future residents. Jinshi Development Hawai'i, Ltd. will follow proper protocol and guidelines to achieve the State's objectives and policies for the provision of energy to residents of the proposed development. The Project will promote cost-effective conservation of energy through the appropriate adoption of energy-efficient practices and technologies. For example, houses will be designed to be energy efficient, and the proposed development design supports the prudent use of resources to the extent possible. Additionally, future residents can use renewable energy systems such as solar panels on their roofs to further reduce energy consumption.

Section 226-18.5 Objectives and policies for facility systems–telecommunications

- (a) Planning for the State’s telecommunications facility systems shall be directed towards the achievement of dependable, efficient, and economical statewide telecommunications systems capable of supporting the needs of the people.
- (b) To achieve the telecommunications objective, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable telecommunications services to accommodate demand.
- (c) To further achieve the telecommunications objective, it shall be the policy of this State to:
 - (1) Facilitate research and development of telecommunications systems and resources;
 - (2) Encourage public and private sector efforts to develop means for adequate, ongoing telecommunications planning;
 - (3) Promote efficient management and use of existing telecommunications systems and services; and
 - (4) Facilitate the development of education and training of telecommunications personnel.

Discussion: The Project supports the State’s objectives and policies regarding telecommunications. The developer will ensure that dependable and efficient telecommunication facility systems are provided to future residents of the proposed development.

Section 226-19 Objectives and policies for socio-cultural advancement–housing

- (a) Planning for the State’s socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:
 - (1) Greater opportunities for Hawai’i’s people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more affordable housing is made available to very low-, low- and moderate-income segments of Hawai’i’s population.
 - (2) The orderly development of residential areas sensitive to community needs and other land uses.
 - (3) The development and provision of affordable rental housing by the State to meet the housing needs of Hawai’i’s people.
- (b) To achieve the housing objectives, it shall be the policy of this State to:
 - (1) Effectively accommodate the housing needs of Hawai’i’s people.
 - (2) Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.
 - (3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.
 - (4) Promote appropriate improvement, rehabilitation, and maintenance of existing rental and for sale housing units and residential areas.
 - (5) Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.
 - (6) Facilitate the use of available vacant, developable, and underutilized urban lands for housing.
 - (7) Foster a variety of lifestyles traditional to Hawai’i through the design and maintenance of neighborhoods that reflect the culture and values of the community.

- (8) Promote research and development of methods to reduce the cost of housing construction in Hawai'i.

Discussion: The Project is complementary to the State's objectives and policies for socio-cultural advancement regarding housing. The proposed cluster development will provide reasonably priced, safe, sanitary, and livable homes located in a suitable environment to accommodate the needs and desires of families and individuals.

The Project will utilize available vacant, developable, and underutilized State urban lands for housing. The proposed residential development will provide additional housing opportunities in the 'Ewa District on O'ahu, which has been designated by the City and County of Honolulu as a key place for future population growth on the Island of O'ahu. The additional housing in the area is expected to support residents' socio-economic aspirations and well-being. The Project will provide high quality housing and living conditions that are attractive to skilled workers, and it will also provide much needed affordable housing units.

The proposed residential development is appropriately scaled to the surrounding area, which includes low-rise single-family homes. The Project is reflective of the character or surrounding neighborhoods, and the planned design of new buildings and improved landscaping at the project site will bolster the scenic beauty of the area.

The Project is not anticipated to result in significant adverse impacts to the natural environment. Jinshi Development Hawai'i, Ltd. will follow proper protocol and guidelines to achieve relevant State objectives and policies as discussed in this chapter. The proposed development design supports the prudent use of resources to the extent possible, and construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project.

Section 226-20 Objectives and policies for socio-cultural advancement–health

- (a) Planning for the State's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:
 - (1) Fulfillment of basic individual health needs of the general public
 - (2) Maintenance of sanitary and environmentally healthful conditions in Hawai'i's communities
 - (3) Elimination of health disparities by identifying and addressing social determinants of health.
- (b) To achieve the health objectives, it shall be the policy of this State to:
 - (1) Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems including substance abuse.
 - (2) Encourage improved cooperation among public and private sectors in the provision of health care to accommodate the total health needs of individuals throughout the State.
 - (3) Encourage public and private efforts to develop and promote statewide and local strategies to reduce health care and related insurance costs.
 - (4) Foster an awareness of the need for personal health maintenance and preventative health care through education and other measures.
 - (5) Provide programs, services, and activities that ensure environmentally healthful and sanitary conditions.
 - (6) Improve the State's capabilities in preventing contamination by pesticides and other potentially hazardous substances through increased coordination, education, monitoring, and enforcement.
 - (7) Prioritize programs, services, interventions, and activities that address identified social determinants of health to improve native Hawaiian health and well-being consistent with the United States Congress' declaration of policy as codified in title 42 United States Code Section 11702, and to reduce health disparities of disproportionately affected

demographics, including native Hawaiians, other Pacific Islanders, and Filipinos. The prioritization of affected demographic groups other than native Hawaiians may be reviewed every ten years and revised based on the best available epidemiological and public health data.

Discussion: The Project supports the State's objectives and policies for socio-cultural advancement regarding health. The proposed development will provide safe, sanitary, and livable homes located in a suitable environment to fulfill the basic needs of families and individuals. The Project aims to provide new housing in an area designated by the State and County for urban development and residential use. The characteristics of the property and surrounding area are suitable for the proposed development.

The Project is not anticipated to result in significant adverse impacts to the natural environment. Sanitary and environmentally healthful conditions will be maintained throughout the development and completion of the Project. Construction will follow proper protocol and guidelines to achieve the State's objectives with regard to maintaining public health and mitigating adverse environmental impacts.

Section 226-23 Objectives and policies for socio-cultural advancement–leisure

- (a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.
- (b) To achieve the leisure objective, it shall be the policy of this State to:
 - (1) Foster and preserve Hawai'i's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.
 - (2) Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently.
 - (3) Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.
 - (4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.
 - (5) Ensure opportunities for everyone to use and enjoy Hawai'i's recreational resources.
 - (6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.
 - (7) Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawai'i's people.
 - (8) Increase opportunities for appreciation and participation in the creative arts, including the literary, theatrical, visual, musical, folk, and traditional art forms.
 - (9) Encourage the development of creative expression in the artistic disciplines to enable all segments of Hawai'i's population to participate in the creative arts.
 - (10) Assure adequate access to significant natural and cultural resources in public ownership.

Discussion: The proposed cluster development is consistent with the State's objectives and policies for socio-cultural advancement regarding leisure and will meet standards to accommodate the recreational needs for future residents. The proposed development will provide reasonably priced, safe, sanitary, and livable homes located in a suitable environment to accommodate the needs and desires of families and individuals. The planned design of new buildings and improved landscaping at the project site are compatible with the surrounding environment and will bolster the scenic beauty of the area.

Existing recreational resources near the proposed development include ‘Ewa Beach Community Park 0.6 miles away, One‘ula Beach Park one (1) mile away, and Pu‘uloa Beach Park 1.6 miles away. Public access to the shoreline is presently available via existing shoreline access right-of-way connections in the Project vicinity. Approximately 1,600 feet to the west of the project site is a public shoreline access connection, located off Pupu Street at the end of Pōhakupuna Place.

The proposed cluster development must comply with associated leisure and recreational requirements such as the park dedication. For residential districts, the park dedication requirement is 350 sq. ft. multiplied by the number of dwelling units in the project. Therefore, if the project develops 21 units, a total of 7,350 square feet of land will be required to meet park dedication requirements. Details of the Cluster Housing regulations can be found in Chapter 22, ROH. The Project will comply with all relevant requirements.

Section 226-26 Objectives and policies for socio-cultural advancement–public safety

- (a) Planning for the State’s socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:
 - (1) Assurance of public safety and adequate protection of life and property for all people.
 - (2) Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic well-being of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.
 - (3) Promotion of a sense of community responsibility for the welfare and safety of Hawai‘i’s people
- (b) To achieve the public safety objectives, it shall be the policy of this State to:
 - (1) Ensure that public safety programs are effective and responsive to community needs.
 - (2) Encourage increased community awareness and participation in public safety programs.
- (c) To further achieve public safety objectives related to criminal justice, it shall be the policy of this State to:
 - (1) Support criminal justice programs aimed at preventing and curtailing criminal activities.
 - (2) Develop a coordinated, systematic approach to criminal justice administration among all criminal justice agencies.
 - (3) Provide a range of correctional resources which may include facilities and alternatives to traditional incarceration in order to address the varied security needs of the community and successfully reintegrate offenders into the community.
- (d) To further achieve public safety objectives related to emergency management, it shall be the policy of this State to:
 - (1) Ensure that responsible organizations are in a proper state of readiness to respond to major war-related, natural, or technological disasters and civil disturbances at all times.
 - (2) Enhance the coordination between emergency management programs throughout the State.

Discussion: The Project is consistent with the State’s objectives and policies for socio-cultural advancement regarding public safety, and it will meet relevant standards to uphold the safety and health of both existing nearby residents and future residents of the proposed development. The purpose of a cluster development is to achieve orderly development by providing adequate infrastructure, safe and efficient streets, and serving the needs of residents of the community. The proposed development will provide safe, sanitary, and livable homes located in a suitable environment to accommodate the needs and desires of families and individuals. The Project aims to provide new housing in an area designated by the State and County for urban development and residential use. The characteristics of the property and surrounding area are suitable for the proposed development.

The Project is not anticipated to result in significant adverse impacts to the environment. Sanitary and environmentally healthful conditions will be maintained throughout the development and

completion of the Project. To assure public safety and adequate protection of life and property, the Project will follow proper protocol and guidelines throughout construction and in implementing various design and site planning elements.

The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site. Under Chapter 23, ROH, the shoreline setback is generally established 40 feet inland from the certified shoreline. Development within the shoreline setback is prohibited and any use of this area requires approval of an SVV or MSS. One purpose of the shoreline setback is to reduce hazards to life and property from coastal flooding. In the interest of promoting public safety and protecting the coastal environment, the Project does not include any proposed use within an 80-ft shoreline setback area.

Part III Priority Guidelines

Overall priority guidelines were established by the State of Hawai'i to address areas of statewide concern. The State shall strive to improve the quality of life for Hawai'i's present and future population through the pursuit of desirable courses of action in seven major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, quality education, principles of sustainability, and climate change adaptation.

Specific Priority Guidelines of the State Plan that pertain to the project are as follows:

Section 226-104 Population growth and land resources priority guidelines.

- (a) Priority guidelines to effect desired statewide growth and distribution:
- (1) Encourage planning and resource management to ensure that population growth rates throughout the State are consistent with available and planned resource capacities and reflect the needs and desires of Hawai'i's people.
 - (2) Manage a growth rate for Hawai'i's economy that will parallel future employment needs for Hawai'i's people.
 - (3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.
 - (4) Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.
 - (5) Explore the possibility of making available urban land, low-interest loans, and housing subsidies to encourage the provision of housing to support selective economic and population growth on the neighbor islands.
 - (6) Seek federal funds and other funding sources outside the State for research, program development, and training to provide future employment opportunities on the neighbor islands.
 - (7) Support the development of high technology parks on the neighbor islands.
- (b) Priority guidelines for regional growth distribution and land resource utilization:
- (1) Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures, and away from areas where other important benefits are present, such as protection of important agricultural land or preservation of lifestyles.
 - (2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.
 - (3) Restrict development when drafting of water would result in exceeding the sustainable yield or in significantly diminishing the recharge capacity of any groundwater area.
 - (4) Encourage restriction of new urban development in areas where water is insufficient from any source for both agricultural and domestic use.

- (5) In order to preserve green belts, give priority to state capital-improvement funds which encourage location of urban development within existing urban areas except where compelling public interest dictates development of a noncontiguous new urban core.
- (6) Seek participation from the private sector for the cost of building infrastructure and utilities and maintaining open spaces.
- (7) Pursue rehabilitation of appropriate urban areas.
- (8) Support the redevelopment of Kaka'ako into a viable residential, industrial, and commercial community.
- (9) Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.
- (10) Identify critical environmental areas in Hawai'i to include but not be limited to the following: watershed and recharge areas; wildlife habitats (on land and in the ocean); areas with endangered species of plants and wildlife; natural streams and water bodies; scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas particularly sensitive to reduction in water and air quality; and scenic resources.
- (11) Identify all areas where priority should be given to preserving rural character and lifestyle.
- (12) Utilize Hawai'i's limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs while ensuring the protection of the environment and the availability of the shoreline, conservation lands, and other limited resources for future generations.
- (13) Protect and enhance Hawai'i's shoreline, open spaces, and scenic resources.

Discussion: The project aligns with the State's population growth and land resources priority guidelines regarding its effect on desired statewide growth and population distribution. The Project will utilize available vacant, developable, and underutilized State urban lands for housing. The proposed residential development will provide additional housing opportunities in the 'Ewa District on O'ahu, which has been designated by the City and County of Honolulu as a key place for future population growth on the Island of O'ahu.

The proposed development is appropriately scaled to the surrounding area, which includes low-rise single-family homes. The Project is reflective of the character or surrounding neighborhoods, and the planned design of new buildings and improved landscaping at the project site will bolster the scenic beauty of the area. The proposed development design supports the prudent use of resources to the extent possible.

The project is not anticipated to pose threats to Native Hawaiian endangered plant or animal species and habitats, and project construction is not expected to result in substantial impacts to environmental and marine resources. Construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project.

The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site. Under Chapter 23, ROH, the shoreline setback is generally established 40 feet inland from the certified shoreline. Development within the shoreline setback is prohibited and any use of this area requires approval of an SSV or MSS. The purpose of the shoreline setback is for the City to protect and preserve the natural shoreline, public pedestrian access, and open space along the shoreline. It is also a secondary policy of the City to reduce hazards to property from coastal floods. The Project does not include any proposed use within an 80-ft shoreline setback.

Section 226-108 Sustainability.

Priority guidelines for sustainability shall include:

Draft Environmental Assessment
Cluster Development at Pōhakupuna

- (1) Encouraging balanced economic, social, community, and environmental priorities.
- (2) Encouraging planning that respects and promotes living within the natural resources and limits of the State.
- (3) Encouraging respect for the host culture.
- (4) Promoting decisions based on meeting the needs of the present without compromising the needs of future generations.
- (5) Considering the principles of the ahupua'a system; and
- (6) Emphasizing that everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Hawai'i.

Discussion: The Project is compatible with the State's sustainability priority guidelines. The development of an appropriately scaled development reflective of the character of the surrounding community on lands designated by the State and County for Urban and Residential while following proper construction and design guidelines will promote a balance of social, community, environmental, and economic goals.

The Project construction is not expected to result in substantial impacts to environmental resources. Construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project. The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site. Under Chapter 23, ROH, the shoreline setback is generally established 40 feet inland from the certified shoreline. To preserve and protect the coastal environment, public safety, and mitigate future threats from sea level rise, the Project does not include any proposed use within an 80-ft shoreline setback.

Section 226-109 Climate change adaptation priority guidelines

Priority guidelines to prepare the State to address to impacts of climate change, including impacts to the areas of agriculture; conservation lands; coastal and near shore marine areas; natural and cultural resources; education; energy; higher education; health; historic preservation; water resources; the built environment; such as housing, recreation, transportation; and the economy shall:

- (1) Ensure that Hawai'i's people are educated, informed, and aware of the impacts climate change may have on their communities.
- (2) Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies.
- (3) Invest in continued monitoring and research of Hawai'i's climate and the impacts of climate change on the State.
- (4) Consider native Hawaiian traditional knowledge and practices in planning for the impacts of climate change.
- (5) Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands, that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change.
- (6) Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments.
- (7) Promote sector resilience in areas such as water, roads, airports, and public health by encouraging the identification of climate change threats, assessment of potential consequences, and evaluation of adaptation options.
- (8) Foster cross-jurisdictional collaboration between county, state, and federal agencies and partnerships between government and private entities and other nongovernmental entities, including nonprofit entities.

- (9) Use management and implementation approaches that encourage the continual collection, evaluation, and integration of new information and strategies into new and existing practices, policies, and plans.
- (10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy.

Discussion: The Project supports the priority guidelines for climate change. The proposed development will not contribute to adverse impacts relating to existing climate change and sea level rise. The Project construction is not expected to result in substantial impacts to coastal and marine resources. Construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project. The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site. Under Chapter 23, ROH, the shoreline setback is generally established 40 feet inland from the certified shoreline. To preserve and protect the coastal environment, public safety, and mitigate future threats from sea level rise, the Project does not include any proposed use within the 80-ft shoreline setback.

B. HAWAI'I 2050 SUSTAINABILITY PLAN

The long-term strategy of the Hawai'i 2050 Sustainability Plan is supported by its main goals and objectives of respect for culture, character, beauty, and history of the State's island communities; balance among economic, community, and environmental priorities; and an effort to meet the needs of the present without compromising the ability of future generations to meet their own needs.

The 2050 Plan delineates five goals toward a sustainable Hawai'i accompanied by strategic actions for implementation and indicators to measure success or failure. The goals and strategic actions that are pertinent to the Project are as follows:

Goal One: *Living sustainably is part of our daily practice in Hawai'i.* Strategic Actions: *Develop a sustainability ethic.*

Goal Two: *Our diversified and globally competitive economy enables us to meaningfully live, work, and play in Hawai'i.* Strategic Actions: *Develop a more diverse and resilient economy; support the building blocks for economic stability and sustainability.*

Goal Three: *Our natural resources are responsibly and respectfully used, replenished, and preserved for future generations.* Strategic Actions: *Provide greater protection for air, and land-, fresh water and ocean-based habitats; conserve agricultural, open space and conservation lands and resources.*

Goal Four: *Our community is strong, healthy, vibrant and nurturing, providing safety nets for those in need.* Strategic Actions: *Provide access to diverse recreational facilities and opportunities.*

Goal Five: *Our Kānaka Maoli and island cultures and values are thriving and perpetuated.* Strategic Actions: *Honor Kānaka Maoli culture and heritage; Celebrate our cultural diversity and island way of life.*

Discussion: The Project will promote the goals of the Hawai'i 2050 Sustainability Plan and is in alignment with the identified strategic actions.

C. HAWAII STATE LAND USE DISTRICT GUIDELINES

Under the Chapter 205, HRS, all lands of the State are to be classified in one of four categories: urban, rural, agricultural, and conservation lands. The State Land Use Commission (LUC), an agency of the State DBEDT, is responsible for each district's standards and for determining the boundaries of each district (Chapter 205-2(a), HRS). The LUC is also responsible for administering all requests for district reclassifications and/or amendments to district boundaries, pursuant to Chapter 205-4, HRS, and the HAR, Title 15, Chapter 15 as amended. Under this Chapter, all lands in Hawai'i are classified into four land use districts: (1) Conservation, (2) Agricultural; (3) Urban, and (4) Rural. The Urban District generally includes lands characterized by "city-like" concentrations of people, structures and services. This District also includes vacant areas for future development. Jurisdiction of this district lies primarily with the respective counties. Generally, lot sizes and uses permitted in the district area are established by the respective County through ordinances or rules.

Discussion: As classified by the State of Hawai'i LUC, the project site is situated within the State Urban District (*Figure 1-4*). The Urban District generally includes lands characterized by "city-like" concentrations of people, structures and services. This District also includes vacant areas for future development.

The Project will utilize available vacant, developable, and underutilized State urban lands for housing. The proposed residential development will provide additional housing opportunities in the 'Ewa District on O'ahu, which has been designated by the City and County of Honolulu as a key place for future population growth on the Island of O'ahu. The proposed use within the property is consistent with permitted uses for the Urban District and will not require district reclassification or boundary amendments.

D. HAWAII COASTAL ZONE MANAGEMENT PROGRAM

The Coastal Zone Management Act of 1972 (16 USC Section 1451), as amended through Public Law 104-150, created the coastal management program and the National Estuarine Research Reserve system. The coastal states are authorized to develop and implement a state coastal zone management program. Hawai'i Coastal Zone Management (CZM) Program received federal approval in the late 1970's. The objectives of the State's Hawai'i Coastal Zone Management (CZM) Program, Section 205A-2, HRS, are to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values and recreational opportunities. The objectives of the program are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone.

Each county is responsible for designating a Special Management Area (SMA) that extends inland from the shoreline. Development within this SMA is subject to County approval to ensure the proposal is consistent with the policies and objectives of the Hawai'i CZM Program. The entire Project site is within the SMA as delineated by the City and County of Honolulu and as such, requires an additional review under State CZM and County SMA rules. The following subsections examine the objectives of the Hawai'i CZM Program and the Project's impacts relative to the State CZM objectives and policies. Specific City and County of Honolulu SMA policies are also discussed in *Section V, I*.

RECREATIONAL RESOURCES

Objective: Provide coastal recreational opportunities accessible to the public.

- (A) *Improve coordination and funding of coastal recreation planning and management.*
- (B) *Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:*

- *Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*
- *Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites and sandy beaches, when such resources will be unavoidable damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*
- *Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*
- *Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*
- *Encouraging expanded public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value;*
- *Adopting water quality standards and regulating point and non-point sources of pollution to protect and where feasible, restore the recreational value of coastal waters;*
- *Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, artificial reefs for surfing and fishing; and*
- *Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use Commissions, board of land and natural resources, county planning commissions, and crediting such dedication against the requirements of Section 46-6.*

Discussion: The Project will not affect coordination and funding of coastal recreation planning and management. The Project will comply with State CZM guidelines and will not impact public access to coastal or recreational areas.

Construction will be in accordance with State and federal water quality regulations. The Project is not expected to result in substantial impacts to coastal and marine resources. Construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project.

Existing recreational resources near the proposed development include One'ula Beach Park located approximately one (1) mile away, and Pu'uloa Beach Park 1.6 miles away. The proposed Project is not expected to adversely affect recreational activities in the area.

The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site; however, the shoreline area near the property is not conducive to coastal recreational activities. The shoreline in this area of 'Ewa Beach consists of three to six-foot high beach rock (limestone) scarp. Small pockets of sand occur at the bottom of the scarp in some areas of 'Ewa Beach, however, no sand occurs in the rubble fronting the Project site. The intertidal area is typically a solid flat limestone platform that extends into the near shore waters mixed with coralline and limestone rubble. The Project site sits on a low-lying, flat coral and limestone rubble platform that is generally about five (5) to six (6) feet above mean sea level across the entire lot.

Public shoreline access ways at intervals of approximately one-half mile should be provided for private developments. The Project is compliant with relevant requirements regarding public shoreline access. Public access to the shoreline is presently available via existing shoreline access right-of-way connections in the Project vicinity. Approximately 1,600 feet to the west of the project site is a public shoreline access connection, located off Pupū Street at the end of Pōhakupuna Place. Since there is an existing public access easement located near the property, the proposed development is not required to include a public shoreline access. While a direct public path towards the shoreline may not be provided through the subject site as part of the project design, use and access of the public shoreline area will be properly maintained.

HISTORIC RESOURCES

Objective: Protect, preserve and, where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone management area that are significant in Hawai'i and American history and culture.

- (A) *Identify and analyze significant archaeological resources;*
- (B) *Maximize information retention through preservation of remains and artifacts or salvage operations; and*
- (C) *Support state goals for protection, restoration, interpretation and display of historic resources.*

Discussion: A Cultural Impact Assessment was conducted to address cultural, historical and archaeological resources at the existing project site. Background research and oral history interviews did not identify any archaeological resources or cultural practices within the project area that would be affected by the proposed project.

An Archaeological Assessment was also conducted for the project area to assess the potential for locating archaeological resources. The study did not identify evidence of archaeological or cultural resources at the site. The report determined no action was required due to negative findings.

SCENIC AND OPEN SPACE RESOURCES

Objective: Protect, preserve and where desirable, restore or improve the quality of coastal scenic and open space resources.

- (A) *Identify valued scenic resources in the coastal zone management area;*
- (B) *Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;*
- (C) *Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and*
- (D) *Encourage those developments which are not coastal dependent to locate in inland areas.*

Discussion: As discussed in Section III, E of this EA, the project is not anticipated to pose adverse effects to coastal ecosystems or scenic and open space resources in the area. The Project is consistent with the objectives of the County General Plan and the 'Ewa Development Plan.

There are no scenic view sheds identified in the project vicinity in either the 'Ewa Development Plan or the City's Coastal View Study (1987). Existing scenic views at the property include views of the Pacific Ocean to the south. While the current vacant lot does afford a view of the ocean from Pōhakupuna Road just mauka of the property, the proposed development is not considered an infringement on the area's scenic resources since it will follow the development characteristics of surrounding land uses and will be consistent with State and County land use and zoning designations.

The design of proposed buildings will be reflective of the surrounding environment and new landscaping can be expected to bolster the natural beauty of the surrounding neighborhood.

COASTAL ECOSYSTEMS

Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

- (A) *Exercise an overall conservation ethic, and practice stewardship in the protection, use, and*

- development of marine and coastal resources;*
- (B) Improve the technical basis for natural resource management;*
- (C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;*
- (D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and*
- (E) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.*

Discussion: The Project is not anticipated to pose adverse effects to coastal ecosystems. Construction BMPs will be used to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project.

The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site. Under Chapter 23, ROH, the shoreline setback is generally established 40 feet inland from the certified shoreline. Development within the shoreline setback is prohibited and any use of this area requires approval of an SSV or MSS. The purpose of the shoreline setback is for the City to protect and preserve the natural shoreline, public pedestrian access, and open space along the shoreline. To preserve and protect the coastal environment, public safety, and mitigate future threats from sea level rise, the Project does not include any proposed use within an 80-ft shoreline setback.

ECONOMIC USES

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

- (A) Concentrate coastal dependent development in appropriate areas;*
- (B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and*
- (C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:*
 - (i) Use of presently designated locations is not feasible;*
 - (ii) Adverse environmental effects are minimized; and*
 - (iii) The development is important to the State's economy.*

Discussion: The Project will utilize available vacant, developable, and underutilized State urban lands for housing. The proposed residential development will provide additional housing opportunities in the 'Ewa District on O'ahu, which has been designated by the City and County of Honolulu as a key place for future population growth on the Island of O'ahu.

The proposed residential development is appropriately scaled to the surrounding area, which includes low-rise single-family homes. The Project is reflective of the character or surrounding neighborhoods, and the planned design of new buildings and improved landscaping at the project site will bolster the scenic beauty of the area. While the Property is bordered by the shoreline, it will not interfere with other important coastal-dependent or coastal-related development such as harbors and ports, visitor industry facilities, and energy generating facilities.

The additional housing in the area is expected to support residents' socio-economic aspirations and well-being. The Project will provide high quality housing and living conditions that are attractive to skilled workers, and it will also provide much needed housing units.

COASTAL HAZARDS

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

- (A) *Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;*
- (B) *Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;*
- (C) *Ensure that developments comply with requirements of the Federal Flood Insurance Program; and*
- (D) *Prevent coastal flooding from inland projects.*

Discussion: Based on the Coastal Hazard Assessment (See Appendix E), the property is not considered a coastal high hazard district. The Project supports the objectives and policies regarding coastal hazards. The proposed development will preserve coastal ecosystems and is not expected to pose a hazard to life and property from tsunami or storm waves.

The property is located directly adjacent to the shoreline, which defines the entire southern boundary of the Project site. Under Chapter 23, ROH, the shoreline setback is generally established 40 feet inland from the certified shoreline. Development within the shoreline setback is prohibited and any use of this area requires approval of an SVV or MSS. One purpose of the shoreline setback is to reduce hazards to life and property from coastal flooding. In the interest of promoting public safety and protecting the coastal environment, the Project does not include any proposed use within an 80-ft shoreline setback area.

MANAGING DEVELOPMENT

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

- (A) *Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;*
- (B) *Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and*
- (C) *Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.*

Discussion: The Project supports the objectives and policies with regards to managing development in coastal areas. This EA complies with the requirements for assessing and communicating the potential short and long-term impacts of a coastal structure.

PUBLIC PARTICIPATION

Objective: Stimulate public awareness, education, and participation in coastal management.

- (A) *Promote public involvement in coastal zone management processes;*
- (B) *Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and*

- (C) *Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.*

Discussion: Public participation is a requirement of the HRS Chapter 343 environmental review process. The Office of Environmental Quality Control (OEQC) is the governing agency of EA publications, and makes available all EAs for public review and comment. The public is provided 30 days to submit comments on the EA. Information regarding the coastal issues and processes is publicly provided in the EA, along with proposed mitigation measures for coastal concerns. Consulted parties in the process are also encouraged to provide inputs regarding the project during the Draft EA.

BEACH PROTECTION

Objective: Protect beaches for public use and recreation.

- (A) *Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;*
- (B) *Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities;*
- (C) *Minimize the construction of public erosion-protection structures seaward of the shoreline;*
- (D) *Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor; and*
- (E) *Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.*

Discussion: The proposed residential development is not anticipated to result in any adverse impact to local beaches, nor should it inhibit public use of nearby coastal resources and recreational opportunities. The Project is in alignment with the beach protection objections set forth in the State's CZM Program. Structures will be located inland from the 80-ft shoreline setback and no erosion protection structures will be built seaward of the shoreline.

MARINE RESOURCES

Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

- (A) *Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;*
- (B) *Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;*
- (C) *Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;*
- (D) *Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and*
- (E) *Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.*

Discussion: The proposed residential development is not expected to adversely impact marine resources and it is in alignment with the objectives set forth in the State's ocean resources management plan.

The Project is compliant with the beach and marine resources protection objectives established by the State's CZM Program. Construction BMPs and ecologically and environmentally sound procedures will be followed to mitigate adverse environmental impacts and protect Hawai'i's natural resources throughout the development of the Project. Structures will be located inland from an 80-ft shoreline setback and no erosion-protection structures will be built seaward of the shoreline.

E. HAWAII WATER QUALITY STANDARDS

The State of Hawai'i Department of Health, Clean Water Branch Hawai'i Water Quality Standards 11-54, Hawai'i Administrative Rules (HAR) were most recently revised in 2014.

The Project is consistent with the applicable objectives and policies for state water quality standards as described below.

General Policy of Water Quality Antidegradation

- (a) Existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
- (b) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the director finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the director shall assure water quality adequate to protect existing uses fully. Further, the director shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.
- (c) Where existing high-quality waters constitute an outstanding resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.
- (d) In those areas where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Clean Water Act.

Discussion: The Project is not anticipated to significantly impact water resources in the surrounding area. Nevertheless, protective measures will be carried out to address potential impacts to the physical environment that may occur because of the Project. Construction BMPs will be implemented to control water quality fronting the Project area. Structures will be located inland from an 80-ft shoreline setback and no erosion-protection structures will be built seaward of the shoreline. After construction is complete, long term water quality impacts are not expected.

F. CITY AND COUNTY OF HONOLULU GENERAL PLAN

The General Plan for the City was adopted in 1977 and has been subsequently amended (most recently in 2002). The General Plan is a comprehensive statement of the long-range social, economic, environmental and design objectives for the general welfare and prosperity of the people of O'ahu. The objectives and policies are organized into 11 subject areas and are intended to guide

and coordinate City land use plans and regulations, and budgeting policies and decisions for public facility capital improvements, operations and maintenance.

The General Plan Update provides objectives and policies intended to guide and coordinate City land use planning and regulation, and budgeting for operations and capital improvements. The Proposed Revised Plan includes continued focus on critical issues such as regional population, economic health, and affordable housing, while also addressing concerns such as climate change, sea level rise, and sustainability.

The Project is consistent with the applicable objectives and policies of the current City and County of Honolulu General Plan as described below. This section's final discussion also addressed the project's alignment with the pending Proposed Revised O'ahu General Plan.

Population

Objective A: To control the growth of O'ahu's resident and visitor populations in order to avoid social, economic, and environmental disruptions

Policy 4: Seek to maintain a desirable pace of physical development through City and County regulations

Object B: To plan for future population growth

Policy 1: Allocate efficiently the money and resources of the City and County in order to meet the needs of Oahu's anticipated future population.

Objective C: To establish a pattern of population distribution that will allow the people of O'ahu to live and work in harmony

Policy 2: Encourage development within the secondary urban center at Kapolei and the 'Ewa and Central O'ahu urban-fringe areas to relieve developmental pressures in the remaining urban-fringe and rural areas and to meet housing needs not readily provided in the primary urban center.

Policy 3: Manage physical growth and development in the urban-fringe and rural areas so that:

- a. An undesirable spreading of development is prevented; and*
- b. Their population densities are consistent with the character of development and environmental qualities desired for such areas.*

Economy

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

Policy 1: Direct major economic activity and government services to the primary urban center and the secondary urban center at Kapolei.

Policy 2 Permit the moderate growth of business centers in the urban-fringe areas.

Natural Environment

Objective A: To protect and preserve the natural environment.

Policy 1: Protect O'ahu's natural environment, especially the shoreline, valleys, ridges and watersheds, from incompatible development.

Policy 2: Seek the restoration of environmentally damaged areas and natural resources.

Policy 4: Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive land forms, and existing vegetation, as well as plan for coastal hazards that threaten life and property.

Policy 5: Require sufficient setbacks of improvements from the shoreline to avoid the future need for protective structures.

Policy 7: Protect the natural environment from damaging levels of air, water, and noise pollution.

Policy 8: Protect plants, birds, and other animals that are unique to the State of Hawai'i and the Island of O'ahu, and protect their habitats.

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.

Policy 1: Protect the Island's significant natural resources: its mountains and craters; forests and watershed areas; marshes, rivers, and streams; shorelines, fishponds, and bays; and reefs and offshore islands.

Policy 2: Protect O'ahu's scenic views, especially those seen from highly developed and heavily traveled areas.

Policy 4: Promote public access to the natural environment for recreational, educational and cultural purposes and the maintenance thereof in a way that does not damage natural or cultural resources.

Housing

Objective A: To ensure a wide range of housing opportunities, choices and prices for all residents.

Policy 1: Support programs, policies and strategies which will provide decent homes at the least possible cost.

Policy 2: Streamline approval and permit procedures for housing and other development projects. Encourage innovative residential developments which result in lower costs, the sustainable use of resources, the more efficient use of land and infrastructure, greater convenience and privacy, and a distinct community identity.

Policy 3: Encourage innovative residential developments which result in lower costs, the sustainable use of resources, the more efficient use of land and infrastructure, greater convenience and privacy, and a distinct community identity.

Policy 7: Provide financial and other incentives to encourage the private sector to build homes for low- and moderate-income housing.

Policy 10: Promote the design of dwellings which take advantage of O'ahu's year-round moderate climate and which use other sustainable design techniques.

Policy 11: Encourage the construction of affordable homes within established low-density communities by such means as "ohana" units, duplex dwellings, and cluster development.

Policy 13: Encourage the production and maintenance of affordable rental housing, 'ohana housing, and accessory dwelling units.

Policy 14: Encourage the provision of affordable housing designed for the elderly and people with disabilities in locations convenient to critical services and to public transit.

Objective C: To provide residents with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by transportation networks and public utilities.

Policy 1: Ensure that residential developments offer a variety of homes to people of different income levels and to families of various sizes.

Policy 2: Encourage the fair distribution of low- and moderate-income housing throughout the island.

Policy 4: Encourage residential development in suburban areas where existing roads, utilities, and other community facilities are not being used to capacity, and in urban areas where higher densities can be readily accommodated.

Policy 6: Discourage residential development in areas where the topography makes construction difficult or hazardous and where providing and maintaining roads, utilities, and other facilities would be extremely costly or environmentally damaging.

Physical Development and Urban Design

Objective A: To coordinate changes in the physical environment of O‘ahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.

Policy 2: Coordinate the location and timing of new development with the availability of adequate water supply, sewage treatment, drainage, transportation, and other public facilities and services.

Policy 3: Require new developments to provide or pay the cost of all essential community services, including roads, utilities, schools, parks, and emergency facilities that are intended to directly serve the development.

Policy 6: Encourage development strategies which concentrate development and thus promote the efficient use of land and infrastructure and reduce the cost of providing and maintaining utilities and other public services

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

Policy 4: Coordinate plans for the development of the secondary urban center at Kapolei with the State and Federal governments, major landowners and developers, and the community.

Policy 6: Encourage the development of the ‘Ewa Marina Community as a major residential and recreation area emphasizing recreational boating activities through the provision of a major marina and a related maritime commercial center containing light-industrial, commercial, and visitor accommodation uses.

Objective D: To maintain those development characteristics in the urban-fringe and rural areas which make them desirable places to live.

Policy 1: Develop and maintain urban-fringe areas as predominantly residential areas characterized by generally low rise, low density development which may include significant levels of retail and service commercial uses as well as satellite institutional and public uses geared to serving the needs of households.

Policy 2: Coordinate plans for developments within the ‘Ewa and Central O‘ahu urban-fringe areas with the State and Federal governments, major landowners and developers, agricultural industries, and the community.

Objective E: To create and maintain attractive, meaningful, and stimulating environments throughout O‘ahu.

Policy 1: Encourage distinctive community identities for both new and existing communities and neighborhoods.

Policy 2: Require the consideration of urban design principles in all development projects.

Policy 3: Require developments in stable, established communities and rural areas to enhance the existing communities and areas.

Policy 6: Preserve and maintain beneficial open space in urbanized areas.

Policy 9: Recognize the importance of using Native Hawaiian plants in landscaping to further the traditional Hawaiian concept of mālama ‘āina and to create a more Hawaiian sense of place.

Objective F: To promote and enhance the social and physical character of O’ahu’s older towns and neighborhoods.

Policy 1: Encourage new construction in established areas to be compatible with the character and cultural values of the surrounding community.

Public Safety and Community Resilience

Objective B: To protect residents and visitors and their property against natural disasters and other emergencies, traffic and fire hazards, and unsafe conditions.

Policy 2: Require all developments in areas subject to floods and tsunamis, and coastal erosion to be located and constructed in a manner that will not create any health or safety hazards or cause harm to natural and public resources.

Culture and Recreation

Objective D: To provide a wide range of recreational facilities and services that are readily available to all residents of O’ahu and that balance access to natural areas with the protection of those areas.

Policy 6: Ensure and maintain convenient and safe access to beaches, ocean environments, and mauka recreation areas.

Policy 8: Encourage ocean and water-oriented recreation activities that do not adversely impact the natural environment and cultural assets, or result in overcrowding or overuse of beaches, shoreline areas and the ocean.

Policy 9: Require all new developments to provide their residents with adequate recreation space.

Policy 10: Encourage the private provision of recreation and leisure-time facilities and services.

Discussion

The project supports the objectives of the Revised General Plan Update. Development of the project will not pose significant adverse impacts to the natural environment and seeks to preserve the existing shoreline from accelerated erosion rates.

G. CITY AND COUNTY OF HONOLULU LAND USE ORDINANCE GUIDELINES

The purpose of the LUO is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the County General Plan and development plans. The LUO is also intended to provide reasonable development and design standards. These standards are applicable to the location, height, bulk and size of structures, yard areas, off-street parking facilities, and open spaces, and the use of structures and land for agriculture, industry, business, residences or other purposes (Revised Ordinance for the City and County of Honolulu, Chapter 21).

Discussion

The subject property is designated as R-5 Residential by the City and County of Honolulu’s LUO. The intent of R-5 zoning district is to provide areas for low density urban residential development.

H. 'EWA DEVELOPMENT PLAN

The Island of O'ahu is divided into eight Development Plan areas; the plans for six of these areas have been designated as Sustainable Communities Plans (SCP). Each plan implements the objectives and policies of the General Plan and serves as a guide for public policy, investment, and decision-making within each respective region. Together with the General Plan, they guide population and land use development over a 20- to 25-year time span.

The project site is located within the region encompassed by the 'Ewa Development Plan, which was last revised in 2013. The document is the culmination of a community-based planning effort led by the Department of Planning and Permitting. Together with the Primary Urban Center Development Plan, The 'Ewa Development Plan is meant to guide population growth and new development on O'ahu over the next 25 years. The population growth and development aspects of these plans distinguish them from the other six regions, which are envisioned as relatively stable areas and have been entitled "Sustainable Community Plans."

Some of the key elements of the 'Ewa Development Plan's vision and guidelines are to:

- Develop a second urban center for O'ahu with its nucleus in the City of Kapolei
- Provide substantial population and economic growth in 'Ewa so that by 2035 the region will support over 164,000 residents, 55,800 homes, and 87,000 jobs.
- Develop a wide range of master planned residential areas to relieve developmental pressures on Oahu's rural areas and to provide housing types not readily provided in the Primary Urban Center (Kāhala to Pearl City).
- Conserve and protect natural resources and open space

The project is consistent in supporting the applicable objectives and policies of the 'Ewa development Plan as described below.

2.2.8 Conservation of Natural Resources

'Ewa Natural Resources, including potable water, coastal water quality, and wetlands and other wildlife habitat, will be conserved by:

- Efficiently using all water supplies through conservation measures and distribution system leak repair;
- Developing a dual water distribution system with potable water for drinking and other clean water uses and non-potable water for irrigation and industrial use;
- Protecting valuable habitats for endangered water birds located in Batis Salt Marsh at Hoakalei and in the West Loch of Pearl Harbor and for endangered plants located within Kalaeloa (formerly Barbers Point Naval Air Station) and elsewhere;
- Requiring surveys to identify endangered species habitat and requiring appropriate mitigations for adverse impacts on endangered species in new development areas;

3.9.2 Guidelines for Existing and Planned Residential Communities

Development for areas designated in the Residential category will follow these guidelines:

- Densities of 5 to 12 units per acre, encouraging more compact, innovative, environmentally sensitive design and alternative layouts.

- In general, limit buildings to not exceed two stories, although the height may vary according to required flood elevation, slope, and roof form.
- Use features such as varied building setbacks and shared driveways to avoid monotonous rows of garages and driveways along neighborhood street frontages
- Use varied roof forms, exterior colors and finishes, building orientation, floor plans, and architectural details to provide visual interest and individual identity.

Discussion

Building design will be compatible with surrounding developments and will adhere to the design guidelines of the 'Ewa Development Plan. Construction, design, and future activities on the property will uphold the conservation and natural resource management guidelines identified in the 'Ewa Development Plan.

The existing topography and drainage patterns will only be modified to ensure sea level rise will have no harmful effects to the property. The project site has no unique physical features which are recognized as a public resource. The location of the property is somewhat unique in terms of its 255 feet of shoreline frontage in an area of primarily small residential lots. Most of the site lies out of view from the public thoroughfares.

I. CITY AND COUNTY OF HONOLULU SPECIAL MANAGEMENT AREA

The project area is located within the Special Management Area (SMA) (Figure 1-2), which was established to preserve, protect, and where possible, to restore the natural resources of the coastal zone of Hawai'i. Special controls on development within the SMA are necessary to avoid permanent loss of valuable resources and foreclosure of management options. The review guidelines of Section 25-3.2 of the Revised Ordinances of Honolulu (ROH) are used by the Department of Planning and Permitting and the City Council for the review of developments proposed in the SMA. These guidelines are derived from Section 205A-26 HRS.

- (1) All Development in the Special Management Area shall be subject to reasonable terms and conditions set by the council in order to ensure that:
 - Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas, and natural reserves is provided to the extent consistent with sound conservation principles;
 - Adequate and properly located public recreation areas and wildlife preserves are reserved;
 - Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources; and
 - Alteration to existing land forms and vegetation, except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation or failure in the event of an earthquake.

Discussion

The existing public shoreline access connection will be maintained approximately 1,600 feet to the west of the project site located off Pupu Street at the end of Pōhakupuna Place. There are no existing wildlife preserves. Proper maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes will be upheld by the Project. Throughout construction, the developer, Jinshi Development Hawai'i, Ltd., will promote re-use and recycling to reduce solid and liquid wastes.

- (2) No development shall be approved unless the council has first found that:
- The development will not have any substantial, adverse environmental or ecological effect except such adverse effect is minimized to the extent practicable and clearly outweighed by public health and safety, or compelling public interests. Such adverse effect shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect, and the elimination of planning options;
 - The development is consistent with the objectives and policies set forth in Section 25-3.2 and area guidelines contained in Section 205A-26, Hawai'i Revised Statutes; and
 - The development is consistent with the County General Plan, Development Plans, Zoning and subdivision codes and other applicable ordinances.

Discussion

As discussed in *Section III E* of this EA, no substantial adverse environmental or ecological cumulative impacts are anticipated from the project. The project is consistent with applicable plans and policies for the State of Hawai'i and the City and County of Honolulu.

- (3) The Council Shall Seek to Minimize, Where Reasonable:
- Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;
 - Any development which would reduce the size of any beach or other area usable for public recreation;
 - Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management area and the mean high tide line where there is no beach;
 - Any development which would substantially interfere with or detract from the line of sight toward the sea from the State highway nearest the coast; and
 - Any development which would adversely affect water quality, existing areas of open water free of visible structure, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

Discussion

The development does not propose the altering or reduction of the existing shoreline area. The project will not interfere with existing public access, nor will it pose adverse impacts to public beaches or recreation areas.

J. SHORELINE SETBACKS

The project site contains a portion of shoreline area extending approximately 250 feet. The shoreline setback area for dwellings extends 120 feet inland of the Certified Shoreline, which was certified by

the Chairperson of the Board of Land and Natural Resources (Figure 5-1). There will be no uninhabited improvements within 80 feet of the shoreline setback area.

Shoreline Setback rules are defined in Chapter 23 of the Revised Ordinances of Honolulu and are pursuant to HRS Chapter 205A. The policy was established to “protect and preserve the natural shoreline, especially sandy beaches; to protect and preserve public pedestrian access laterally along the shoreline and to the sea; and to protect and preserve open space along the shoreline. Secondly, the policy also seeks reduce hazards to property from coastal floods. The specific purpose of Chapter 23 establishes standards that generally prohibit within the shoreline area any construction or activity which may adversely affect beach processes, public access along the shoreline, or shoreline open space.

As defined in Section 23-1.5(b), the following structures and activities are prohibited within the shoreline area, with the following exceptions:

- (1) Minor structures and activities permitted under rules adopted by the department which do not affect beach processes or artificially fix the shoreline and do not interfere with public access, public views or open space along the shoreline. If, due to beach erosion or other cause, the director determines that a minor structure permitted under this section may affect beach processes or public access or has become located seaward of the shoreline, the director or other governmental agency having jurisdiction may order its removal;
- (2) Minor structures and activities necessary for or ancillary to continuation, but not expansion, of agriculture or aquaculture in the shoreline area on June 16, 1989;
- (3) Maintenance, repair, reconstruction, and minor additions to or alterations of legal, publicly owned boating, maritime, or ocean sports recreational facilities, which result in little or no interference with natural shoreline processes. Privately owned boating, maritime, or ocean sports recreational facilities are specifically excluded from this exception;
- (4) Nonconforming structures or structures that have received a shoreline setback variance;
- (5) Construction, installation, maintenance, repair, and replacement of civil defense warning or signal devices and sirens.

Draft Environmental Assessment
Cluster Development at Pōhakupuna

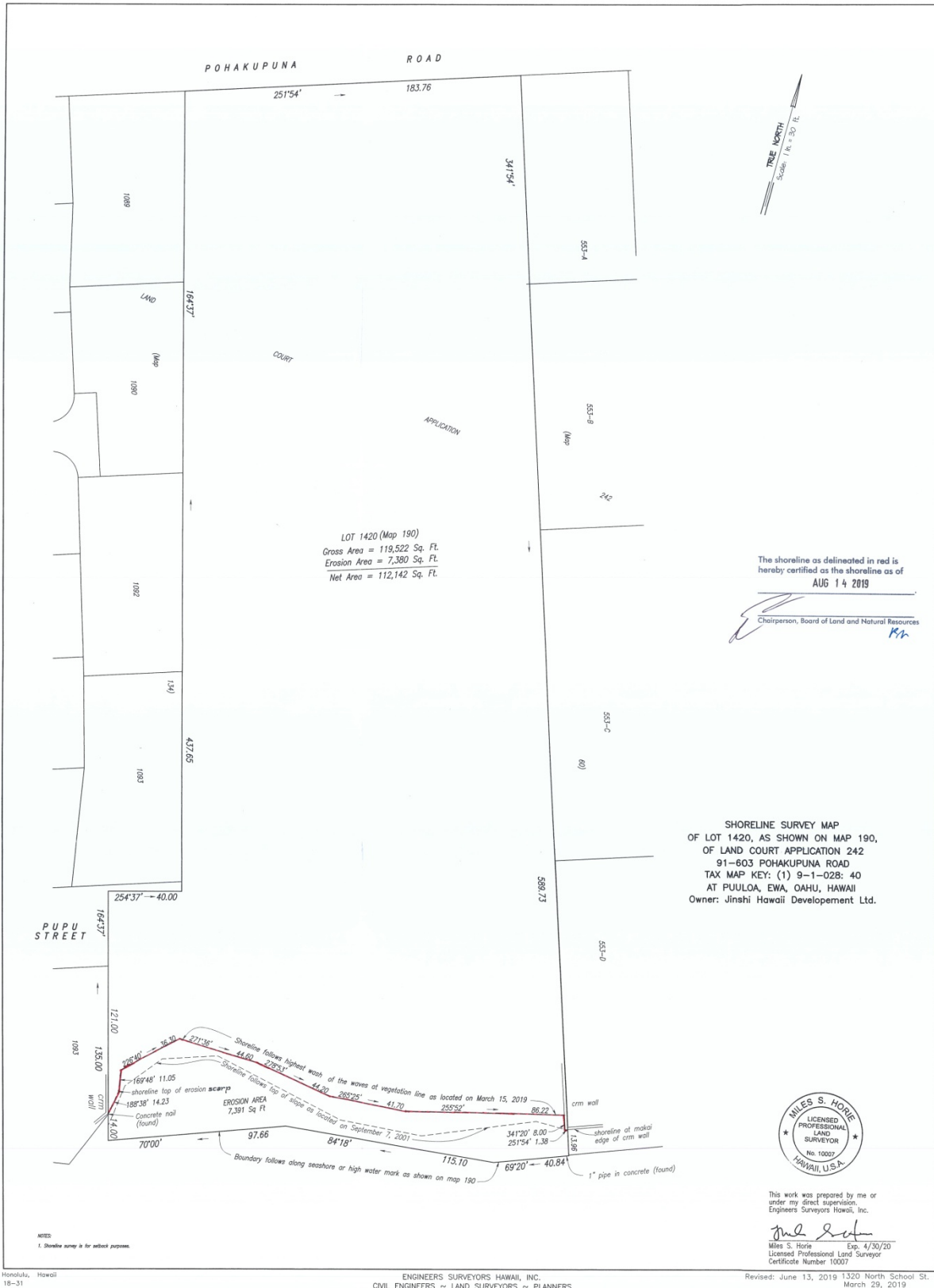


Figure 5-1

Shoreline Survey Map

VI. Findings Supporting the Anticipated Determination

A. ANTICIPATED DETERMINATION

Based on a review of the significance criteria outlined in Chapter 343, HRS, and Section 11-200-12, State Administrative Rules, Contents of DEA, the project has been determined to not result in significant adverse effects on the natural or human environment. A Finding of No Significant Impact (FONSI) is anticipated.

B. REASONS SUPPORTING THE ANTICIPATED DETERMINATION

The potential impacts of the project have been fully examined and discussed in this DEA. As stated earlier, there are no significant environmental impacts expected to result from the project. This determination is based on the assessments as presented below for criterion (1) to (13).

- (1) *Involve an irrevocable loss or destruction of any natural or cultural resources.*

The project will not involve an irrevocable loss or destruction of the natural resource of the shoreline area. There are no known cultural resources on the site but if one is found then appropriate actions will be taken.

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

The existing vacant land will be utilized to its full potential and provide much needed housing for the area. Yet, the project will not curtail the range of beneficial uses of the environment. The shoreline area will remain untouched so it can hopefully provide the best environment for limu to thrive as it once did long ago.

- (3) *Conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.*

The project does not conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

- (4) *Substantially affects the economic or social welfare of the community or State.*

The project will result in short-term economic benefits during construction that include direct, indirect, and induced employment opportunities and multiplier effects, but not at a level that would generate significant economic activity.

- (5) *Substantially affects public health.*

The project is consistent with existing land uses and is not expected to affect public health. However, there will be temporary short-term impacts to air quality from possible dust emissions and temporary degradation of the acoustic environment in the immediate vicinity resulting from construction equipment operations. The project will comply with State and County regulations during the construction period and will implement best management practices to minimize temporary impacts.

- (6) *Involves substantial secondary impacts, such as population changes or effects on public facilities.*

Draft Environmental Assessment
Cluster Development at Pōhakupuna

While the project will provide much needed housing for the area, no substantial secondary impacts, such as population changes or effects on public facilities, are anticipated.

- (7) *Involves a substantial degradation of environmental quality.*

The project will not involve a substantial degradation of environmental quality. Long-term impacts to air and water quality, noise, and natural resources are not anticipated. The use of standard construction and erosion control BMPs will minimize the anticipated construction-related short-term impacts.

- (8) *Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.*

The proposed project is not anticipated to have a considerable effect upon the environment.

- (9) *Substantially affects a rare, threatened or endangered species, or its habitat.*

There are no known rare, threatened or endangered species of flora or fauna or associated habitat on the project site that could be adversely affected by the construction and operation of the proposed project.

- (10) *Detrimentially affects air or water quality or ambient noise levels.*

General temporary impacts associated with construction are identified in Section III of this EA. Mitigation measures which are outlined in this EA will be applied during the on-going construction activity. No detrimental long-term impacts to air, water, or acoustic quality are anticipated with the project improvements. The improvements are not anticipated to detrimentally affect air or water quality or ambient noise levels.

- (11) *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.*

According to the Flood Insurance Rate Map, Community Panel Number 15003C0336G, prepared by the Federal Emergency Management Agency (FEMA), a majority of the project site is within Zone D, "areas in which flood hazards are undetermined, but possible" as shown in *Figure 3-3*. The proposed project will cover much of the project site with impervious surfaces, which will increase the volume of runoff relative to the presently undeveloped condition of the site. Grass swales and grading channels will control the potential for flooding in the area. A proposed underground stormwater detention vault underneath the pavilion will manage any excess stormwater runoff from the developed site and potential for flooding in areas surrounding the project site will be minimized.

- (12) *Substantially affects scenic vistas and view-planes identified in county or state plans or studies.*

There are no scenic view sheds identified in the project vicinity in either the 'Ewa Development Plan or the City's Coastal View Study (1987). Existing scenic views at the property include views of the Pacific Ocean to the south. While the current vacant lot does afford a view of the ocean from Pōhakupuna Road just mauka of the property, the development of the proposed development is not considered an infringement on the area's scenic resources since it will follow the development

characteristics of surrounding land uses and will be consistent with State and County land use and zoning designations.

(13) *Require substantial energy consumption.*

Construction of the project will not require substantial energy consumption relative to other similar sized projects.

C. SUMMARY

Based on the above findings, further evaluation of the project’s impacts through the preparation of an Environmental Impact Statement is not warranted. The EA recommends mitigation measures to alleviate impacts when such impacts are identified. A Finding of No Significant Impact (FONSI) is anticipated for this project.

VII. List of Agencies, Organizations and Individuals Receiving Copies of the EA

Table 7-1

Respondents & Distribution	Pre-Assessment Consultation/ Recipient	Pre-Assessment Consultation Comments Received	Receiving Draft EA	Draft EA Comments Received
Federal Agencies				
U.S. Fish and Wildlife Service	X	X	X	
U.S. National Marine Fisheries Service	X		X	
U.S. National Oceanic Atmospheric Administration	X		X	
State of Hawai'i Agencies				
Department of Health (DOH)	X		X	
Clean Water Branch	X		X	
Wastewater Branch	X		X	
Department of Land and Natural Resources (DLNR)				
Division of Forestry and Wildlife	X		X	
Division of State Parks	X		X	
Engineering Division	X		X	
Land Division	X		X	
State Historic Preservation Division	X		X	
Office of Conservation and Coastal Lands	X		X	

Draft Environmental Assessment
Cluster Development at Pōhakupuna

City and County of Honolulu Agencies				
Board of Water Supply	X		X	
Department of Environmental Services	X	X		
Department of Parks & Recreation			X	
Department of Planning and Permitting			X	
Civil Engineering Branch			X	
Land Use Permits Division			X	
Planning Division			X	
Subdivision Branch	X	X	X	
Traffic Review Branch			X	
Urban Design Branch	X	X	X	
Wastewater Branch			X	
Honolulu Fire Department			X	
Honolulu Police Department				
'Ewa Neighborhood Board No. 23	X	X	X	
Libraries				
Hawai'i State Library			X	
'Ewa Public Library			X	
Other				
Hawaiian Electric Company (HECO)	X			

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Cluster Development at Pōhakupuna



EWA NEIGHBORHOOD BOARD NO. 23

NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BOULEVARD, SUITE 160 • HONOLULU, HAWAII, 96817
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**DRAFT REGULAR MEETING MINUTES
THURSDAY, JULY 11, 2019
EWA BEACH PUBLIC LIBRARY**

CALL TO ORDER: Chair Pro Tem Mitchell Tynanes called the meeting to order at 7:02 p.m. **A quorum was established with 10 members present.** Note - This 11-member Board requires six (6) members to establish a quorum and to take official Board action.

Board Members Present – Lynn Robinson-Onderko, Penelope Parnes, John Rogers, David Aki, Mikaela Callahan, John Clark III, Amanda Rathbun, Sam Puleasi, Kathleen Foote and Mitchell Tynanes.

Board members absent – Charles Severance

Guests – Captain David Schubert (Honolulu Fire Department-HFD), Lieutenant Sanford Yue, Lieutenant Kent Fernandez, Major Joseph Trinidad, (Honolulu Police Department-HPD), Corporal Roland Pagan (Ewa Weed and Seed), Michael Colon (Mayor Kirk Caldwell's Representative), Bruce Shimokawa (Hawaii Department of Transportation-HDOT), Rock Riggs (Senator Mike Gabbard's Office), Lisa Enanoria (Haseko), Oryn Nakamura (Board of Water Supply-BWS), Jared Ellis (Councilmember Ron Menor's Office), Senator Kurt Fevella, Shayne Greenland (Department of Education-DOE), Leroy Lui (808 Clean Ups), Danny Hayes (MCBH), Kailee Lefebvre (CRB), Jason Locke (Ewa Beach Lions Club-EBLC), Karen Luke, Fid Limani, Mike Plowman, Laurie Von Hamm, Delia Clark, Abigail Fevella, Mel Masuda, Clarice Pacatang, Michael Mareko-Penevela, Denise Peneste (Residents), Naomi Hanohano (Neighborhood Commission Office).

Rules of speaking: Vice Chair Clark read the rules of speaking.

Introductions – The Board members introduced themselves.

Elections of Officers to serve from July 1, 2019 to June 30, 2020:

Chairperson: Aki nominated and Parnes seconded the nomination of Mitchell Tynanes as Chair of the Board. Tynanes was elected as Chair by unanimous consent. 10-0-0 (Aye: Aki, Callahan, Clark, Foote, Rathbun, Puleasi, Parnes, Robinson-Onderko, Rogers, and Tynanes. Nay: none, Abstain: none).

Vice Chair: Parnes nominated and Puleasi seconded the nomination Robinson-Onderko and Clark self-nominated and Aki seconded the nomination as Vice Chair. Robinson-Onderko was elected as Vice Chair by a quorum vote of 6-4-0. (Robinson-Onderko - Aye: Aki, Puleasi, Parnes, Robinson-Onderko, Tynanes and Rogers. Clark – Aye: Clark, Callahan, Foote, Rathbun. Abstain: none.)

Secretary: Clark nominated and Aki seconded the nomination of Penelope Parnes as Secretary of the Board. Parnes was elected as Secretary by unanimous consent. 10-0-0 (Aye: Aki, Callahan, Clark, Foote, Rathbun, Puleasi, Parnes, Robinson-Onderko, Rogers, and Tynanes. Nay: none, Abstain: none).

Treasurer: Clark nominated and Aki seconded the nomination of John Rogers as Treasurer of the Board. Rogers was elected as Treasurer by unanimous consent. 10-0-0 (Aye: Aki, Callahan, Clark, Foote, Rathbun, Puleasi, Parnes, Robinson-Onderko, Rogers, and Tynanes. Nay: none, Abstain: none).

PUBLIC SAFETY REPORTS

Honolulu Fire Department (HFD) – Captain Shubert reported the following:

- **June 2019 Statistics:** There was 1 Wild land/Brush fire, and 7 Activated Alarms (no fire). There were 101 medical emergencies and 6 Motor Vehicle Collisions.
- **Fire Safety Tip for July 2019:** HFD gave tips on Grilling Safety.

Honolulu Police Department (HPD) District 8 – Lieutenant Fernandez reported the following for the Ewa Beach area:

- **June 2019 Statistics:** There were 10 motor vehicle thefts, 6 burglaries, 34 other thefts and 13 Unauthorized Entry

Draft Environmental Assessment
Cluster Development at Pōhakupuna

EWA NEIGHBORHOOD BOARD NO. 23
DRAFT MEETING MINUTES

THURSDAY, JULY 11, 2019
PAGE 4 OF 10

3. Leadership Seminar: Greg Guy noted the Global Leadership Seminar happening on Thursday, August 8 and Friday, August 9, 2019 at the KROC Center which costs \$209.00 and recommended everyone in leadership to attend. Flyers was distributed and also left on the information table.
4. 91-603 Pohakupuna Road: Jim Mau noted he came to the board to speak about the plans for the lot at 91-603 Pohakupuna Road and clear up any misunderstanding that may have happened and apologized for not coming to the community sooner and Thanked Chair Tynanes and Senator Fevella for direction. Mau noted that they are still working with the Department of Planning and Permitting (DPP) regarding the lot which is 2.74 acres which the owner plans to sub-divide into 15 residential lots which will be reached by two (2) different entrances, Pupu place which accesses three (3) lots on the Oceanside where a public park will be built, and the other 13 will be accessed by an entrance on Pohakupuna Road. Mau noted that the development is still in a preliminary stage. Chair Tynanes asked Mau to come back to give updates as the project moves forward. Board member Aki noted his concern with heavy equipment on a small street and safety of the area residents. Mau noted that he will come back to the Board to give updates as the project progresses.
5. Ewa Hongwanji: Resident Michael noted an e-waste recycling day on Saturday, July 13, 2019 from 9:00 a.m. to 12:00 p.m. and asked the community for anyone that is available to help them that day.
6. Ewa Beach Town Hall meeting: Resident Michael noted the Town Hall meeting that will be held on Tuesday, July 23, 2019 starting at 7:00 p.m. at Ilima Intermediate Cafeteria and hopes to see everyone there.
7. Westloch Elderly Village: Resident Joni Miller noted her opposition to proposed affordable housing project which is planned to be built next to her senior home. Miller noted that she and other seniors in the community chose to live there because it is quiet and does not want noise from families with young children. Miller noted that the seniors are not opposed to the affordable housing project if it is built for seniors also noting that there is a long wait list for independent senior living. Miller noted that many seniors who came from the Ewa plantation needs homes and wants to stay in the Ewa area. Resident Toni Kelly also a resident at West Loch Elderly village also noted her opposition to the affordable housing project and wants the project to stop. Kelly noted a public hearing that was held at her facility but did not ask the seniors if they wanted the project next to them because the City knows that the seniors do not want young families next to them and came to the board for help. Board member Aki noted attending the public hearing along with former Board member Jason Locke who heard the senior's opposition to the project and also stated his concerns for the safety of the seniors and supports the senior's feelings.
8. Lion's Club Oneula monthly Clean up: Lion's Club Vice President Jason Locke thanked the volunteers from JCHS and everyone else who helped at the Saturday, June 29, 2019 clean-up effort at Oneula/Hau Bush Beach Park and to the Ball Corporation that provided canned water for the volunteers. Locke announced the next monthly clean-up will be held on Saturday, July 27, 2019 from 8:00 a.m. to 10:00 a.m. all cleaning supplies will be provided and shave ice and snacks will be served.
9. Hawaii Bicycling League (HBL): Board member Rogers announced the next workshop that will be held on Saturday, August 3, 2019 at the KROC center, they will have folding bikes available for the first 4 people who wants try one. Rogers noted that there are several rides coming up and for more information, go to www.hbl.org.
10. Rate Commission Hearings: Board member Rogers noted some upcoming meetings with the rate commission regarding future policies and rates for Honolulu's Transit System. Rogers noted that the next meeting will be held on Monday, July 16, 2019 at 2:30 p.m. to 4:30 p.m. at the Mission meeting room next to Honolulu Hale. Rogers also noted that more information will be posted on the Ewa Neighborhood Board Facebook page.
11. Agenda items missing: Resident Karen Luke thanked all the newly elected Board member for their willingness to serve on the Ewa Neighborhood Board No. 23 noting that she depends on the board to be the voice for the community. Luke noted her concern with some agenda items that was not listed on tonight's agenda which were the community concern about suicide prevention from JCHS graduate Noah who asked the Board's support to ask for funding to provide support services at JCHS and the unfinished business of the Puuloa Gun Range noise problem. Chair Tynanes noted that those items were not included in this month's agenda due to a newly elected Board and he did not know who would be the Chair but he will include it on a future agenda.
12. Puuloa Gun Range: Resident Mike Plowman asked and Chair Tynanes confirmed that the Puuloa Gun Range issue will be put on a future agenda.
13. 808 Clean ups: Board member Parnes announced that the monthly 808 clean up at Oneula/Hau Bush Beach Park will be held on Saturday, July 13, 2019 from 9:00 a.m. to 12:00 p.m. and all supplies are provided. Parnes did note that the water will be provided but you may bring your own water also.
14. Teen Building USA: John Clark requested that his Teen Building USA presentation be moved to community concerns/public announcements.

Clark motioned and Aki seconded the motion to move "Teen Building USA" from New Business to Community Concerns and Public announcements. The motioned passed by unanimous consent. 10-0-0 (Aye: Aki, Callahan, Clark, Foote, Rathbun, Puletasi, Parnes, Robinson-Onderko, Rogers, and Tynanes. Nay: none, Abstain: none).

VIII. List of References

City and County of Honolulu, Department of Planning and Permitting. *General Plan Objectives and Policies*. 1992.

City and County of Honolulu, Department of Planning and Permitting. *'Ewa Development Plan*. July 2013 (Amended 2020).

Ernest K. Hirata & Associates, Inc. *Visual Soil Reconnaissance*. April 2003.

Federal Emergency Management Agency. November 5, 2014
FIRM Flood Insurance Rate Map City and County of Honolulu, Panel Number 150003C-0336G. Prepared for the National Flood Insurance Program.

Pacific Islands Ocean Observing System. *pacioos.hawaii.edu/shoreline/slr-hawaii/*. 2017.

State of Hawai'i Department of Land and Natural Resources, Office of Conservation and Coastal Lands. *Hawai'i Sea Level Rise Vulnerability and Adaptation Report*. 2017.

State of Hawai'i Department of Land Utilization, *Coastal View Study*. 1987.

United States Census Bureau. (2019, July 1) *Quick Facts 'Ewa Beach CDP, Hawaii*. United States Census Bureau. <https://www.census.gov/quickfacts/ewabeachcdphawaii>

United States Department of Agriculture Natural Resources Conservation Service. (2020, June 10) *Web Soil Survey of Island of O'ahu, Hawai'i*. <https://websoilsurvey.nrcs.usda.gov/app/>

APPENDIX A
CONCEPTUAL DRAWINGS

FLOOR AREA TABULATION					PARKING	
UNIT TYPES		NO. OF UNITS	FLOOR AREA (SQ. FT.)	TOTAL FLOOR AREA (SQ. FT.)	SPACES REQ'D PER UNIT	TOTAL SPACES
UNIT A	1st FLOOR		707.3			
	2nd FLOOR		1,163.7			
	TOTAL	4	1,871.0	7,484.0	2	8
UNIT A-1	1st FLOOR		721.4			
	2nd FLOOR		1,177.0			
	TOTAL	2	1,898.4	3,796.8	2	4
UNIT B	1st FLOOR		707.3			
	2nd FLOOR		1,206.0			
	TOTAL	4	1,913.3	7,653.2	2	8
UNIT C	1st FLOOR		1,280.2			
	2nd FLOOR		1,566.2			
	TOTAL	1	2,846.4	2,846.4	3	3
UNIT D	1st FLOOR		1,055.8			
	2nd FLOOR		1,352.8			
	TOTAL	1	2,408.6	2,408.6	2	2
UNIT E	1st FLOOR		1,400.6			
	2nd FLOOR		1,481.3			
	TOTAL	1	2,881.9	2,881.9	3	3
UNIT F	1st FLOOR		1,380.0			
	2nd FLOOR		1,388.2			
	TOTAL	1	2,768.2	2,768.2	3	3
UNIT G	1st FLOOR		1,565.1			
	2nd FLOOR		1,895.8			
	TOTAL	1	3,460.9	3,460.9	3	3

(FLOOR AREA TABULATION CONT'D)

(FLOOR AREA TABULATION CONT'D)				(PARKING TABULATION CONT'D)		
UNIT H						
	1st FLOOR		853.7			
	2nd FLOOR		1,249.5			
	TOTAL	1	2,103.2	2,103.2	2	2
UNIT J	1st FLOOR		1,099.1			
	2nd FLOOR		1,465.8			
	TOTAL	1	2,564.9	2,564.9	3	3
UNIT K	1st FLOOR		1,345.5			
	2nd FLOOR		1,372.3			
	TOTAL	4	2,717.8	10,871.2	3	12
	TOTAL NO. OF UNITS	21			TOTAL PARKING	51
PAVILION				400.0		
			TOTAL	49,239.3		

BUILDING AREA TABULATION			
UNIT TYPES	NO. OF UNITS	BLDG AREA (SQ. FT.)	TOTAL BLDG AREA (SQ. FT.)
UNIT A	4	1,237.0	4,948.0
UNIT A-1	2	1,250.8	2,501.6
UNIT B	4	1,267.8	5,071.2
UNIT C	1	1,723.9	1,723.9
UNIT D	1	1,496.8	1,496.8
UNIT E	1	1,836.4	1,836.4
UNIT F	1	1,916.5	1,916.5
UNIT G	1	2,051.3	2,051.3
UNIT H	1	1,338.2	1,338.2
UNIT J	1	1,570.0	1,570.0
UNIT K	4	1,906.7	7,626.8
PAVILION			400.0
	21	TOTAL	32,480.7

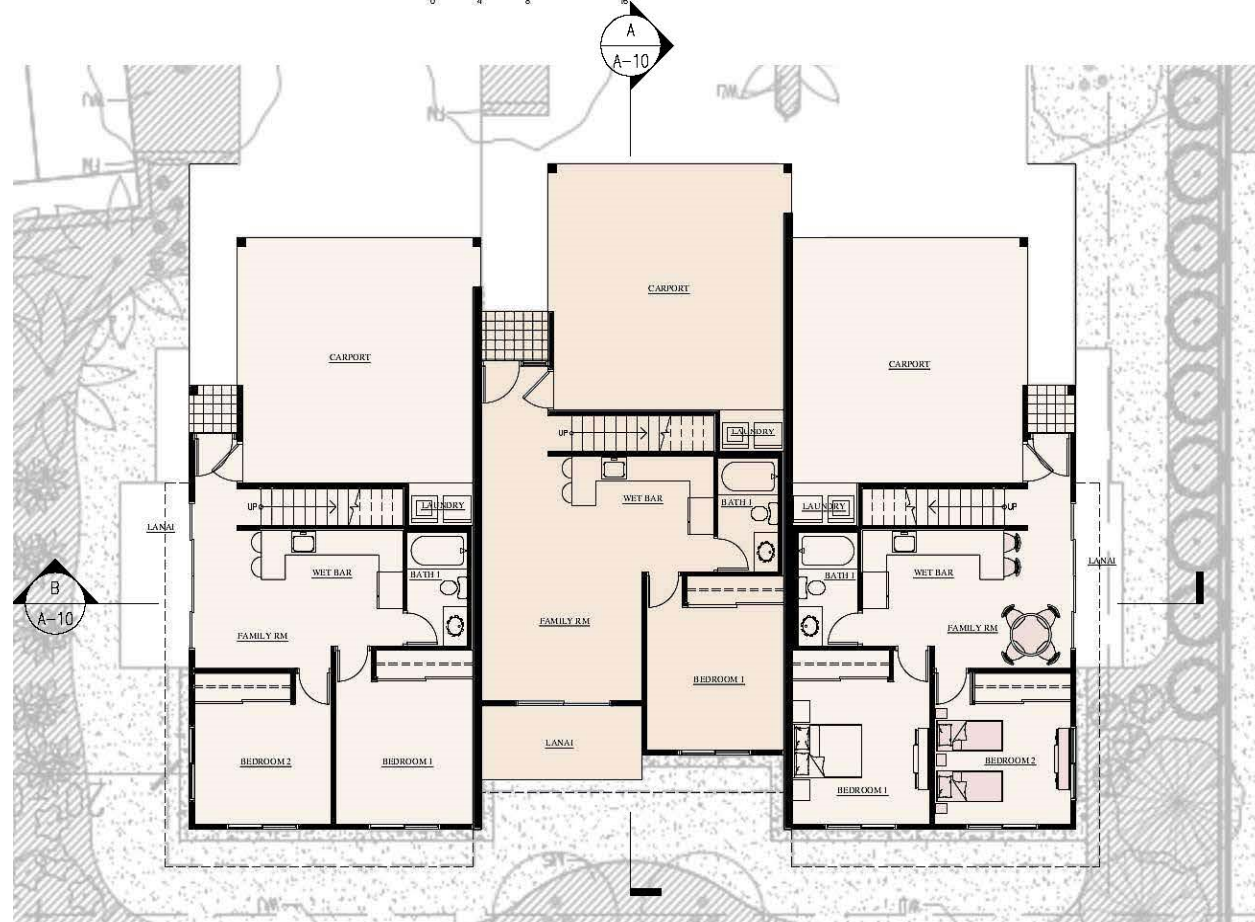
PROJECT INFORMATION

ZONING DESIGNATION:	R-5 (RESIDENTIAL DISTRICT)
DEVELOPMENT PLAN AREA:	EWA
FEMA FLOOD DESIGNATION:	D (UNDETERMINED FLOOD HAZARD) VE (100 YEAR FLOOD, COASTAL, WAVE ACTION, BASE ELEVATION DETERMINED)
SMA:	IN SMA
SHORELINE:	80 FT. & 120 FT. SHORELINE SETBACK
STATE LAND USE:	URBAN DISTRICT
LOT AREA:	119,522 SQ. FT.
NO. OF UNITS:	ALLOWABLE - R-5 → TOTAL PROJECT AREA/3,750 119,522 SQ. FT./3,750 = 31 UNITS ACTUAL - 21 UNITS
FLOOR AREA: (SEE FLOOR AREA TABULATION)	FAR - 49,239 SQ. FT./119,522 SQ. FT. = 41.2%
BUILDING AREA: (SEE BLDG AREA TABULATION)	ALLOWABLE - 50% x 119,522 SQ. FT. = 59,761 SQ. FT. ACTUAL - 32,481 SQ. FT./119,522 SQ. FT. = 27.2%
HEIGHT LIMIT:	25' UNLESS SLOPING
PARKING: (SEE PARKING TABULATION)	1 SPACE PER 1,000 SQ. FT. = 51 SPACES REQUIRED, 51 PROVIDED 10 VISITOR STALLS PROVIDED
OPEN SPACE/ RECREATIONAL AREA CALCS:	350 SQ. FT. PER DWELLING UNIT 350 SQ. FT. x 21 UNITS = 7,350 SQ. FT. REQUIRED 12,571 SQ. FT. PROVIDED



UNIT 'A' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



UNIT 'A' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



UNIT 'A' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'A' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'A' REAR EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'A' LEFT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"





UNIT 'B' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



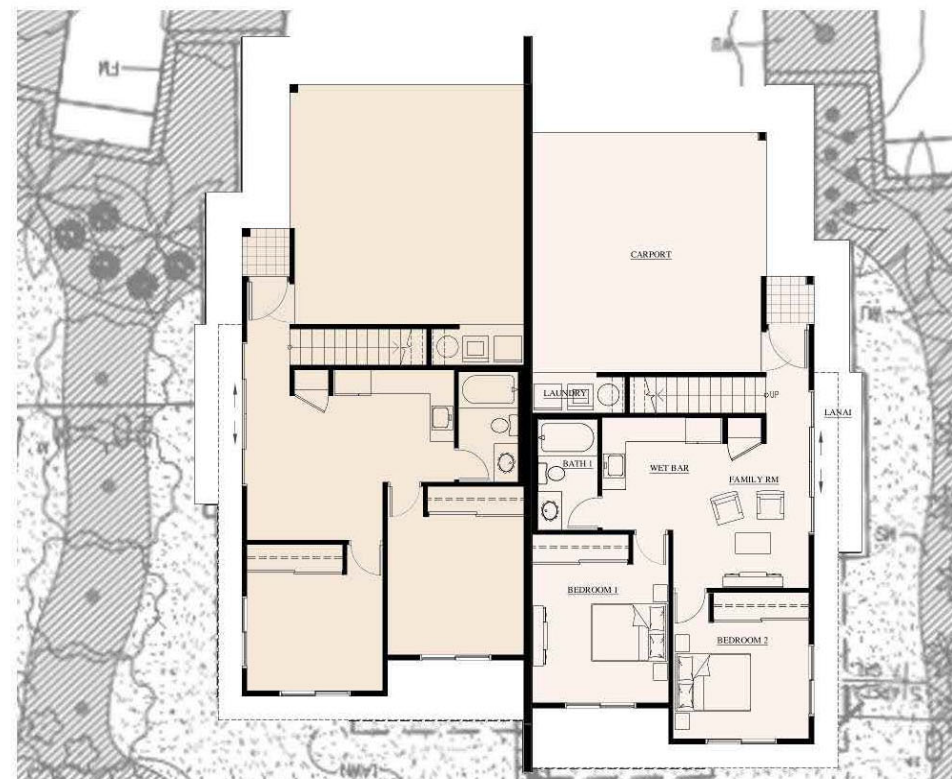
UNIT 'B' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'B' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



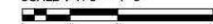
UNIT 'B' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



UNIT 'B' REAR EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'B' LEFT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"





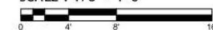
UNIT 'C' AND 'D' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



UNIT 'C' AND 'D' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



UNIT 'C' AND 'D' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'C' AND 'D' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



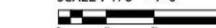
UNIT 'C' AND 'D' REAR EXTERIOR ELEVATION

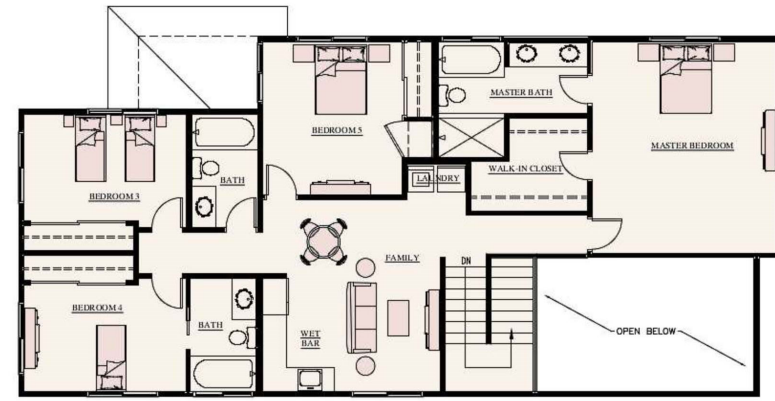
SCALE : 1/8" = 1'-0"



UNIT 'C' AND 'D' LEFT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"





UNIT 'E' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



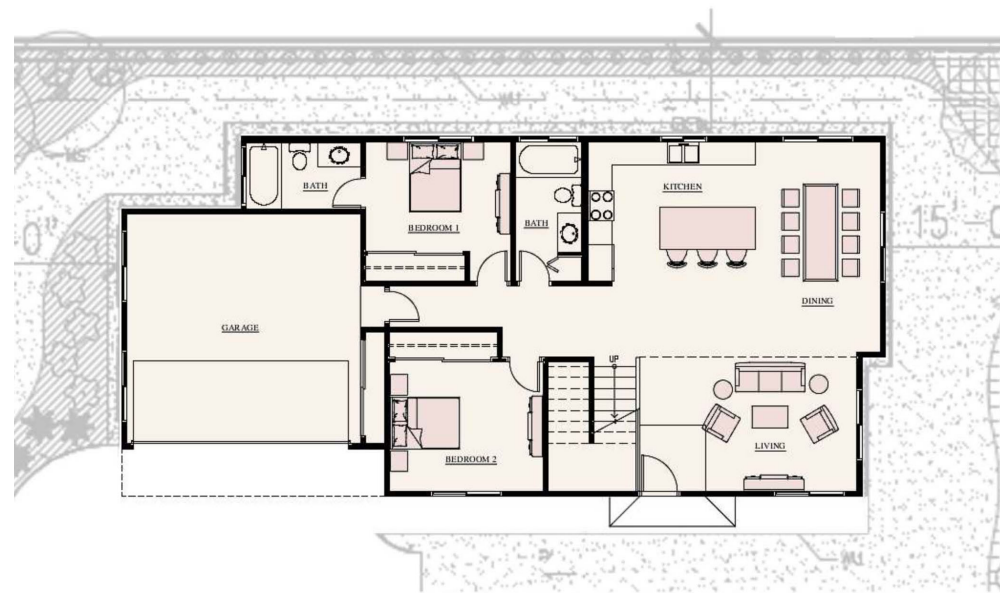
UNIT 'E' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'E' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



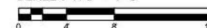
UNIT 'E' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



UNIT 'E' REAR EXTERIOR ELEVATION

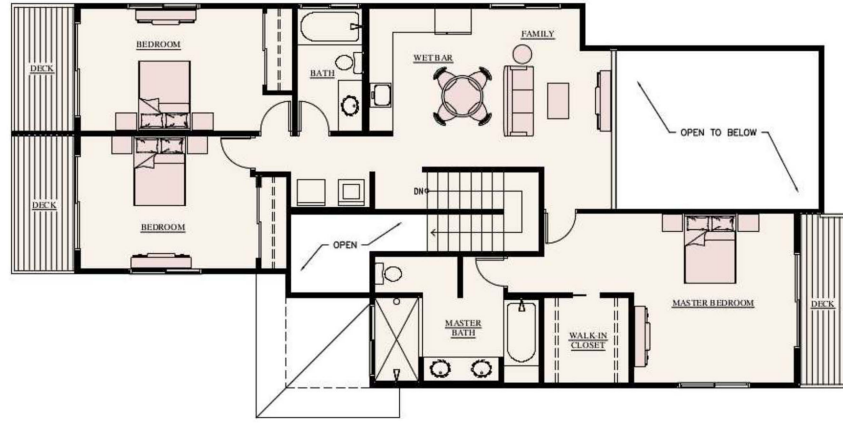
SCALE : 1/8" = 1'-0"



UNIT 'E' LEFT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"





UNIT 'F' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"
0 4 8 16



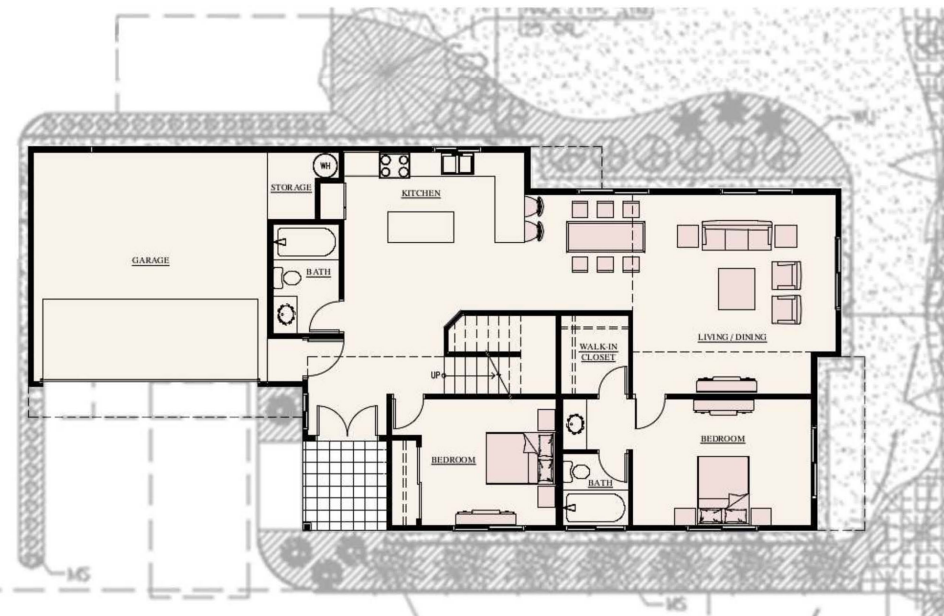
UNIT 'F' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
0 4 8 16



UNIT 'F' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
0 4 8 16



UNIT 'F' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"
0 4 8 16



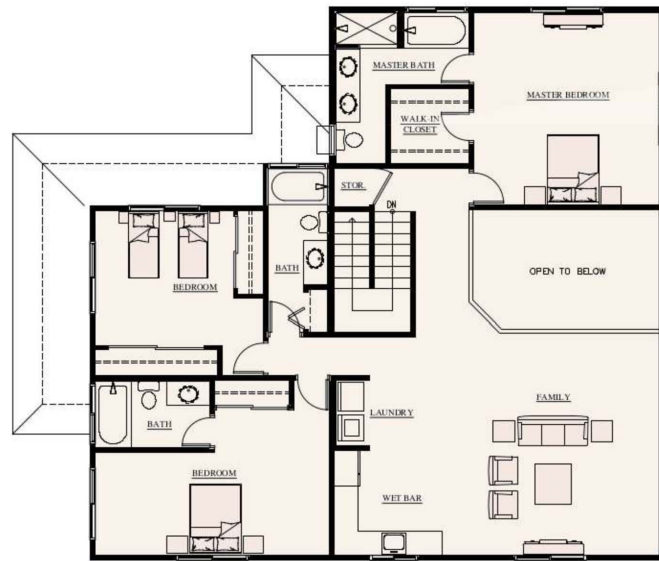
UNIT 'F' REAR EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
0 4 8 16



UNIT 'F' LEFT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
0 4 8 16



UNIT 'G' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



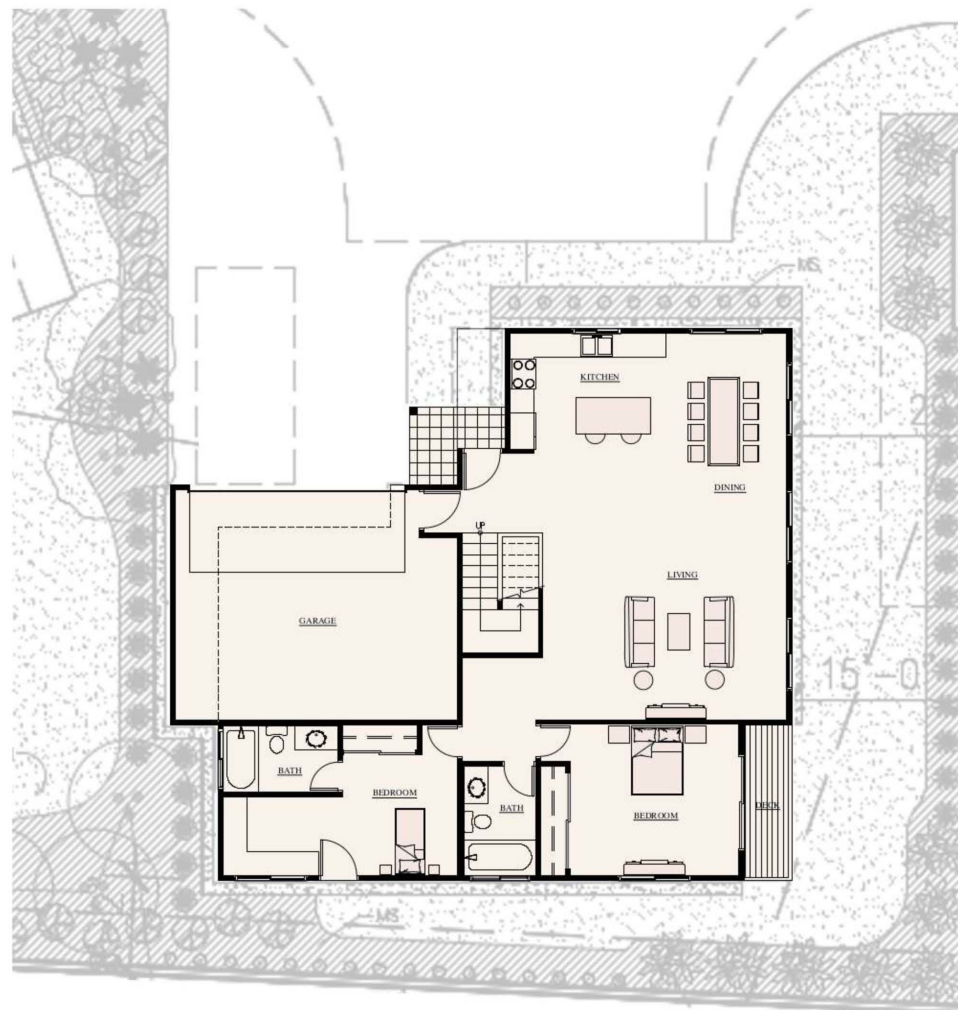
UNIT 'G' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'G' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'G' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"



UNIT 'G' REAR EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"



UNIT 'G' LEFT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"





UNIT 'H' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"
 0 4 8 16



UNIT 'H' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"
 0 4 8 16



UNIT 'H' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
 0 4 8 16



UNIT 'H' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
 0 4 8 16



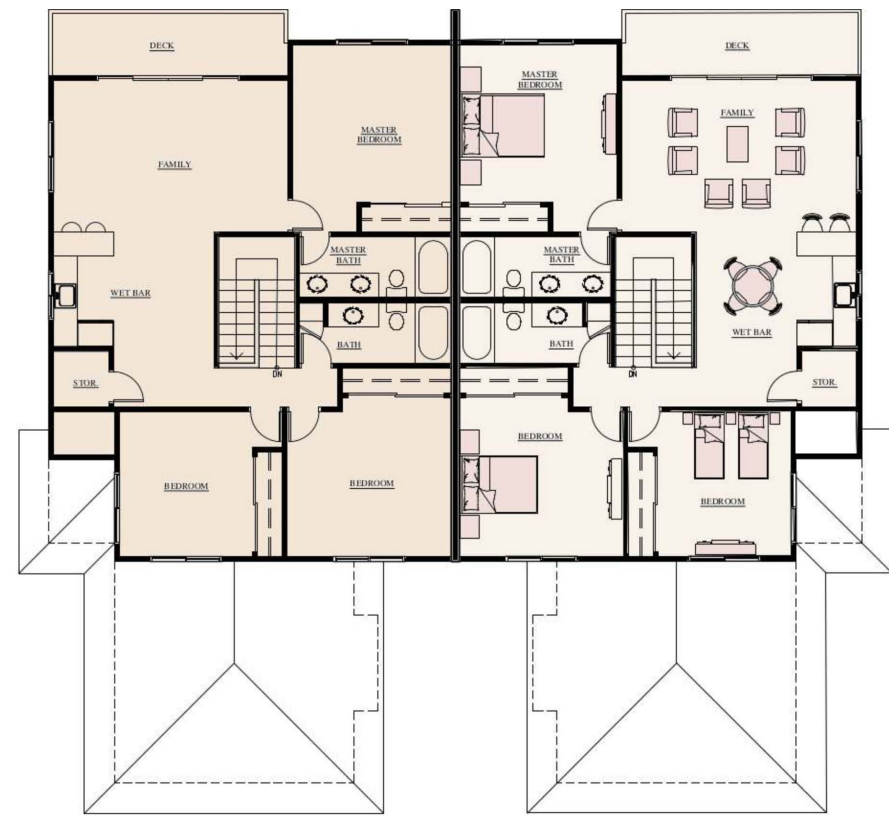
UNIT 'H' REAR EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
 0 4 8 16



UNIT 'H' LEFT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
 0 4 8 16



UNIT 'K' SECOND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"
 0 4 8 16



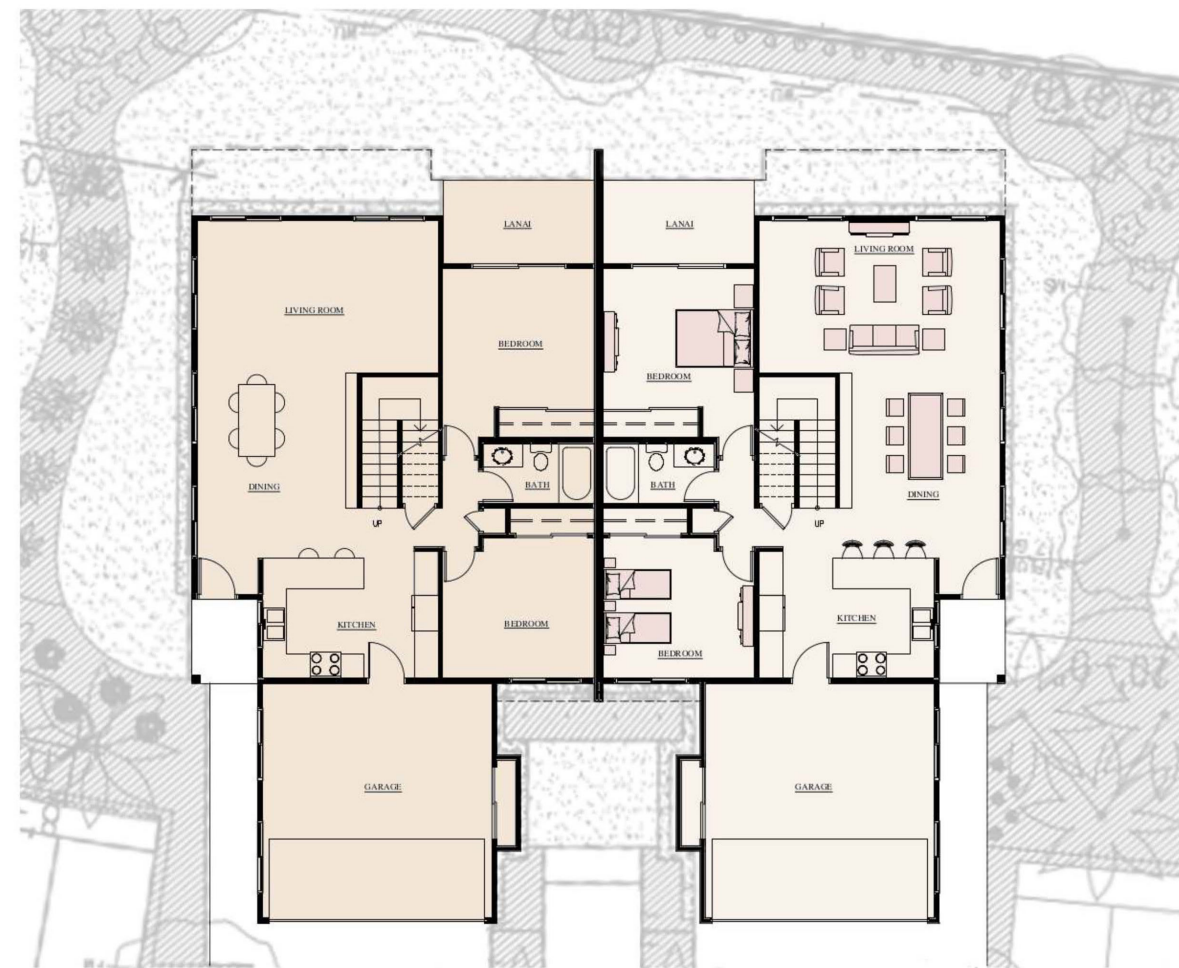
UNIT 'K' FRONT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
 0 4 8 16



UNIT 'K' RIGHT EXTERIOR ELEVATION

SCALE : 1/8" = 1'-0"
 0 4 8 16



UNIT 'K' GROUND LEVEL FLOOR PLAN

SCALE : 1/8" = 1'-0"
 0 4 8 16



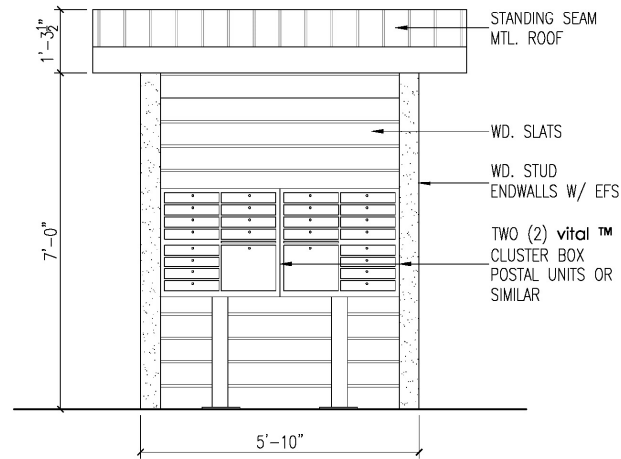
UNIT 'K' REAR EXTERIOR ELEVATION

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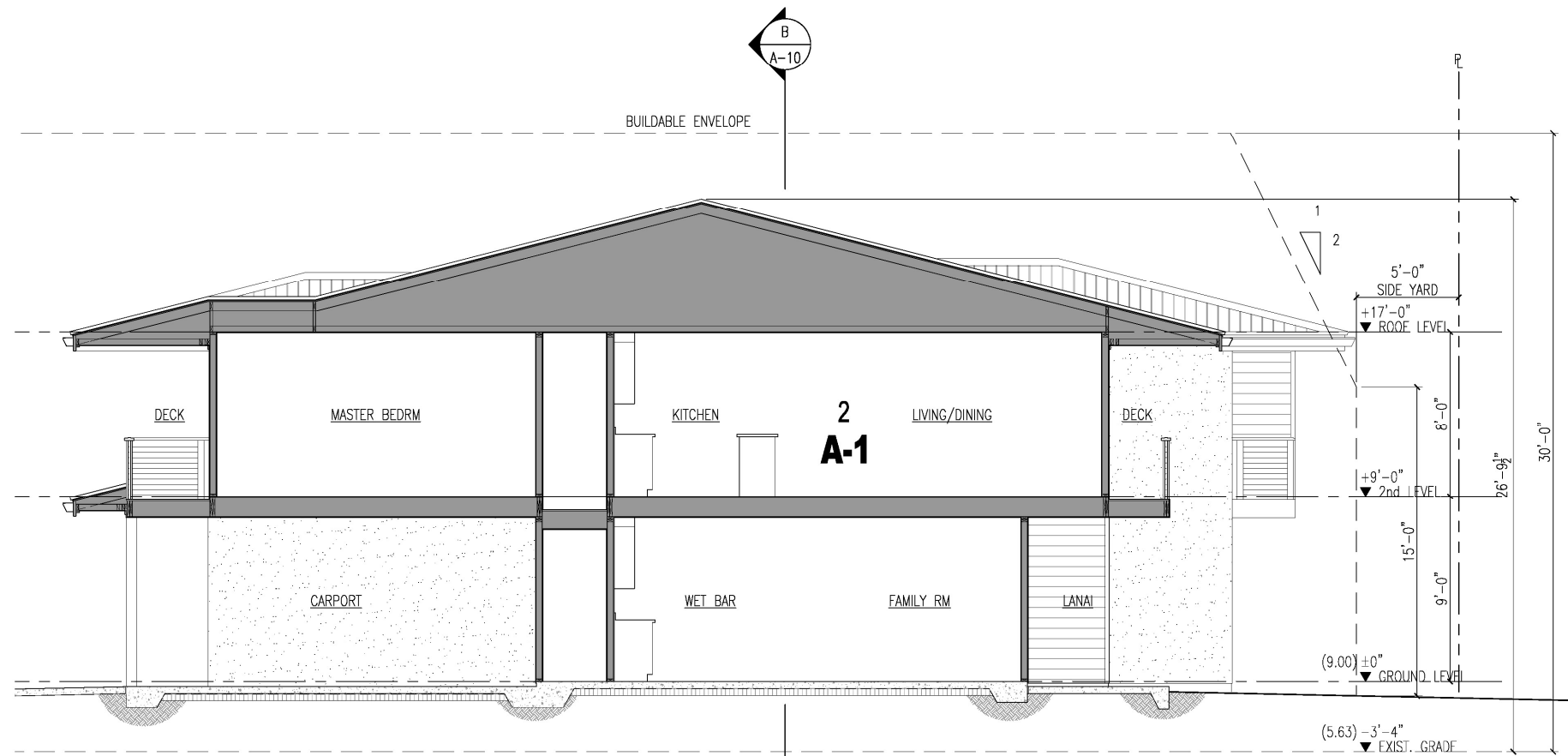


UNIT 'K' LEFT EXTERIOR ELEVATION

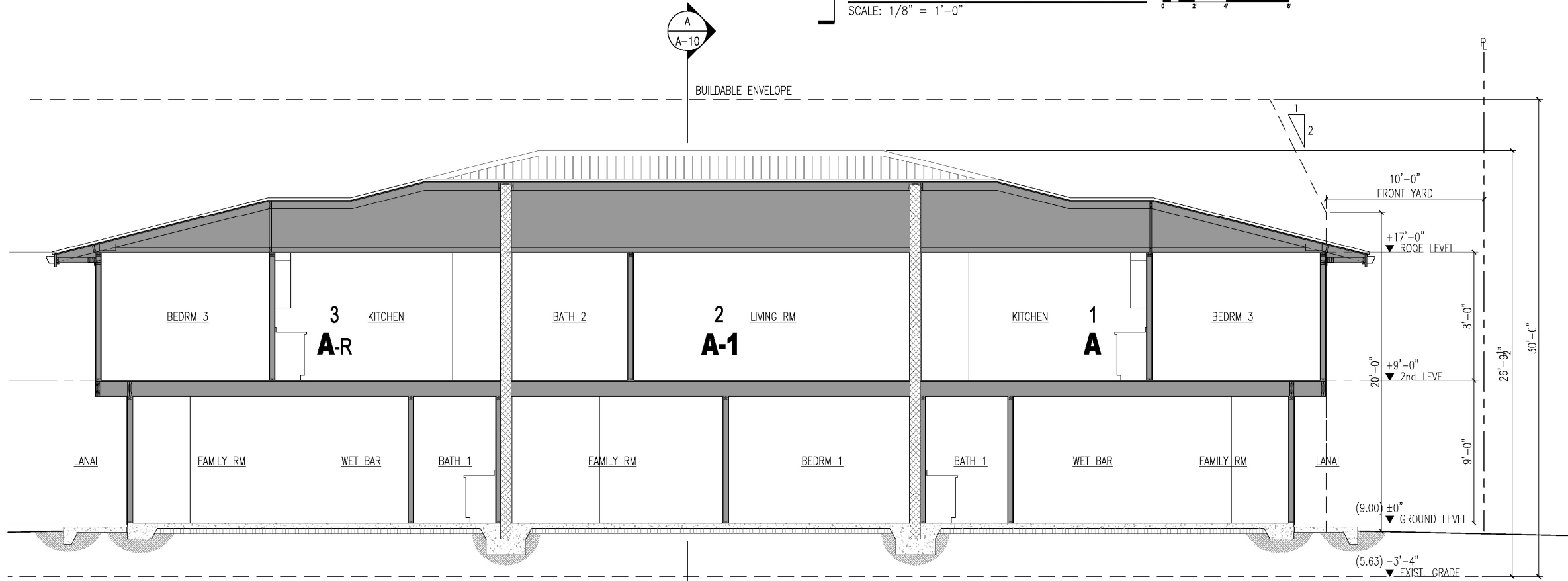
SCALE : 1/8" = 1'-0"
 0 4 8 16



1 MAILBOX ELEVATION
 SCALE: 1/2" = 1'-0"



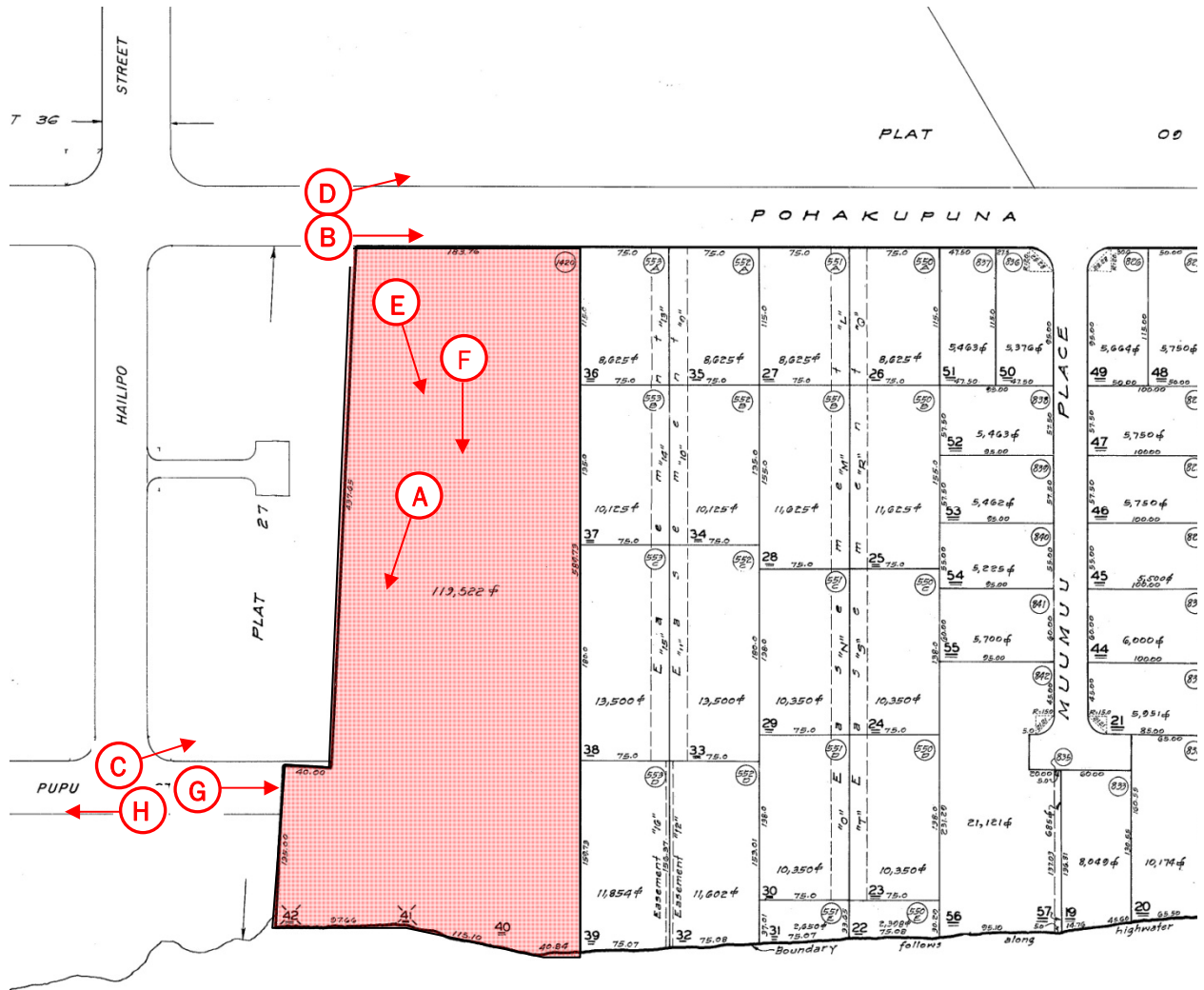
LONGITUDINAL SECTION A
 SCALE: 1/8" = 1'-0"



TRANSVERSE SECTION B
 SCALE: 1/8" = 1'-0"

APPENDIX B
SITE PHOTOGRAPHS

PHOTO KEY PLAN



NORTH

Draft Environmental Assessment
Cluster Development at Pōhakupuna



Photograph A – View within project site in southwest direction.



Photograph B – View at front of property at Pōhakupuna Road.

Draft Environmental Assessment
Cluster Development at Pōhakupuna



Photograph C – Existing single family dwelling at Pupu St.



Photograph D - View across Pōhakupuna Road.

Draft Environmental Assessment
Cluster Development at Pōhakupuna



Photograph E – View within project site in southeast direction



Photograph F – View within project site in makai direction

Draft Environmental Assessment
Cluster Development at Pōhakupuna



Photograph G – View at the end of Pupu St. looking east towards the project site



Photograph H – View down Pupu St. looking west

APPENDIX C

CULTURAL IMPACT ASSESSMENT

Draft
Cultural Impact Assessment for the
91-603 Pōhakupuna Road Project,
Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu
TMK: [1] 9-1-028:040

Prepared for
Group 70 International, Inc.
on behalf of
Jinshi Hawaii Development LTD

Prepared by
Kellen Tanaka, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: HONOULIULI 159)

May 2020

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Fax: (808) 244-1994

Management Summary

Reference	Cultural Impact Assessment for the 91-603 Pōhakupuna Road Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: [1] 9-1-028:040 (Tanaka and Hammatt 2020)
Date	May 2020
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: HONOULIULI 159
Agencies	State of Hawai‘i, Department of Health, Office of Environmental Quality Control (DOH/OEQC)
Land Jurisdiction	Private
Project Proponent	Jinshi Hawaii Development LTD
Project Location	The project area is located at 91-603 Pōhakupuna Road in coastal Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu. The project area is depicted on a 1999 Pearl Harbor U.S. Geological Survey (USGS) topographic quadrangle and a 2013 Google Earth aerial photograph.
Project Description	The proposed project includes a residential development that will consist of approximately 19 units.
Project Acreage	2.74 acres (1.11 hectares)
Document Purpose	Due to the project area’s location within the City and County of Honolulu, Special Management Area (SMA), an environmental assessment (EA) is being prepared. An SMA permit, and a cluster permit or subdivision will be required. A shoreline setback variance (SSV) may be required. The project site is zoned for residential uses. This cultural impact assessment (CIA) 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 <i>Guidelines for Assessing Cultural Impacts</i>). The document will likely also support the project’s historic preservation review under HRS §6E-42 and Hawai‘i Administrative Rules (HAR) §13-275 and §13-284.
Results of Background Research	Background research for this study yielded the following results, presented in approximate chronological order: <ol style="list-style-type: none"> 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

	<p>fresh water. The project area in pre-Contact Hawai'i would have consisted of lowland dry shrubs and grasslands.</p> <ol style="list-style-type: none"> 2. Honouliuli is the largest <i>ahupua'a</i> (land division usually extending from the uplands to the sea) in the <i>moku</i> (district) of 'Ewa. Honouliuli translates literally as "dark water," "dark bay," or "blue harbor," and thus is named for the waters of Pearl Harbor which marks the eastern boundary of the <i>ahupua'a</i> (Jarrett 1930:22). Another source translates Honouliuli as "The blue bays or inlets" (<i>Saturday Press</i>, 11 August 1883). Honouliuli appears in the "Mo'olelo of Lepeamoā," the chicken-girl of Pālama, where Honouliuli is the name of the husband of the chiefess Kapālama, and grandfather of Lepeamoā (Westervelt 1923:164–184). 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 at the time of his 1930 survey, <i>mai'a</i> (banana; <i>Musaceae</i>) and <i>kō</i> (sugarcane; <i>Saccharum officinarum</i>) were being cultivated within the pit caves (sinkholes) (McAllister 1933:109). 5. The traditional <i>ka'ao</i> (legends) associated with the area speak of the <i>akua</i> (godly) brothers, Kāne and Kanaloa. It was their supernatural feat of hurling <i>pōhaku</i> (stone) across the island that determined the boundaries of land divisions (Sterling and Summers 1987:1). Additional <i>mo'olelo</i> (stories) speak of Hi'iaka and her travels across the plains of 'Ewa. In particular, the <i>wahi pana</i> (storied place) of Kaupe'a (located north of the current project area) is described. Kamakau describes Kaupe'a as a wide plain where a grove of <i>wiliwili</i> (<i>Erythrina sandwicensis</i>) stands (Kamakau 1991a:47). This plain is an <i>ao kuewa</i>, a realm belonging to homeless souls. In general, the <i>kama'āina</i> (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, the primary landmark for travelers on the trail running from Pearl Harbor to Wai'anae. A <i>heiau</i> (pre-Christian place of
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	<p>worship) 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 <i>heiau</i> 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.</p> <ol style="list-style-type: none"> 7. Additional <i>heiau</i> located within Honouliuli included Pu'u Ku'ua located at Palikea and two unidentified <i>heiau</i>. These two unidentified <i>heiau</i> are located at the foot of Pu'u Kanehoa and Pu'u Kuina, respectively. 8. A cross-<i>ahupua'a</i> (east-west) trail that bordered Pearl Harbor passed through Honouliuli north of Pu'uokapolei and continued along the coast to Wai'anae following the route of the modern Farrington Highway. A <i>mauka-makai</i> (mountains-sea; north-south) trail branched off the cross-<i>ahupua'a</i> trail into two offshoots which led to the settlements of Kūalaka'i and One'ula, located along the southern coast. 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 <i>ali'i</i> (royalty) recorded by Hawaiian historian Samuel Kamakau date back to at least the twelfth century. <i>Ali'i</i> associated with Honouliuli and greater 'Ewa Moku included Kākuhihewa, Keaunui, Lakona, Mā'ilikūkahi, and Kahahana. 10. In early historic times, the population of Honouliuli was concentrated at the western edge of West Loch in the vicinity of Kapapapuhi Point in the "Honouliuli Taro Lands." This area was clearly a major focus of population due to the abundance of fish and shellfish resources close to a wide expanse of well-irrigated bottomland suitable for wetland taro cultivation. 11. Early foreign accounts describe the southwest coast of O'ahu, including Honouliuli Ahupua'a, as an area "a little distance from the sea, the soil is rich and all the necessities of life are abundantly produced" (Vancouver 1798:215). A sailor among Vancouver's crew observed, however, that "from the number of houses within the harbour it should seem to be very populous; but the very few inhabitants who made their appearance were an indication of the contrary" (Vancouver 1798:216). 12. Following the Māhele of 1848, 96 individual land claims were made in the <i>ahupua'a</i> of Honouliuli, with 72 claims being
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	<p>registered and awarded by King Kamehameha III to <i>maka ʻāinana</i> (commoners). The 72 <i>kuleana</i> (land holding of a tenant or <i>hoa ʻāina</i> residing in the <i>ahupua ʻa</i>) awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, irrigated <i>lo ʻi</i> (taro fields), <i>kula</i> (pasture or dry field), and house lots.</p> <p>13. Beginning with the time of Western Contact, however, Hawaiian populations were introduced to many virulent western diseases which began to decimate the native population. Thus, four years following the 1832 census, the ʻEwa population had dropped to 3,423 (Schmitt 1973:9, 36), “a decrease of 592 in 4 years” (Ewa Station Reports 1836). Between 1848 and 1853, a series of epidemics of measles, influenza, and whooping cough often wiped out whole villages.</p> <p>14. With the increasing foreign interests on Oʻahu Island during the last half of the nineteenth century, an array of agricultural enterprises were attempted. 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 Ahupuaʻa for a total of \$95,000.</p> <p>15. 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 ʻEwa Plain. Campbell’s first well was named Waianiani (“crystal waters”) by the <i>kama ʻāina</i> 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 (Hoʻokuleana 2014).</p> <p>16. The early twentieth century saw the lands of Honouliuli heavily utilized by both civilians and the U.S. military for transportation. The U.S. Government began acquiring the coastal lands of ʻEwa for development of a naval base at Pearl Harbor.</p> <p>17. 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.</p>
<p>Results of Community Consultation</p>	<p>CSH attempted to contact 62 Hawaiian organizations, agencies, and community members. Of the seven people that responded, two <i>kama ʻāina</i> and/or <i>kūpuna</i> (elders) participated in formal interviews for more in-depth contributions to the CIA. Consultation was received from community members as follows:</p>

	<ol style="list-style-type: none"> 1. Wallace Kyoshi Ito, Limu Hui Coordinator for Kua‘āina Ulu ‘Auamo (KUA) 2. Christian Kaimanu Yee, <i>kama‘āina</i> and cultural informant
<p>Impacts and Recommendations</p>	<p>Based on information gathered from the cultural and historical background and the community consultation, potential impacts were identified and the following recommendations were made:</p> <ol style="list-style-type: none"> 1. Mr. Ito would like to see the project be a “model of <i>pono</i> [proper] development.” He recommends that developers “takes into account the history of ‘Ewa Beach and the importance of <i>limu</i> [seaweed] to that history.” 2. Mr. Ito recommends the developers “consider protecting the shoreline from runoff, surface flow [...]” He stated that “naturally occurring sand berms” protect the shoreline by preventing surface runoff from flowing directly into the ocean and allowing the water to percolate down to recharge the aquifer. Mr. Ito recommended maintaining the sand berm or creating an artificial berm to prevent any surface flow from entering directly into the ocean. 3. Mr. Ito noted that individual homeowners can help by eliminating the concrete, thereby allowing rainwater to percolate into the ground and decrease surface runoff which carries pollutants into the ocean. 4. Mr. Ito also noted the importance of preserving shoreline access for the community. He would like “to be able to continue to take school groups, community groups to the shoreline to talk about <i>limu</i>.” 5. Mr. Yee stated the he does not want the <i>limu</i> to be negatively impacted by the proposed project. 6. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities should cease in that area and the State Historic Preservation Division (SHPD) should be notified pursuant to HAR §13-280-3. If <i>iwi kūpuna</i> (Native Hawaiian skeletal remains) are identified, all earth moving activities in the area should stop, the area be cordoned off, and the SHPD notified pursuant to HAR §13-300. 7. In the event that <i>iwi kūpuna</i> and/or cultural finds are encountered during construction, cultural and lineal descendants of the area should be consulted to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

Table of Contents

Management Summary	i
Section 1 Introduction	1
1.1 Project Background	1
1.2 Document Purpose.....	1
1.3 Scope of Work	1
1.4 Environmental Setting	5
1.4.2 <i>Ka Makani</i> (Winds)	5
1.4.3 <i>Ka Ua</i> (Rains).....	7
1.4.4 <i>Nā Kahawai</i> (Streams).....	9
1.4.5 <i>Lihikai ame ka Moana</i> (Seashore and Ocean)	11
1.4.6 Built Environment.....	12
Section 2 Methods	13
2.1 Archival Research.....	13
2.2 Community Consultation.....	13
2.2.1 Scoping for Participants.....	13
2.2.2 “Talk Story” Sessions.....	13
2.2.3 Completion of Interview	14
Section 3 <i>Ka‘ao</i> and <i>Mo‘olelo</i>	15
3.1 <i>Ka‘ao</i>	15
3.1.1 The Naming of Honouliuli.....	15
3.1.2 Kāne and Kanaloa and the <i>Loko I‘a</i> (Fishpond) of Pu‘uloa	16
3.1.3 Pu‘okapolei, Astronomical Marker and <i>Heiau</i>	17
3.1.4 Kamapua‘a and Kamaunuanoho at Pu‘uokapolei.....	18
3.1.5 Coastal Village of Kūalaka‘i.....	19
3.1.4 The First Breadfruit Brought from Kahiki.....	19
3.1.5 The Traveling Mullet of Honouliuli	19
3.1.6 Ka-lua-ōlohe Caves of Honouliuli	20
3.1.7 Kanekua‘ana	21
3.1.8 Palila	22
3.1.9 Kākuhihewa	22
3.2 <i>Wahi Pana</i>	23
3.2.1 <i>Heiau</i>	23
3.2.2 Plains of ‘Ewa.....	26
3.2.3 Kūalaka‘i.....	28
3.2.4 Kalaeloa	28
3.2.5 Nā Ala Hele (Trails)	29
3.3 <i>‘Ōlelo No‘eau</i>	29
3.3.1 Concerning Sharks.....	31
3.3.2 Concerning the <i>Pipi</i> or Pearl Oyster of Pu‘uloa	32
3.3.3 Concerning the <i>‘Anaeholo</i> of Honouliuli	33
3.3.4 Concerning <i>Kalo</i>	33
3.3.5 Concerning the <i>Ao Kuewa</i> , Realm of the Homeless Souls	33
3.4 <i>Oli</i> (Chants)	34
3.4.1 <i>Oli</i> for Kūali‘i	34

3.5 <i>Mele</i> (Songs).....	35
3.5.1 <i>Mele no Kūali‘i</i>	36
3.5.2 <i>Eia Mai Au ‘o Makalapua</i>	37
Section 4 Traditional and Historical Background	40
4.1 Pre-Contact to Early Post-Contact Period	40
4.2 Early Historic Period	42
4.2.1 Observations of Early Explorers and Visitors	42
4.2.2 Missionaries.....	45
4.2.3 Honouliuli Taro Lands.....	46
4.2.4 The Māhele and Kuleana Awards.....	46
4.2.5 Population Decline.....	47
4.3 Mid- to Late 1800s.....	51
4.3.1 Ranching in Lower Honouliuli	51
4.3.2 Rice Cultivation	53
4.3.3 The Sugar Plantations of ‘Ewa	56
4.3.4 Oahu Railway and Land Company (OR&L)	57
4.3.5 Other Enterprises in Honouliuli.....	61
4.4 1900s.....	64
4.4.1 The U.S Military Development of Pearl Harbor.....	64
4.4.2 History of Camp Malakole	64
4.4.3 Development in the Vicinity of the Project Area.....	66
Section 5 Previous Archaeological Research	78
5.1 Early Studies.....	78
5.2 Modern Studies in the Vicinity Not Associated with the Ewa Marina Project.....	78
5.2.1 Pu‘uloa Elementary School (McCoy 1972).....	78
5.2.2 James Campbell High School (Dye and Jourdane 2006).....	78
5.2.3 Proposed Iglesia Ni Cristo Church Project (Hammatt and Shideler 2011).....	86
5.2.4 James Campbell High School (Sroat et al. 2012; McElroy and Duhaylonsod 2017).....	86
5.3 Review of Work at Adjacent Portions of the Proposed Ewa Marina.....	86
5.3.1 Jourdane 1979	86
5.3.2 Davis 1979	87
5.3.3 Archaeological Test Excavations (Hommon and Ahlo 1983)	91
5.3.4 Hammatt and Shideler 1989	93
5.3.5 Dunn and Haun 1991	93
5.3.6 Franklin, Goodfellow and Wulzen (1995).....	93
5.3.7 Ocean Pointe Drainage Improvements Archaeological Resources Assessment (Rosendahl 2004)	95
Section 6 Community Consultation.....	96
6.1 Introduction.....	96
6.2 Community Contact Letter	96
6.3 Community Contact Table.....	99
6.4 <i>Kama‘āina</i> Interviews	110
6.4.1 Wallace K. Ito	110
6.4.2 Christian Kaimanu Yee.....	123
6.5 Summary of <i>Kama‘āina</i> Interviews.....	137
Section 7 Traditional Cultural Practices.....	139

7.1 Gathering of Plant and Aquatic Resources	139
7.2 Cultural Sites	142
7.3 Religious Practice	143
7.4 Burials.....	143
Section 8 Summary and Recommendations	144
8.1 Results of Background Research	144
8.2 Results of Community Consultations	146
8.3 Impacts and Recommendations	146
Section 9 References Cited	148
Appendix A Place Names of Honouliuli.....	162

List of Figures

Figure 1. Portion of the 1999 Pearl Harbor USGS 7.5-minute topographic quadrangle showing the project area.....	2
Figure 2. 2013 Google Earth aerial photograph showing the location of project area	3
Figure 3. Tax Map Key (TMK) [1] 9-1-028 depicting the project area (Hawai‘i TMK Service 2014)	4
Figure 4. Portion of a 1999 Pearl Harbor USGS topographic quadrangle with overlay of <i>Soil Survey of the State of Hawaii</i> (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and surrounding the project area	6
Figure 5. Place names of Honouliuli in relation to the project area overlaid on a 2011 USGS orthoimagery aerial photograph.....	24
Figure 6. 1825 Malden map of the southern coast of O‘ahu with study area; note the faint lines from West Loch stretching northwest, west, and south depict ancient foot trails	30
Figure 7. Map of O‘ahu population distribution in 1853 (in Coulter 1931:18) showing the location of the project area and indicating the coastal population density in the vicinity was very low	50
Figure 8. 1880s photograph of James Campbell’s residence on the ‘Ewa Plain (Hawai‘i State Archives).....	52
Figure 9. 1906 Donn Hawaii Territory Survey map of O‘ahu with land use showing the location of the project area (indicated to be within the area of grazing lands).....	54
Figure 10. Waikele rice fields below the Oahu Sugar Company mill (Hawai‘i State Archives n.d.)	55
Figure 11. Ewa Plantation Company sugarcane fields, Filipino Camp area, ca. 1925 (University of Hawai‘i at Mānoa)	58
Figure 12. 1890 photograph of Pearl Harbor with OR&L railroad tracks along the coast (Honolulu Advertiser Archives)	60
Figure 13. Map of ‘Ewa Plain historical features from 1825 to World War II (Tuggle and Tomonari-Tuggle 1997:32).....	62
Figure 14. Dredging in Pearl Harbor ca. 1908 (Hawai‘i State Archives).....	65
Figure 15. Camp Malakole soldiers raising the barracks roof (Bandel in Albert 1980:336).....	67
Figure 16. Camp Malakole soldiers wiring the barracks (Bandel in Albert 1980:336).....	67
Figure 17. Portion of the U.S. Army War Department fire control map, Barbers Point (1919) and Nanakuli (1919) quadrangles showing the location of the project area indicating a coastal trail and a probable cattle wall within the project area and a couple of houses approximately 150 m to the east along the coast	68
Figure 18. 1928 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area as in scrub land with no development other than the suggestion of an unimproved trail or road along the east side of the project area	69
Figure 19. Portion of the U.S. Army War Department terrain map, Barbers Point (1936) and Ewa (1933) quadrangles showing the location of the project area with an unimproved road (the future Pōhakupuna Road) along the north side of the project area and an unimproved road crossing through the project area to the coast near “Station X”	70

Figure 20. 1950 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area showing with nine buildings and a central access driveway extending south toward the coast71

Figure 21. Portion of the 1953 Ewa and Puuloa USGS topographic quadrangles showing seven houses within the project area, an improved road along the east side of the project area, an unimproved road (the future Pōhakupuna Road) along the north side and an unimproved road along the west side down to the coast72

Figure 22. 1961 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area and much the same configuration of buildings as in the 1950 aerial photograph but most of the trees have now been removed; extent and density of suburban development is rapidly expanding73

Figure 23. Portion of the 1968 Ewa and Puuloa USGS topographic quadrangles showing the location of the project area within the dense suburban development of ‘Ewa Beach74

Figure 24. 1976 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area with far fewer buildings and exposures of raised reef limestone suggesting recent grading but also showing areas of scrub regrowth suggesting the passage of time since the demolition of structures on the *mauka* portion of the lot.....75

Figure 25. 1988 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area with demolition of almost all structures.....76

Figure 26. Portion of the 1999 Pearl Harbor USGS topographic quadrangle showing the locations of previous archaeological studies in the vicinity of the project area.....79

Figure 27. Portion of 1999 Pearl Harbor USGS topographic quadrangle showing the locations of previously identified historic properties in the vicinity of the project area83

Figure 28. Archaeological reconnaissance survey areas designated by Jourdane (1979:5), noting approximate region containing eight archaeological sites88

Figure 29. Archaeological reconnaissance survey area by Davis (1979:4), noting Survey Zones I–IV and area disturbed by sugarcane.....89

Figure 30. Map of designated Survey Zone III of the Ewa Beach project showing the location of the archaeological features recorded (adapted from Davis 1979:17)90

Figure 31. Map showing the location of the five Hommon and Ahlo (1983) test excavatgions numbered X-1 through X-5 (Hommon and Ahlo 1983:4).....92

Figure 32. Project area and site location map (from Dunn and Haun 1991:15) (note “BT” designations are for backhoe trenches and do not designate historic properties; for greater detail on historic properties in relation to the present project area see Figure 20)94

Figure 33. Community consultation letter page one.....97

Figure 34. Community consultation letter page two.....98

Figure 35. Photograph of abundance of *limu* along shore in front of Lion’s Club property at One‘ula Beach Park in 1977 (photo courtesy of Wally Ito)113

Figure 36. Photo showing Uncle Henry and the absence of *limu* along shore in front of Lion’s Club property at One‘ula Beach Park in 2012 (photo courtesy of Mr. Wally Ito)115

Figure 37. *Limu wāwae ‘iole* (left) and *limu a‘ala‘ula* (right) (CSH 2019).....118

Figure 38. *Limu līpoa* (CSH 2019)119

Figure 39. *Grateloupia hawaiiiana* (CSH 2019)120

Figure 40. *Limu kohu* (CSH 2019).....121

Figure 41. *Limu hā‘ula* (CSH 2019).....122

Figure 42. *Limu wāwae‘iole* observed at One‘ula Beach Park (CSH 2019)125

Figure 43. *Limu a‘ala‘ula* observed at One‘ula Beach Park (CSH 2019)126

Figure 44. *Limu kala* observed at One‘ula Beach Park (CSH 2019)128

Figure 45. Example of *hīna‘i* (basket fish trap) (CSH 2019)129

Figure 46. *Limu kala* used as bait to catch *kala* (unicorn surgeon fish, *Naso brevirostris*) (photo courtesy of Mr. Yee)130

Figure 47. Abundance of *limu* washed ashore within ‘Ewa Limu Management Area (CSH 2019)132

Figure 48. *Limu a‘ala‘ula* observed within ‘Ewa Limu Management Area (CSH 2019)133

Figure 49. *Limu wāwae‘iole* observed within ‘Ewa Limu Management Area (CSH 2019).....134

Figure 50. *Limu hā‘ula* observed within ‘Ewa Limu Management Area (CSH 2019).....135

Figure 51. Leather mudweed observed within ‘Ewa Limu Management Area (CSH 2019)136

List of Tables

Table 1. Land Commission Awards in Honouliuli48

Table 2. Previous archaeological studies in Honouliuli Ahupua‘a near the project area80

Table 3. Historic properties previously identified in the project area vicinity84

Table 4. Community contact table99

Section 1 Introduction

1.1 Project Background

At the request of Group 70 International, Inc. (G70), on behalf of Jinshi Hawaii Development LTD, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared a cultural impact assessment (CIA) for the 91-603 Pōhakupuna Road Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: [1] 9-1-028:040. The proposed project includes a residential development that will consist of approximately 19 units. The project area is located at 91-603 Pōhakupuna Road in coastal Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu. The present project owner is shown in City and County records as Golden Lion Ewa Beach, LLC. The 2.74-acre (1.11-hectare) property is depicted on a portion of the 1999 Pearl Harbor U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a 2013 aerial photograph (Figure 2), and a tax map plat (Figure 3).

1.2 Document Purpose

Due to the project area’s location within the City and County of Honolulu, Special Management Area (SMA), an environmental assessment (EA) is being prepared. An SMA permit, and a cluster permit or subdivision, will be required. A shoreline setback variance (SSV) may be required. The project site is zoned for residential uses.

This CIA 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*). The document will likely also support the project’s historic preservation review under HRS §6E and Hawai‘i Administrative Rules (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 CIA includes the following:

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

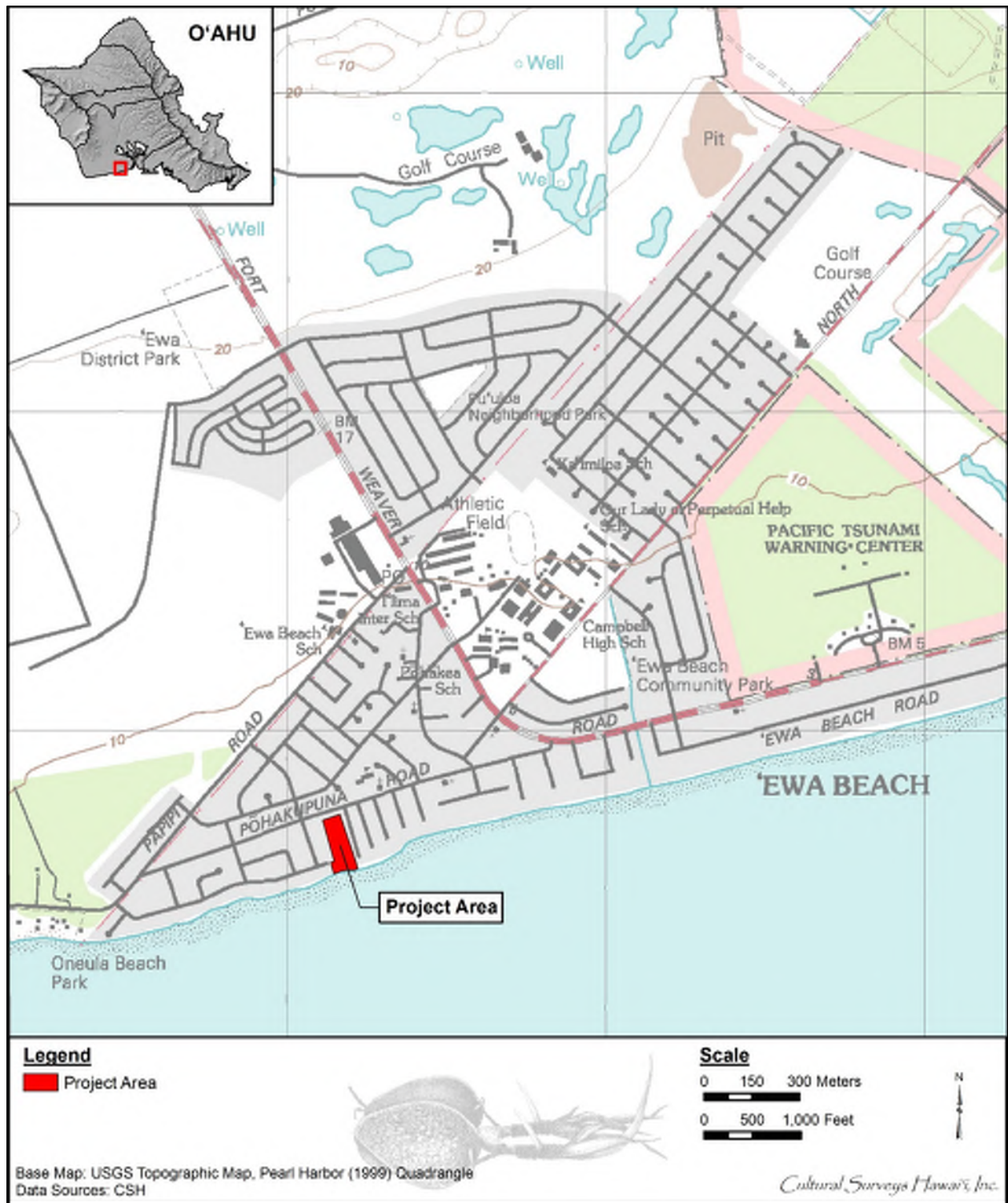


Figure 1. Portion of the 1999 Pearl Harbor USGS 7.5-minute topographic quadrangle showing the project area



Figure 2. 2013 Google Earth aerial photograph showing the location of project area

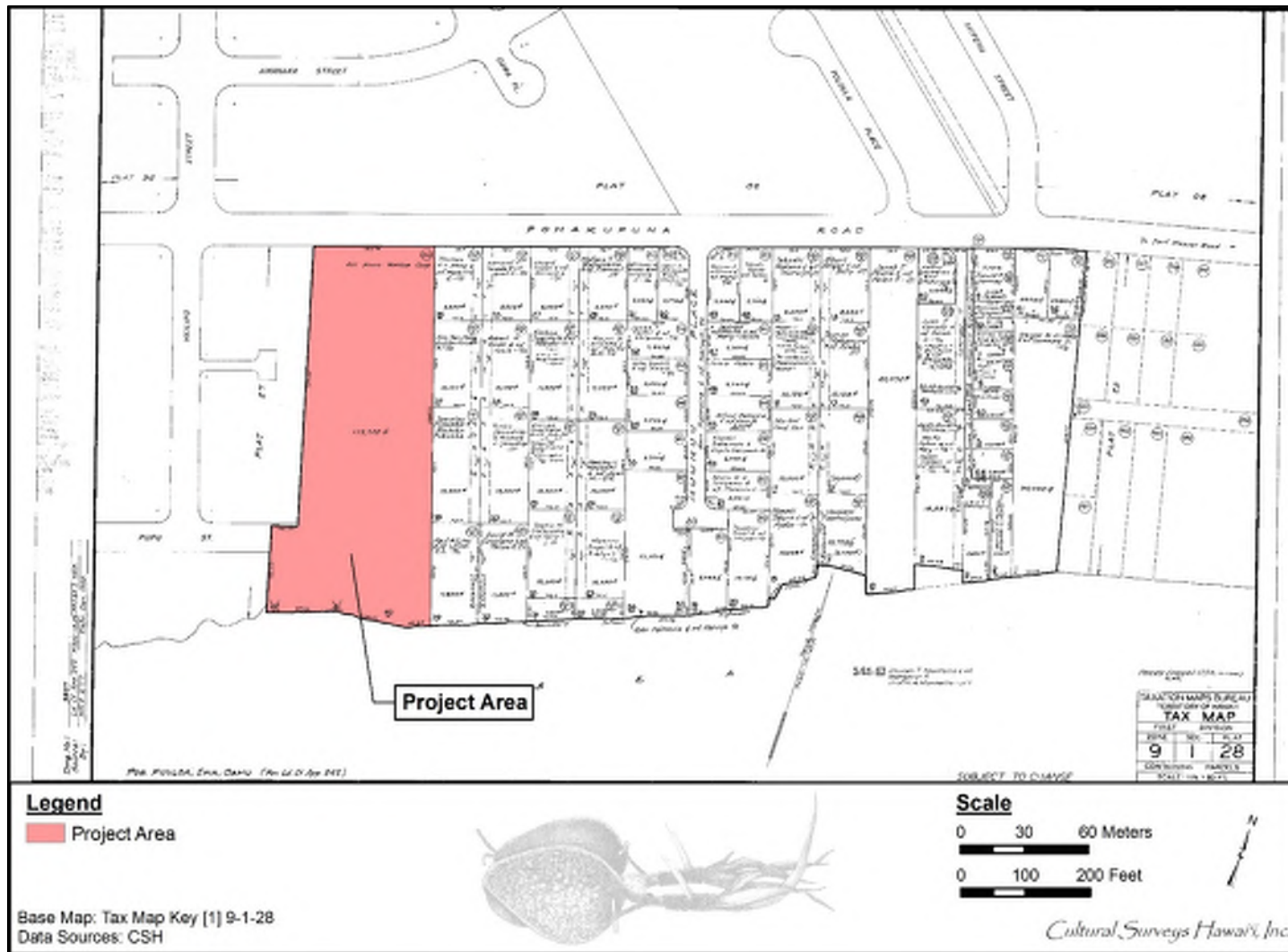


Figure 3. Tax Map Key (TMK) [1] 9-1-028 depicting the project area (Hawai'i TMK Service 2014)

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 is entirely coral (limestone) outcrop (CR) (Figure 4). Coral outcrop (CR) is described as consisting of “coral or cemented calcareous sand on the island of Oahu” (Foote et al. 1972:29).

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 Kūapāka'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'iakaikapoliopole*, the goddess Hi'iaka, the young sister of the fire goddess Pele, born as 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'au. While traversing the island chain, Hi'iaka encounters various gods and demi-gods, spirits and shapeshifters, as well as chiefs and commoners. According to the *mo'olelo* (story), 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

ME KANALIMAKUMAMĀKOLU

Aloha ku'u hoa i ka pū'ali lā

A luna i Pōhākea, he luna o Kamaoha

He lae 'ino 'o Maunauna

'O Līhu'e ke hele 'ia

Honi i ke 'ala mau'u

CHANT ONE HUNDRED

AND FIFTY-THREE

Alas my friend of the rugged
mountain pass

On high at Pohakea, above Kamaoha

Maunauna is a dangerous escarpment
Lihu'e's high plain yet to be traversed

Inhaling the scent of the grasses

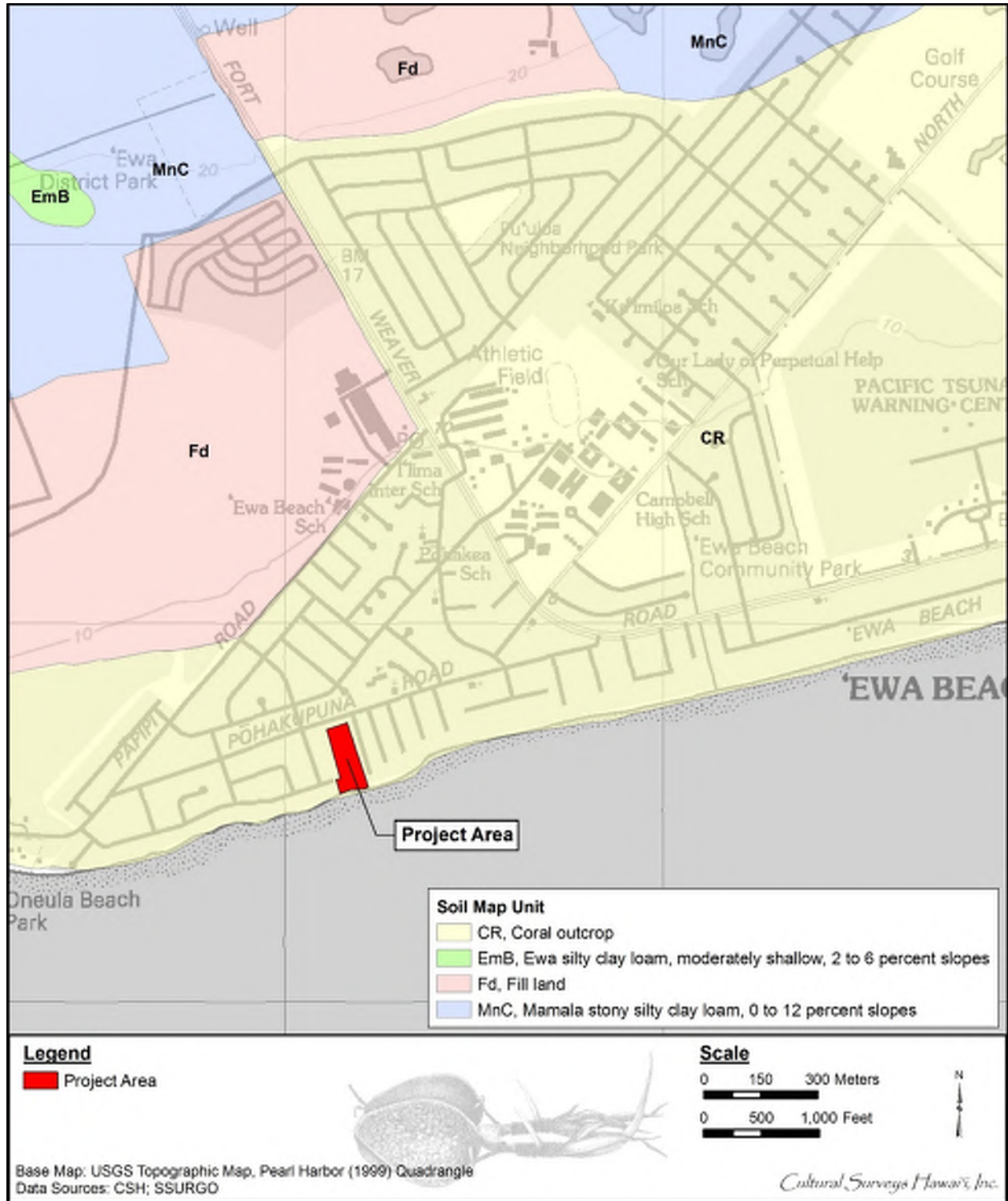


Figure 4. Portion of a 1999 Pearl Harbor USGS topographic quadrangle with overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and surrounding the project area

<i>I ke 'ala o ke kupukupu</i>	The fragrance of kupukupu fern
<i>E linoa ala e ka Waikōloa</i>	Entwined by the Waikoloa breeze
<i>E ka makani he Wai'ōpua</i>	By the wind called Wai'ōpua
<i>Ku'u pua, me he pua lā i ku'u maka</i>	My blossom, like a flower in my sight
<i>Ka 'oni i ka haku 'ōnohi, kā ka wai lā i li'u</i>	Moving before my eyes, washed salty by tears
<i>I ku'u maka lā, e uē au lā.</i>	There in my sight, I weep.

[Ho'oulumāhiechie 2008a:280; Ho'oulumāhiechie 2008b:262]

1.4.3 *Ka Ua* (Rains)

Precipitation is a major component of the water cycle, 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'oilō* (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 et al. 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* [elders] 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 *oli* (chant) offered by Hi'iakaikapoliopole. During Hi'iaka's travel through 'Ewa she recites this affectionate *oli* as she recalls the Kai'okia edict placed on her and Lohi'au by Pele:

<i>'A'ole au e hele i ke kaha o Kaupe'a</i>	I shall not tread Kaupe'a's expanse
<i>Kēlā kaha kūpā koili a ka lā i ke kula</i>	That stretch where the sun beats down on the plain
<i>Ua kūpono a'ela ka lā i ka piko o Wākea</i>	The sun is right overhead, at the navel of Wākea

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

<i>'O kauhale a ka 'ōlelo</i>	O house made of words
<i>Ho 'ohiki ihola i kānāwai</i>	Utter as an edict
<i>Kau ihola i kānāwai</i>	Place as a law
<i>He kānāwai 'okia</i>	An order of separation
<i>'Ālina ihola ka 'o Pu'uloa</i>	Thus Pu'uloa is branded by epithet
<i>He 'āina kauā.</i>	A land of outcasts and slaves.

[Ho'oulumāhie 2008a:294–295; Ho'oulumāhie 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. Frequently 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'anae 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 Kalo'i, Hunehune, Makalapa, Makakilo, 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 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*, a creation chant of the Hawaiian universe, 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 (Kanahale 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, Kanahale 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. [Kanahale 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 toward 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 2017).

Utilizing a well driller, Campbell drilled several hundred feet down until reaching a large supply of pure, fresh water (Board of Water Supply 2017). According to the Board of Water Supply (2017):

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

Campbell's first well was named Waianiani ("crystal waters") by the *kama'āina* of Honouliuli (Nellist 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho'okuleana 2014). Campbell's

original Honouliuli well was finally sealed by the City and County of Honolulu in 1939 (Ho'okuleana 2014).

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

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

The Hawaiians knew Pearl Harbor as Pu'uloa, and they believed that there, dwelling in a large cavern on the Honouliuli side of the harbor, Ka'ahupāhau, the queen of all sharks on O'ahu, made her home. Her chief guard was a brother shark, who lived in a pit at the entrance to the lochs. The Hawaiian people said the drydock was built over the cavern of Ka'ahupāhau's son, who also lived in Pu'uloa. Angered by the violation of his home, the shark prince destroyed the imposing structure. The engineers in charge of the project attributed the collapse of the foundation to hydrostatic pressure. Whatever the cause, several years' work was wrecked within minutes . . . this time, before starting to rebuild, they asked the Hawaiians to bless the site. After that the work continued without further trouble. [Clark 1977:69–70]

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 onshore locality known as Hilo one. According to Maly and Maly (2012):

That place, Hilo-one, [...] is situated on the northern side of Kualakai, towards Kalaeloa. And the name of the spring in which Hiiaka looked and saw her reflection was Hoakalei (Reflection of a lei). It was at this place that Hiiaka saw the two lehua trees growing, from which she picked the blossoms too make her four garlands. [Maly and Maly 2012:125]

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

<i>O Hiiaka ka wahine,</i>	Hiiaka is the woman
<i>Ke ako la i ka pua o Hoakalei,</i>	Who picked the flowers of Hoakalei,
<i>Ke kui la, ke uo la i ka manai</i>	And with a needle strung and made them into
<i>Eha ka lei, ka apana lei lehua</i>	four garlands, the sectioned lei of the woman,

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

[Ka Na‘i Aupuni, Volume II, Number 6, 7 June 1906, Ka Moolelo o Hiiaka-i-kapoli-o-Pele; Maly and Maly 2012:125]

Moving westward from Pu‘uloa are Iroquis Beach, Pu‘uloa Beach Park (formerly ‘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; Kanahale asserts that “early Hawaiians regarded fishing as the oldest, and hence the most prestigious of professions” (Kanahale 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 1991a:84]

1.4.6 Built Environment

The built environment surrounding the project area includes residential property in development to the north and west and a residential subdivision with associated infrastructure to the east. Papipi Road provides access to the project area from the residential subdivision. The project area includes a U-shaped access road connecting three parking lots, a comfort station, and a softball field.

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, mele* (songs), traditional *mo‘olelo*, 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 2020), 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

We begin our consultation efforts reviewing an 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. To facilitate the consultation process, we also contact 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 also invites referrals and new contacts during the consultation outreach.

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

It is important to CSH cultural researchers to 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," 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 informants if we have lost our *kūpuna*. CSH makes it a point to reach out to the *'ohana* of our fallen *kūpuna* and pay our respects including sending all past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 *Ka'ao and Mo'olelo*

Hawaiian storytellers of old were greatly honored; they were a major source of entertainment and their stories contained 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* are often full of *kaona* or double meanings.

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

In differentiating *ka'ao* and *mo'olelo* it may be useful to think of *ka'ao* as expressly delving into the *wao akua* (realm of the gods), discussing the exploits of *akua* (gods) in a primordial time. *Mo'olelo* on the other hand, reference a host of characters from *ali'i* (royalty) 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 lead to the Hawaiian race of *ali'i* and *maka'āinana*. The *ka'ao* in and around the project area shared below are some of the oldest Hawaiian stories that have survived; they still speak to the characteristics and environment of the area and its people.

3.1 *Ka'ao*

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]

Another explanation for the names comes from the "Legend of Lepeamoā," the chicken-girl of Pālāma. In this legend, Honouliuli is the name of the husband of the chiefess Kapālāma and grandfather of Lepeamoā. The land of Honouliuli was named for the grandfather of Lepeamoā (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 Wai'anae 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]

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

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

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

On the left side of the pond stood the stone called Hina, which represented a goddess of the sea by that name. Each time the sea ebbed, the rock became gradually visible, vanishing again under water at high tide. Ku, another stone on the right, was never seen above sea level.

This stone represented Ku'ula, Red Ku, a god for fish and fishermen. From one side of the pond a long wall composed of driven stakes of hard wood, ran toward the island [Laulaunui] in the lochs. When the fish swam up the channel and then inside of this wall, they invariably found themselves in the pond. A short distance from the spot where the pond touched the shore was a small koa or altar composed of coral rock. It was here that the first fish caught in the pond was laid as an offering to the gods. [Pukui 1943:56]

The fishpond contained many fish, especially the *akule* (bigeye scad; *Selar crumenophthalmus*), thus its name, “the enclosure for *akule* fish” (Pukui 1943:56–57). The pond was destroyed when the channel to Pearl Harbor was dredged in the early twentieth century. The caretaker of the pond took the stones Kū and Hina to a deep place in the ocean and sunk them so “none would harm or defile them.” Cobb (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 Kauhiwawaiono, two conspirators against Kamehameha I, lived at Pu'uloa. The chief Kauhiwawaiono 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 Kepo'okala. 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* [others, company] [...]

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 *anapuni* (the arced 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].

3.1.3 Pu'okapolei, Astronomical Marker and Heiau

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'oilō [winter, rainy season]. [Kamakau 1976:14]

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* (pre-Christian place of worship) 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.

3.1.4 Kamapua'a and Kamaunuanoho at Pu'uokapolei

Pu'uokapolei was also known to be the home of Kamapua'a's grandmother, Kamaunuanoho, 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 [Kamaunuanoho] 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]

Emma Nakuina goes on to note, "A very short time ago [prior to 1904] the foundations of Kamaunuanoho'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 Kekele'aikū, 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.

3.1.5 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 1991b: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 1906:271]

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” (Pukui 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 Kaihuopalaai 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.’ [McAllister 1933:108]

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 recorded that other Hawaiians say there never was a fishpond by that name.

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]

Beckwith (1918) says that Kaihuopala'ai changed into the fishpond near Kapapahu Point, which means “the eel flats.”

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, from Sterling and Summers 1978:53].

3.1.6 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” (Myroie 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.

3.1.7 Kanekua'ana

Kanekua'ana is a *kia'i* (caretaker/guardian), in the form of a *mo'o* (lizard or water spirit), of 'Ewa that took care of the people that lived from Honouliuli to Hālawā. Even those who were not her descendants were cared for in times of need. When *i'a* (marine food) became scarce they would build a *waihau heiau* (a *heiau* for *mo'o*) 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 *nahawe* 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 1991b: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 seen today (Maly and Maly 2003:60).

A clarification of the story of Kanekua'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 a year so that they could increase. A poor widow, a relation of the *mo'ō*, took some of the *pipi* and hid them in a basket. The *konoiki* (overseer) 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'ō* 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 1978:49–50]

3.1.8 Palila

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

Translation:

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 1918:5(2):142–143]

3.1.9 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, northwest of the project area:

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

3.2 *Wahi Pana*

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 [spiritual power], 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*, *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 5. A table of Honouliuli place names is located in Appendix A

3.2.1 *Heiau*

Heiau were pre-Christian places of worship. Construction of some *heiau* were elaborate, consisting of large communal structures, while others were simple earth terraces or shrines (McAllister 1933:8).

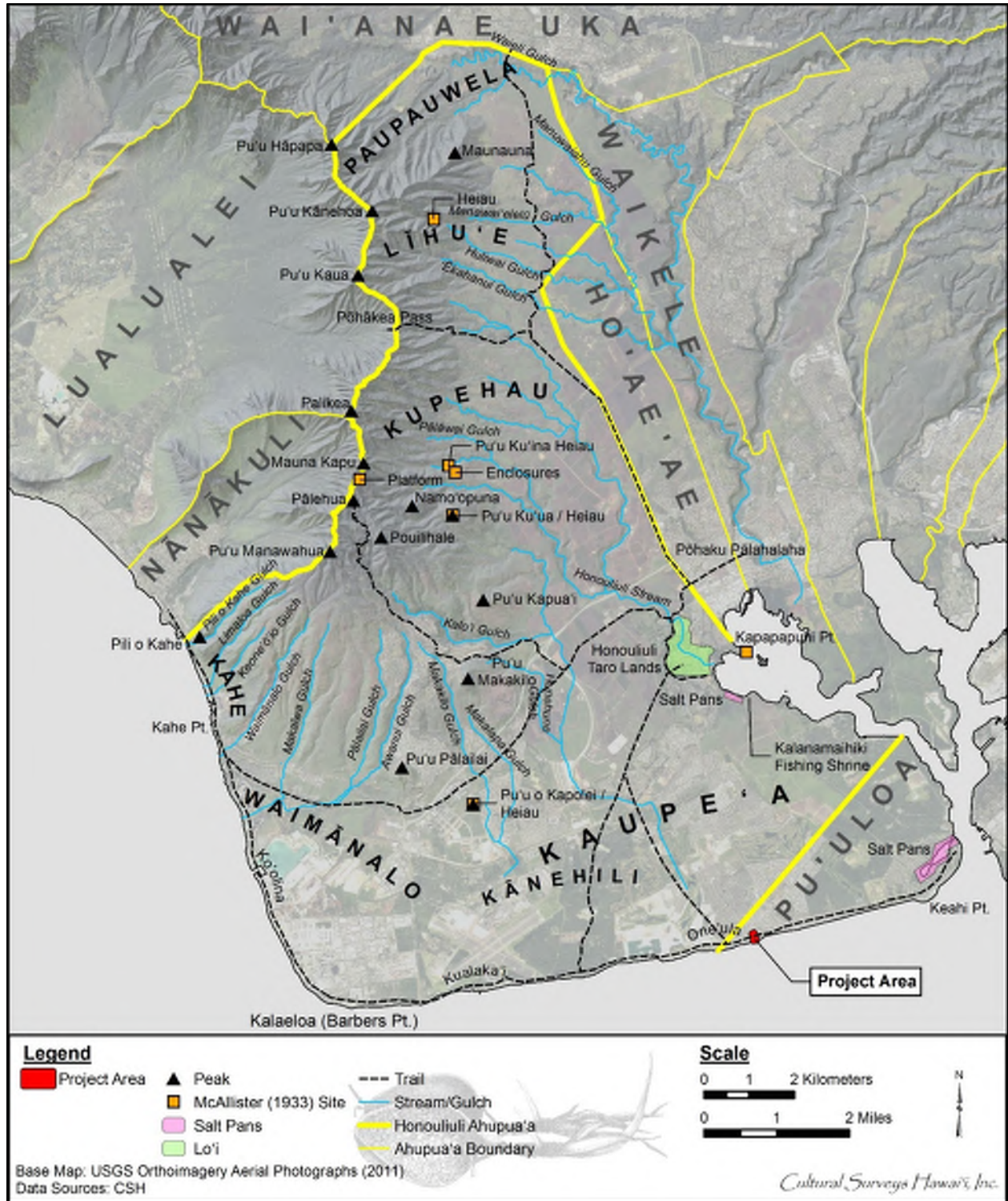


Figure 5. Place names of Honouliuli in relation to the project area overlaid on a 2011 USGS orthoimagery aerial photograph

Heiau are most commonly associated with important religious ceremony; large structures with platforms or altars of one or more terraces were indicative of such function (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 o Kapolei, on Pu'u Ku'ua, at the foot of Pu'u Kanehoa, and at the foot of Mauna Kapu (McAllister 1933).

3.2.1.1 Pu'u o Kapolei

A *heiau* was once located on Pu'u o Kapolei, but it had been destroyed by the time of McAllister's (1933:108) survey of the island in the early 1930s. 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 (1919:6[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 feet (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).

3.2.1.2 Pu'u Ku'ua

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

3.2.1.3 Unidentified *heiau* at the foot of Pu'u Kanehoa

Located at the foot of Pu'u Kanehoa is a small enclosure 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 the 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 Plains 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 1991a: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.

<i>E newa ai o hea make i ka lā,</i>	Go carefully lest you fall dead in the sun,
<i>Akua noho la i Pu'uokapolei.</i>	The god that dwells on Kapolei hill.
<i>E hanehane mai ana ka lā i nā</i>	The sun is wailing on account of the
<i>wahine o Kamao,</i>	women of Kamao,
<i>Akua pe'e, pua 'ohai o ke kaha,</i>	A hiding god, blossoming ohai of the banks
<i>I walea wale i ke a-</i>	Contented among the stones
<i>I ka ulu kanu a Kahai.</i>	Among the breadfruit planted by Kahai.
<i>Haina 'oe e ka oo-</i>	Thou hast spoken of by the oo-

E ka manu o Kānehili.

By the bird of Kānehili.

[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* (*Sesbania tomentosa*) grove on the hill. These women were named Pu'uokapolei and Nāwahineokama'oma'o (*Ka Hōkū o Hawai'i*, 22 February 1927, translated in Maly 1997:19). As she continued her travels, she looked to the ocean and saw the canoe carrying Lohi'au:

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

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

3.2.3 Kūalaka'i

Kūalaka'i is the name of an area near Barbers Point, located on the southwestern side of Honouliuli Ahupua'a. Clark (1977:74) says it is named for a type of sea cucumber that squirts a purple fluid when squeezed. Pukui identifies the sea creature as *Tethys* a member of the invertebrate family *Aplysiidae* commonly called sea hares (Pukui et al. 1974:119). Pukui adds this area was once the site of a spring called Hoaka-lei ("lei reflection") "because Hi'iaka picked *lehua* (*Metrosideros macropus*, *M. collina* subsp. *polymorpha*) flowers here to make a *lei* and saw her reflection in the water" (Pukui et al. 1974:119).

3.2.4 Kalaeloa

Kalaeloa literally means "the long point" (Pukui et al. 1974:72). Kalaeloa Point was the home of Uhu Makaikai, a *kupua* who could take the form of a man or a giant parrotfish (*uhu*). He is mentioned in several legends concerning the hero Kawelo and with Kawelo's struggles with the ruling chief of Kaua'i, 'Aikanaka.

This friend was Kauahoa also an alii of Wailua (Kauai). Their king, Aikanaka, in the time of Kākuhihewa of Oahu and Lonoikamakahiki of Hawaii. Aikanaka got offended with Kawelo and sent him to live at Waikiki. Cause. The king at a surf bathing told Kawelo to get a calabash of water for him to wash off with, but on Kawelo’s failing to do it, he took a calabash of soft poi and threw it over Kawelo and sent him off as already stated. At Waikiki, Kawelo studied the art of fighting to be revenged on Aikanaka. A *kupua*, Uhu makaikai, a fish was his teacher. Makuakeke was his helper in the canoe. The fish lived at Pōhaku o Kawai near Kalailoa (Kalaeloa), Oahu (Barbers Point) [...] [Hawaiian Ethnological Notes, Bishop Museum Vol. II:114, translation in Sterling and Summers 1978:41]

3.2.5 Nā Ala Hele (Trails)

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

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

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 6) 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 and One‘ula.

3.3 ‘Ōlelo No‘eau

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

They reveal with each new reading ever deeper layers of meaning, giving understanding not only of Hawai‘i and its people but of all humanity. Since the sayings carry the immediacy of the spoken word, considered to be the highest form of cultural expression in old Hawai‘i, they bring us closer to the everyday thoughts and lives of the Hawaiians who created them. Taken together, the sayings offer a basis for an understanding of the essence and origins of traditional Hawaiian values.

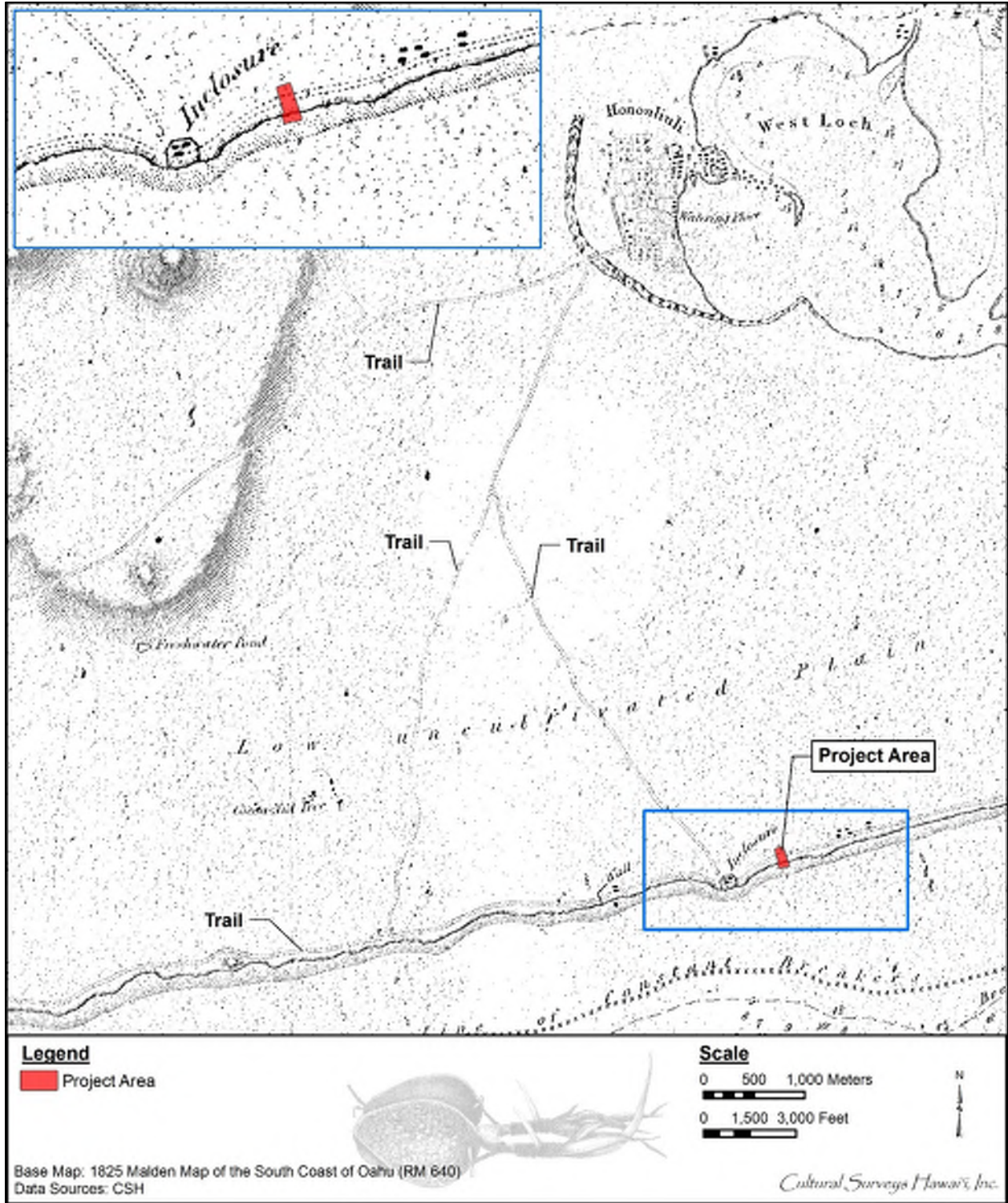


Figure 6. 1825 Malden map of the southern coast of O'ahu with study area; note the faint lines from West Loch stretching northwest, west, and south depict ancient foot trails

The sayings may be categorized, in Western terms, as proverbs, aphorisms, didactic adages, jokes, riddles, epithets, lines from chants, etc., and they present a variety of literary techniques such as metaphor, analogy, allegory, personification, irony, pun, and repetition. It is worth noting, however, that the sayings were spoken, and that their meanings and purposes should not be assessed by the Western concepts of literary types and techniques. [Pukui 1983:vii]

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

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 say the 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 alahela 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

A rare taro called the "kāi 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 kāi-koi o 'Ewa

He has eaten the kāi-koi taro of 'Ewa

Kāi 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 Kāi 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

In 'Ewa, O'ahu. Said to be where homeless ghosts wander among the trees. [Pukui 1983:180]

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.

3.3.6 Concerning the Landscape of 'Ewa

3.3.6.1 'Ōlelo No 'eau #80

The following proverb describes the red landscape of the 'Ewa plain.

'Āina koi 'ula I ka lepo.

Land reddened by the rising dust.

Said of 'Ewa, O'ahu. [Pukui 1983:11]

3.3.6.2 *'Ōlelo No'eau* #2542

The expression below describes the residents of Kaupe'a 'Ili.

'Ō'ū ō loa na manu o Kaupe'a.

The birds of Kaupe'a trill and warble.

Said of the chatter of happy people. [Pukui 1983:278]

3.3.6.3 *'Ōlelo No'eau* #1855

The expression below discusses the boundaries between *ali'i* and *maka'āinana* lands in 'Ewa.

Ku ae 'Ewa; Noho iho 'Ewa.

Stand-up 'Ewa; Sit-down 'Ewa.

The names of two stones, now destroyed, that once marked the boundary between the chiefs' land (Kua'e 'Ewa) and that of the commoners (Noho iho 'Ewa) in 'Ewa, O'ahu. [Pukui 1983:200]

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* (divine power); such *mana* was made manifest through the use of themes and *kaona*. According to Pukui, chants for the gods (*pule*; prayers) came first, and chants for the *ali'i*, “the descendants of the gods,” came second in significance. Chants “concerning the activities of the earth peopled by common humans,” were last in this hierarchy (Pukui 1995:xvi–xvii). Emerson conversely states,

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

While *oli* may vary thematically, subject to the perspective of the *ho'opa'a* (chanter), it was undoubtedly a valued art form used to preserve oral histories, genealogies, and traditions, to recall special places and events, and to offer prayers to *akua* and *'aumākua* (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*.

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

[*Ka Nupepa Kuokoa*, Book 7, Number 21, 23 May 1868, He mele no Kualii, Kulanipipili, Kulanioka, Kunuiakea; Fornander 1917:4(2):400–401]

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

3.5 Mele (Songs)

The following section draws from the Hawaiian art of *mele*, poetic song intended to create two styles of meaning.

Words and word combinations were studied to see whether they were auspicious or not. There were always two things to consider the literal meaning and the *kaona*, or 'inner meaning.' The inner meaning was sometimes so veiled that only the people to whom the chant belonged understood it, and sometimes so obvious that anyone

who knew the figurative speech of old Hawai'i could see it very plainly. There are but two meanings: the literal and the *kaona*, or inner meaning. The literal is like the body and the inner meaning is like the spirit of the poem. [Pukui 1949:247]

The Hawaiians were lovers of poetry and keen observers of nature. Every phase of nature was noted and expressions of this love and observation woven into poems of praise, of satire, of resentment, of love and of celebration for any occasion that might arise. The ancient poets carefully selected men worthy of carrying on their art. These young men were taught the old *meles* and the technique of fashioning new ones. [Pukui 1949:247]

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* 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 Kūali'i*

The celebrated chief, Kūali'i, is said to have led an army of twelve thousand against the chiefs of Ko'olauloa with an army of twelve hundred upon the plains of Keahumoa (Fornander 1917:6[2]:364-401) which according to McAllister (1933:107) are located west of Kīpapa Gulch in Waialeale. Perhaps because the odds were so skewed the battle was called off and the *ali'i* of Ko'olau ceded the districts of Ko'olauloa, Ko'olaupoko, Waialua, and Wai'anae to Kūali'i. When the *ali'i* of Kaua'i heard of this victory at Honouliuli they gave Kaua'i to Kūali'i as well and thus he became possessed of all the islands. The strife at Honouliuli was the occasion of the recitation of a song for Kūali'i by a certain Kapa'ahulani. This *mele* compares the king to certain places and objects in the islands, in this instance to the first breadfruit planted by Kaha'i at Pu'uloa, and a pig and a woman on Pu'u o Kapolei, possibly a reference to Kamapua'a and his grandmother.

In this *mele*, the cold winds of Kumomoku and Leleiwe, near Pu'uloa in Honouliuli are compared unfavorably to the god Kū:

<i>Aole i like Ku.</i>	Not like these are thou, Ku
<i>Ia ua hoohali kehau,</i>	[Nor] the rain that brings the land breeze,
<i>Mehe ipu wai ninia la,</i>	Like a vessel of water poured out.
<i>Na hau o Kumomoku;</i>	Nor to the mountain breeze of Kumomoku,
<i>Kekee na hau o Leleiwi,</i>	[The] land breeze coming round to Leleiwi.
<i>Oi ole ka oe i ike</i>	Truly, have you not known?
<i>I ka hau kuapuu</i>	The mountain breezes, that double up your back,
<i>Kekee noho kee, o Kaimohala,</i>	[That make you] sit crooked and cramped at Kaimohala,
<i>O Kahili i Kaupea-la</i>	The Kahili at Kaupea?
<i>Aole i like Ku</i>	Not like these are thou, Ku
[Fornander 1917:6(2):390–391]	

A later section of this *mele* also refers to Pu'u o Kapolei and makes mention of the famous blue *poi* of Honouliuli.

<i>O Kawelo-e, e Kawelo-e,</i>	O Kawelo! Say, Kawelo!
<i>O Kaweloiki puu oioi,</i>	Kawelokiki, the sharp-pointed hill,
<i>Puu o Kapolei-e-</i>	Hill of Kapolei.
<i>Uliuli ka poi e piha nei-o Honouliuli.</i>	Blue is the poi which appeases [the hunger] of Honouliuli.

[Fornander 1917:6(2):400-401]

3.5.2 *Eia Mai Au 'o Makalapua*

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

In analyzing this *mele*, cultural historian Kīhei de Silva notes that “Eia mai Au ‘o Makalapua” is the second of three chants that make up *hō'alo i ka ihu o ka Lanakila* (Three Train Chants for Lili'uokalani). He adds that these songs, “when considered in chronological succession [...] add a Hawaiian dimension to the story of Benjamin Franklin (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 B.F. Dillingham’s rise to influence within Hawaiian political spheres, and his eventual founding and construction of the OR&L line. Dillingham also figures prominently within Honouliuli Ahupua'a (see Section 4.3.4). 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).

<i>Eia mai au ‘o Makalapua</i>	Here I am, Makalapua
<i>Hō‘alo i ka ihu o ka Lanakila.</i>	Traveling where the <i>Lanakila</i> goes.
<i>‘O ke ku‘e a ka hao a i Kūwili</i>	The piston works at Kūwili
<i>Ka hiona ‘olu a ‘o Hālawa.</i>	And down the pleasant descent of Hālawa.
<i>Ua lawa ka ‘ikena i ke awalau</i>	Satisfying is the view of the lochs
<i>Iā ‘Ewa ka i‘a hāmau leo.</i>	Of ‘Ewa, “land of the silent fish.”
<i>Ua piha ka uahi a i Mānana</i>	The smoke rises at Mānana
<i>Aweawe i ke kula o Waipi‘o.</i>	And streams along at Waipi‘o.
<i>I kai ho‘i au a Honouliuli</i>	Then I reached the lowlands of Honouliuli
<i>Ahuwale ke ko‘a o Pōlea.</i>	Where the corals of Pōlea lie exposed.
<i>Ha‘ina ‘ia mai ana ka puana</i>	This is the conclusion of the song
<i>Hō‘alo i ka ihu a ka Lanakila.</i>	Of traveling where the <i>Lanakila</i> 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 Background

4.1 Pre-Contact to Early Post-Contact Period

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, 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 following:

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*), bananas, and *olonā* (*Touchardia latifolia*) 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* (*Pipturus*). It was also famous for a rare taro called the *kai 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 kāi-koi o 'Ewa.

He has eaten the Kāi-koi taro of 'Ewa.

Kāi 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 Kāi taro, is not easily forgotten.

[Pukui 1983:305]

The lochs of Pearl Harbor were ideal for the construction of fishponds and fishtraps. 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. At least one probable quarrying site (State Inventory of Historic Places [SIHP] # 50-80-12-4322) is present in Makaīwa Gulch at 152 m (500 ft) above mean sea level (Hammatt et al. 1990).

Early historical accounts of the general region typically refer to the more populated areas 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 that pre-Contact and early historic populations also adapted to less inviting areas, despite the environmental hardships.

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 1991b: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 1991b:54).

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

Upon consenting to become *mō'ī* at the age of 29, Mā'ilikūkahī was taken to Kapukapuākea Heiau at Pa'ala'akai in Waialua to be consecrated. Soon after becoming king, Mā'ilikūkahī 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'ilikūkahī's reign, Kamakau writes,

In the time of Mā'ili-kūkahī, 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 1991b:55]

Mā'ilikūkahī'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'uaniu 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, the soil is rich and all the necessaries of life are abundantly produced" (Vancouver 1798:215). Mr. Whitbey, one of Vancouver's crew, observed, "from the number of houses within the harbour it should seem to be very populous; but the very few inhabitants who made their appearance were an indication of the contrary" (Vancouver 1798:216).

Captain Vancouver sailed by Kalaeloa (Barbers Point) in 1792, and recorded his impression of the small coastal village of Kūalaka'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]

Henry Barber was an English sea captain who traveled around the Hawaiian Islands during 1794 to 1807. Barber is the namesake for today's common place name, Barbers Point, traditionally known as Kalaeloa.

In 1795 he left China in the ship *Arthur* for the northwest going again by way of Australia. In the following summer he was trading along the Alaskan and British Columbian coast. In Sept. 1796, he left Nootka Sound for Canton via 'the Island.' The *Arthur* called in at Honolulu at the end of October for provisions and re-fittings.

At 6 p.m. on October 31, 1796, Barber sailed the *Arthur* out of Honolulu harbor for Kauai to get a supply of yams. Two hours later the brig hit a shoal about an acre in extent with 12 feet of water over it, and close to the breakers. The shoal was probably a little to the westward of Pearl Harbor. But as Judge Howay says, how the skipper steered his brig into such a position is a mystery. [Sterling and Summers 1978:40]

Kamakau recalls the same incident as follows:

In October, 1796, a ship [*Arthur*, under Henry Barber] went aground at Kalaeloa, Oahu. This ship had visited the island on several occasions during the rule of Kalandi-ku-pule. This was the first time a foreign ship had grounded on these shores, Kamehameha was on Hawaii, but Young had remained on Oahu. All the men on the ship came ashore at night in their boats. At daylight when the ship was seen ashore Ku-i-helani placed a ban on the property of the ship and took care of the foreigners. Hawaiian divers recovered the valuables, and they were given over to the care of Kuaihelani, but part were given by Captain Barber to the men who had recovered them. [Kamakau 1992:174]

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

The first mission station in 'Ewa was established in 1834 at Kalua'aha near Pearl Harbor. Charles Wilkes, of the U.S. Exploring Expedition, visited the missionary enclave at Honouliuli town in 1840.

At Ewa, Mr. Bishop has a large congregation. The village comprises about fifty houses, and the country around is dotted with them [...] The natives have made some advance in the arts of civilized life; there is a sugar-mill which, in the season, makes two hundred pounds of sugar a day [...] In 1840, the church contained nine hundred members, seven hundred and sixty of whom belonged to Ewa, the remainder to Waianae; but the Catholics have now established themselves at both these places, and it is understood are drawing off many from their attendance on Mr. Bishop's church. [Wilkes 1970:80-81]

4.2.3 Honouliuli Taro Lands

In early historic times, the population of Honouliuli was concentrated at the western edge of West Loch in the vicinity of Kapapahu Point in the “Honouliuli Taro Lands.” This area was clearly a major focus of population due to the abundance of fish and shellfish resources in close proximity to a wide expanse of well-irrigated bottomland suitable for wetland taro cultivation. Dicks et al. (1987:78–79) conclude, on the basis of 19 radiocarbon dates and three volcanic glass dates, that “Agricultural use of the area spans over 1,000 years.”

Undoubtedly, Honouliuli was a locus of habitation for thousands of Hawaiians. Prehistoric population estimates are a matter of some debate but it is worth pointing out that in the earliest mission census (1831-1832) the land of Honouliuli contained 1,026 men, women, and children (Schmitt 1973:19). It is not clear whether this population relates to Honouliuli Village or district but the village probably contained the vast majority of the district’s population. The nature of the reported population structure for Honouliuli (less than 20% children under 12 years of age) and the fact that the population decreased more than 15% in the next four years (Schmitt 1973:22) suggests the pre-Contact population of Honouliuli Village may well have been significantly greater than it was in the 1830s.

4.2.4 The Māhele and Kuleana Awards

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 LCAs 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* 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. A lawsuit (Civil Court Case No. 348) was brought by Ha'alelea in 1858, to reclaim the fishing rights of the Pu'uloa fisheries from Isaac Montgomery, and the court ruled in Ha'alelea's favor. 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. LCA parcels were generally clustered within lower Honouliuli Gulch. This area, known as the "Honouliuli Taro Lands," remains far north of the current project area. No LCAs were recorded within the current project area.

4.2.5 Population Decline

At Contact, the most populous *ahupua'a* on the island of O'ahu was Honouliuli, with the majority of the population centered on Pearl Harbor. In 1832, a missionary census of Honouliuli recorded the population as 1,026, which represented 25% of the total 'Ewa District population of 4,015 (Schmitt 1973:19).

Beginning with the time of Western Contact, however, Hawaiian populations were introduced to many virulent western diseases which began to decimate the native populations. Thus, four years following the 1832 census, the 'Ewa population had dropped to 3,423 (Schmitt 1973:9, 36), "a decrease of 592 in 4 years" (Ewa Station Reports 1836).

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, Kapapahuhi
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, Kapapahuhi

LCA	Awardee	'Ii	LCA	Awardee	'Ii
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	<i>ahupua'a</i> award

Reverend Lowell Smith noted the following:

The people of Ewa are a dying people. I have not been able to obtain an exact count of all the deaths & births since the last general meeting. But my impression is that there have been as many as 8 or 10 deaths to one birth. I have heard of but 4 births on Waiawa during the year, & all of these children are dead. I have attended about 20 funerals on that one land, & 16 of these were adults. [Ewa Station Reports 1836]

Between 1848 and 1853, a series of epidemics of measles, influenza, and whooping cough 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 town.

John Coulter prepared a reconstruction of the distribution of the population of O'ahu ca. 1853 (Figure 7). The Coulter maps shows no population in the vicinity of the project area.

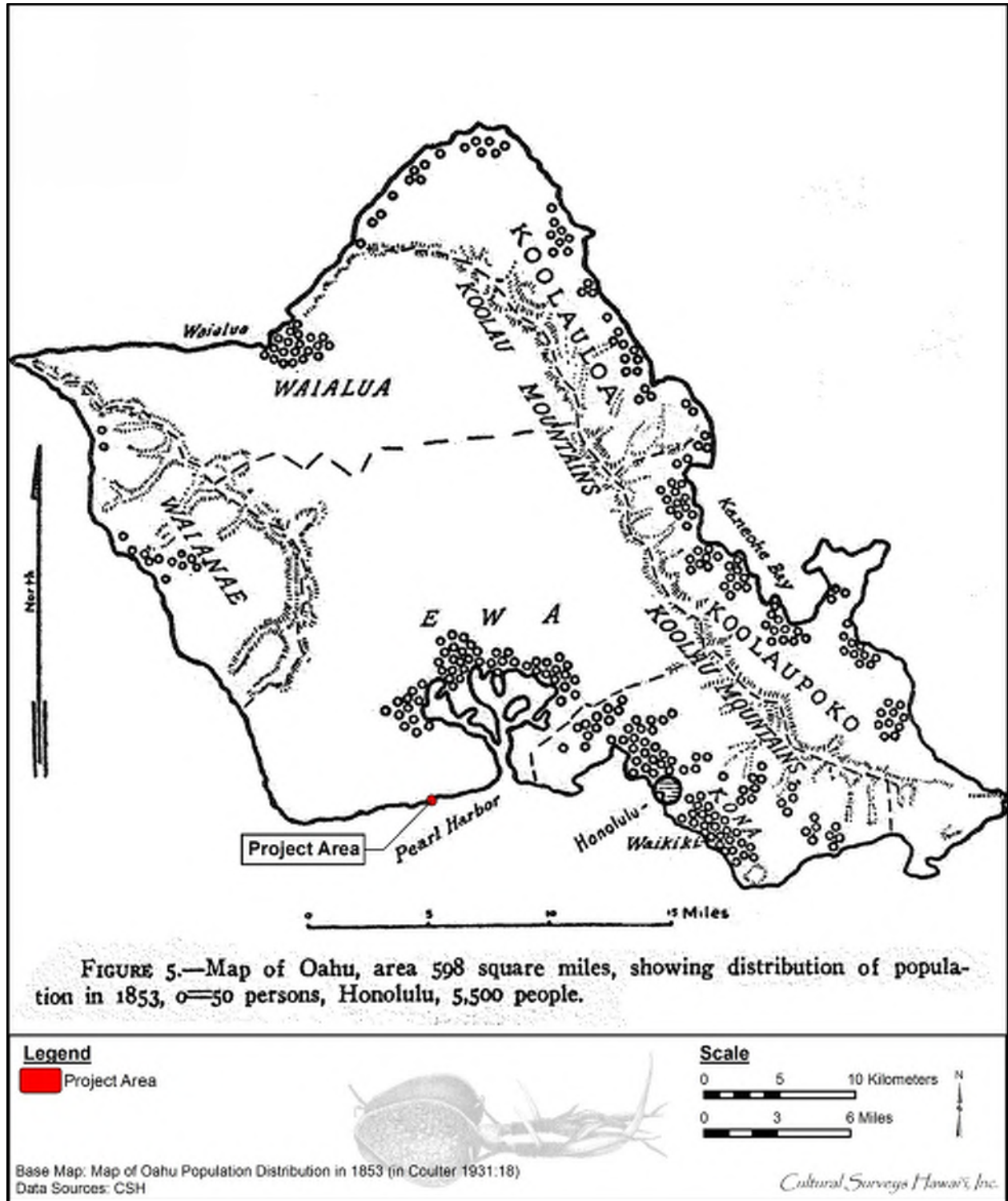


Figure 7. Map of O‘ahu population distribution in 1853 (in Coulter 1931:18) showing the location of the project area and indicating the coastal population density in the vicinity was very low

4.3 Mid- to Late 1800s

4.3.1 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'u'loa, 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 8. 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).

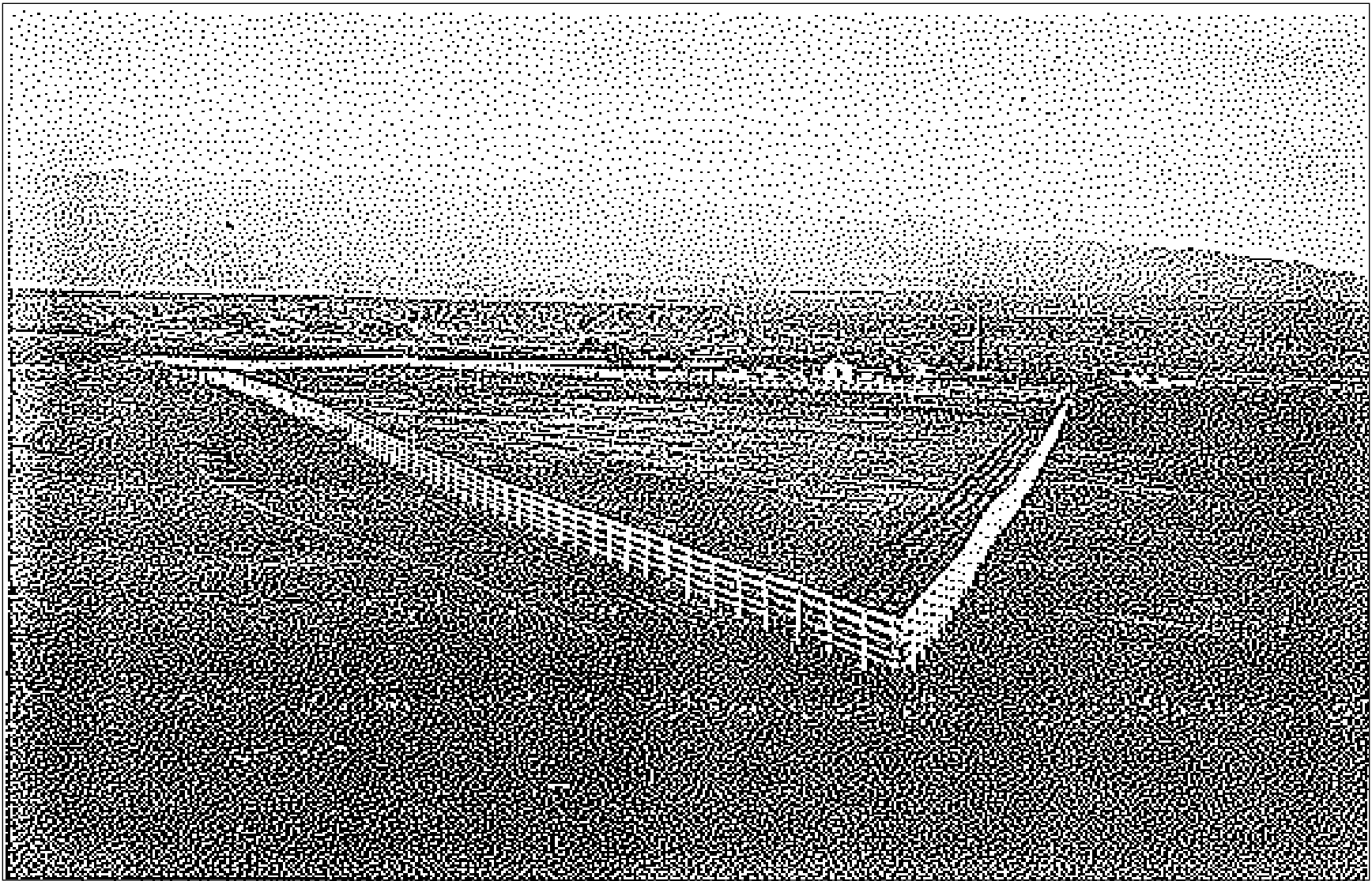


Figure 8. 1880s photograph of James Campbell's residence on the 'Ewa Plain (Hawai'i State Archives)

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 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'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.

The present project area is understood to have been within grazing land (Figure 9).

4.3.2 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 with pay at \$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 10). 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]

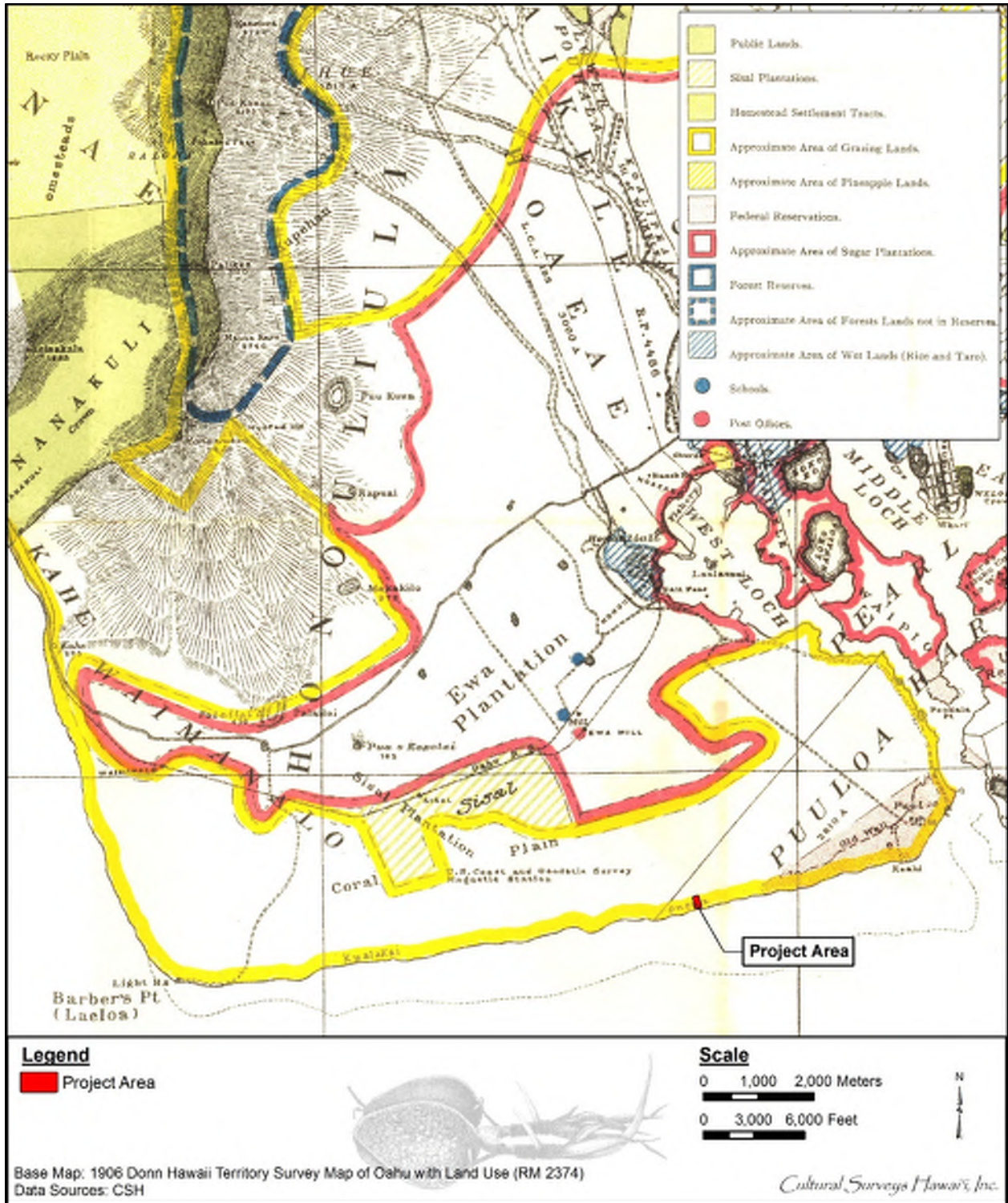


Figure 9. 1906 Donn Hawaii Territory Survey map of O'ahu with land use showing the location of the project area (indicated to be within the area of grazing lands)



Figure 10. Waikele rice fields below the Oahu Sugar Company mill (Hawai'i State Archives n.d.)

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 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* and *'auwai* 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]

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).

4.3.3 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 '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 Hālawā in the eastern section of 'Ewa.

4.3.3.1 The Ewa Plantation Company

The Ewa Plantation Company was incorporated in 1890 for sugarcane cultivation (Figure 11). The first crop, 2,849 tons of sugar, was harvested in 1892. The 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 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 11 is an aerial shot taken ca. 1925.

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, Spanish, 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 lands in 1970 and continued operations until 1995, when they decided to shut down sugarcane production in the combined plantation areas (Dorrance and Morgan 2000:45, 50).

During the subsequent decades of the twentieth century, sugarcane operations in 'Ewa phased out and, more recently, former cane lands have been rezoned for residential development. Structures in the area of the former plantation villages have fallen into disrepair or have been demolished. However, portions of the area including Varona Village, Tenney Village, and Renton Village have been designated the 'Ewa Villages Historic District (State Inventory of Historic Places [SIHP] # 50-80-12-9786), which has been nominated for National Historic Landmark status.

4.3.4 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 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

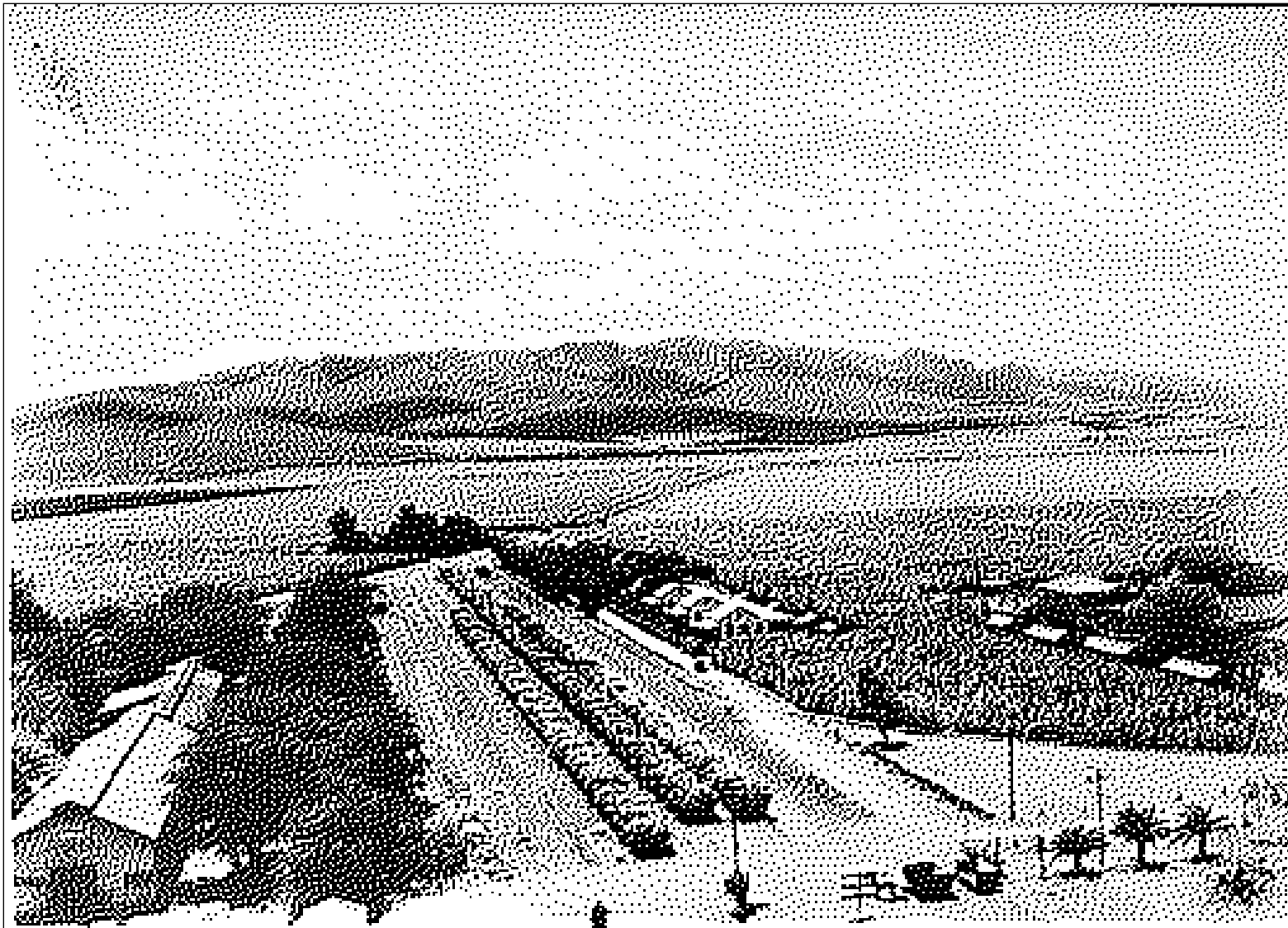


Figure 11. Ewa Plantation Company sugarcane fields, Filipino Camp area, ca. 1925 (University of Hawai'i at Mānoa)

1967:III, 100). This railroad line eventually ran across the center of the 'Ewa Plain at the lower boundary of the sugar fields (Figure 12). 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]

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

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 Waikale 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. Additionally, the still-existing OR&L rail line through Honouliuli has been placed on the National Register of Historic Places (Site 50-80-12-9714).



Figure 12. 1890 photograph of Pearl Harbor with OR&L railroad tracks along the coast (Honolulu Advertiser Archives)

4.3.5 Other Enterprises in Honouliuli

One of the first enterprises in Honouliuli in the post-Contact period was the making of salt. In 1849, Kekau'ōnohi sold the lands of Pu'uloa to Isaac Montgomery. In partnership with Kamehameha III, Isaac Montgomery established a very profitable salt works enterprise near Keahi Point at the entrance to Pearl Harbor. Kamakau (1992:409) reported, "The king and Isaac of Pu'uloa are getting rich by running the salt water into patches and trading salt with other islands." The salt was sent to Russian settlements in the Pacific Northwest, where it was used to pack salmon (*Hawaiian Gazette*, 29 January 1897). Shortly after establishing the salt works, Isaac Montgomery sold the business to Charles W. Vincent, while remaining on as manager (King 1982:545).

In his diaries, the American diplomat David Lawrence Gregg recounts a visit to the Pu'uloa salt works in May 1854:

We first landed at the salt works of Mr. [Charles W.] Vincent, and were taken over them by Mr. Isaac Montgomery, the superintendent. From 10 to fifteen thousand barrels of salt are annually manufactured, and it would be easy to make three or four times that amount. Pits a few inches of uniform depth are dug in the clay, which appears to be impervious, into which the water is let by means of sluices, and suffered to stand until a thick crust of salt is formed by evaporation. This is then taken off and a new supply of water introduced. A 'crop' of salt, as it is called, requires about three weeks. [King 1982:131]

An 1853 newspaper article (*Polynesian*, 20 August 1853) on the "Puuloa Salt Works" says that this was the only place "where large quantities of salt were manufactured." The high quality of salt produced in Pu'uloa is discussed in an account which appeared in a newspaper article in *Ka Hae Hawaii* on 25 July 1860.

The Salt of Pu'uloa.

From ancient times the Hawaiian people have understood the production of salt. Salt production is something that garnishes the food. It is also something for trade. However, the salt of Hawai'i is not great quality. The beef and the pork that has been sprinkled with this salt is not great, and if it is left out a long time, it becomes rotten. During this time however, salt has been produced at Pu'uloa and it is of high quality. The unpleasant/bitter parts within are separated out, and a mill has been obtained as well that mixes it like bread and the salt produced in other lands. For this reason, the salt from Pu'uloa is greatly desired today, is exported to other lands, and brings wealth to land. [*Ka Hae Hawaii* 1860]

An 1867 newspaper article (*Ka Nupepa Kuokoa*, 2 February 1867) stated that salt production in Pu'uloa was continuing under the direction of Aikake.

Kelly (1991:160) says there was another salt works at Kūalaka'i (Nimitz Beach), but does not give a reference for this claim. A map (Figure 13) created by Tuggle and Tomonari-Tuggle (1997:32), based on historic maps and documentation, also identifies a "Chinese Salt Works" north of the project area along the West Loch of Pu'uloa.

The Chinese were involved in salt production around Pearl Harbor, usually in concert with their management of fishponds. One son of a Chinese resident of the

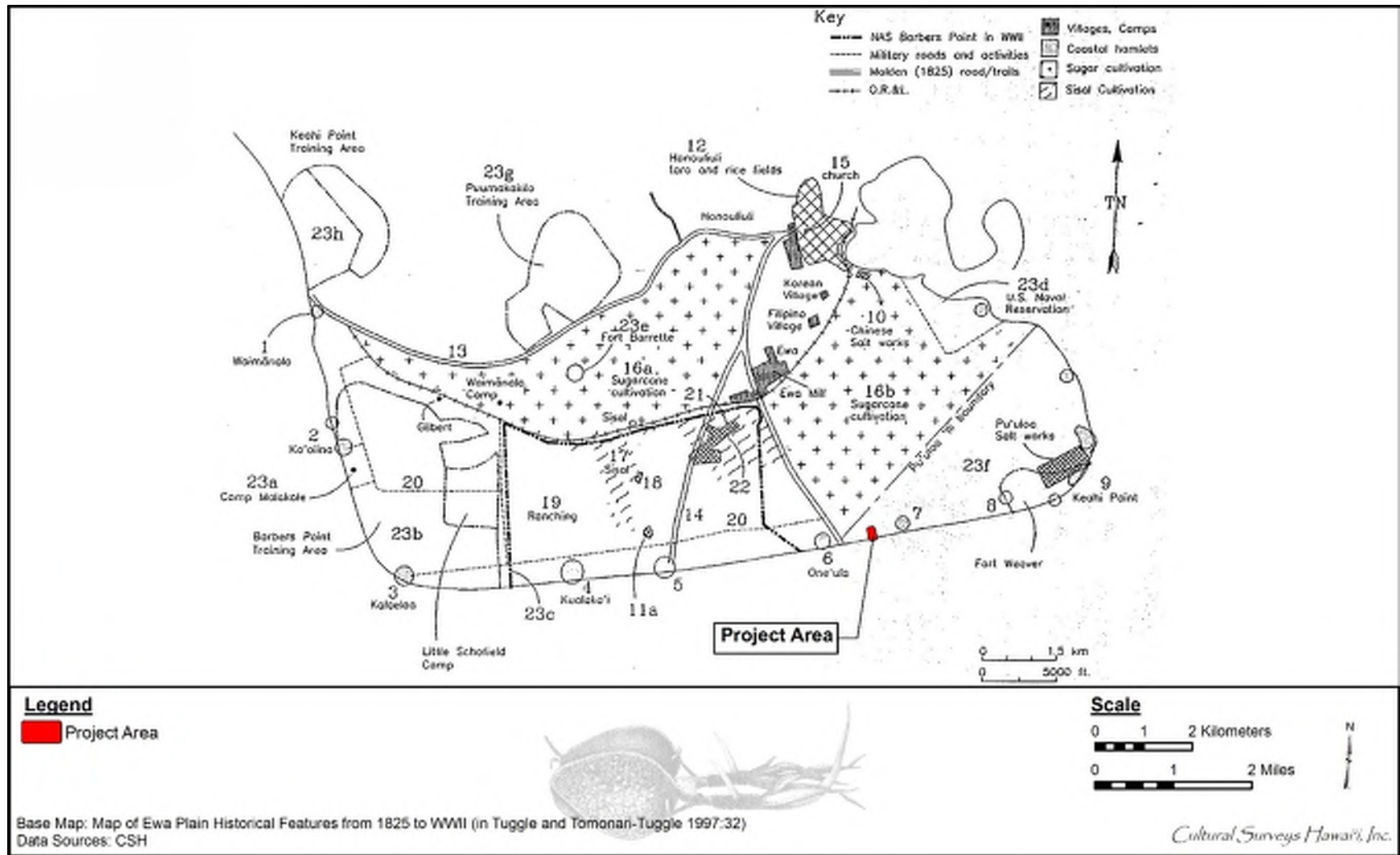


Figure 13. Map of 'Ewa Plain historical features from 1825 to World War II (Tuggle and Tomonari-Tuggle 1997:32)

area, Mau Yung Kui, the groundkeeper of the John 'I'i estate in Waipi'o, remembered [for ca. 1900] the Chinese form of salt production from salt pans bordering the sea, which were fed continually with seawater by the tides themselves [...] [Damon 1882:37]

In 1890, Dillingham leased all land below 200 ft to William Castle, who used most of the land for sugarcane, but also 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 Kūalaka'i 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]

Although many of the fishponds at Pearl Harbor deteriorated from lack of care and lack of people to maintain them in the early nineteenth century, there was some action to reclaim these areas in the later part of the century. Some were converted to rice fields, but others were maintained as fishponds or duck ponds. Records of the Minister of Public Instruction (1848) show that some ponds were maintained by local teachers and students, with the funds generated used for the upkeep of the school system. Some ponds as early as 1848 were also maintained by prisoners, possibly from the women's prison located at Honouliuli. In 1852, however, Levi Ha'alelea reasserted his claims to these neglected lands, when he claimed all of the mullet from this area be reserved to him (Hawai'i Kingdom files, cited in Silva 1987:A-7 to A-9). During James Campbell's tenure of the land, fishponds and Pu'uloa fishing rights were leased out to various entrepreneurs (Kelly 1985:175).

Into the early twentieth century, some Hawaiian families continued to live in Honouliuli and preserve the traditional lifestyle, including at the fishing village of Kūalaka'i. 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 Kūalaka'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]

4.4 1900s

4.4.1 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 14). 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 'I'i 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 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.

4.4.2 History of Camp Malakole

The wartime history of Camp Malakole (1940–1946) has been well described by Robert H. Albert (1980). The Camp Malakole Military Reservation, also known as the Honouliuli Military Reservation (Malakole Campsite), included 30 ha (75.01 acres) acquired by the Secretary of War in the late 1930s. In 1939, the area was chosen as a firing range for the Sixty-Fourth Coast Artillery (AA) Regiment, stationed out of Fort Shafter (Albert 1980:303). Under the command of Colonel Charles W. Wing, the regiment cleared the land and set up six batteries along the coast (Bennett 2003:50).



Figure 14. Dredging in Pearl Harbor ca. 1908 (Hawai'i State Archives)

The camp was selected to be the base of the 251st Coast Artillery (Anti-Aircraft) Regiment on 16 September 1940. This camp was to function as a defensive gun and firing position sector for the regiment. Based out of California, this unit was the first National Guard Unit to be ordered outside the continental United States during peace time (Albert 1980:303). By the end of 1940, the soldiers stationed at Camp Malakole spent half the day setting up the field defensive gun and half the day building the camp (Albert 1980:304) (Figure 15 and Figure 16). The camp construction was officially finished in February 1941 (Bennett 2003:55).

The camp was meant to house approximately 2,000 men and included 48 barracks buildings, 12 mess halls, nine magazines and storage houses, five officers' quarters, seven showers, latrines, dispensary, officers' mess, headquarters buildings, fire house, post office, regimental day room, movie theater, laundry, car repair shop, gas station, guard houses, and photo lab (Bennett 2003:55).

By 1941, the imminent threat of war was becoming more apparent. During the first half of 1941, the population of the camp grew from 1,200 to 2,400. On 7 December 1941, the soldiers stationed at Camp Malakole had just come back from a week-long island alert and had placed the guns and ammunition in storage bunkers (Albert 1980:304). Nevertheless, a hasty defense effort was able to defend against Japanese dive bombers attacking the camp and the unit is credited with shooting down two Japanese bombers. Three soldiers stationed at Camp Malakole—Sargent Henry Blackwell, Sargent Warren Rassmusen, and Corporal Clyde Brown—were the first American soldiers killed in the attack. They were taking private flying lessons that morning out of John Rodgers Airport (Harding 2013).

In 1942, the Regiment deployed to the Fiji Islands to establish anti-aircraft defense for the airfield there. From there, they participated in campaigns in Guadalcanal, Bougainville, and Luzon in the Philippines (Albert 1980:305).

After the Regiment left in 1942, Camp Malakole became a weapons training school for live-firing ranges of anti-aircraft and anti-tank training. By 1943, the camp became an important staging area for cargo coming into and out of O'ahu, as well as soldier replacement for personnel entering oversea theaters. Service reports from the camp report that over 43,000 troops were billeted and staged through the camp in the final 32 months of war, averaging over 1,100 troops a month (Albert 1980:306). The camp was a strategic tool during the United States' involvement in the war. It served as an important area for the logistical effort in the war and the main anti-aircraft gunnery school on O'ahu. After the end of World War II, the camp was abandoned. There is little information available about exactly when or why the camp was abandoned. Due to the construction of the adjacent industrial park and Chevron Oil Refinery, little remains of the camp.

4.4.3 Development in the Vicinity of the Project Area

A series of twentieth century maps and aerial photographs shows the general lack of early human enterprise in the vicinity of the present project area (Figure 17 through Figure 25). The 1919 U.S. Army War Department fire control map depicts wall segments within the project area that may be associated with ranching activity (see Figure 17). One segment, located in the southwest corner of the project area, extends parallel to the coastline. Another segment, located near the eastern end of the project area, extends perpendicular to the coastline. The 1933-1936 U.S. Army War Department terrain map depicts an unimproved roadway extending parallel to the coastline and through the project area (see Figure 19). A waterhole is also depicted near the eastern edge of the project area. The 1953 USGS topographic map depicts One'ula Road extending to the

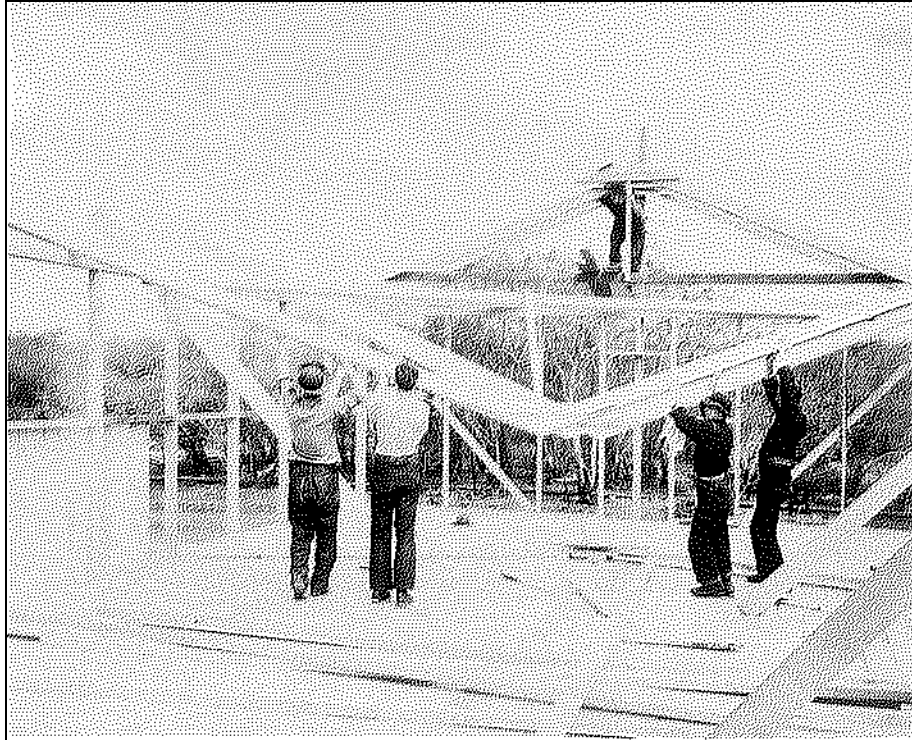


Figure 15. Camp Malakole soldiers raising the barracks roof (Bandel in Albert 1980:336)

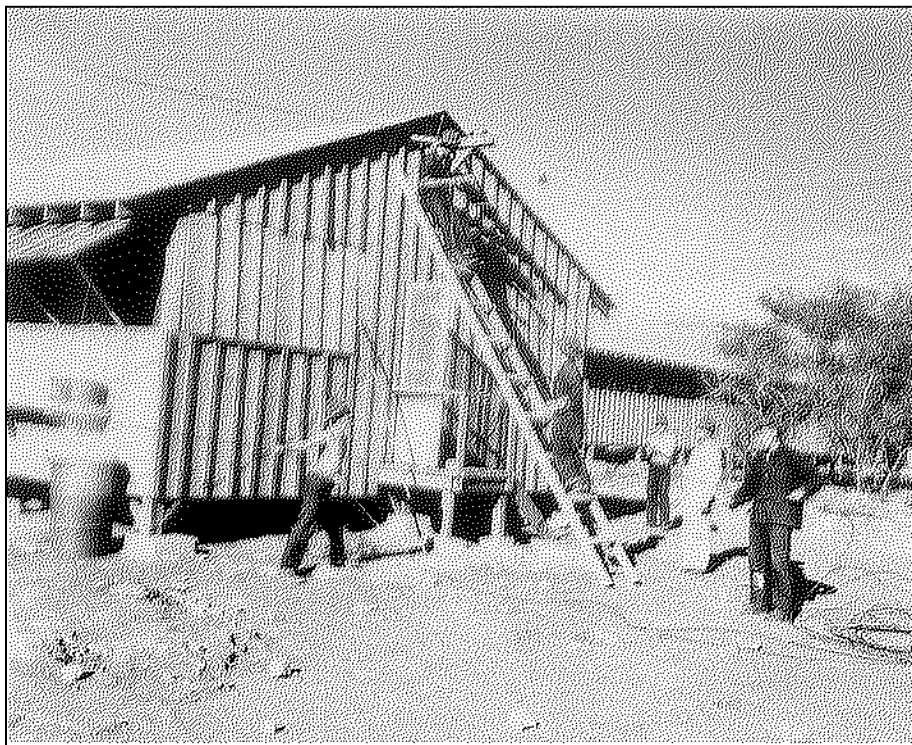


Figure 16. Camp Malakole soldiers wiring the barracks (Bandel in Albert 1980:336)

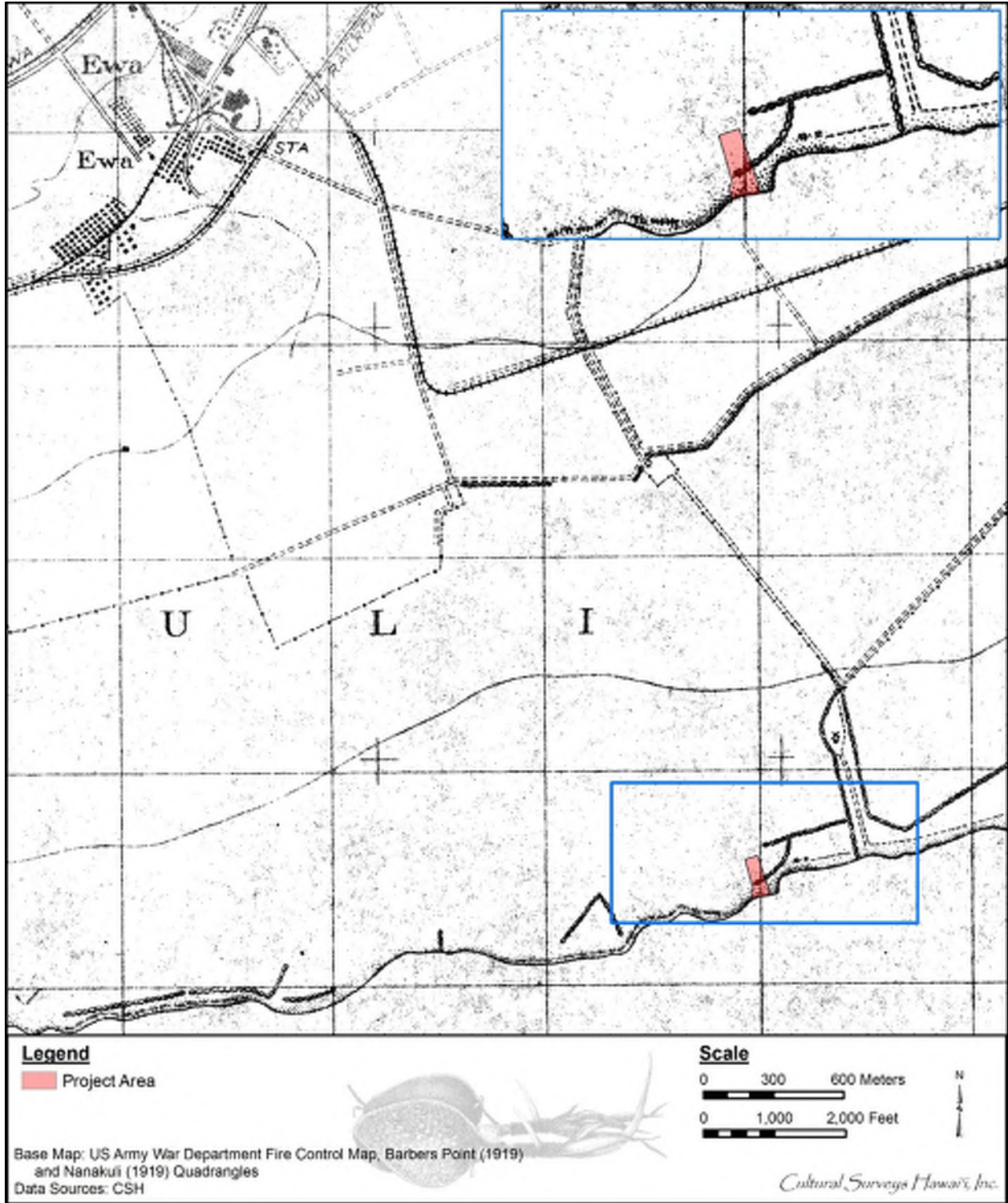


Figure 17. Portion of the U.S. Army War Department fire control map, Barbers Point (1919) and Nanakuli (1919) quadrangles showing the location of the project area indicating a coastal trail and a probable cattle wall within the project area and a couple of houses approximately 150 m to the east along the coast

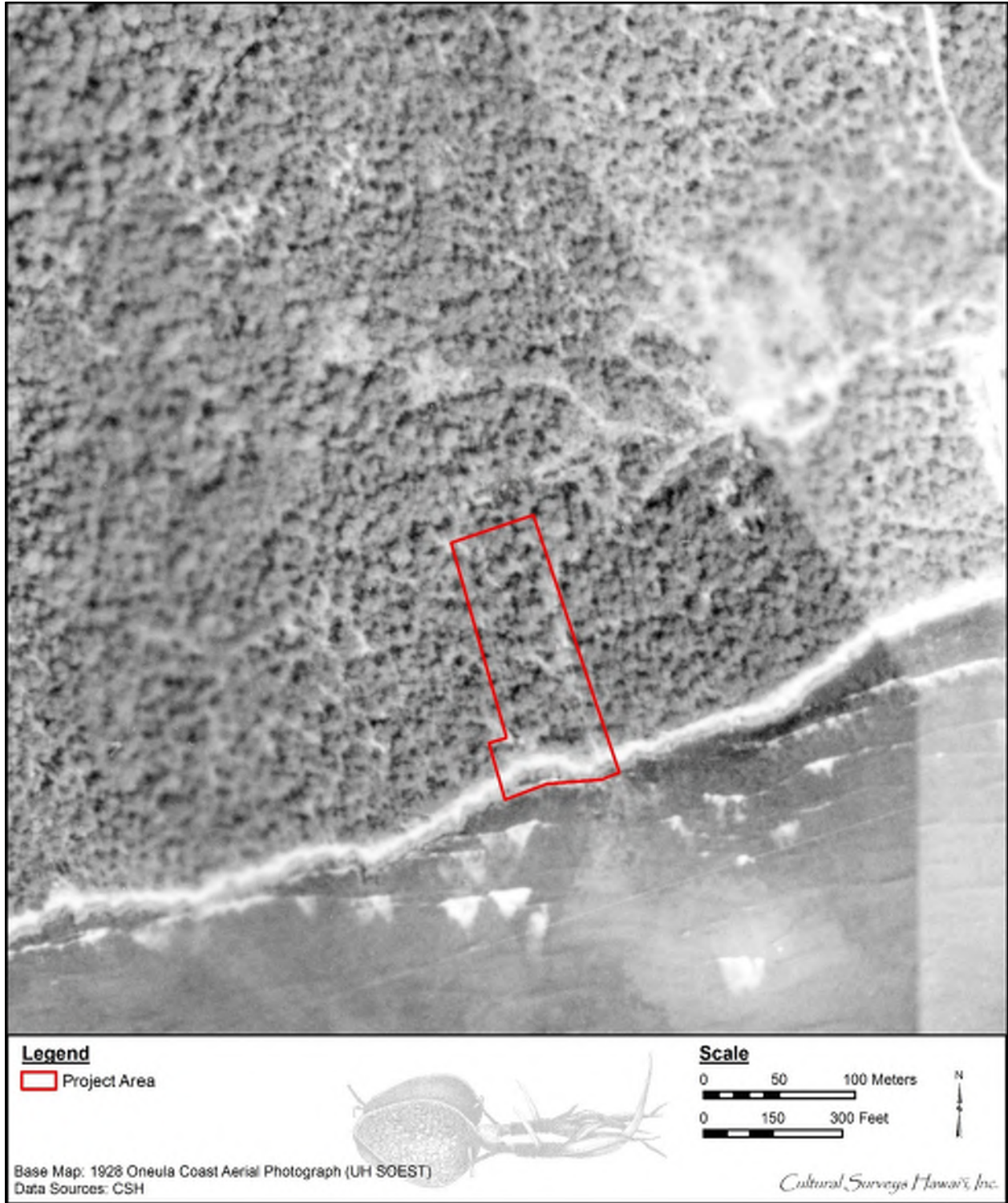


Figure 18. 1928 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area as in scrub land with no development other than the suggestion of an unimproved trail or road along the east side of the project area



Figure 19. Portion of the U.S. Army War Department terrain map, Barbers Point (1936) and Ewa (1933) quadrangles showing the location of the project area with an unimproved road (the future Pōhakupuna Road) along the north side of the project area and an unimproved road crossing through the project area to the coast near “Station X”



Figure 20. 1950 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area showing with nine buildings and a central access driveway extending south toward the coast

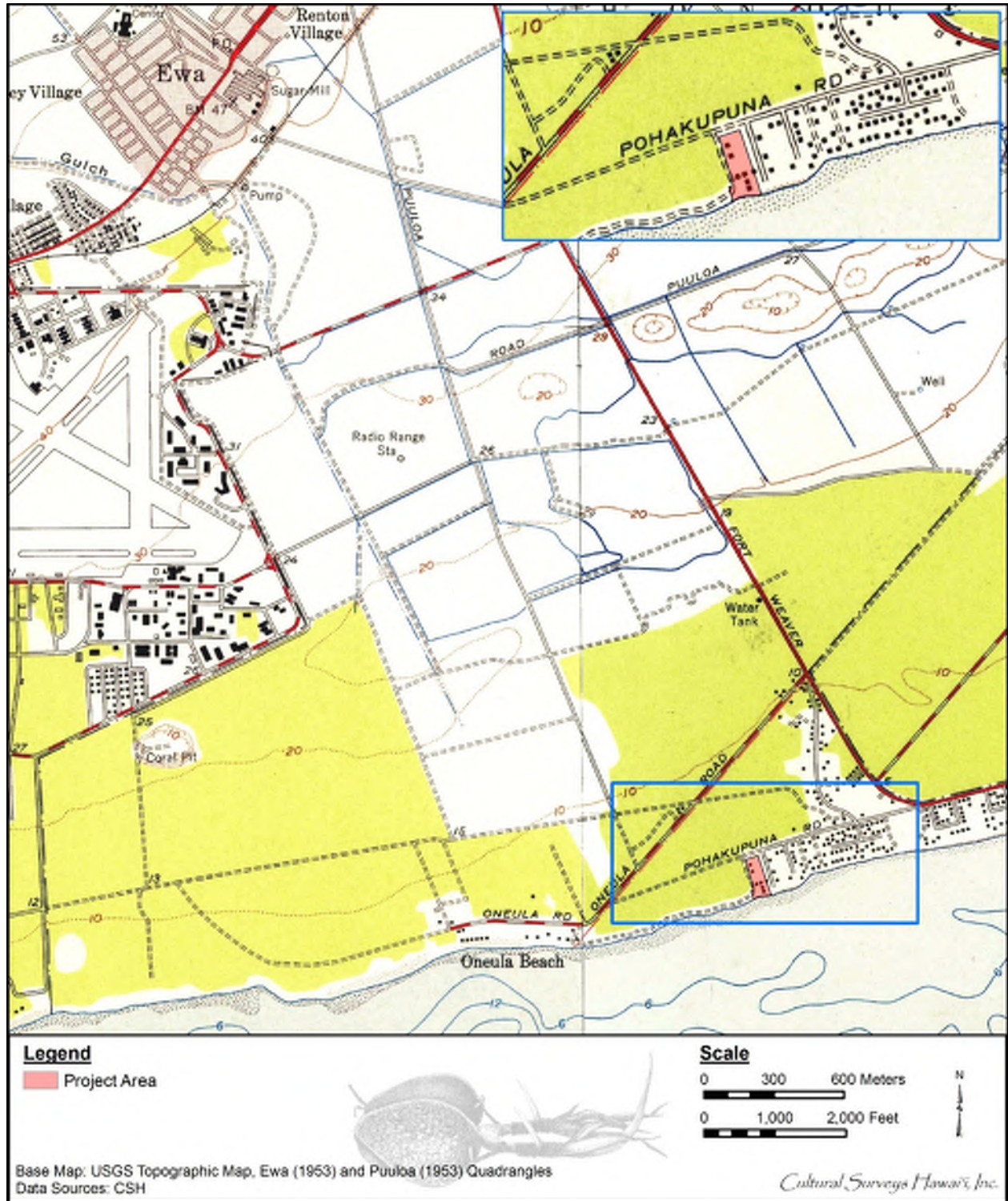


Figure 21. Portion of the 1953 Ewa and Puuloa USGS topographic quadrangles showing seven houses within the project area, an improved road along the east side of the project area, an unimproved road (the future Pōhakupuna Road) along the north side and an unimproved road along the west side down to the coast



Figure 22. 1961 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area and much the same configuration of buildings as in the 1950 aerial photograph but most of the trees have now been removed; extent and density of suburban development is rapidly expanding

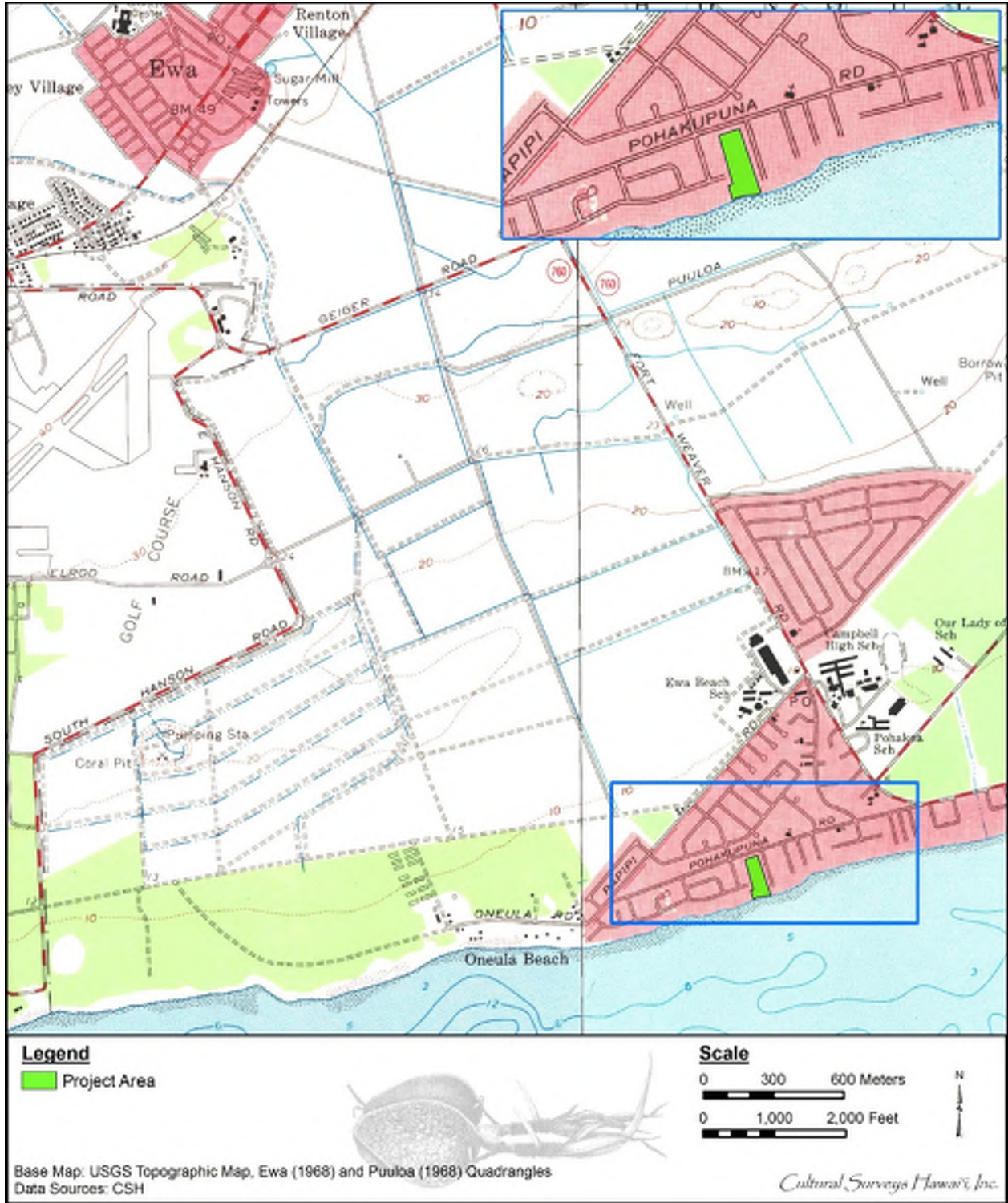


Figure 23. Portion of the 1968 Ewa and Puuloa USGS topographic quadrangles showing the location of the project area within the dense suburban development of ‘Ewa Beach



Figure 24. 1976 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area with far fewer buildings and exposures of raised reef limestone suggesting recent grading but also showing areas of scrub regrowth suggesting the passage of time since the demolition of structures on the *mauka* portion of the lot



Figure 25. 1988 Oneula Coast aerial photograph (UH SOEST) showing the location of the project area with demolition of almost all structures

eastern edge of the project area along One'ula Beach (see Figure 21). The map also shows the extensive build-out of the Marine Corps Air Station and the development of the modern road grid. Additional infrastructure development to the north of the project area and residential subdivisions to the east of the project area are depicted on the 1968 USGS topographic map (see Figure 23).

The project area appears to have been previously developed between 1933 and 1950 (see Figure 19 and Figure 20). Several structures appear on the 1950 aerial photograph (see Figure 20), 1953 USGS map (see Figure 21), and 1961 aerial photograph (see Figure 22) that appear to be residential in nature. By 1976, it appears that several of the northern structures were demolished (see Figure 24), and by 1988, all but one small structure has been demolished (see Figure 25).

Section 5 Previous Archaeological Research

Several archaeological studies have been conducted in the vicinity of the project area. This section discusses previous archaeological studies in the area (Figure 26 and Table 2) and identifies the types and locations of previously identified historic properties (Figure 27 and Table 3).

The organizational approach used here provides a brief overview of early descriptive work (Thrum 1906, McAllister 1933) pertaining to archaeology on the 'Ewa Plain of Honouliuli Ahupua'a and then presents a discussion of archaeological studies and finds in the vicinity of the project area—first focusing on work that has not been associated with the (formerly known as) 'Ewa Marina/Ocean Pointe project and then summarizing the work and finds associated with the 'Ewa Marina/Ocean Pointe project, which extends a considerable distance to the west.

5.1 Early Studies

The first mention of archaeology in the 'Ewa plains was a brief description by Thrum of a *heiau* that had once been at Pu'uokapolei (Thrum 1906:46). It was described as “a heiau on Kapolei hill, Ewa-size and class unknown. Its walls thrown down for fencing.” The *heiau* had been completely destroyed by 1930 when J. Gilbert McAllister (1933:108) made a survey of important O'ahu sites. McAllister (1933) described all archaeological features in the 'Ewa plains as Site 146:

Ewa coral plains, throughout which are remains of many sites. The great extent of old stone walls, particularly near the Pu'uloa Salt Works belongs to the ranching period of about 75 years ago. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. [McAllister 1933:109]

5.2 Modern Studies in the Vicinity Not Associated with the Ewa Marina Project

5.2.1 Pu'uloa Elementary School (McCoy 1972)

The first archaeological survey in Pu'uloa was conducted by Patrick McCoy of the Bishop Museum for the proposed Pu'uloa Elementary School, on the grounds of the current Kaimiloa Elementary School (McCoy 1972). The survey identified SIHP # 50-80-13-1570, a wall complex including four *ahu* (rock mounds) and several pit caves. Walls had been constructed around some of the pit caves. The walls of the complex were interpreted as possible late nineteenth to early twentieth century corral remnants, while the four *ahu* were considered to be possible remnant traditional Hawaiian markers (McCoy 1972:5–6).

5.2.2 James Campbell High School (Dye and Jourdane 2006)

T.S. Dye & Colleagues, Archaeologists, Inc., conducted an archaeological inventory survey (negative finds recorded as an archaeological assessment) for a proposed Sprint PCS cellular site at James Campbell High School in 'Ewa Beach (Dye and Jourdane 2006). The survey consisted of an archaeological literature review and concluded the project would have no visual or direct effect on any historic properties.

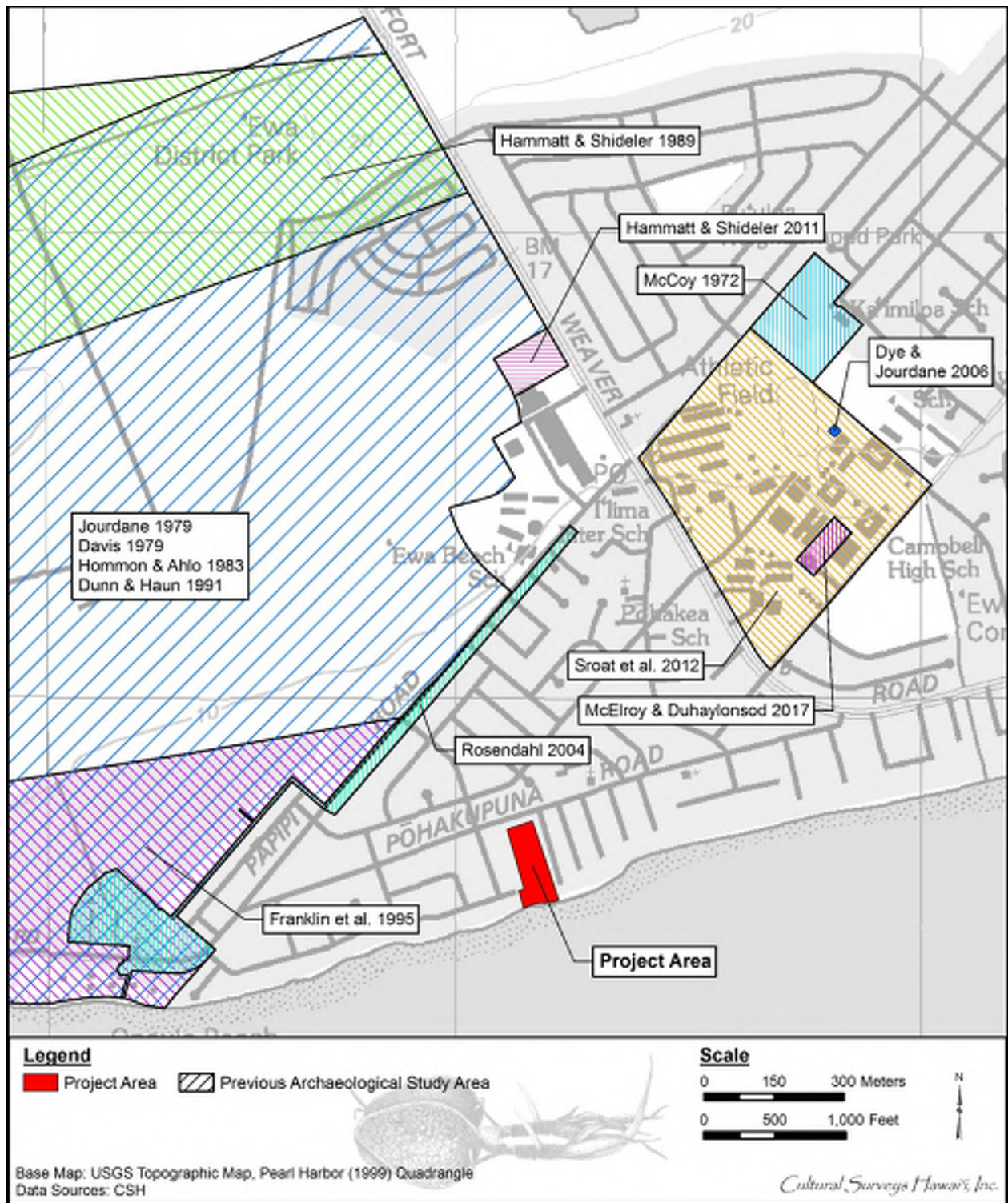


Figure 26. Portion of the 1999 Pearl Harbor USGS topographic quadrangle showing the locations of previous archaeological studies in the vicinity of the project area

Table 2. Previous archaeological studies in Honouliuli Ahupua'a near the project area

Reference	Type of Investigation	Location	Results
McAllister 1933	Archaeological reconnaissance	Island-wide	Site 146, Ewa coral plains with walls and cultural use of pit caves
McCoy 1972	Archaeological inventory survey	Kaimiloa Elementary School, Pu'uloa	SIHP # 50-80-13-1570, a wall complex including four <i>ahu</i> and several pit caves
Davis 1979	Archaeological inventory survey	Ewa Marina Community, One'ula	Identified 107 cultural features interpreted as part of a late pre-Contact/early historic settlement, combined into 18 complexes: SIHP #s 50-80-12-3201 through -3211, -3214 through -3218, and SIHP #s 50-80-13-3212 and -3213; three of the six features of SIHP # -3212 confirmed in 1991 and reassigned as individual sites (SIHP #s -3212, -4280, -4281) (SIHP #s -3201 through -3211, -3214 through -3218, and -4280 not included in Figure 27 as they fall outside the map area)
Jourdane 1979	Archaeological reconnaissance survey	Ewa Marina Community, One'ula	Preliminary survey identified an unquantified number of sites, assessed as indeterminate in age; no permanent site numbers assigned, and no map of site locations included
Hommon and Ahlo 1983	Archaeological test excavations	Former cane fields in <i>mauka</i> portion of proposed Ewa Marina Community Development Area	Conducted with aid of a backhoe at five locations to assess likelihood of historic properties in former cane lands; no historic properties identified
Hammatt and Shideler 1989	Archaeological reconnaissance survey	Ewa Marina Community, One'ula	Confirmed at least two C-shaped structures, SIHP #s 50-80-12-3208:A1 and -3208:A2, recorded by Davis (1979) as well as an alignment and three sinkholes filled in by boulders; no newly assigned site numbers

Reference	Type of Investigation	Location	Results
Dunn and Haun 1991	Archaeological inventory survey with test excavations	Ewa Marina Community, One'ula	Located 53 sites with 312+ features, including prehistoric habitation and agricultural sites, SIHP #s -3201 through -3206, -3208 through -3218, -4265, -4267 through -4272, -4274 through -4282, -4284, -4286, -4289 through -4293, and -4295 through -4307; many sites previously identified by Davis (1979) but some reassigned
Franklin et al. 1995	Data recovery	Ewa Marina Community, One'ula	Excavated 92 units at 67 features at 22 of 53 sites identified by Dunn and Haun (1991) and suggested initial occupation of region was in form of temporary camps
Rosendahl 2004	Archaeological resources assessment and archaeological monitoring plan	Ocean Pointe/Pāpipi Road Drainage Improvements project, TMKs: [1] 9-1-035, 036	Rosendahl concluded "there is only a small chance that any significant archaeological remains will be found in the planned excavation area" (Rosendahl 2004:10)
Dye and Jourdane 2006	Archaeological assessment (archaeological inventory survey with negative finds)	James Campbell High School	No historic properties identified
Hammatt and Shideler 2011	Archaeological inventory survey (negative finds recorded as an archaeological assessment)	Iglesia Ni Christo Church, Fort Weaver Rd, 'Ewa Beach	No surface historic properties identified and no indications of possible subsurface historic properties
Sroat et al. 2012	Archaeological literature review and field inspection	James Campbell High School	Noted two small filled-in sinkholes; no historic properties located; extensive previous disturbance suggests construction work eradicated any archaeological sites that may have been present

Reference	Type of Investigation	Location	Results
McElroy and Duhaylonsod 2017	Archaeological inventory survey (negative finds recorded as an archaeological assessment)	James Campbell High School, TMK: [1] 9-1-001:002 (por.).	No historic properties identified; fill deposits generally shallow, above a basal coral shelf (typically raised reef limestone encountered at 20-85cmbs)

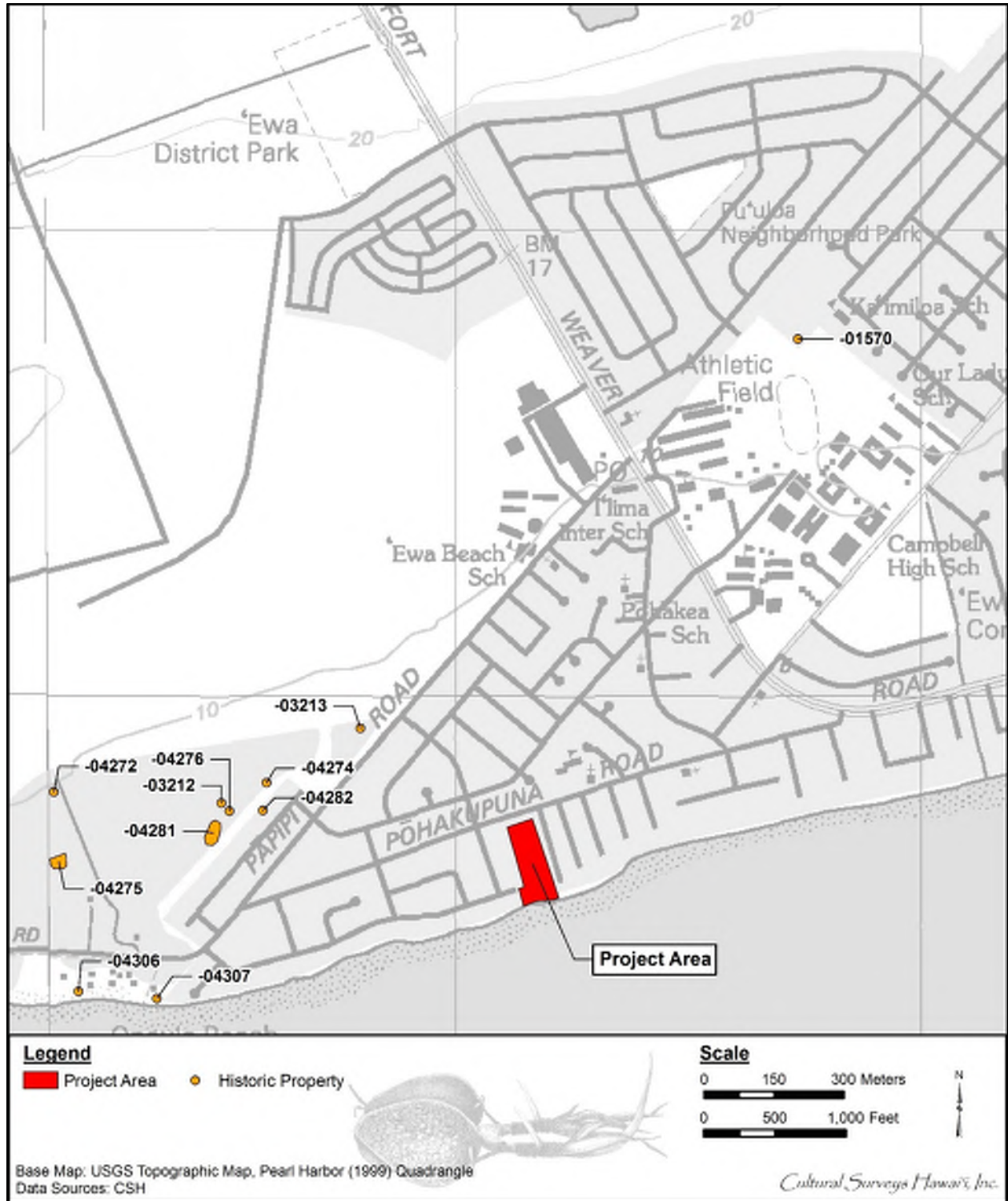


Figure 27. Portion of 1999 Pearl Harbor USGS topographic quadrangle showing the locations of previously identified historic properties in the vicinity of the project area

Table 3. Historic properties previously identified in the project area vicinity

SIHP # 50-80-13-	Nature of Site	Source	Comment
1570	Wall complex including four <i>ahu</i> (rock mounds) and several pit caves	McCoy 1972	Walls had been constructed around some of pit caves; walls of complex interpreted as possible late nineteenth to early twentieth century corral remnants, while four <i>ahu</i> considered possible remnant traditional Hawaiian markers
3212	Cluster of six features	Davis 1979; Dunn and Haun 1991	Site included a rectangular platform, two wall segments, a rectangular enclosure, an <i>ahu</i> and a garden area of 12 mounds
3213	C-shape	Davis 1979, Dunn and Haun 1991	Very large C-shape, temporary habitation
4272	Concrete foundation	Dunn and Haun 1991	Primary portion of structure is rectangular concrete floor pad that measures approx. 12.4 m at 215° by 5.0 m; contains metal stanchions (probably served to restrain or contain animals), preform concrete troughs, and wooden fence posts with barbed wire
4274	Concrete structure	Dunn and Haun 1991	Structure has opening at ground level in center of west wall measuring approx. 0.70 m by 0.30 m high; exterior of structure finished with smooth concrete; interior lined with bricks with letters "Carnegie" or "Stockton"; height of approx. 1.36 m consistent throughout rectangular walls of structure; it appears to have had a roof at one time; smoke stack located in east wall, slightly off center and to north, and rises to a height of approx. 6.0 m above height of surrounding walls
4275	Complex (11 features)	Dunn and Haun 1991; Franklin et al. 1995	Overall complex area measures approx. 58.0 m (350°/170°) by 35.0 m; generally features constructed with stacked limestone cobbles often combined with bedrock outcroppings; recent debris scattered across site, but no prehistoric midden found
4276	Modified sink hole	Dunn and Haun 1991	Site is natural sinkhole modified with concrete foundation on ground surface; sinkhole measures approx. 1.5 m at 60° by 1.2 m; rectangular concrete foundation slab surrounds limestone sinkhole; measures approx. 2.40 m by 1.60 m; aluminum ladder in sinkhole

SIHP # 50-80-13-	Nature of Site	Source	Comment
4281	Habitation Complex (five features)	Dunn and Haun 1991; Franklin et al. 1995	Prehistoric with historic modification, site consists of five features, constructed of small to large subangular limestone cobbles, boulders, and slabs incorporated with bedrock; Feature A Enclosure (2) also identified as SIHP # -3212C, Features B, C, D, and all rubble concentrations
4282	Complex	Dunn and Haun 1991	Overall site measures approx. 35.0 m at 40° by 15.0 m; constructed of angular limestone cobbles and boulders crudely stacked and piled; contains short portion approx. 4.0 m (faced); remainder probably bulldozed; may have been a foundation for old homestead building
4306	Enclosure	Dunn and Haun 1991	Enclosure is square shape in plan; constructed with limestone cobbles stacked one to three courses high and wide in linear square pattern; probable age is recent
4307	Concrete slab	Dunn and Haun 1991	Octagon-shaped concrete slab with hole measuring approx. 0.25 m in diameter and 0.17 m deep in center of slab, possibly WWII-associated

Construction activities included an antenna and light pole and an equipment facility placed over concrete on the existing campus. Ground disturbance for the facility would be less than 48 inches while that for the pole would be approximately 33 ft. Previous boring results, by Clayton Group Services, indicated fill soils were present to 3.0 ft below surface and likely continued to 6.5 ft overlaying the coral reef basal layer (Dye and Jourdane 2006:6).

5.2.3 Proposed Iglesia Ni Cristo Church Project (Hammatt and Shideler 2011)

In 2011, CSH performed an archaeological inventory survey (negative finds recorded as an archaeological assessment) consisting of a field check of a 3.029-acre parcel and an archaeological literature review for the proposed Iglesia Ni Cristo Church located on Fort Weaver Road south of Kamalie Street and north of the Ewa Beach Post Office, 'Ewa Beach. The entire project area was an open lot with extensive previous disturbance and repeated grubbing. The study indicated there are no surface historic properties and minimal concern for the possible presence of subsurface historic properties (Hammatt and Shideler 2011).

5.2.4 James Campbell High School (Sroat et al. 2012; McElroy and Duhaylonsod 2017)

In 2010, CSH conducted an archaeological literature review and field inspection for a James Campbell High School project. Results of the field check for the entire survey area were minimal, consisting of only two small filled-in sinkholes (Sroat et al. 2012). No historic properties were located within the immediate bounds of that project area on the campus. All three school campuses of the survey area (Campbell High School and the adjacent 'Ilima Intermediate and Pohakea Elementary schools) showed extensive previous disturbance as evidenced by surface grading, infrastructure installation, and the complex of school structures. The paucity of archaeological sites strongly suggested the previous construction of the three schools eradicated virtually all trace of any archaeological sites that may have been present.

Keala Pono Archaeological Consulting LLC (McElroy and Duhaylonsod 2017) carried out an archaeological inventory survey (recorded as an archaeological assessment in the absence of finds) for improvements at the James Campbell High School, TMK: [1] 9-1-001:002 (por.). The archaeological work included a pedestrian survey that covered 100% of the project area, as well as test excavations consisting of six trenches. It was noted that the project lands had been extensively disturbed by modern use, and no archaeological remains were found on the surface. No subsurface cultural features or deposits were encountered during trenching. Fill deposits were generally shallow, above a basal coral shelf (typically the raised reef limestone was encountered at 20-85 cmbs).

5.3 Review of Work at Adjacent Portions of the Proposed Ewa Marina

Between 1979 and 1991, five archaeological surveys (Davis 1979; Dunn and Haun 1991; Hammatt and Shideler 1989; Hommon and Ahlo 1983; Jourdane 1979) were conducted for the Ewa Marina Community Development project. In 1994, Franklin et al. (1995) completed Phase II data recovery fieldwork along the coastal portion for the Ewa Marina Community Development project.

5.3.1 Jourdane 1979

On 23 February 1979, the Bishop Museum conducted a preliminary archaeological reconnaissance survey of 887 acres proposed for an Ewa Marina Community Development

(Jourdane 1979:1) and produced a six-page archaeological report (with appendices addressing botany and providing notes on Honouliuli history). The study focused on a 180-acre parcel (designated Area A, Figure 28) and conducted only a cursory investigation of the surrounding densely vegetated area (designated Area B, see Figure 28). Eight possible sites were noted in Area A consisting of three enclosures, a coral-paved area, a coral sinkhole with possible modification, a raised platform composed of coral slabs, and two remnant alignments. The findings were assessed as indeterminate in age, of either prehistoric or historic origin. Area B was reported to have a higher site density and to contain numerous, though unquantified, sites including coral walls and enclosures, and sinkholes and depressions (Jourdane 1979:3). No permanent site numbers were assigned, and no map of the site locations was included (other than a map showing the general vicinity of the possible historic properties shown here in Figure 28). Further work in both areas was recommended.

5.3.2 Davis 1979

Between September and October 1979, Hawai'i Marine Research, Inc., conducted an archaeological survey of approximately 445 hectares (about 1,099 acres) for the proposed Ewa Marina Community development project and identified 107 cultural features "inferred to have once been part of an extensive late prehistoric/early historic settlement along the coast of the Ewa plain" (Davis 1979:1). Of the four designated Survey Zones, no historic properties were identified within the *mauka* Survey Zone IV (consisting of the vast majority of the project area) due to sugarcane cultivation (Figure 29). The 107 designated features were combined into 18 designated site complexes and designated as SIHP #s 50-80-12-3201 through -3218. The features generally were located in cluster complexes and were predominantly situated around a swamp in the far western coastal zone of the study area. However, habitation and agricultural sites also continued eastward along the coastal zone and included a probable ceremonial platform. Analysis of a volcanic flake collected from a habitation enclosure yielded a date range of AD 1733-1805 (the accuracy of volcanic glass dating is now in doubt).

Of greatest importance for the present study area are the results from Davis designated Survey Zone III, which is his closest survey area in which there were finds (Figure 30). Davis (1979:15, 18) notes this Survey Zone III area was much disturbed by dirt roads, a pig farm, and modern gardening activity. "Only nine features were recorded here, of which there was one platform, one walled enclosure, and four C-shaped shelter walls" Davis (1979:18). These nine features were lumped into three historic properties:

SIHP # -3211 was described as follows:

Two C-shaped shelters located in the northwest corner of Survey Zone III.

[Feature A] C-shaped wall of multiple stacked construction; open side of "C" towards the southwest; no surface midden observed.

[Feature B] C-shaped wall of multiple-stacked construction; opening towards the south; no surface midden observed. [Davis 1979:34]

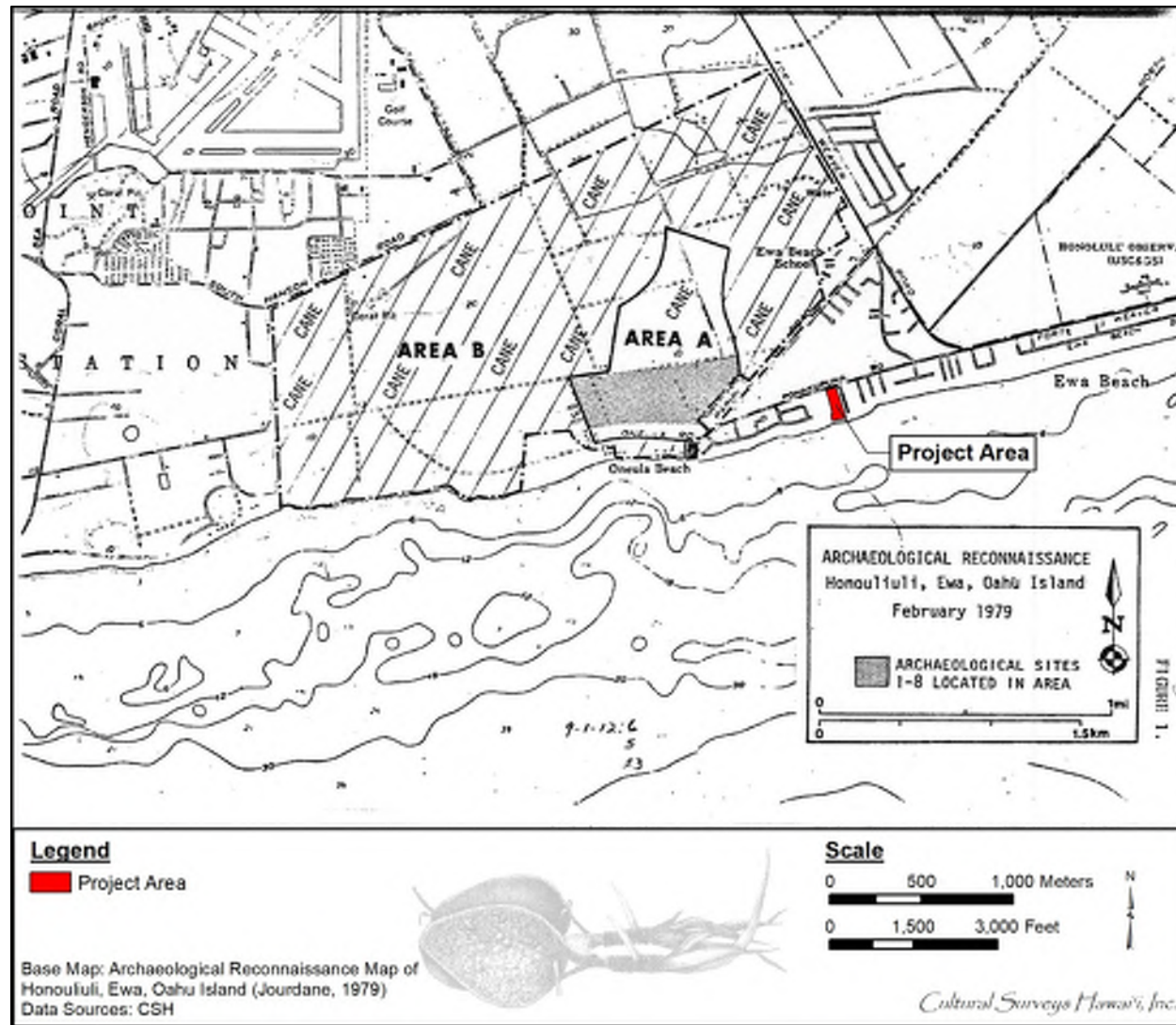


Figure 28. Archaeological reconnaissance survey areas designated by Jourdane (1979:5), noting approximate region containing eight archaeological sites

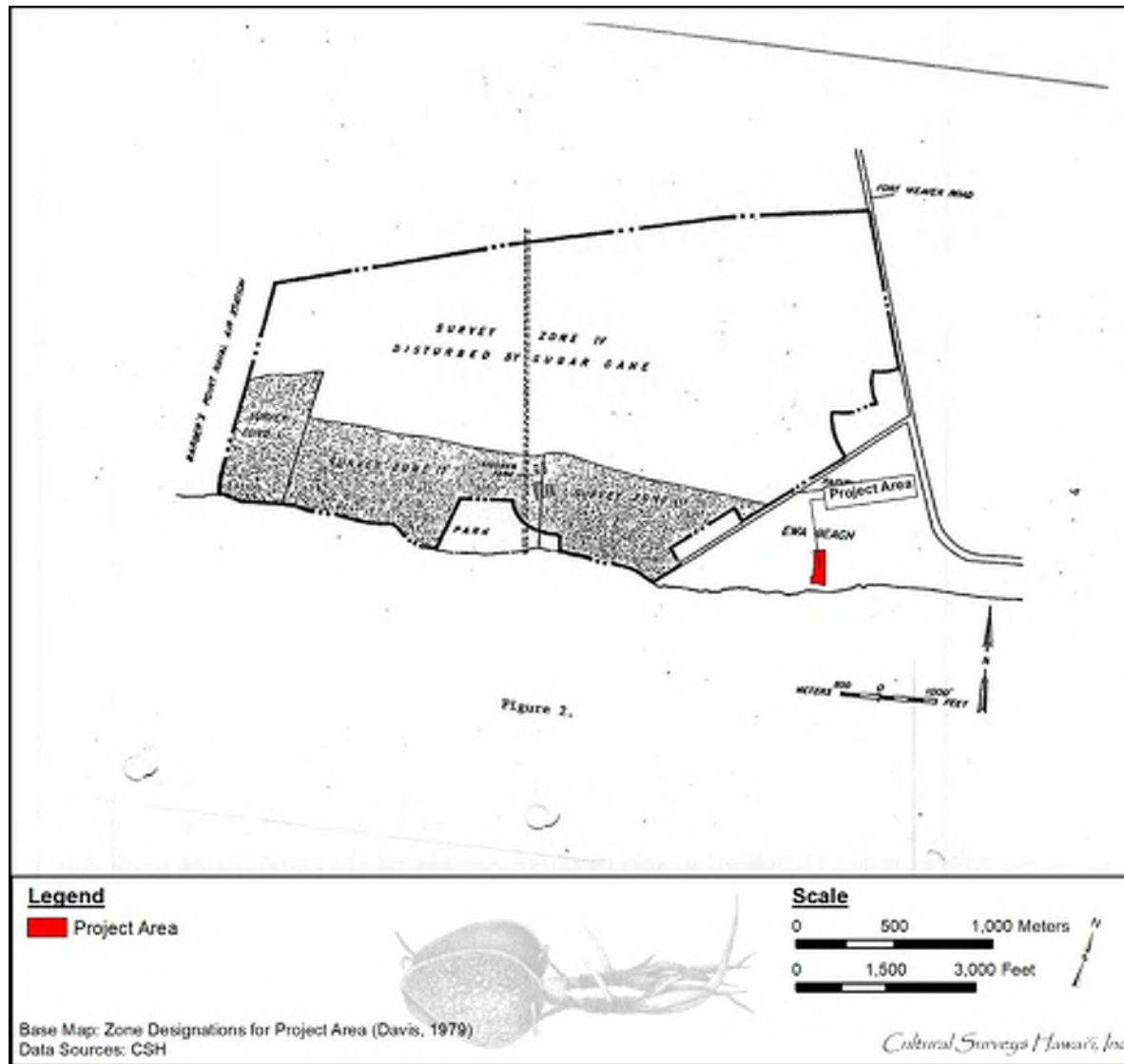


Figure 29. Archaeological reconnaissance survey area by Davis (1979:4), noting Survey Zones I-IV and area disturbed by sugarcane.

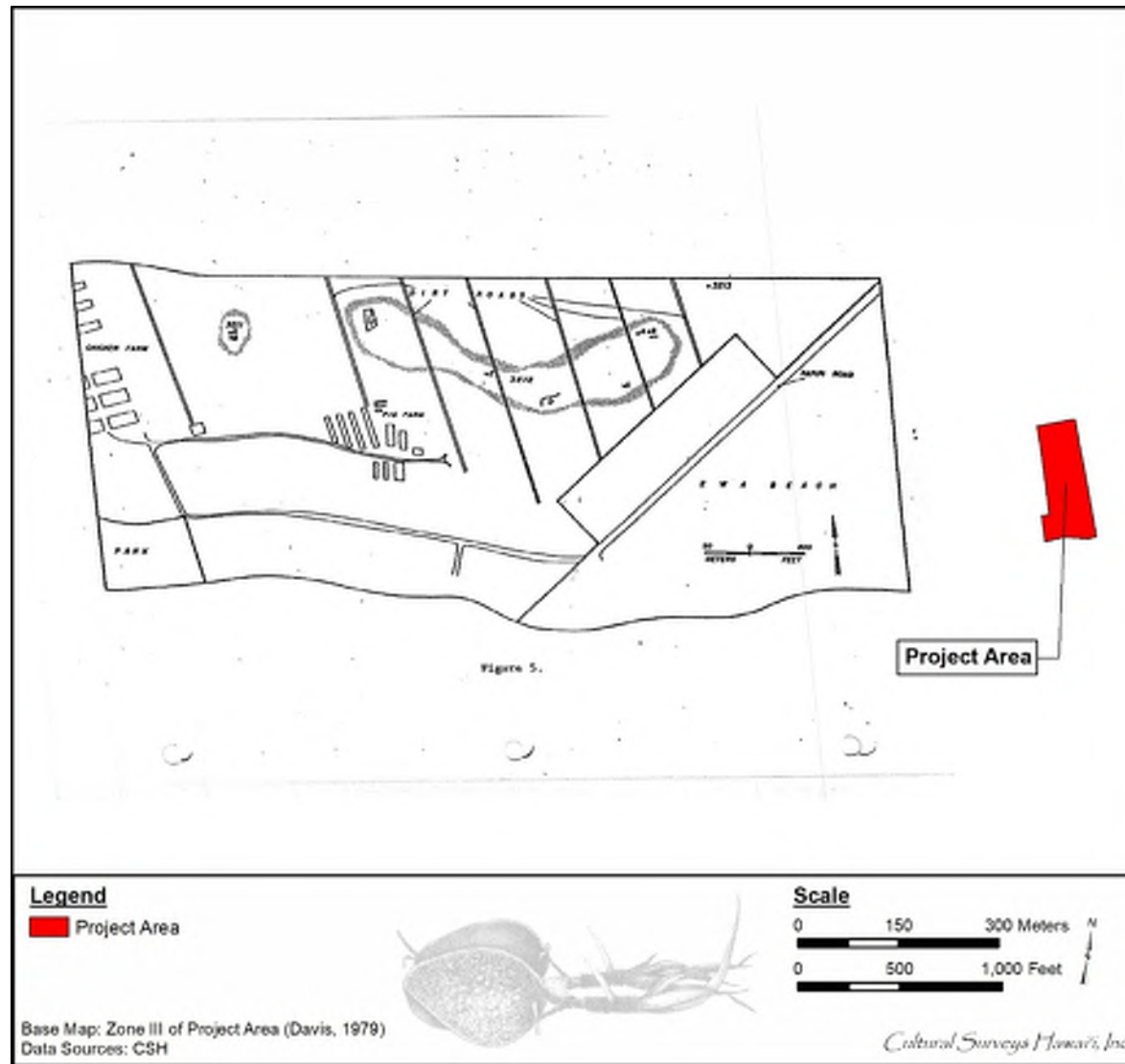


Figure 30. Map of designated Survey Zone III of the Ewa Beach project showing the location of the archaeological features recorded (adapted from Davis 1979:17)

SIHP # -3212 was described as follows:

A cluster of 6 features in the northeast sector of Survey Zone III.

[Feature A] Rectangular platform. An elevated rectangular floor of small limestone boulders and cobbles with relatively high multiple stacked facing; slight depression in center of floor; given height of nearly 1m, this may be a rather large *ahu*; no midden observed on the surface although measurements are different, this, may be Bishop Museum Site 1 (Jourdan 1979:3).

[Feature B] Wall. Remnant of multiple-stacked, free-standing wall; no surface midden observed.

[Feature C] Rectangular enclosure. large walled enclosure of mixed core-filled and multiple stacked construction with some interior and exterior facing of upright limestone slabs; possible doorway in northeast wall; an amorphous rubble mound (fire-cracked limestone?) c.24m² in area adjacent to southwest corner—slight depression (c.2m x 40cm deep) in mound suggests possibility of an *imu* or earth oven; surface debris Includes: *Nerita*, *Cypraea*, *Conus*, *Brachidontes* and *Tellina* shell, and fish bone midden; this seems to be Bishop Museum Site 1 (Jourdan 1979:2).

[Feature D] Wall. Section of free-standing multiple-stacked limestone boulder wall with occasional up-right slabs, no surface midden observed.

[Feature E] *Ahu*. Large rectangular *ahu* of multiple-stacked construction with small boulder facing and mixed boulder/cobble fill; broken bottles only surface debris observed.

[Feature F] Garden area. A cluster of 12 somewhat oval rock mounds ranging in size from 1.5m x 1m to 4m x 1.8m and from 30cm to 55cm high; the mounds are piled up on limestone outcrops adjacent to deposits of humic sediments from which the rock or the mounds was taken; this feature is quite similar to those at Barber's Point inferred to be horticultural features; no surface midden observed. [Davis 1979:34]

SIHP # -3213 was described as follows:

Very large C-shape east side of Zone III multiple-stacked wall built of limestone cobbles and small boulders with open side towards east; apparent accumulation of sand on interior floor; no surface midden observed. [Davis 1979:34]

As a sweeping generalization, Davis reports a low density of sites and features notably all set back 250 m or more from the coast (although prior destruction of more coastal features cannot be ruled out).

5.3.3 Archaeological Test Excavations (Hommon and Ahlo 1983)

Science Management, Inc. (Hommon and Ahlo 1983) reported on five archaeological test excavations conducted with the aid of a backhoe at the then proposed Ewa Marina Community Development Area (Figure 31).

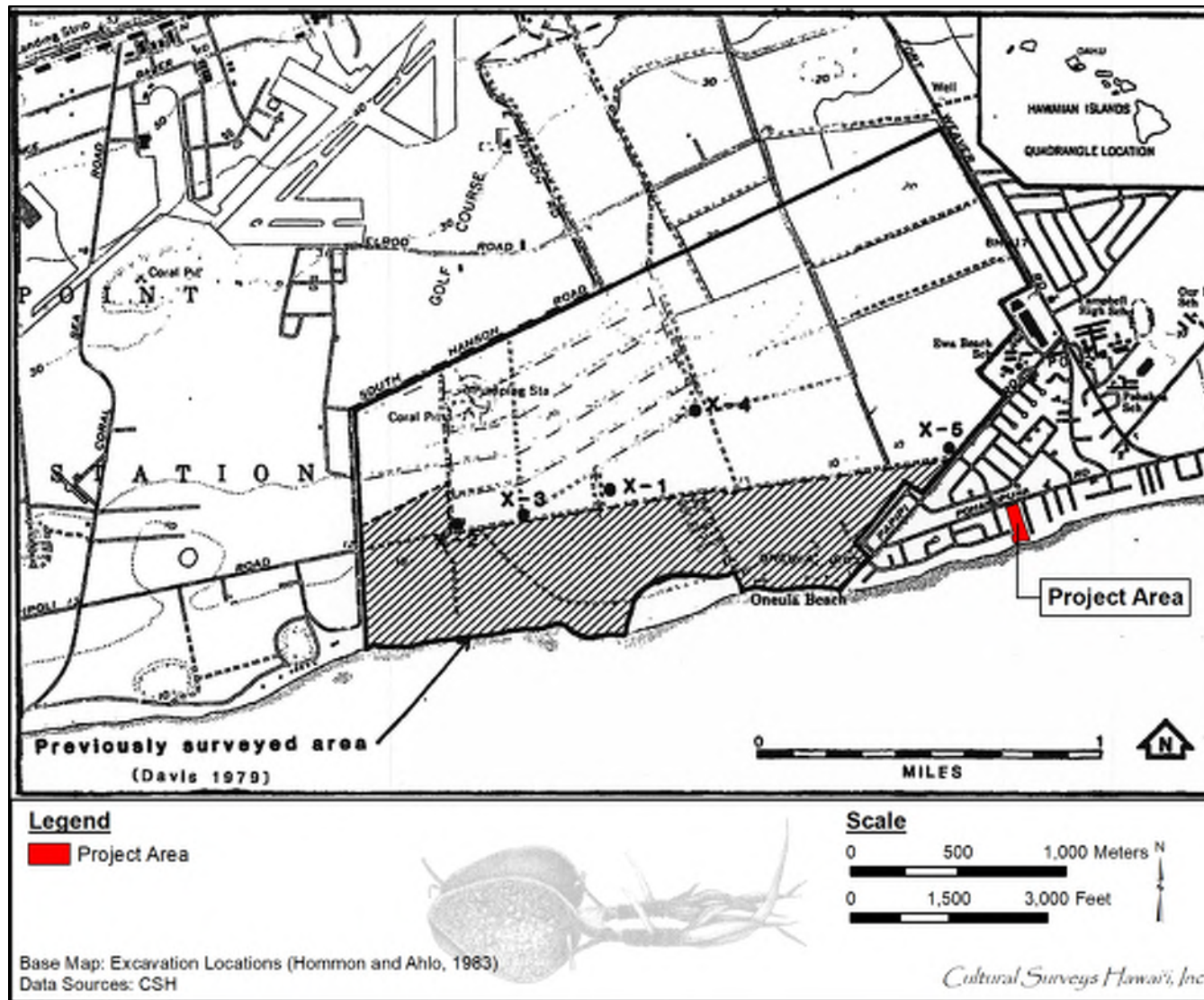


Figure 31. Map showing the location of the five Hommon and Ahlo (1983) test excavations numbered X-1 through X-5 (Hommon and Ahlo 1983:4)

These were carried out basically to evaluate the potential for buried historic properties under former sugarcane fields in the *mauka* portion of the then proposed Ewa Marina Community Development Area and were generally along the seaward portion of the former cane fields. Typically, these five test excavations encountered raised reef limestone bedrock quite close to the surface (<30 cm). No historic properties were identified in the *mauka* former cane field area examined and no further archaeological work in the *mauka* former cane field area was recommended (Hommon. and Ahlo 1983:10).

5.3.4 Hammatt and Shideler 1989

In 1989, CSH conducted a follow-up survey of approximately 400 acres in the *mauka* (northern) portion of the Ewa Marina Community project and confirmed at least two C-shaped structures, SIHP #s 50-80-12-3208A1 and -3208A2, recorded by Davis (1979) as well as an alignment and three sinkholes filled in by boulders (Hammatt and Shideler 1989). Davis (1979) suggested the features date to approximately World War II based on the orientation and a bottle glass artifact. However, Hammatt and Shideler (1989:13) “perceive the small C-shapes as typical of prehistoric structures and are uncertain of their temporal affinities.” The project area was primarily within the area designated Survey Zone IV by Davis (1979), while the confirmed sites were within Survey Zone I (see Figure 26 and Figure 29). No site numbers were assigned to the previously undocumented features. The study recommended a future investigation during the dry season when there would be less vegetative ground cover and higher visibility of archaeological features.

5.3.5 Dunn and Haun 1991

From February through June 1990, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an extensive and intensive archaeological inventory survey with test excavations for the Ewa Marina Community project (Dunn and Haun 1991) (Figure 32). Fifty-three sites consisting of over 312 component features were documented including prehistoric habitation and agricultural sites. Two concentrations of prehistoric habitation sites were identified, located in the far west end of the study area and in the east-central portion. The majority of agricultural sites found within the survey area were located in the intermediate zone between the two concentrations.

Many of the sites were previously identified as sites or features by Davis (1979).

Test excavations consisted of 61 test units placed in 57 features in addition to 122 informal shovel test pits at 13 sites, 24 backhoe trenches within the cane field lands, and 176 sinkhole tests. Sixty-seven indigenous artifacts were collected from the test units and shovel tests. No cultural deposits were encountered in any of the cane field trenches. Sinkholes yielded bird bones and occasional midden and charcoal deposits. Radiometric dating of charcoal suggests the earliest Hawaiian usage of the area began between AD 1000 and 1250 and intensified between AD 1500 and 1700. The study concludes Hawaiian occupation of the area spread from west to east, occupying first the area surrounding the swamp (see Davis 1979), then expanding eastward toward One‘ula.

5.3.6 Franklin, Goodfellow and Wulzen (1995)

From December 1993 to March 1994, PHRI conducted Phase II data recovery along the southern portion of the project area for the Ewa Marina Community development project (Franklin et al. 1995). The data recovery fieldwork consisted of 92 excavation units at 67 features at 22 of the 53 sites identified during the Dunn and Haun (1991) archaeological inventory survey.

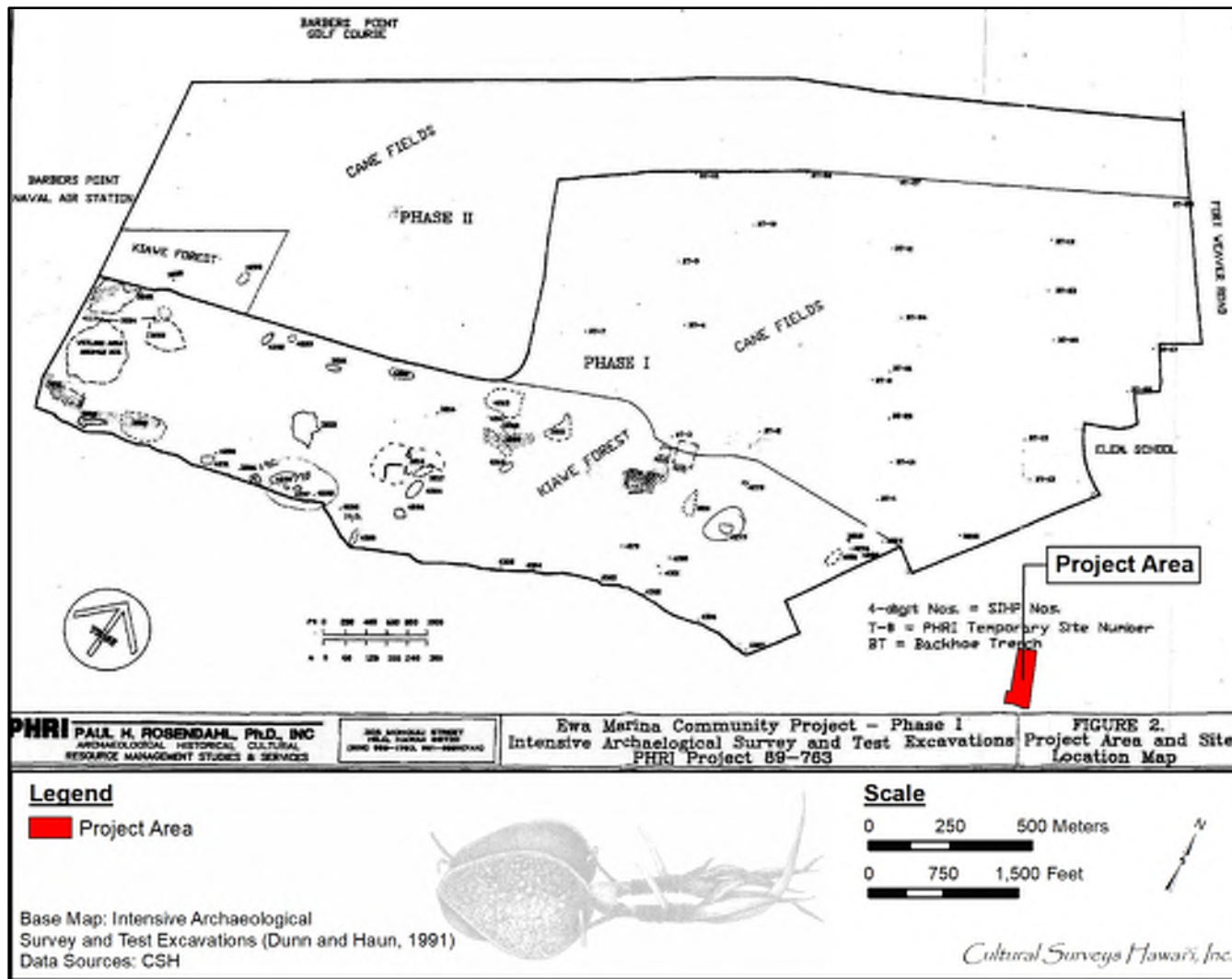


Figure 32. Project area and site location map (from Dunn and Haun 1991:15) (note “BT” designations are for backhoe trenches and do not designate historic properties; for greater detail on historic properties in relation to the present project area see Figure 20)

Franklin et al. (1995:ii) note that 117 features at 30 sites had been excavated for a combined total of 155 feature excavations. The authors concluded “initial occupation of the region was mainly in the form of temporary camps, some of which, over time, acquired almost permanent status, with certain sites being consistently reoccupied for short periods” (Franklin et al. 1995:ii). Data recovery excavation work was carried out at two relatively close historic properties SIHP # -4275 Features D, G, H, I, and L and SIHP # -4281 Features A and B. SIHP # -4275 was evaluated as including ten agricultural features posited as pre-Contact or from early historic period use and one feature resulting from bulldozing. SIHP # -4281 was evaluated as including one semi-permanent habitation with pre-Contact and early post-Contact period use (Feature A) with other features believed to be bulldozer piles.

5.3.7 Ocean Pointe Drainage Improvements Archaeological Resources Assessment (Rosendahl 2004)

PHRI (Rosendahl 2004) prepared an archaeological resources assessment and archaeological monitoring plan for an Ocean Pointe/Pāpipi Road Drainage Improvements project (TMK: [1] 9-1-035, 036). Rosendahl concluded that “there is only a small chance that any significant archaeological remains will be found in the planned excavation area” (Rosendahl 2004:10).

Section 6 Community Consultation

6.1 Introduction

Throughout the course of this assessment, an effort was made to contact and consult with Native Hawaiian Organizations (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* of Honouliuli. CSH initiated its outreach effort in November 2018 through letters, email, telephone calls, and in-person contact. CSH completed the community consultation in July 2019.

6.2 Community Contact Letter

Letters (Figure 33 and Figure 34) along with a map and an aerial photograph of the project were mailed with the following text:

At the request of Group 70 International (G70), Cultural Surveys Hawai'i, Inc. (CSH) is conducting a cultural impact assessment (CIA) for the Pōhakupuna Road project, Honouliuli Ahupua'a, 'Ewa District, O'ahu, Hawai'i, TMK: [1] 9-1-028:040. The project area is depicted on a portion of the 1999 Pearl Harbor U.S. Geological Survey (USGS) topographic quadrangle and a 2013 Google Earth aerial photograph (Figure 1 and Figure 2).

G70 is proposing a residential development that will consist of approximately 19 units. The project area is located at 91-603 Pōhakupuna Road in coastal Honouliuli Ahupua'a, 'Ewa District, O'ahu. The project area consists of 119,522 square feet (sq ft) (2.74 acre/1.11 hectare).

An Environmental Assessment (EA) is being prepared due to the project area's location within the City and County of Honolulu, Special Management Area (SMA). An SMA permit, and a Cluster Permit or Subdivision, will also be prepared. A Shoreline Setback Variance (SSV) may be required. The project site is zoned for residential uses.

The purpose of this CIA is to gather information about the project area and its surroundings through research and interviews with individuals knowledgeable about this area in order 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.**

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 159

htammka@culturalsurveys.com

www.culturalsurveys.com

November 2018

Aloha,

At the request of Group 70 International (G70), Cultural Surveys Hawai'i, Inc. (CSH) is conducting a cultural impact assessment (CIA) for the Pōhakupuna Road project, Honouliuli Ahupua'a, 'Ewa District, O'ahu, Hawai'i, TMK: [1] 9-1-028:040. The project area is depicted on a portion of the 1999 Pearl Harbor U.S. Geological Survey (USGS) topographic quadrangle and a 2013 Google Earth aerial photograph (Figure 1 and Figure 2).

G70 is proposing a residential development that will consist of approximately 19 units. The project area is located at 91-603 Pōhakupuna Road in coastal Honouliuli Ahupua'a, 'Ewa District, O'ahu. The project area consists of 119,522 square feet (sq ft) (2.74 acre/1.11 hectare).

An Environmental Assessment (EA) is being prepared due to the project area's location within the City and County of Honolulu, Special Management Area (SMA). An SMA permit, and a Cluster Permit or Subdivision, will also be prepared. A Shoreline Setback Variance (SSV) may be required. The project site is zoned for residential uses.

The purpose of this CIA is to gather information about the project area and its surroundings through research and interviews with individuals knowledgeable about this area in order 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 *kāpuna* 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.**

Figure 33. Community consultation letter page one

HONOULIULI 159 – CIA for the 91-603 Pōhakupuna Road Project

Page 2

In advance, we appreciate your assistance in our research effort. If you are interested in participating in this study, please contact Kellen Tanaka at ktanaka@culturalsurveys.com. We are also available by phone at (808) 262-9972.

Mahalo nui loa,

Kellen Tanaka
Cultural Researcher

Figure 34. Community consultation letter page two

- 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 most cases, two or three attempts were made to contact individuals, organizations, and agencies. Community outreach letters were sent to a total of 62 individuals or groups, seven responded, and two of these *kama'āina* and/or *kupuna* met with CSH for more in-depth interviews. The results of the community consultation process are presented in Table 4.

6.3 Community Contact Table

Below in Table 4 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 4. Community contact table

Name	Affiliation	Comment
Alaka'i, Robert	Cultural practitioner	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Alau, Maile	Executive Director, Hawai'i Maoli	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Amaral, Annelle	President, Association of Hawaiian Civic Clubs	Letter and figures sent via email 30 November 2018; Ms. Amaral forwarded letter and figures to incoming AHCC president Hailama Farden on 30 November 2018
Arakawa, Lance	Executive Director, Ewa Historical Preservation Society	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Barbieto, Leda	Raised in Ewa Plantation (Banana / Varona Camp)	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response

Name	Affiliation	Comment
Barbieto, Pio	Raised in Ewa Plantation (Banana / Varona Camp)	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Bond, John	Kanehili Cultural Hui	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Cabanilla, Rida	Respresentative, District 41; Ewa Historical Society	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Cayan, Phyllis	Intake Specialist, SHPD	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018 DLNR Intake SHPD replied via email 30 November 2018: <i>Aloha, your submittal is in the queue for review by the History & Culture Branch and is assigned log 2018.02826 for reference.</i>
Chang, Kevin	Co-Director, Ku'āina Ulu 'Aumamo (KUA)	Letter and figures sent via email 28 February 2019; Mr. Chang replied via email 28 February 2019: <i>Mahalo for your inquiry. I am connecting you with our Limu Hui Coordinator and our board member Pamela Fujii who both carry on the work of the Ewa Limu project which I believe you speak of. Hopefully they can be of help to you!;</i> CSH replied via email 28 February 2019: <i>Mahalo for your quick response and for the information you provided. We look forward to hearing from them.</i>
Crabbe, Kamana'opono	Ka Pouhana of OHA	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response

Name	Affiliation	Comment
DaMate, Leimana	Executive Director, DLNR-Aha Moku	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
De Santos, Kahulu	Cultural Advisor, Aulani, A Disney Resort and Spa	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Ewa Pu'uloa Hawaiian Civic Club		Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Farden, Hailama	Incoming President, Association of Hawaiian Civic Clubs	Mr. Farden replied via email 30 November 2018: <i>Mahalo for the information provided. I do want to ask if you have been in contact with three of our Hawaiian Civic Clubs bordering or in the area of Honouliuli? ('Ahahui Sivila O Kapolei, 'Ewa Pu'uloa and Pearl Harbor HCCs) Likewise, I am familiar with the area and know that some recent work has been done by Kepā Mally, Kamehameha Schools and other Heritage groups. Has G70 already asked for the information already collected? I know many kūpuna have been interviewed (some who had great knowledge of the area, but have already passed, like the late Arline Eaton – herself a past Hawaiian Civic Club President). Some of the groups did spend quite a bit of money on the research and documentation. Please let me know your contact with these Hawaiian Civic Clubs and organization and then I will be happy to assist beyond this. Mahalo!</i>

Name	Affiliation	Comment
Fevella, Kurt	President, Ewa Beach Lions Club	Letter and figures sent via USPS 29 November 2018; Letter and figures sent via USPS 4 January 2019; no response
Fujii, Pamela	Board Member with KUA and the 'Ewa Limu Project and Project Director for the Hawai'i Coral Reef Initiative Research Program and Pacific International Training Desk at the University of Hawai'i at Mānoa	Letter and figures sent via email 28 February 2019; Ms. Fuji'i replied via email 6 March 2019: <i>Attached are two attachments that may help tell the story of Uncle Henry Chang Wo and the Ewa Limu Project. Uncle Wally Ito is the Limu Hui Coordinator for KUA, Po'o for the Ewa Limu Project and is the best person to talk story.</i>
Hilo, Regina	Burial Sites Specialist, SHPD	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Holt Takamine, Victoria	Executive Director, PA'I Foundation	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Ito, Wally	Limu Hui Coordinator, Kua'aina Ulu 'Auamo (KUA)	Letters and figures sent via email 28 February 2019 Mr. Ito replied via email 28 February 2019: <i>Mahalo for reaching out. The Limu Management Area (LMA) you spoke about is a few miles down the shoreline from the project site in the Pearl Harbor direction. I am not from that ahupua'a but I worked for many years with Uncle Henry Chang Wo who continued his family's practice of harvesting limu from the Ewa Beach shoreline. Uncle Henry was the impetus in getting the LMA. Myself and a few other people carry on Uncle's passion for limu and continue to share limu 'ike with others as Uncle Henry did. Please let me know how I can help.</i>

Name	Affiliation	Comment
		<p>CSH replied via email 2 February 2019: <i>Mahalo for your quick response and for the information you provided. I have read a few articles online about Uncle Henry and your work with the 'Ewa Limu Project. Would you be willing to meet with CSH in person to share your mana'o regarding limu? You may also submit written testimony if it is more convenient.</i></p> <p>Mr. Ito replied via email 2 February 2019: <i>I would prefer to meet in person. Do you have a time and place in mind? Always happy to talk about limu.</i></p> <p>CSH replied via email 1 March 2019: <i>Sounds great. I can meet you at a time and place that is convenient for you. I'm available any day next week.</i></p> <p>Mr. Ito replied via email 1 March 2019: <i>Tuesday is my only available day next week [...]. If you want to meet town side, 99 Ranch Food Court in Mapunapuna is my recommendation. Time is up to you. I don't have anything scheduled for that day.</i></p> <p>CSH replied via email 1 March 2019: <i>Tuesday works for me [...]</i>; CSH met with Mr. Ito at 99 Ranch in Mapunapuna 5 March 2019</p> <p>CSH sent Mr. Ito a draft of summary of interview via email 29 March 2019</p> <p>Mr. Ito approved summary 18 April 2019</p> <p>Mr. Ito invited CSH to accompany a school group on an <i>huaka'i</i> at One'ula Beach Park and Pu'uloa Beach Park</p> <p>29 April 2019: <i>I will be at One'ula Beach Park this Wednesday at 8:00 am. I am hosting a school group from Keaukaha and we will walk the shoreline and try to identify what</i></p>

Name	Affiliation	Comment
		<p><i>kinds of limu we find. Around 10:30, we will head to Pu'uloa Beach Park to talk about what we observed on our shoreline walk. You are welcome to tag along.</i></p> <p>CSH sent Mr. Ito a draft of summary of <i>huaka'i</i> of One'ula Beach Park and Pu'uloa Beach Park 22 May 2019 Mr. Ito approved summary 28 June 2019</p>
Kai, G. Umi	President, 'Aha Kāne	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Kaleikini, Ali'ikaua	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Kaleikini, Hāloa	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Kaleikini, Kala	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Kaleikini, Mahiamoku	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Kaleikini, Moehonua	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Kaleikini, No'eau	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response

Name	Affiliation	Comment
Kaleikini, Paulette Ka'anohi	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Kaleikini, Tuahine	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Kane, Shad	'Ewa Moku Representative, Aha Moku; Kalaeloā Heritage and Legacy Foundation	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Kanekoa, Mikiala	Hālau 'o Kaululaua'e	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Keala, Jalna		Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Keli'inoi, Kalahikiola	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Keli'inoi, Kilinahe	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Moani, Keli'inoi	Cultural descendant	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Kruse, Kehaulani	Outrigger Enterprises, Cultural Advisor	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response

Name	Affiliation	Comment
Lee, Mike Kumukauoha	Kanehili Cultural Hui	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Lewis, Joseph Kūhiō		Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Lomaoang, Florence and Fernando	Former neighborhood board member; long time resident	Letter and figures sent via USPS 29 November 2018; Replied via phone: <i>Florence and Fernando are unable to participate due to health</i>
Lopez, Kealii	Imua Hawaii	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Lyman, Melissa	Kalaeloa Heritage and Legacy Foundation, President	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Malama, Tesha	'Ewa Villages Association	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Nahulu-Mahelona, Moani	Hawaiian Studies Department, Kapolei HS	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
National Park Service Honouliuli National Monument		Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; Ms. Johanna Fuller replied on behalf of PWR Honouliuli, NPS via email 30 November 2018: <i>Thank you for your email! We just received your letter today as well. I will forward your request on to the Chief of Cultural and Natural Resources</i>

Name	Affiliation	Comment
Paik, Linda Kaleo	Cultural practitioner/ Secretary/Treasurer for Koa Ike Cultural Specialist; Former History and Culture, SHPD 'Aha Wahine Aha Moku Committee, Kona District, Oahu	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Paishon, Jr., Frank	Raised in Tenney Village	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Patterson, Kaleo	Native Hawaiian Church; Pacific Justice & Reconciliation Center	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Philpotts, Douglas	Descendant of Campbell family	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Puahala, Roth	President, Ke One O Kakuhihewa	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Quintal, Leti	Raised in 'Ewa Plantation, Secretary for the Immaculate Conception Church in 'Ewa	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Ramos, Rodolfo	President, Ewa Villages Community Association; Chair of 'Ewa Task Force	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; letter and figures sent via email 4 January 2019; no response
Rodenhurst, Roda	President, 'Ahahui Siwila Hawai'i O Kapolei (Kapolei Hawaiian Civic Club)	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response

Name	Affiliation	Comment
Sadowski, John K.	Founder of 'Ewa Beach Surf Club	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; letter and figures sent via email 4 January 2019; no response
Shibuya, Barbara	Kama'āina of 'Ewa, member of the Shibuya Dayanan Family	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Shimabukuro, Maile	Senator, District 21	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Silva, Adrian Nakea	Chariman, Hui Huliau, Inc.	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Solis, Ka'ahiki	SHPD, Cultural Historian (O'ahu)	Letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Suganuma, La'akea	President, Royal Hawaiian Academy of Traditional Arts and Nā Lei Ali'i Kawananakoa	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Swinney, Shirley S.	Vice President, Kapolei Community Development Corporation; Hawaii Community Development Authority	Letter and figures sent via USPS 29 November 2018; letter and figures sent via USPS 4 January 2019; no response
Tynanes, Mitchell	Chair, Ewa Neighborhood Board No. 23	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response

Name	Affiliation	Comment
Wong-Kalu, Hinaleimoana	OIBC Chair	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; Chair Hina replied via email 30 November 2018: <i>Mahalo for this invite. Unfortunately I am not a good source of historical information beyond what is available in the existing studies and documented accounts of this place. Hope that others may avail their knowledge and resource to this effort.</i>
Woode, Napali	Native Hawaiian Economic Alliance	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; no response
Yee, Christian Kaimanu	<i>Kama 'āina, familiar with wahi pana and mo'olelo</i>	Letter and figures sent via USPS 29 November 2018; letter and figures sent via email 30 November 2018; letter and figures sent via email 4 January 2019; CSH spoke with Mr. Yee on 23 February 2019: <i>Mr. Yee mentioned that the proposed project may be located within or near the 'Ewa Limu Management Area. He also stated he hopes the project will not effect the limu.</i> CSH contacted Mr. Yee via telephone to schedule <i>huaka'i</i> to One'ula Beach Park and 'Ewa Limu Management Area CSH met with Mr. Yee at One'ula Beach Park 29 March 2019 CSH sent Mr. Yee a draft summary of <i>huaka'i</i> to One'ula Beach Park and 'Ewa Limu Management Area 10 June 2019 Mr. Yee approved summary 3 July 2019

6.4 *Kama'āina* Interviews

The authors and researchers of this report extend our deep appreciation to everyone who took the time to speak and share their *mana'o* and *'ike* with CSH whether in interviews or brief consultations. We request that if these interviews are used in future documents, the words of contributors be 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.

6.4.1 Wallace K. Ito

On 5 March 2019, CSH met with Mr. Wallace Kyoshi Ito at Moanalua 99 (formerly 99 Ranch Market) to discuss the Pōhakupuna Road project and to share his *'ike* of the traditional gathering practices and abundant marine resources of the shoreline of Honouliuli Ahupua'a.

Born in downtown Honolulu on 10 April 1953, Mr. Ito moved to 'Aiea where he attended Alvah Scott Elementary School from kindergarten through third grade. He then moved to Kalihi where he attended Kapālama Elementary School, Kalākaua Middle School, and Farrington High School. After graduating from Farrington High School in 1971, Mr. Ito attended the University of Hawai'i (UH) at Mānoa. Mr. Ito left UH-Mānoa before graduating to work with his father at his refrigeration/air conditioning business for 25 years. In the fall of 2004, Mr. Ito enrolled in Hawai'i Pacific University's (HPU) Marine Science Program where he obtained a Bachelor of Science (BS) degree in Marine Biology in 2014.

Mr. Ito shared with CSH his extensive knowledge regarding the environmental factors that led to the decline of *limu* which was once abundant along the 'Ewa shoreline. Pukui and Elbert (1984:190) define *limu* as “all kinds of plants living under water, both fresh and salt, also algae growing in any damp place in the air, as on the ground, on rocks, and on other plants; also mosses, liverworts, lichens.” In ancient times, *limu* was “the third component of a nutritionally balanced but monotonous diet consisting of fish and *poi*” providing significant amounts of vitamins and minerals including Vitamin A, Vitamin B12, Vitamin C, and riboflavin (Abbott and Williamson 1974:2–3). *Limu* was also used for medicinal purposes. Over the years, Mr. Ito observed the decline of the *limu* and other marine resources along the shoreline, which was a result of the 'Ewa plain's transition from agricultural to urbanization.

Mr. Ito is currently the Limu Hui Coordinator for Kua'āina Ulu 'Auamo (KUA), an “innovative, community-based initiative for protecting, restoring and caring for Hawai'i” (KUA 2019).

KUA is advancing community-based natural resources management in Hawai'i, working together with government agencies and communities towards restoring Hawai'i communities' traditional role as caretakers of their lands and waters. [KUA 2019]

In 2014, KUA partnered with the 'Ewa Limu Project (ELP) to establish the Limu Hui. ELP is a “community-centered grassroots effort” whose primary missions are “the preservation of coastal habitat through re-planting of select species of *limu*” and “the firm avocation of marine education and preservation of Hawaiian culture and values” ('Ewa Limu Project n.d.). The Limu Hui is an initiative to “gather the gatherers,” bringing together *limu* practitioners from across the Hawaiian Islands to share their knowledge of *limu* (KUA 2019).

Mr. Ito discussed the late Henry Chang Wo Jr., affectionately known as “Uncle Henry,” one of the founders of the ELP:

Uncle Henry grew up on this shoreline. And, he learned about *limu* and harvested *limu* with his grandmother, his mother, and aunties along the shoreline. . . his grandmother, his mom, and aunties knew a lot about *limu*. What kind of *limu*, the *limu* names, and the medicinal uses of *limu*. . . Uncle Henry was just dragged along as a ‘bag boy’ . . . he wasn’t really interested in learning all this, he was just forced to do it. Eventually, I guess, by just being with them, he kind of learned about *limu*. And as they got older, that’s when he realized ‘Eh! I better get a little more serious about learning’ so he would be the one to pass on that knowledge. ‘Cause when his grandmother and his mom pass away, all of the knowledge would be lost. So, Uncle Henry took it upon himself to kind of start teaching about *limu*. And talking about it.

ELP provides outreach through “workshops to pass on knowledge obtained from him [Uncle Henry] and other *kūpuna* as well as knowledge gained from scientific research” (‘Ewa Limu Project n.d.). In 2009, Uncle Henry asked Mr. Ito to join him on his “talk story” sessions which he called “Show and Tell.” They would collect samples of *limu* and present them to various community groups. Following the passing of Uncle Henry, Mr. Ito and a couple other people dedicated themselves to continuing his teaching.

Uncle Henry was also involved in the establishment of the ‘Ewa Limu Management Area (LMA). Effective 1 January 2007, HRS §188.22.8 established the ‘Ewa LMA which is “located in the waters off ‘Ewa Beach on the south shore of O‘ahu, and extends from the western edge of the gunnery range to Mu‘umu‘u Street, from the shoreline 150 feet seaward” (DLNR 2019a). Within the LMA, people are permitted “to hand-pick up to one pound of all types of *limu* combined per person from 6:00 am to 6:00 pm during the months of July, November, and December” (DLNR 2019a). Mr. Ito noted, “That’s the only area in the State that actually is an LMA, Limu Management Area, that’s specifically for *limu*. There’s a lot of FMAs, Fishery Management Areas, but that’s the only place that specifically addresses *limu*.”

He added,

It’s good to have a Limu Management Area if there is a need and a purpose for it . . . For us, with KUA, it’s conservation with keeping in mind that people are part of the management. And so, we don’t support a ‘No Take Area.’ Lot of conservation organizations today, that’s how they manage species. No hunting, no fishing in this area. Let the area restore itself. We don’t buy into that philosophy . . . especially us in Hawai‘i, there’s many people, many communities that depend on being able to harvest *limu*, depend on being able to catch their dinner and they depend on the ability to go out and hunt, to bring food for themselves and the community. So, it’s all about proper management rather than complete closure.

. . . it’s all on the same philosophy that the resource is there for us to enjoy. And so, June/July [is] graduation time and November/December [is] Christmas time. So, that’s the whole idea of being able to enjoy the resource. Provide food for yourself and for the family. That’s why we want to protect it. That’s why we want it to grow.

Mr. Ito discussed the effect the LMA is having on the marine resources along the 'Ewa shoreline.

I didn't meet Uncle Henry until like two years after the start of the LMA. The first time I got to see that place was two to three years after the start. He described, he talked about the place being covered by invasive *limu*, the gorilla *ogo* [*Gracilaria salicornia*]. With the help of a Campbell High School teacher and his students, they managed to eliminate a good portion of the gorilla *ogo* and ever since then the native *limu* started to come back. But also saw a transition from a species of *limu*, from *caulerpas* [*Caulerpa taxifolia*] to *codium* [*edule*], *wāwaiole*. The first time I saw that plenty different species of *caulerpas* and after about 3-4 years we saw more, I've seen more *codium*. That's what people like to eat. *Wāwaiole*. The invasive *limu* population, the gorilla *ogo*, the one that was there originally, that is not coming back at all, but in the last few years we been seeing another invasive *limu* starting to take over, the leather mudweed [*Avrainvillea amadelpha*]. The one that they're trying to get rid of in Maunalua Bay, Hawai'i Kai side. Starting to come up on the shoreline in 'Ewa Beach.

He noted that when he takes school groups to the shoreline within the LMA, they observe a lot of "different kinds of native *limu*." Mr. Ito discussed the various types of *limu* he has observed along the shoreline:

So, *limu līpoa* [*Dictyopteris plagiogramma*]. *Limu kohu* [*Asparagopsis taxiformis*], I still find in abundance. Uncle Henry's favorite *limu* was *līpe'epe'e* [*Laurencia succisa*] and that is still found in abundance in small pockets. We still see a lot of the *wāwaiole* today, but not in the kind of abundance that people describe earlier.

Mr. Ito described the landscape of Honouliuli Ahupua'a during the plantation era:

This is when Fort Weaver Road was a two-lane road. One lane in, one lane out. People who lived there at the time, they said certain times of the year, before they even get close to the ocean, they can smell the ocean. And, what that is, is *limu līpoa*. *Limu līpoa* has that real ocean smell. *Limu līpoa* would detach from the whole patch and get washed up on shore. Once a year and would be real abundant on the shoreline. Just piled up on the shoreline. And has a real fragrant smell.

He recalled the changing landscape as the 'Ewa plain slowly began to urbanize:

So, from the 1970s . . . was all sugar cane . . . Fort Weaver Road, one lane down, one lane up, as you driving down, only sugar cane, both sides. . . And then slowly, driving down Fort Weaver Road slowly became four lanes, now six lanes, some places, if you count the turnoff, like eight lanes. Talking about four lanes going one direction, four lanes in the other direction. And, the disappearance of the sugar cane and the new crop that came up was houses.

Mr. Ito recalled the abundance of *limu* and other marine resources along the 'Ewa shoreline (Figure 35). He noted that he used to gather *ogo* (Japanese name for *limu manauaea*, *Gracilaria coronopifolia*) from the shoreline in front of the project area. He also mentioned that he used to go fishing at his "friend's in-law's house" which was located "two houses away" from the project area.



Figure 35. Photograph of abundance of *limu* along shore in front of Lion's Club property at One'ula Beach Park in 1977 (photo courtesy of Wally Ito)

We used to catch *pāpio* [juvenile Black Trevally, *Caranx lugubris*], once in a while, *ulua* [Giant Trevally, *Caranx ignobilis*], big *ulua*, 'ō'io [Bone fish, *Albula Vulpes*], lot of times, 'ō'io, *moi* [Pacific threadfish, *Polydactus sexfilis*], *moi* would come up, another thing that would come up a lot was eel, moray eel.

He recalled how the abundance of *limu* made it difficult to catch fish when casting his fishing line from the shore.

From the mid 1980s to the mid 1990s, so about 10 years. At the beginning, like mid-80s, still had plenty *limu*. So, we would throw our line out, and put em in the pole holder and you put the bell on, so when the fish bite, the bell gonna ring. You know at the beginning, like in the early 1980s, sometimes we set the pole down, set the line, put the bell on and before we even turn around to sit down the bell is going 'ding-ding, ding-ding, ding-ding' but that was cause get so much *limu*. The *limu* get all stuck on the line and when the waves come.

Over the years, he observed the decline of *limu* and other marine resources (Figure 36): “. . . that's why we stopped fishing, we would go over there put our bait on the hook throw em out, leave em out there for 4 or 5 hours, bring em back in, the bait still on em. No more *limu*, no more eels, no more nothing.”

Mr. Ito discussed the importance of *limu* to the overall health of the near shore ecosystem:

. . . I started to learn about *limu*, the importance of, this is my ecology classes at HPU. We talk about the base of the marine food chain, talking about the *limu*. The fish, herbivores eat the *limu*, then the carnivores eat the herbivores. But also in ecology class, we learn about apex predators. For the near shore coral reef, one of the apex predators is the moray eel [*puhi*; *Muraenidae*]. And so, if at the top of the food chain, if you have a healthy population of apex predator, that means every trophic level below that is healthy, in order to support that. So, if you dive and you see eels all over the place and eels eating each other, you know that's a healthy reef cause get plenty food for them to have a high population.

Mr. Ito believes the abundance of *limu* was a result of the agricultural activities occurring *mauka* of the shoreline.

My guess is that the plantation had something to do with the *limu* abundance too. Irrigation, fertilizer that would percolate down to the aquifer and fertilizer would help the *limu* grow . . .

. . . what the underground water does, the underground springs, what that does is bring nitrogen from *mauka* to the *kai* [sea], the shoreline. As we lose the groundwater, we losing the nitrogen. That's one of the essential nutrients for *limu*.

Mr. Ito stated that one of the major factors in the decline of *limu* along the 'Ewa shoreline is the loss of groundwater which is the result of the transition of the 'Ewa plain from agricultural to urbanization. He noted that impermeable surfaces, such as concrete, roads, and roofs, prevent rainwater from percolating down into the ground restoring the underground aquifer and contribute to surface runoff which carry pollutants that are harmful to *limu*.



Figure 36. Photo showing Uncle Henry and the absence of *limu* along shore in front of Lion's Club property at One'ula Beach Park in 2012 (photo courtesy of Mr. Wally Ito)

. . . what happens today is people build homes and they lazy cut grass, so concrete. Creating more impermeable surfaces. Rain fall down, all going flow. Surface flow directly to the ocean. Carrying with it all the *‘ōpala* [rubbish], all the oils that leak onto your driveway.

Mr. Ito emphasized the relationship between the *mauka* and *makai* areas. He noted that Uncle Henry could determine the health of the *ahupua‘a* by observing the amount of *limu* along the shore.

Uncle Henry, he saw all that cause he grew up when he harvested *limu* all the time. And he saw the declining of the *limu*. And Uncle Henry always talked about standing on the shoreline and looking at the *limu*, what kind of *limu* should be there, what's there, how much get, and by looking at that he could tell you without turning around, he could tell you the health of the *ahupua‘a*. So, it's standing on the shoreline seeing the decline of the *limu* and [seeing] the transition of agriculture to urbanization, [and realizing it is the] cause [of] the decline of that.

Mr. Ito discussed how “naturally occurring sand berms” protect the shoreline by preventing surface runoff from flowing directly into the ocean and allowing the water to percolate down recharging the aquifer.

If you have a sandy beach, almost always right at the vegetation line, you're gonna see a naturally occurring sand berm, in varying heights . . . by cutting down that sand berm when has all the big rain, all that surface runoff, all gonna flow directly into the ocean. Directly into the ocean, right where our *limu* beds are. Carrying with them all the silt, and all the *‘ōpala* and essentially runoff. That's all, we know that, not only for *limu*, but for coral, that's not good stuff.

Mr. Ito mentioned that the most common reasons attributed to the decline of *limu* along the 'Ewa shoreline are over-harvesting and improper harvesting; however, Mr. Ito noted that “if those reasons were the main cause of *limu* decline, we would see a decline in only certain species of *limu*. People only harvest the one they eat. We would have a hard time finding those *limu* today and there should be a high abundance of other *limu*. But because we don't have anything, it's something much bigger than that.”

Mr. Ito would like to see the project be a “model of *pono* [proper] development.” He recommends that “whoever is developing that place takes into account the history of 'Ewa Beach and the importance of *limu* to that history.”

He would like developers to “consider protecting the shoreline from runoff, surface flow . . . design and build allowing the rainwater to percolate down rather than impermeable surfaces.” Mr. Ito recommended maintaining the sand berm or creating an artificial berm to prevent any surface flow from flowing directly into the ocean.

Keep in mind the importance of that sand berm or that rise just before the shoreline. In this area is all rocky, so I don't know if there is actually a natural protection. Even create an artificial one, so that prevents all that water from flowing directly onto the shoreline.

He also noted the importance of preserving shoreline access for the community. He stated, “[F]or Uncle Henry, for us carrying on his work, as far as teaching about *limu*, it's important for

us to protect and to be able to continue to take school groups, community groups to the shoreline and talk about *limu*.”

He stated that “before we can even think about *limu* restoration or *limu* making a comeback . . . we got to stop all the negative impact first. . . . Stop the bleeding first, then we start thinking about restoration and bringing back the *limu*. Try to save what’s there today and try to keep it from declining further.

He stated that “individual homeowners can help in a small way, but if everybody helps in a small way, it’s gonna have a huge impact.”

Individual homeowners can do stuffs like eliminate the concrete. Put plants. Grow food, grow your own food. But also rain barrels. Collect the rain that fall onto your roof. Collect them into barrels and slowly use that to water your plants. You’re going to decrease the surface flow of the rain and the whole idea is to allow the rain to percolate the ground.

On 1 May 2019, CSH accompanied Mr. Ito, Dr. Ryan Okano, Phycologist and Ms. Pamela Fujii, board member with KUA and the ‘Ewa Limu Project and Project Director for the Hawai‘i Coral Reef Initiative Research Program and Pacific International Training Desk at the University of Hawai‘i at Mānoa as they led a group of students from Ka ‘Umeke Kā‘eo, a Hawaiian language immersion school from Keaukaha on the island of Hawai‘i, on a *huaka‘i* (journey) along the coastline at One‘ula Beach Park to collect samples of *limu*. Before beginning the *huaka‘i*, Mr. Ito explained to the group that when collecting *limu*, one must be sure not to remove the holdfast, the part which is attached to the rocks or other surfaces (DLNR 2019b). The group then separated into three smaller groups and proceeded east to the end of One‘ula Beach Park.

The group observed numerous species of *limu* along the rocky shoreline including *limu pepiao* (*Padina* spp.), *limu alani* (*Dictyota* spp.), *limu ‘a‘ala‘ula* (*Codium arabicum* and *C. reediae*) (Figure 37), *limu wāwae‘iole* (*Codium edule*) (see Figure 37), *Chaetomorpha antennina*, *limu pālahalaha* (*Ulva fasciata*), *limu kala* (*Sargassum* spp.), *limu līpoa* (*Dictyopteris australis*) (Figure 38), *Grateloupia hawaiiiana* (Figure 39), *limu kohu* (*Asparagopsis taxiformis*) (Figure 40), *limu lipe‘epe‘e* (*Chondrophycus dotyi*), *limu hā‘ula* (*Amansia glomerata*) (Figure 41), and sea grapes (*Caulerpa* spp.) as well as invasive algae, hook weed (*Hypnea musciformis*), prickly seaweed (*Acanthophora spicifera*), gorilla ogo (*Gracilaria Salicornia*), and leather mudweed (*Avrainvillea amadelpha*).

Following the *huaka‘i*, the group stopped briefly at the Kalo‘i Gulch drainage basin where Mr. Ito explained the history of the ‘Ewa Plain and the relationship between the development occurring in the *mauka* area of the ‘Ewa plain and the marine resources of the ‘Ewa coastline. He noted that surface water from the *mauka* areas flows toward the ocean carrying pollutants that are harmful to marine resources along the coastline. During periods of heavy rain, stormwater collecting in the Kalo‘i Gulch drainage basin overflows and floods the area near the shoreline. This excess water is prevented from flowing directly into the ocean by the natural sand berm located between the basin and the shoreline.

The group then traveled by automobile to Pu‘uloa Beach Park to “talk story” about the samples of *limu* the group collected at One‘ula Beach Park. As the group identified the samples of *limu*, Mr. Ito shared his *‘ike* (knowledge) about the different species.

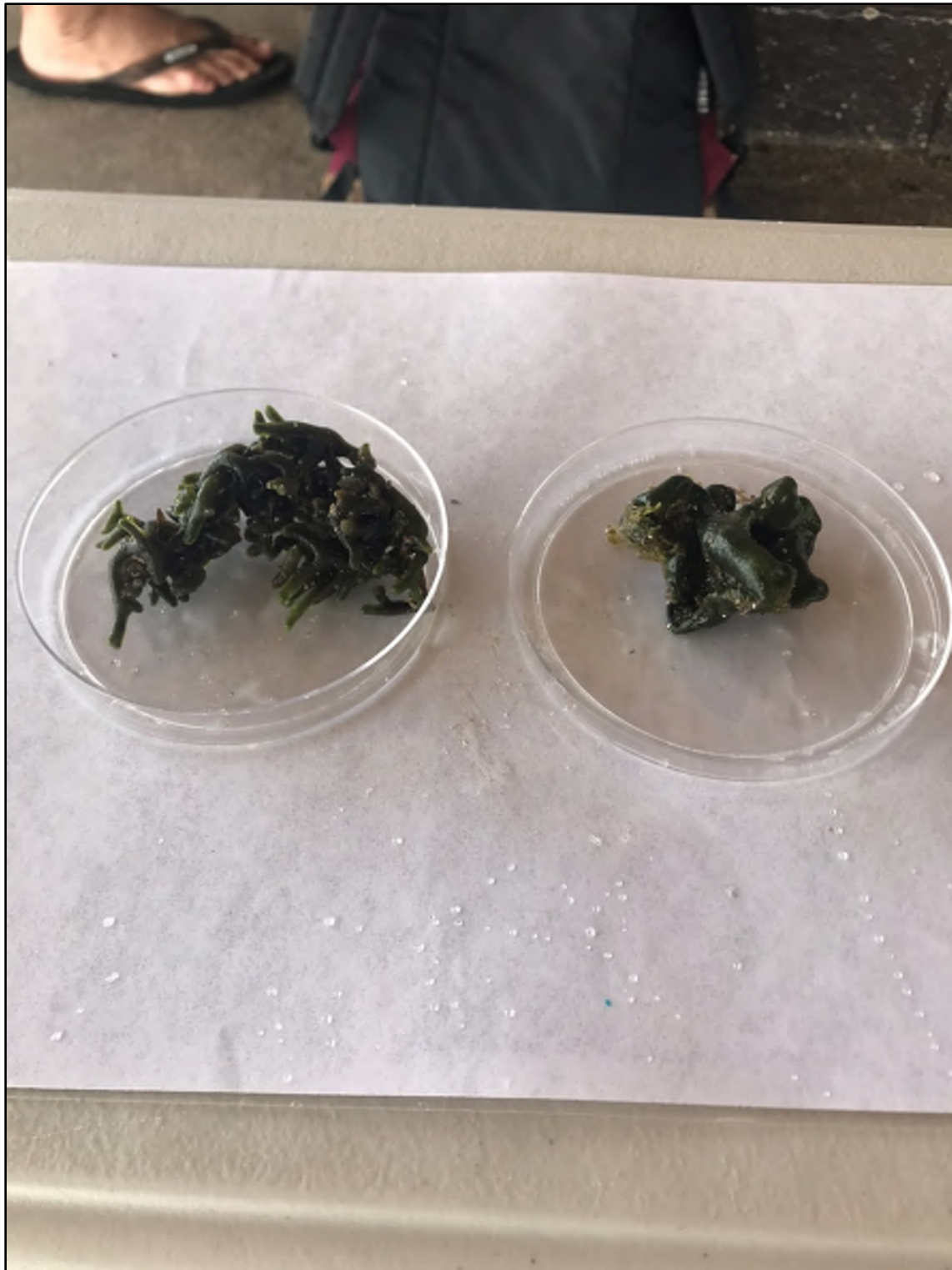


Figure 37. *Limu wāwae 'iole* (left) and *limu a'ala'ula* (right) (CSH 2019)



Figure 38. *Limu lipoa* (CSH 2019)



Figure 39. *Grateloupia hawaiiiana* (CSH 2019)



Figure 40. *Limu kohu* (CSH 2019)



Figure 41. *Limu hā'ula* (CSH 2019)

He stated the *limu pepiao* is a pioneer species, the first species to colonize an area. He mentioned that *limu alani*, which was observed in abundance in the beginning of the *huaka'i*, is used medicinally to treat respiratory problems. *Limu alani* is also used by divers to wipe their goggles, preventing them from fogging.

Mr. Ito stated that *limu 'a'ala'ula* and *limu wāwae'iole* are cousins since both species are part of the *Codium* family. He noted that *Grateloupia hawaiiiana* is the cousin of *limu huluhuluwaena* (*Grateloupia filicina*) which was known as one of Queen Lili'ūokalani's favorite *limu*. He also stated that *Chaetomorpha antennina* is similar to *limu 'ele'ele* (*Ulva prolifera*), however, *Chaetomorpha antennina* has branches that are segmented unlike *limu 'ele'ele* that has branches consisting of a single section. He mentioned that *limu pāhalahala*, a member of the *Ulva* family, is known as the "lettuce of the sea." Mr. Ito discussed the numerous uses of *limu kala*. He demonstrated that *limu kala* can be used to treat cuts by chewing it and applying it to a wound, noting that the iodine found in *limu kala* is an antiseptic that cleans wounds, helping them heal. He also discussed the ceremonial uses of *limu kala* as part of the ritual of *ho'oponopono* where family members get together to "set right what was wrong" (Pukui et al. 1972:61). He stated that participants in the ritual would wear a *lei po'o* (wreath worn around the head) of *limu kala* and walk into the ocean, letting the *lei* get carried away by the waves along with the problems the participants were fighting over. He noted the word *kala* within the phrase "*E kala mai*" which translates to "forgive me."

Mr. Ito also stated that *limu kala* is laid on the bottom of a canoe during long voyages. He noted that *limu kala* is known for its strength and persistence since it is often found where waves are strong, adding that the *mana* (spiritual power) from the *limu* goes into the paddler.

While discussing *limu lipe'epe'e*, Mr. Ito asked the group if anyone is a student of *hula* (dance) since *limu lipe'epe'e* was *kapu* (forbidden) for *hula* dancers. He noted that the word *pe'epe'e* translates to "slippery." Mr. Ito noted the belief that dancers who eat *limu lipe'epe'e* might slip and fall during a performance or they may forget their choreography.

Mr. Ito also described the behavior of invasive *limu* that reproduce rapidly and take up nutrients native species need to survive. He explained how the invasive hook weed attaches (hooks) itself to other *limu*, smothering it. He noted that this species does not always display invasive behavior, however, in Maui the species has grown so rapidly it is considered an invasive species. Mr. Ito also noted that fish do not usually eat invasive algae, contributing to their abundance; however, he also noted that certain fish do eat the invasive prickly seaweed.

6.4.2 Christian Kaimanu Yee

On 23 February 2019, CSH briefly spoke with Mr. Christian Kaimanu Yee at Zippy's Waimalu regarding the Pōhakupuna Road project. Mr. Yee mentioned that the proposed project may be located within or near the 'Ewa LMA. HRS §188-22.8 established the 'Ewa LMA "from the shoreline and extending one hundred fifty feet seaward in Ewa beach from the gunnery range to the boat ramp at Mu'umu'u Street" (DLNR 2019a). The purpose of the LMA is "to preserve and sustain the *limu* supply by establishing a *limu* management area along the shoreline of 'Ewa beach on O'ahu" (*Honolulu Advertiser* 2006).

Mr. Yee was "made in 'Ewa Beach, [but] born in England." His father was a fireman for the United States Air Force and was stationed at Lakenheath Air Force Base (AFB) in England when

Mr. Yee was born in 1980. His mother is a second-generation Filipina from ‘Ewa Beach. Mr. Yee lived in England until 1983 when his father got stationed at Nelles AFB in Las Vegas. In 1985, his family returned to Hawai‘i and moved to ‘Ewa Beach where he lived until 1986, when his parents “separated for a little while” and his father moved to Waimalu in ‘Aiea. After being honorably discharged from the military, Mr. Yee’s father worked for a trucking company. His father would take him on “drives” where they would visit cultural sites including *heiau* and Kūkaniloko, the sacred birthstones where the highest ranking *ali‘i* were born (Sterling and Summers 1978:139).

Kukaniloko is considered to be the very center of the Hawaiian culture. As a person and a nation, one can come here and directly be in contact with the past, present, and future of Hawaii. Only royalty were allowed in the area of Lihue. High ranking *ali‘i* were born here, and the privileged were brought here to learn aspects of Hawaiian culture such as navigation. [Yee 2013b]

Mr. Yee’s father continued to share numerous *mo‘olelo* (stories) regarding the mythical and ancient past of O‘ahu. Mr. Yee began studying Hawaiian history and culture and in 2013, equipped with the knowledge that he had inherited from his father and his *kumu* (teacher) Kaipo‘i, Mr. Yee began a blog, *Pohukaina Cave*. In this blog he shares, “Hawaiian history and places from a bicycle”:

I am a resident of Waimalu in the moku of Ewa with a fascination of history, and being a Hawaiian it’s gotta be Hawaiian history for now! [...] I just want to share something that might appeal to you and hopefully things from the past will not be lost and covered by the fast present day life style! [Yee 2013a]

On 29 March 2019, CSH met with Mr. Yee at One‘ula Beach Park to discuss the Pōhakupuna Road project. One‘ula Beach Park is located at the end of Papipi Road. Pukui et al. translate One‘ula as “red sand” (Pukui et al. 1974:171). John Clark noted that One‘ula Beach Park probably received its name due to “a large drainage ditch from the mountains that once emptied quantities of red dirt upon the beach and into the surrounding ocean” (Clark 1977:73). Clark also suggested an alternate version for the naming of One‘ula in which a fisherman named Kapu lived on the beach near the One‘ula area during the early 1900s. Kapu was also known by the English name “Red” and by the Hawaiian name ‘Ula‘ula which also translates to “Red.” Kapu had “several canoes and many feet of fish net” which he used to fish the nearby waters and transient fisherman referred to this area as “‘Ula‘ula.” Clark suggests One‘ula may possibly be an alternate way of saying “Red’s Beach” (Clark 1977:73).

While at One‘ula Beach Park, CSH inquired into the known resources associated with Honouliuli and ‘Ewa Moku. According to legend, ‘Ewa is the seed bed for *limu* (Western Pacific Regional Fishery Management Council 2000). In order to speak further on this legend, Mr. Yee proceeded to lead CSH on a *huaka‘i* to document marine resources along the shoreline of ‘Ewa Beach, a region once known for its abundance of edible *limu*; the presence of this abundant natural and cultural resource attracted gatherers from across O‘ahu Island (Clark 1977:72). Traveling by foot along the shoreline, CSH noted the landscape consists primarily of “patches of coral outcropping” (Clark 1977:73). Mr. Yee and CSH observed a few species of *limu* which had been washed ashore; these species included *limu wāwae‘iole* (*Codium edule*) (Figure 42) and *limu a‘ala‘ula* (*Codium Arabicum*) (Figure 43). *Wāwae‘iole* translates to “rat’s feet” due to the thin cylindrical shape of its branches (Abbott and Williamson 1974:11). *Limu wāwae‘iole* is a green



Figure 42. *Limu wāwae 'iole* observed at One'ula Beach Park (CSH 2019)



Figure 43. *Limu a'ala'ula* observed at One'ula Beach Park (CSH 2019)

algae which is often eaten “as a single *limu* with fish or in a stew” (Abbott and Williamson 1974:12). Mr. Yee recalled that his grandmother used to make soup with *limu wāwae‘iole*, “I remember a thick green one [*wāwae‘iole*] my grandma used to make hot soup with, Filipino style.”

Limu wāwae‘iole is also sometimes referred to as *limu a‘ala‘ula* (Abbott and Williamson 1974:11). *Limu a‘ala‘ula* is a green algae which is “often pounded very fine and mixed with pounded salted squid, while chili peppers may also be added if preferred. It is also sometimes pounded with other seaweeds to be eaten with poi and fish or meats” (Reed 1907:69). *A‘ala‘ula* translates to “red fragrance” due to the fragrant red liquid it exudes when it is prepared (Abbott and Williamson 1974:11).

Mr. Yee also observed *limu kala* (*Sargassum echinocarpum*) floating in the water along the shore (Figure 44). After removing it from the ocean to take a picture, he returned it back to the ocean and noted that a turtle (*honu*) would eat it. *Limu kala* is also known as *limu honu* since turtles are known to eat *limu kala*.

Limu is the base of the marine food chain, providing the primary source of food for fishes and other marine fauna (Western Pacific Regional Fishery Management Council 2000). The unicorn surgeon fish (*Naso brevirostris*) is also known to eat *limu kala*, consequently, the fish is known as *kala* in Hawaiian. *Limu kala* is also eaten by *palani* (Dussumier’s surgeon fish, *Acanthurus dussumieri*) and *enenue* (Ash colored rudder fish, *Kyphosus cinerescens*) (Abbott and Williamson 1974:14).

In ancient times, *limu kala* was used as bait for catching *kala*. Fishermen wove *hīna‘i* (basket fish trap) which were then filled with *limu kala* and placed into the sea (Figure 45). These *hīna‘i kala* were large traps, capable of holding up to 60 *kala* per haul (Maly and Maly 2003:45). Mr. Yee mentioned that he recently learned how to use *limu kala* as bait to catch *kala*. He stated that you need to “set the hook in the stem or on the opposite side on the crown. Then wrap the line around the stem behind the leaves to hide it. Then you have to let it float naturally in the water with the swell” (Figure 46).

Limu kala is also used for various medicinal and religious purposes. It is often “chopped or chewed and applied as a poultice” on open coral cuts (Abbott and Williamson 1974:6). Another medicinal use of *limu kala* was symbolic. A *lei* of *limu kala* was draped around the neck of a person who was suffering from an illness; the person walked into the ocean allowing the waves to wash away the *lei* along with the illness from which they were suffering. Traditionally, *limu kala* was also used in a number of rituals. According to David Malo, *limu kala* also was used by *kahuna* (priests) in at least two rituals. Following the burial of a relative, the ceremony of *huikala* (purification) was performed on those who watched and mourned over the body. A *kahuna pule heiau* (temple priest) brought a dish filled with sea water containing *limu kala* and turmeric and sprinkled the water on those who needed cleansing while reciting prayers for their purification (Malo 1951:97–98). Another ceremony involving *limu kala* was performed by fishermen in the month of Hinaiaele‘ele (July) when *‘ōpelu* (Mackerel scad, *Decapterus pinnulatus* and *D. maruadsi*) could be caught by net and used for food. The fishermen would assemble at the *ku‘ula heiau* (fishing shrine). A *kahuna* would bring a dish of water containing *limu kala* and turmeric and offer a prayer of purification (Malo 1951:209).

Limu kala also contributed to the family ritual of *ho‘oponopono*, which Pukui described as “getting the family together to find out what is wrong. [...] Then, with discussion and repentance



Figure 44. *Limu kala* observed at One‘ula Beach Park (CSH 2019)



Figure 45. Example of *hīna 'i* (basket fish trap) (CSH 2019)



Figure 46. *Limu kala* used as bait to catch *kala* (unicorn surgeon fish, *Naso brevirostris*) (photo courtesy of Mr. Yee)

and restitution and forgiveness—and always with prayer—to set right what was wrong” (Pukui et al. 1972:61). During the *ho‘oponopono*, “a member of the family would gather young leaves of *limu kala*, clean and wash them and present them to the family assembled in a circle. After praying and seeking forgiveness from each other, the *limu* was eaten” (Abbott and Williamson 1974:6). This ceremony is also indexed within the Hawaiian name of *kala* which Pukui and Elbert define as “to forgive, pardon, excuse” (Pukui and Elbert 1986:112).

[...] *kala* is a mutual process in which both the instigator and recipient of an offense are released from the emotional bondage Hawaiians call *hala* [...] *Kala* seeks to strip the incident of its pain-causing attributes. An insult or injustice may be remembered—but if *mihi* [apology] and *kala* have been sincere, it is remembered as ‘no big thing anymore.’ [Pukui et al. 1972:75]

Limu kala is also associated with the goddess Hinalaulimukala, whose name translates to “Hina leaves of *limu kala*.” Living within the ocean depths, Hinalaulimukala was the goddess of *kahuna* who were knowledgeable of medicines from the sea (Gutamanis 2010:93).

Mr. Yee and CSH then travelled via automobile to Pu‘uloa Beach Park, formerly known as ‘Ewa Beach Park. Pu‘uloa Beach Park is located at the end of Fort Weaver Road, adjacent to the Pu‘uloa Rifle Range. The shoreline in this area was known as Kūpaka (Clark 1977:72). Pukui and Elbert (1986:169) define Kūpaka as “to kick, thrash, as one in anger or as a child having a tantrum.” Mr. Yee recalled learning to surf with his father at Pu‘uloa Beach Park.

Pu‘uloa Beach Park is located on the eastern end of the ‘Ewa LMA. Following the establishment of the LMA, gathering of *limu* was prohibited for one year, allowing the *limu* to repopulate. Following that year, harvesting was once again permitted, however, people are limited to “hand-pick up to one pound of all types of *limu* combined per person per day from 6:00 am to 6:00 pm during the months of July, November, and December” within the management area (DLNR 2019a).

Mr. Yee and CSH proceeded west from Pu‘uloa Beach Park along the shoreline within the eastern end of the LMA, observing the abundance of *limu* which had washed up on shore (Figure 47). A number of different species of *limu* were observed including *limu a‘ala‘ula* (Figure 48), *limu wāwae‘iole* (Figure 49), *limu hā‘ula* (*Amansia glomerata*) (Figure 50), and leather mudweed (*Avrainvillea amadelpa*) (Figure 51).

The most predominant species of *limu* observed along the beach within the LMA was the leather mudweed (see Figure 51). Leather mudweed is an invasive green algae discovered in Hawai‘i in 1981; it is now found in large communities along O‘ahu’s south shore including Waikīkī and Maunalua Bay (Hawaii News Now 2012 and *Honolulu Star-Bulletin* 2010). It is often found on sandy bottoms where it competes with sea grasses that provide food for turtles and other marine species (DLNR 2019c). The leather mudweed traps sediments and mud creating an anoxic layer (DLNR 2019c). In anoxic water conditions, oxygen levels in the ocean have been depleted resulting in “dead zones” incapable of supporting marine life (Ecological Society of America 2019).

The proposed Pōhakupuna Road project is located approximately 125 m to the west of the ‘Ewa LMA. Mr. Yee noted that the ‘Ewa LMA is the only management area in Hawai‘i specifically



Figure 47. Abundance of *limu* washed ashore within ‘Ewa Limu Management Area (CSH 2019)



Figure 48. *Limu a'ala'ula* observed within 'Ewa Limu Management Area (CSH 2019)



Figure 49. *Limu wāwae‘iole* observed within ‘Ewa Limu Management Area (CSH 2019)



Figure 50. *Limu hā'ula* observed within 'Ewa Limu Management Area (CSH 2019)



Figure 51. Leather mudweed observed within 'Ewa Limu Management Area (CSH 2019)

created for the management of *limu*, adding that he does not want the *limu* to be negatively impacted by the proposed project.

6.5 Summary of *Kama'āina* Interviews

Based on reviewed and approved interview summaries of Wallace K. Ito and Christian Kaimanu Yee, the following is a synthesis of findings within Honouliuli Ahupua'a.

Mr. Wallace Kyoshi Ito, the Limu Hui Coordinator for KUA, recalled the abundance of *limu* and other marine resources along the 'Ewa shoreline. He recalled gathering *ogo* from the shoreline in front of the project area and fishing at his "friend's in-law's house" which was located "two houses away" from the project area. He added that the abundance of *limu* made it difficult to cast his fishing line from the shore, noting that "the *limu* would get all stuck on the line."

Mr. Ito stated that *limu* is vital to the overall health of the near shore ecosystem. Mr. Ito noted that *limu* is the "base of the marine food chain," adding that in order to support a healthy population of apex predators, every trophic level below must also be healthy.

Mr. Christian Kaimanu Yee noted that *limu kala* is eaten by *honu* and *kala*. He described how *limu kala* is used as bait to catch *kala*, stating that you "set the hook in the stem or on the opposite side on the crown. Then wrap the line around the stem behind the leaves to hide it. Then you have to let it float naturally in the water with the swell."

Mr. Ito stressed the relationship between the *mauka* and *makai* areas. Mr. Ito believes the abundance of *limu* along the 'Ewa shoreline was a result of the agricultural activities occurring *mauka* of the shoreline, noting that "fertilizer . . . would percolate down to the aquifer and fertilizer would help the *limu* grow. . ." He added that "underground springs, . . . bring nitrogen from *mauka* to the *kai* [sea], the shoreline.

Mr. Ito stated that the loss of groundwater resulting from the transition of the 'Ewa plain from agricultural to urbanization is one of the major factors in the decline of *limu* along the 'Ewa shoreline. He noted that rainwater is prevented from percolating down into the ground by impermeable surfaces, such as concrete, roads, and roofs. These impermeable surfaces prevent the rainwater from restoring the underground aquifer and contribute to surface runoff which carries pollutants harmful to *limu*. Mr. Ito stated that the shoreline is protected by "naturally occurring sand berms" which prevent surface runoff from flowing directly into the ocean, allowing the water to percolate down into the ground recharging the aquifer.

Mr. Ito, Dr. Ryan Okano, Phycologist, Ms. Pamela Fujii, board member with KUA and the 'Ewa Limu Project and Project Director for the Hawai'i Coral Reef Initiative Research Program and Pacific International Training Desk at the University of Hawai'i at Mānoa, and a group of students from Ka 'Umeke Kā'eo, a Hawaiian language immersion school from Keaukaha on the island of Hawai'i, observed numerous species of *limu* along the rocky shoreline of One'ula Beach Park including *limu pepiao*, *limu alani*, *limu 'a'ala'ula*, *limu wāwae'iole*, *Chaetomorpha antennina*, *limu pālalahala*, *limu kala*, *limu līpoa*, *Grateloupia hawaiiiana*, *limu kohu*, *limu lipe'epe'e*, *limu hā'ula*, and sea grape as well as invasive algae, hook weed, prickly seaweed, gorilla *ogo*, and leather mudweed. Mr. Yee and CSH also observed a few species of *limu* which had been washed ashore at One'ula Beach Park including *limu wāwae'iole*, *limu a'ala'ula*, and *limu kala*. Mr. Yee recalled that his grandmother used to make soup with *limu wāwae'iole*.

Mr. Ito discussed the numerous species of *limu* and their uses. He stated that *limu alani* is used medicinally to treat respiratory problems. He also stated that *limu kala* can be used to treat cuts by chewing it and applying it to a wound, noting that *limu kala* contains iodine which is an antiseptic that cleans wounds, helping them heal. He also noted that divers wipe their goggles with *limu alani* to prevent them from fogging up.

He also discussed the ceremonial uses of *limu* including *limu kala* which is used during the ritual of *ho'oponopono*, stating that participants wear a *lei po'o* of *limu kala* and walk into the ocean, letting the *lei* get carried away by the waves along with the problems the participants were fighting over. He stated that *limu kala*, known for its strength and persistence, is also laid on the bottom of a canoe during long voyages, noting the belief that the paddler receives *mana* from the *limu*. Mr. Ito also noted that *limu lipe'epe'e* was *kapu* for *hula* dancers due to the belief that eating *limu lipe'epe'e* might cause dancers to slip and fall during a performance or they may forget their choreography.

Mr. Ito and Mr. Yee discussed the 'Ewa Limu Management Area, noting that it's "the only area in the State that actually is an LMA, Limu Management Area, that's specifically for *limu*." Mr. Ito stated that when he takes school groups to the shoreline within the LMA, they observe a lot of "different kinds of native *limu*." During a *huaka'i* within the 'Ewa LMA, Mr. Yee and CSH observed a number of different species of *limu* including *limu a'ala'ula*, *limu wāwae'iole*, *limu hā'ula*, and leather mudweed.

Section 7 Traditional Cultural Practices

Timothy R. Pauketat succinctly describes the importance of traditions, especially regarding the active manifestation of one's culture or aspects thereof. According to Pauketat,

People have always had traditions, practiced traditions, resisted traditions, or created traditions [...] Power, plurality, and human agency are all a part of how traditions come about. Traditions do not simply exist without people and their struggles involved every step of the way. [Pauketat 2001:1]

It is understood that traditional practices are developed within the group, in this case, within the Hawaiian culture. These traditions are meant to mark or represent aspects of Hawaiian culture that have been practiced since ancient times. As with most human constructs, traditions are evolving and prone to change resulting from multiple influences, including modernization as well as other cultures. It is well known that within Hawai'i, a "broader "local" multicultural perspective exists" (Kawelu 2015:3) While this "local" multicultural culture is deservedly celebrated, it must be noted that it 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 survivance 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 help 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 within the *ahupua'a* in ancient times, and the aspects of these traditional practices that continue to be practiced today; however, this section also challenges "tropes of authenticity" (Cipolla 2013), and acknowledges the multicultural influences and entanglements that may "change" or "create" a tradition.

This section integrates information from Sections 3–6 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.

7.1 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 et al. 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.

There are no natural streams in the vicinity of the project area. However, fresh water remains available below the surface of Honouliuli. Dissolution “pit caves” (Myroie 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.

The lowlands fronting 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 “*kāi 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 kāi-koi o 'Ewa*, He has eaten the Kāi-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 Kūalaka'i as being plentiful in fish. Clark (1977:74) and Pukui et al. (1974:119) describe Kūalaka'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.

Interviewee Wallace Ito, Limu Hui Coordinator for KUA, recalled the abundance of *limu* and other marine resources along the 'Ewa shoreline. He noted that he used to gather *ogo* (Japanese name for *limu manaua*) from the shoreline in front of the project area. *Ogo* is often eaten with fish and meat or mixed with other seaweeds (Abbot 1972:17). He also mentioned that he used to go fishing at his “friend's in-law's house” which was located “two houses away” from the project

area. He recalled catching *pāpio*, *ulua*, *‘ō‘io*, *moi*, and moray eels. He also recalled the difficulty of casting his fishing line from the shore due to the abundance of *limu* which would get stuck on his fishing line. He also mentioned that the health of the near shore ecosystem can be determined by the presence of apex predators including moray eels, noting that a healthy population of apex predators indicate that every trophic level below is also healthy.

Limu is the base of the marine food chain providing food to herbivores which are then eaten by carnivores. *Limu kala* is known to be eaten by the unicorn surgeon fish which is known in Hawaiian as *kala*. Interviewee Christian Kaimanu Yee noted that he uses *limu kala* as bait to catch *kala*. *Limu kala* is also known as *limu honu* since it is also eaten by turtles.

During a *huaka‘i* along the coastline at One‘ula Beach Park, Mr. Ito, Dr. Ryan Okano, Ms. Pamela Fujii, and a group of students from Ka ‘Umeke Kā‘eo observed numerous species of *limu* along the rocky shoreline including *limu pepiao*, *limu alani*, *limu ‘a‘ala‘ula*, *limu wāwae‘iole*, *Chaetomorpha antennina*, *limu pālahalaha*, *limu kala*, *limu līpoa*, *Grateloupia hawaiiiana*, *limu kohu*, *limu lipe‘epe‘e*, *limu hā‘ula*, and sea grapes as well as invasive algae, hook weed, prickly seaweed, gorilla *ogo*, and leather mudweed.

Mr. Ito discussed the numerous species of *limu* and their different uses. Traditionally, *limu* was “the third component of a nutritionally balanced but monotonous diet consisting of fish and *poi*” providing significant amounts of vitamins and minerals including Vitamin A, Vitamin B12, Vitamin C, and riboflavin (Abbott and Williamson 1974:2–3). *Limu* is used as an ingredient in a variety of dishes including stews, *poke* and salads (University of Hawai‘i, Botany Department 2002). Mr. Yee stated that his grandmother used to make hot soup with *limu wāwae‘iole*.

Mr. Ito stated that *limu alani* is used medicinally to treat respiratory problems. He also noted that *limu kala* can be used medicinally to treat cuts. *Limu kala* is also used as a part of ceremonies and rituals including *ho‘oponopono*. Mr. Ito stated that participants in the *ho‘oponopono* would wear a *lei po‘o* of *limu kala* and walk into the ocean; the *lei* was carried away by the waves along with the problems over which the participants were fighting. Mr. Ito also stated that *limu kala* is laid on the bottom of a canoe during long voyages, noting that *limu kala* is known for its strength and persistence and the *mana* from the *limu* goes into paddler. He also stated that *limu lipe‘epe‘e* was *kapu* for hula dancers, noting the meaning of *pe‘epe‘e* which translates to “slippery.” It is believed that dancers who eat *limu lipe‘epe‘e* might slip and fall during performance or they may forget their choreography.

Mr. Ito observed the decline of *limu* and other marine resources along the ‘Ewa shoreline. He believes the decline in *limu* is the result of the urbanization of the ‘Ewa plain, noting that impermeable surfaces such as concrete, roads, and roofs prevent rain water from percolating down into the ground restoring the underground aquifer and contributing to surface runoff which carries pollutants harmful to *limu*. He stressed the importance of sand berms which protect the shoreline by preventing surface runoff from flowing directly into the ocean and allowing the water to percolate down to recharge the aquifer.

Mr. Yee noted that the project area is located adjacent to the ‘Ewa LMA which was established in 2007 to “preserve and sustain the *limu* supply” (Honolulu Advertiser 2006). During a visit to the ‘Ewa LMA, Mr. Yee and CSH observed a number of different species of *limu* including *limu a‘ala‘ula*, *limu wāwae‘iole*, *limu hā‘ula*, and leather mudweed. Mr. Ito notes that *limu a‘ala‘ula* and *limu wāwae‘iole* are cousins, as they are both members of the *Codium* family. The most

predominant species of *limu* observed within the 'Ewa LMA was the leather mudweed, an invasive green algae found in large communities along the south shore of O'ahu.

7.2 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 extending from Honolulu to Wai'anae. A cross-*ahupua'a* (east-west) trail that bordered Pearl Harbor, passed through Honouliuli north of Pu'uokapolei, and continued along the coast to Wai'anae following the route of the modern Farrington Highway. A *mauka-makai* (north-south) trail branched off the cross-*ahupua'a* trail into two offshoots that led to the settlements of Kūalaka'i and One'ula which are located along the southern coast, west of the project area.

The 'Ewa coastal plain was also a place of spiritual significance as it was associated with the *ao kuewa*, the realm of homeless souls. According to Samuel Kamakau, there existed three spirit realms, the *ao kuewa*, *ao 'aumakua*, and *ke ao o milu*. Upon death, the spirit of the recently deceased was said to leave the body and then proceed toward a *leina* where they would leap into Pō, the world of the unseen (Handy and Pukui 1972:146). The spirit was guided to and over the *leina* and into Pō by their *'aumakua* (Handy and Pukui 1972:146), 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 until such time that they were rescued by their *'aumakua*. Fornander (1919:6[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* of the hill.

Pu'uokapolei was also known to be the home of Kamapua'a's grandmother, Kamaunuanoho, (Nakuina 1904:50). 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 (Pukui 1974:203). Another account (*Ka Loea Kālai'āina*, 13 January 1900 in Sterling and Summers 1978:34) stated that Kekele'aikū, the older brother of Kamapua'a, also lived on Pu'uokapolei.

The plain of Pukaua is also located near Pu'uokapolei, northwest of the project area. Two distinct *mo'olelo* are connected with this cultural site. The first of these two stories was presented in the 13 January 1900 edition of *Ka Loea Kālai'āina* which states two old women with supernatural powers were heading to their home to Pukaua following an evening of fishing at the village of Kualaka'i. As the sun began to rise, the women hid to avoid being seen and their bodies turned to stone. The second *mo'olelo* involves Hi'iaka, and is spread across several daily editions of *Ka Hōkū o Hawai'i* from February 1927. According to the *mo'olelo*, the two women were *mo'o*. The women met Hi'iaka as she journeyed toward the 'Ewa coast. They were afraid Hi'iaka would kill them, so they transformed into their lizard form and hid from Hi'iaka (*Ka Hōkū o Hawai'i*, 15 February 1927, translated in Maly 1997:19). This stone was known as "Pe'e-kāua," which translates to "we two hidden."

Kūalaka'i is the name of an ancient fishing village located on the southwestern side of Honouliuli Ahupua'a, west of the project area. Kūalaka'i is mentioned in the "Legend of the Children" which foretells the breaking of the eating *kapu* by the *ali'i* (*Ka Loea Kālai 'āina*, 22 July 1899:15, translation in Sterling and Summers 1978:7). This area was also once the site of a spring called Hoaka-lei ("lei reflection"), where according to *mo'olelo*, Hi'iaka picked *lehua* and saw her reflection in the water (Pukui et al. 1974:119).

Kalaeloa is an area located west of the project area at the southwestern point of O'ahu. Kalaeloa Point was the home of Uhu Makaikai, a *kupua* who could take the form of a man or a giant parrotfish (*uhu*). He is mentioned in several legends concerning the hero Kawelo and with Kawelo's struggles with 'Aikanaka, the ruling chief of Kaua'i (Hawaiian Ethnological Notes, Bishop Museum Vol. II:114, translation in Sterling and Summers 1978:41).

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.

7.3 Religious Practice

Several *heiau* stood in Honouliuli Ahupua'a including Pu'uokapolei Heiau, Pu'u Ku'ua Heiau, and two unidentified *heiau* located at the foot of Pu'u Kanehoa and Pu'u Kuina, respectively. Each year, a ceremony commemorating the changing of the seasons is still observed in the beginning of May at Waikīkī and Honouliuli. 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). The ceremony occurs at Pu'uokapolei Heiau which 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 toward Papa'ena'ena Heiau, located in Waikīkī.

7.4 Burials

'Ewa was famous for the many limestone caves formed in the uplifted coral, called the "Ewa Karst." In traditional Hawaiian times, the areas of exposed coral outcrop were undoubtedly more extensive. Where not covered by alluvium or stockpiled material, this Pleistocene limestone outcrop has characteristic dissolution "pit caves" (Mylroie and Carew 1995). The caves of Pu'uloa were sometimes also used as burial caves. Following the death of Keali'iahonui, son of Kaua'i's last king, Kaumuali'i, in 1849, his body was buried in Pu'uloa (Alexander 1907:27). Burials have been encountered in the coastal areas of the *ahupua'a*, however, no burials have been encountered within the project area or within the vicinity of the project area.

Section 8 Summary and Recommendations

CSH undertook this CIA at the request of Group 70 International, Inc. The research broadly covered the entire *ahupua'a* of Honouliuli, including the current project area.

8.1 Results of Background Research

Background research for this study yielded the following results, presented in approximate chronological order:

1. The 'Ewa plains, south of the Wai'anae mountain range, consist largely of limestone and alluvial deposits pockmarked with karsts formed by the dissolution of limestone by underground fresh water. The project area in pre-Contact Hawai'i would have consisted of lowland dry shrub and grasslands.
2. Honouliuli is the largest *ahupua'a* (land division usually extending from the uplands to the sea) in the *moku* (district) of 'Ewa. Honouliuli translates literally as "dark water," "dark bay," or "blue harbor," and thus is named for the waters of Pearl Harbor which marks the eastern boundary of the *ahupua'a* (Jarrett 1930:22). Another source translates Honouliuli as "The blue bays or inlets" (*Saturday Press*, 11 August 1883). Honouliuli appears in the "Mo'olelo of Lepeamoā," the chicken-girl of Pālama, where Honouliuli is the name of the husband of the chiefess Kapālama, and grandfather of Lepeamoā (Westervelt 1923:164–184).
3. Generally, Honouliuli was described as very hot and dry. Evidence for drought-like conditions is 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 at the time of his 1930 survey *mai'a* (banana; *Musaceae*) and *kō* (sugarcane; *Saccharum officinarum*) were being cultivated within the pit caves (sinkholes) (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 north of the current project area) is described. Kamakau describes Kaupe'a as a wide plain where a grove of *wiliwili* (*Erythrina sandwicensis*) stands (Kamakau 1991a: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. A cross-*ahupua'a* (east-west) trail that bordered Pearl Harbor, passed through Honouliuli north of Pu'uokapolei, and continued along the coast to Wai'anae following the route of the modern Farrington Highway. A *mauka-makai* (north-south) trail branched off the cross-*ahupua'a* trail into two offshoots which led to the settlements of Kūalaka'i and One'ula which are located along the southern coast.
9. The rich resources of Pu'uuloa—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 Kākūhihewa, Keaunui, Lakona, Mā'ilikūkahi, and Kahahana.
10. In early historic times, the population of Honouliuli was concentrated at the western edge of West Loch in the vicinity of Kapapahu Point in the "Honouliuli Taro Lands." This area was clearly a major focus of population due to the abundance of fish and shellfish resources in close proximity to a wide expanse of well-irrigated bottomland suitable for wetland taro cultivation.
11. Early foreign accounts describe the southwest coast of O'ahu, including Honouliuli Ahupua'a, as an area "a little distance from the sea, the soil is rich and all the necessities of life are abundantly produced" (Vancouver 1798:215). A sailor among Vancouver's crew observed, however, that "from the number of houses within the harbour it should seem to be very populous; but the very few inhabitants who made their appearance were an indication of the contrary" (Vancouver 1798:216).
12. 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.
13. Beginning with the time of Western Contact, however, Hawaiian populations were introduced to many virulent western diseases which began to decimate the native populations. Thus, four years following the 1832 census, the 'Ewa population had dropped to 3,423 (Schmitt 1973:9, 36), "a decrease of 592 in 4 years" (Ewa Station Reports 1836). Between 1848 and 1853, a series of epidemics of measles, influenza, and whooping cough often wiped out whole villages.

14. With the increasing foreign interests on O‘ahu Island during the last half of the nineteenth century, an array of agricultural enterprises was attempted. 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 a total of \$95,000.
15. 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).
16. The early twentieth century saw the lands of Honouliuli heavily utilized by both civilians and the U.S. military for transportation. 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.
17. 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.

8.2 Results of Community Consultations

CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. Community outreach letters were sent to a total of 62 individuals or groups; seven responded and two of these *kama ‘āina* and/or *kūpuna* met with CSH for more in-depth interview. Consultation was received from community members as follows:

1. Wallace K. Ito, Limu Hui Coordinator for Kua‘āina Ulu ‘Auamo (KUA)
2. Christian Kaimanu Yee, *kama ‘āina* and cultural informant

8.3 Impacts and Recommendations

Based on information gathered from the cultural and historical background and the community consultation potential impacts were identified and the following recommendations were made:

1. Mr. Ito would like to see the project be a “model of *pono* [proper] development.” He recommends that developers “take[s] into account the history of ‘Ewa Beach and the importance of *limu* [seaweed] to that history.”
2. Mr. Ito recommends the developers “consider protecting the shoreline from runoff, surface flow.” He stated that “naturally occurring sand berms” protect the shoreline by preventing surface runoff from flowing directly into the ocean and allowing the water to percolate down to recharge the aquifer. Mr. Ito recommended maintaining the sand berm or creating an artificial berm to prevent any surface flow from flowing directly into the ocean.
3. Mr. Ito noted that individual homeowners can help by eliminating the concrete which would allow rainwater to percolate into the ground and decrease surface runoff which carries pollutants into the ocean.

4. Mr. Ito also noted the importance of preserving shoreline access for the community. He would like “to be able to continue to take school groups, community groups to the shoreline to talk about *limu*.”
5. Mr. Yee stated the he does not want the *limu* to be negatively impacted by the proposed project.
6. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities should cease in that area and the SHPD should be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* (Native Hawaiian skeletal remains) are identified, all earth moving activities in the area should stop, the area cordoned off, and the SHPD notified pursuant to HAR §13-300.
7. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, cultural and lineal descendants of the area should be consulted to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

Section 9 References Cited

Abbott, Isabella Aiona

1992 *Lā'au Hawai'i: Traditional Hawaiian Uses of Plants*. Bishop Museum Press, Honolulu.

Abbott, Isabella Aiona and Elanor Horswill Williamson

1974 *Limu: An Ethnobotanical Study of Some Edible Hawaiian Seaweeds*. Pacific Tropical Botanical Garden, Kaua'i, Hawai'i.

Akana, Collette Leimomi and Kiele Gonzalez

2015 *Hanau Ka Ua: Hawaiian Rain Names*. Kamehameha Publishing, Honolulu.

Alameida, Roy Kakulu

1993 Land Tenure and Land Use in Kawaihapai, O'ahu. Master's thesis in History. University of Hawai'i at Mānoa, Honolulu.

Albert, Robert, H.

1980 A Study of the Wartime History of Camp Malakole, 1940-1946. Appendix III of *Archaeological and Paleontological Investigation at Kalaloe (Barbers Point), Honouliuli, 'Ewa district, Oahu Island. Federal Study Areas 1a and 1b and State of Hawai'i Optional Area 1*, by Hallett H. Hammatt and William Folk. Report 14-115. Archaeological Research Center Hawai'i, Inc.

Alexander, W.D.

1907 The Funeral Rites of Prince Kealiihonui. *Annual Report of the Hawaiian Historical Society for 1906*. Hawaiian Historical Society, Honolulu.

Ava Konohiki

2015 Ancestral Visions of 'Āina website. Available online at <http://www.avakonohiki.org/>.

Beckwith, M.W.

1918 *Hawaiian Romance of Laieikawai*. Martha Warren Beckwith, introduction and translation. Washington Government Printing Office, Washington, D.C..

1940 *Hawaiian Mythology*. University of Hawaii Press, Honolulu.

1970 *Hawaiian Mythology*. University of Hawaii Press, Honolulu.

Bennett, John D.

2003 Camp Malakole, Oahu, T.H. *The Coast Defense Journal*:49.

2005 Battery Arizona and the Kahe Point Military Reservation. *The Coast Defense Journal* 19(1):61–80.

Board of Commissioners

1929 *Indices of Awards made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands*. Star-Bulletin Publishing, Honolulu.

Board of Water Supply

2017 *Oahu's Water History*. Electronic document, <http://www.boardofwatersupply.com/about-us/oahus-water-history> (accessed 1 January 2017).

Bordner, Richard M. and Carol Silva

1983 *Archaeological Reconnaissance and Historical Documentation: Waimanalo Gulch, Oahu, TMK:9-2-03:2,40,13 (por)*. Report on file at Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawai'i.

Bowser, George

1880 *The Hawaiian Kingdom Statistical and Commercial Directory and Tourists' Guide 1880-1881*. George Bowser & Company, Honolulu and San Francisco.

Briggs, L. Vernon

1926 *Experiences of a Medical Student in Honolulu, and on the Island of Oahu, 1881*. David D. Nickerson Company, Boston.

Campbell, Archibald

1967 *A Voyage Round the World from 1806 to 1812 with an Account of the Present State of the Sandwich Islands, and A Vocabulary of their Language*. Hawaiian Historical Society, University of Hawaii Press, Honolulu.

Chamberlain, Levi

1956 *Trip Around Oahu by Levi Chamberlain in 1826. 65th Annual Report of the Hawaiian Historical Society for the Year 1956*. Hawaiian Mission Children's Society, Honolulu.

Chiddix, Jim and MacKinnon Simpson

2004 *Next Stop Honolulu! The Story of the Oahu Railway & Land Company*. Sugar Cane Press, Honolulu.

Chinen, Jon J.

1958 *The Great Māhele, Hawai'i's Land Division of 1848*. University of Hawaii Press, Honolulu.

Cipolla, Craig N.

2013 *Native American Historical Archaeology and the Trope of Authenticity. Historical Archaeology*. Vol. 47:3:12–22.

Clark, John R.K.

1977 *The Beaches of O'ahu*. University of Hawaii Press, Honolulu.

Cobb, John N.

1905 *The Commercial Fisheries of the Hawaiian Islands in 1903*. U.S. Fish Commission Report for 1904. Government Printer, Washington D.C.

Cordy, Ross

2002 *The Rise and Fall of the O'ahu Kingdom*. Mutual Publishing, Honolulu.

Coulter, John Wesley

1931 *Population and Utilization of Land and Sea in Hawaii, 1853*. Bishop Museum Bulletin 88. Bishop Museum Press, Honolulu.

Coulter, John Wesley and Chee Kwon Chun

1937 *Chinese Rice Farmers in Hawaii*. University of Hawai'i Research Publications, Number 16. University of Hawai'i, Honolulu.

Damon, Frank

1882 Tours Among the Chinese, No. 1. *The Friend*, April 1882, Honolulu.

Davis, Bertell D.

1979 *Report on Archaeological Survey of the Proposed Ewa-Marina Community Development, Ewa Beach, Oahu Island*. Hawaii Marine Research, Inc., Honolulu.

DLNR (Department of Land and Natural Resources)

2019a *'Ewa Limu Management Area*. Electronic document, dlnr.hawaii.gov/dar/regulated-areas/ewa-limu-management-area.

2019b *Marine Invertebrates and Limu*. Electronic document, <https://dlnr.hawaii.gov/dar/fishing/fishing-regulations/marine-invertebrates/>

2019c *Leather Mudweed*. Electronic document, <https://dlnr.hawaii.gov/ais/invasivealgae/avrainvillea/>

De Silva, Kīhei

2003 *Hō'alo i ka Ihu o ka Lanakila, Three Train Chants for Lili'uokalani*. Kamehameha Schools. Electronic document, https://apps.ksbe.edu/kaiwakiloumoku/kaleinamanu/essays/hoalu_ikaihu_olanakila

Devaney, Dennis M., Marion Kelly, Polly Jae Lee, and Lee S. Motteler

1982 *Kane'ohē—A History of Change*. Department of Anthropology Report Series 76-2. Bernice Pauahi Bishop Museum, Honolulu.

Dicks, A. Merrill, Alan E Haun, and Paul H. Rosendahl

1987 *Archaeological Reconnaissance Survey for Environmental Impact Statement, West Loch Estates - Golf Course and Parks, Land of Honouliuli, Ewa District, Island of Oahu*. Paul H. Rosendahl, Ph.D., Inc., Hilo, Hawai'i.

Donn, John M.

1906 *Hawaii Territory map of Oahu*. Registered Map 2374. Hawai'i Land Survey Division, Department of Accounting and General Services, Honolulu.

Dorrance, William H. and Francis S. Morgan

2000 *Sugar Islands*. Mutual Publishing, Honolulu.

Downes, Cornelius D. (editor)

1953 History of Pearl Harbor. *Pearl Harbor Shipyard Log* Vol. VII No. 27, July 3. Pearl Harbor, Hawai'i.

Dunn, Amy E. and Alan E. Haun

1991 *Intensive Archaeological Survey and Test Excavations, Ewa Marina Project-Phase I, Land of Honouliuli, Ewa District, Island of Oahu (TMK 9-1-011-001,2,3,4,5,6,7;9-1-012-008,9,11,12,13,16,17)*. Paul H. Rosendahl, Ph.D., Inc., Hilo, Hawai'i.

Dye, Thomas S. and Elaine H.R. Jourdane

2006 *Archaeological Assessment for the Proposed Sprint PCS Campbell High School Cell Site No. HI60XC506A, 91-980 North Road, Honouliuli, 'Ewa, O'ahu Island, TMK:(1)9-1-001:002 por.* T. S. Dye & Colleagues, Archaeologists, Inc., Honolulu.

Ecological Society of America

2019 *Hypoxia*. Electronic document, <https://www.esa.org/wp-content/uploads/2012/12/hypoxia.pdf>

Edmondson, Charles Howard

1946 *Reef and Shore Fauna of Hawaii*. Bernice Pauahi Bishop Museum, Honolulu.

Ellis, William

1963 *Journal of William Ellis*. Reprint of London 1827 edition and Honolulu 1917 edition. Advertiser Publishing Company, Ltd., Honolulu.

Ellis, Sheila Nonaka (editor)

1995 *Where Pearls Flourished: Mo'olelo o Mānana—The Story of Pearl City*. Pearl City High School Heritage Learning Center, Pearl City Local History Project, Pearl City, Hawai'i.

Emerson, N.B.

1915 *Pele and Hiiaka, A Myth From Hawaii*. Honolulu Star-Bulletin Limited, Honolulu.

1965 *The Unwritten Literature of Hawaii: The Sacred Songs of the Hula*. Collected by Nathaniel B. Emerson. Charles E. Tuttle Company, Rutland, Vermont and Tokyo.

'Ewa Limu Project

n.d. 'Ewa Limu Project brochure.

Ewa Plantation Company

1923 *Ewa Plantation Company Annual Report*. Microfilm at University of Hawai'i at Mānoa, Hamilton Library, Honolulu.

Ewa Station Reports

1836 *Ewa Station Reports for 1836*. Microfilm at Hawaiian Mission Children's Museum, Honolulu.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens

1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawai'i Agricultural Experiment Station. U.S. Government Printing Office, Washington, D.C.

Fornander, Abraham

1917 *Fornander Collection of Hawaiian Antiquities and Folk-Lore*, Vol. IV. Bishop Museum Press, Honolulu.

1918 *Fornander Collection of Hawaiian Antiquities and Folklore*, Vol. V. Memoirs of the Bernice Pauahi Bishop Museum. Bishop Museum Press, Honolulu. Fornander 1980

1919 *Fornander Collection of Hawaiian Antiquities and Folklore*, Vols. V, VI. Memoirs of the Bernice P. Bishop Museum. Bishop Museum Press, Honolulu.

1996 *Fornander's Ancient History of the Hawaiian People to the Times of Kamehameha I*. Mutual Publishing, Honolulu.

Franklin, Leta J., Susan T. Goodfellow, and Warren Wulzen

1995 *Final Report Phase II—Data Recovery Archaeological Mitigation Program Ewa Marina Community Project Volume II: Tables Land of Honouliuli, Ewa District, Island of Oahu*. Paul H. Rosendahl, Inc., Hilo, Hawai'i.

Frierson, Barbara

1972 A Study of Land Use and Vegetation Change: Honouliuli, 1790-1925. Manuscript prepared for Graduate Seminar in Geography 750, University of Hawai'i at Mānoa, Honolulu.

Genz, Joseph H., Mahealani Liborio, and Hallett H. Hammatt

2012 Draft *Cultural Impact Assessment for the Division of Urban Forestry Administration Building Replacement Project, Waikīkī Ahupua'a, Honolulu (Kona) District, O'ahu Island, TMK: [1] 3-1-043: por. 001*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Giambelluca, Thomas W., Michael A. Nullett, and Thomas A. Schroeder

1986 *Rainfall Atlas of Hawai'i*. Department of Land and Natural Resources, State Historic Preservation Division, State of Hawai'i, Honolulu.

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K.**Eischeid, and D.M. Delparte**

2013 Online Rainfall Atlas of Hawai'i. *Bulletin of the American Meteorological Society* volume 94, pp. 313-316, doi: 10.1175/BAMS-D-11-00228.1. University of Hawai'i at Mānoa, Honolulu. Electronic resource, <http://rainfall.geography.hawaii.edu>

Google Earth

2013 Aerial photographs of Hawai'i. Google Inc., Mountain View, California. Available online at www.google.com/earth.html.

Gutamanis, June

2010 *Hawaiian Herbal Medicine: Kāhuna Lā'au Lapa'au*. Island Heritage Publishing. Waipahu, Hawai'i.

Halliday, William R.

2005 Current Status of the 'Ewa Karst, Honolulu County, Hawai'i. *The Cave Conservationist*. February 1998. Electronic document, <http://www.caves.org/section/ccms/wrh/> (accessed 22 December 2005).

Hammatt, Hallett H. and David Shideler

1989 *An Archaeological and Paleontological Assessment of Proposed Ewa Marina; Phase II Lands at Honouliuli, Ewa, O'ahu*. Cultural Surveys Hawai'i, Kailua, Hawai'i.

2011 *Archaeological Assessment for the 3.029 Acre Iglesia Ni Christo Project, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island TMK: [1] 9-1-115:009*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Hammatt, Hallett H., Jennifer Robins, Mark Stride, and Matthew McDermott

1990 *An Archaeological Inventory Survey for the Makaīwa Hills Project Site, Honouliuli, 'Ewa, O'ahu*. Cultural Surveys Hawai'i, Kailua, Hawai'i.

Handy, E.S. Craighill

1940 *The Hawaiian Planter, Volume 1. His Plants, Methods and Areas of Cultivation.* Bishop Museum Bulletin 161. Bernice Pauahi Bishop Museum, Honolulu.

Handy, E.S. Craighill and Elizabeth Green Handy

1972 *Native Planters in Old Hawai'i: Their Life, Lore, and Environment.* Bishop Museum Press, Honolulu.

Handy, E.S. Craighill and Mary Kawena Pukui

1972 *The Polynesian Family System in Ka'u, Hawai'i.* Charles E. Tuttle Company, Ruland, Vermont and Tokyo, Japan.

Harding, Stephen

2013 *First Planes Down at Pearl.* Electronic document, www.historynet.com/first-planes-down-at-pearl.htm. Hawaiian Ethnological Notes, Bishop Museum Vol. II:114, translation in Sterling and Summers 1978:41.

Hawaii News Now

2012 *Invasive algae targets Waikiki.* Electronic document, <https://www.hawaiinewsnow.com/story/17260726/invasive-algae-targets-waikiki/>

Hawai'i State Archives

n.d. Photograph of Waikele rice fields below Oahu Sugar Company Mill. Hawai'i State Archives, Honolulu.

1880s Photograph of James Campbell's residence on 'Ewa Plain. Hawai'i State Archives, Honolulu.

1908 Photograph of dredging in Pearl Harbor. Hawai'i State Archives, Honolulu.

Hawaiian Gazette

1897 *Hawaiian Gazette*, 29 January. Honolulu.

Hawai'i TMK Service

2014 Tax Map Key [1] 9-1-028. Hawai'i TMK Service, Honolulu.

Hommon, Robert J. and Hamilton M. Ahlo

1983 *Archaeological Test Excavations at the Proposed Ewa Marina Community Development Area, Ewa, Oahu.* Science Management, Inc., Honolulu.

Honolulu Advertiser

2006 *New law bans lumu removal from 'Ewa area.* Electronic document, <http://the.honoluluadvertiser.com/article/2006/Dec/28/br/br7659340281.html>

Honolulu Advertiser Archives

1890 Photograph of Pearl Harbor and OR&L railroad tracks along the coast. Honolulu Advertiser, Honolulu.

Honolulu Star-Bulletin

2010 Cleanup of Maunalua Bay has been great success. Electronic document, http://archives.starbulletin.com/content/20100503_cleanup_of_maunalua_bay_ha_s_been_great_success

Ho'okuleana, LLC

2014 Ho'okuleana website / blog. Available online, <http://totakeresponsibility.blogspot.com/2014>

Ho'oulumāhiehie

2008a *Ka Mo'olelo o Hi'iakaikapoliopele*. Original Hawaiian text taken from series of articles in *Ka Na'i Aupuni* 1905-1906. Awaiaulu Press, Honolulu.

2008b *The Epic Tale of Hi'iakaikapoliopele*. As told by Ho'oulumāhiehie. M. Puakea Nogelmeier, translator. Awaiaulu Press, Honolulu.

Hula Preservation Society

2014 Hula Preservation Society website. Available online at <http://hulapreservation.org>.

'I'i, John Papa

1959 *Fragments of Hawaiian History as Recorded by John Papa 'I'i*. Bishop Museum Press, Honolulu.

Immisch, George B.

1964 Land Reclamation and the Role of the Hydroseparator at Ewa Plantation: A Case Study of Some of the Effects of Mechanized Harvesting in the Hawaiian Sugar Industry. Master's thesis, University of Hawai'i at Mānoa, Honolulu.

Jarrett, Lorna H.

1930 *A Source Book in Hawaiian Geography*. University of Hawai'i, Honolulu.

Jourdane, Elaine

1979 *Archaeological Reconnaissance Survey of Proposed Ewa Marina, Campbell Estate Properties, One'ula, Honouliuli, O'ahu, Hawai'i*. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Judd, Walter F.

1971 Hawaii's Military Heritage, Polynesian to Annexation. Unpublished manuscript. Copy on file at Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Ka Hae Hawaii

1860 The Salt of Pu'uloa. *Ka Hae Hawaii*, 25 July.

Ka Loea Kālai'āina

1899 Na Wahi Pana o Ewa. *Ka Loea Kālai'āina*, 8 July.

1899 Article. *Ka Loea Kālai'āina*, 10 June.

Ka Nupepa Kuokoa

1885 Legend of Keaomelemele. *Nupepa Kuokoa*, 25 April.

Kahiolo, G.W.

1978 *He Moolelo No Kamapuaa, The Story of Kamapuaa*. Esther T. Mookini and Erin C. Neizmen, translators, with the assistance of David Tom. Hawaiian Studies Program, University of Hawai'i at Mānoa, Honolulu.

Kamakau, Samuel M.

1976 *The Works of the People of Old, Nā Hana a Ka Po'e Kahiko*. Bishop Museum Special Publication 61. Originally published 1869-1879

1991a *Ka Pō'e Kahiko: The People of Old*. Originally published 1869-1870. Bishop Museum Press, Honolulu.

1991b *Tales and Traditions of the People of Old: Nā Mo'olelo o Ka Po'e Kahiko*. Bishop Museum Press, Honolulu.

1992 *Ruling Chiefs of Hawai'i*. Revised edition. Kamehameha Schools Press, Honolulu.

Kame'eleihiwa, Lilikalā

1992 *Native Land and Foreign Desires: Pehea Lā E Pono Ai?* Bishop Museum Press, Honolulu.

1996 *A Legendary Tradition of Kamapua'a, the Hawaiian Pig-God*. Bishop Museum Special Publication 89. Bernice Pauahi Bishop Museum, Honolulu.

Kanahele, George S.

1995 *Waikiki 100 B.C. to 1900 AD An Untold Story*. Queen Emma Foundation, Honolulu.

Kawelu, Kathleen L.

2015 *Kuleana and Commitment: Working Toward a Collaborative Hawaiian Archaeology*. University of Hawai'i Press, Honolulu.

Kelly, Marion

1985 Notes on the History of Honouliuli. Appendix A in *An Archaeological Survey of the Naval Air Station, Barber's Point O'ahu, Hawai'i*, by A.E. Haun. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

1991 Notes on the History of Honouliuli. In *An Archaeological Survey of the Naval Air Station, Barber's Point, O'ahu, Hawai'i*. Bishop Museum, Honolulu.

King, Pauline

1982 *The Diaries of David Lawrence Gregg: An American Diplomat in Hawaii 1853-1858*. Pauline King, editor. Hawaiian Historical Society, Honolulu.

KUA (Kua'āina Ulu 'Auamo)

2019 *About KUA*. Electronic document, <http://kuahawaii.org/about/>.

Kuykendall, Ralph S.

1967 *The Hawaiian Kingdom: 1874-1893*. Volume 3. University of Hawaii Press, Honolulu.

Landgraf, Anne Kapulani

1994 *Nā Wahi Pana 'o Ko'olau Poko*. University of Hawai'i Press, Honolulu.

Landrum, James, B.A., Robert Drolet, Ph.D., and Katharine Bouthillier, M.A.

1997 *Final Report Cultural Resources Overview Survey Naval Magazine Lualualei Island of O'ahu, Hawai'i*. In conjunction with Department of Defense Legacy Resource Management Program: Demonstration Project #70. Ogden Environmental and Energy Services Company, Inc., Honolulu.

Malden, Lieutenant Charles R.

1825 South Coast of Oahu. Registered Map 640. Hawai'i Land Survey Division, Department of Accounting and General Services, Honolulu.

Malo, David

- 1951 *Hawaiian Antiquities (Mooolelo Hawaii)*. Second edition. Nathaniel B. Emerson, translator. Bishop Museum Press, Honolulu.

Maly, Kepa

- 1997 Historical Documentary Research. In *Archaeological Reconnaissance Survey, Naval Magazine Lualualei, NAVMAG-West Loch, Lands of Pu'uloa, Honouliuli, Waikele, and Waipi'o, District of 'Ewa, Island of O'ahu*, by Peter M. Jensen and James Head, pp. 7–59. Paul H. Rosendahl, Ph.D., Inc., Hilo, Hawai'i.

Maly, Kepā and Onaona Maly

- 2003 *Volume 1: Ka Hana Lawai'a A Me Na Ko'a O Na Kai 'Ewalu. A History of Fishing Practices and Marine Fisheries of the Hawaiian Islands*. Kumu Pono Associates, Hilo, Hawai'i.
- 2012 *He Mo'olelo 'Āina – Traditions and Storied Places in the District of 'Ewa and Moanalua (in the District of Kona), Island of O'ahu A Traditional Cultural Properties Study – Technical Report*. Kumu Pono Associates, Hilo, Hawai'i.

McAllister, Gilbert J.

- 1933 *Archaeology of Oahu*. Bernice Pauahi Bishop Museum, Honolulu.

McCoy, Patrick C.

- 1972 *Archaeological Survey of the Proposed Puuloa Elementary School Site, Ewa Beach, Oahu*. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

McElroy, Windy K. and Dietrix Duhaylonsod

- 2017 *Archaeological Assessment for Improvements to Campbell High School, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu TMK: (1) 9-1-001:002 (por.)*. Keala Pono Archaeological Consulting LLC, Kāne'ohe, Hawai'i

McGregor, Davianna Pōmaika'i

- 1996 An Introduction to the *Hoa'aina* and Their Rights. *The Hawaiian Journal of History* 30:1–28.

Meyen, F.J.F.

- 1981 *A Botanist's Visit to Oahu in 1831. Being the Journal of Dr. F.J.F. Meyen's Travels and Observations about the Island of Oahu*. A. Jackson, editor and M.A. Pultz, translator. Press Pacifica, Ltd., Kailua, Hawai'i.

Mylroie, John E. and James L. Carew

- 1995 Karst Development on Carbonate Islands. Chapter 3 in *Unconformities and Porosity in Carbonate Strata*, edited by D.A. Budd and A. Saller. American Association of Petroleum Geologists Memoir 63.

Nakuina, Emma M.

- 1904 *Hawaii - Its People and Their Legends*. Hawai'i Promotion Committee, Honolulu.

Nakuina, Moses K.

- 1990 *The Wind Gourd of La'amaomao*. First edition. Esther T. Mookini and Sarah Nākoa, translators. Kalamakū Press, Honolulu.

- 1992 *The Wind Gourd of La'amaomao, The Hawaiian Story of Pāka'a and Kūapāka'a, Personal Attendants of Keawenuia'umi, Ruling Chief of Hawaii and Descendants of La'amaomao.* Collected, edited, and expanded by Moses K. Nakuina; Esther T. Mookini and Sarah Nākoa, translators. Kalamakū Press, Honolulu.
- 1998 Fish Stories and Superstitions. In *Hawaiian Folk Tales*, compiled by Thomas G. Thrum, pp. 269–274. Mutual Publishing, Honolulu.

Nedbalek, Lani

- 1984 *Waipahu: A Brief History.* Wonder View Press, Mililani, Hawai'i.

Nellist, George F.

- 1925 *The Story of Hawaii and its Builders.* Honolulu Star-Bulletin Ltd., Territory of Hawai'i.

NOAA (National Oceanic and Atmospheric Administration)

- 2017 *Native Hawaiian Cultural Heritage.* Papahānaumokuākea Marine National Monument. Website, <https://www.papahanaumokuakea.gov/heritage/>.

O'ahu Resource Conservation and Development Council

- 2013 *Watershed Based Management Plan for Honouliuli Watershed: A Guide for Erosion and Sediment Control on Agricultural and Forest Reserve Lands.* Kunia, Hawai'i.

Office of Hawaiian Affairs

- 2015 *Papakilo Database.* Office of Hawaiian Affairs cultural and historical database. Electronic document, <http://papakilodatabase.com/main/index.php>.

Pagliari, Penny

- 1987 *Ewa Plantation: An Historical Survey 1890 to 1940.* Manuscript, Historic Preservation Program, University of Hawai'i at Mānoa, Honolulu.

Paradise of the Pacific

- 1902 Ewa Plantation Company. *Paradise of the Pacific*, December. 15:19–22.

Pauketat, Timothy R.

- 2001 *The Archaeology of Traditions.* University Press of Florida, Gainesville, Florida.

Polynesian

- 1853 Puuloa Salt Works. *Polynesian*, 20 August.

Portlock, Captain Nathaniel

- 1789 *A Voyage Round the World, but More Particularly to the North-west Coast of America: Performed in 1785, 1786 and 1788 in the King George and Queen Charlotte by Captains Portlock and Dixon.* Second edition. George Goulding, London.

Pukui, Mary K.

- 1943 Childhood in Old Hawai'i. *Paradise of the Pacific*, Honolulu.
- 1949 Songs (Meles) of Old Ka'u, Hawaii. *Journal of American Folklore*, July-September: 247–258.
- 1983 *'Ōlelo No'eau, Hawaiian Proverbs & Poetical Sayings.* Bishop Museum Special Publication 71. Bishop Museum Press, Honolulu.

Pukui, Mary Kawena and Caroline Curtis

1949 *Pikoi, and Other Legends of the Island of Hawai'i*. Compiled by Mary Kawena Puku'i and retold by Caroline Curtis. Kamehameha Schools, Honolulu.

Pukui, Mary K. and Samuel H. Elbert

1986 *Hawaiian Dictionary*. Second edition. University of Hawaii Press, Honolulu.

Pukui, Mary Kawena and Laura Green

1995 *Folktales of Hawai'i. He Mau Ka'ao Hawai'i*. Collected and translated by Mary Kawena Pukui with Laura S.S. Green. Bishop Museum Press.

Pukui, Mary Kawena, E.W. Haertig, and Catherine A. Lee

1972 *Nānā I Ke Kumu (Look to the Source) Volume I*. Queen Liliuokalani Children's Center Liliuokalani Trust. Hui Hānai, Honolulu.

Pukui, Mary K., Samuel H. Elbert, and Esther Mookini

1974 *Place Names of Hawaii*. University of Hawaii Press, Honolulu.

Reed, Minnie, M.S.

1907 *The Economic Seaweeds of Hawaii and Their Food Value*. Honolulu.

Rosendahl, Paul H.

2004 *Archaeological Resources Assessment and Archaeological Monitoring Plan Ocean Pointe/Papipi Road Drainage Improvements Project Ocean Pointe Project Land of Honouliuli, 'Ewa District Island of O'ahu (TMK:9-1-35, 36)*. Paul H Rosendahl, Inc., Hilo, Hawai'i.

Saturday Press

1883 *Dictionary of Hawaiian Localities*. *Saturday Press*, 11 August.

Schmitt, Robert C.

1968 *Demographic Statistics of Hawai'i: 1778-1965*. University of Hawaii Press, Honolulu.

1973 *The Missionary Censuses of Hawaii*. Pacific Anthropological Records No. 20. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Shintani, Terry

1993 *The Wai'anae Book of Hawaiian Health*. Waianae Coast Comprehensive Health Center, Waianae.

Silva, Carol

1987 Appendix A: Historical Documentary Research. In *Archaeological Reconnaissance Survey for Environmental Impact Statement, West Loch Estates - Golf Course and Parks, Land of Honouliuli, Ewa District, Island of Oahu*, by A. Merrill Dicks, Alan E. Haun, and Paul H. Rosendahl. Paul H. Rosendahl, Ph.D., Inc., Hilo, Hawai'i.

Sroat, Ena, David W. Shideler, and Hallett H. Hammatt

2012 *Final Archaeological Literature Review and Field Inspection for the Campbell High School Project, Pu'uloa, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island TMK: [1] 9-1-001:002*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Sterling, Elspeth P. and Catherine C. Summers

- 1978 *Sites of O'ahu*. Department of Anthropology, Bernice Pauahi Bishop Museum. Bishop Museum Press, Honolulu.

Thrum, Thomas G.

- 1887 Appropriation Bill for the Biennial Period Ending March 13, 1888. *Hawaiian Almanac and Annual for 1887*. Thomas G. Thrum, Honolulu.
- 1906 *Hawaiian Almanac and Annual for 1907*. Thomas G. Thrum, Honolulu.
- 1922 Hawaiian Place Names. Appendix to *A Dictionary of the Hawaiian Language* by Lorrin Andrews (revised by Henry H. Parker) (1922) pp. 625–274. Board of Commissioners of Public Archives of the Territory of Hawaii, Honolulu.

Titcomb, Margaret

- 1952 *Native Use of Fish in Hawaii*. With the collaboration of Mary Kawena Pukui. University of Hawaii Press, Honolulu.

Trask, Mililani

- 2012 Hawaiian Perspectives GMOs and Cultural Values. *Facing Hawai'i's Future*. Hawai'i SEED, Koloa.

Treiber, Gale

- 2005 Oahu's Narrow Gauge Operations in Hawaii Since WWII. *The Railroad Press* 66:10–29.

Tuggle, H. David and M.J. Tomonari-Tuggle

- 1997 *Synthesis of Cultural Resource Studies of the 'Ewa Plain, Task 1a: Archaeological Research Services for the Proposed Cleanup, Disposal and Reuse of Naval Air Station Barbers Point, O'ahu, Hawai'i*. International Archaeological Research Institute, Inc., Honolulu.

UH SOEST

- 1928 UH SOEST Oneula coast aerial photograph. University of Hawai'i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at <http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/>
- 1950 UH SOEST Oneula coast aerial photograph. University of Hawai'i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at <http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/>
- 1961 UH SOEST Oneula coast aerial photograph. University of Hawai'i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at <http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/>
- 1976 UH SOEST Oneula coast aerial photograph. University of Hawai'i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at <http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/>
- 1988 UH SOEST Oneula coast aerial photograph. University of Hawai'i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at <http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/>

Ulukau

- 2014 *Māhele Database*. Hawaiian Electronic Library, <http://ulukau.org/cgi-bin/vicki?l=en..>

University of Hawai'i at Mānoa

- 1900 Photograph of first pineapple plantation in Kunia. University of Hawai'i at Mānoa, Honolulu.
- 1925 Photograph of Ewa Plantation sugarcane fields, Filipino camp. University of Hawai'i at Mānoa, Honolulu.

University of Hawaii, Botany Department

- 2002 *Edible Limu of Hawaii*. Electronic document. <http://www.hawaii.edu/reefalgae/publications/ediblelimu/>

U.S. Army War Department

- 1919 U.S. Army War Department fire control map, Barbers Point and Nanakuli quadrangles. USGS Information Services, Denver, Colorado.
- 1919 U.S. Army War Department fire control map, Nanakuli quadrangle. USGS Information Services, Denver, Colorado.
- 1933 U.S. Army War Department terrain map, Ewa quadrangle. USGS Information Services, Denver, Colorado.
- 1936 U.S. Army War Department terrain map, Barbers Point quadrangle. USGS Information Services, Denver, Colorado.

USDA (U.S. Department of Agriculture)

- 2001 Soil Survey Geographic (SSURGO) database. U.S. Department of Agriculture, Natural Resources Conservation Service. Fort Worth, Texas. <http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/>.

USGS (U.S. Geological Survey)

- 1953 Ewa and Puuloa USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.
- 1968 Ewa and Puuloa USGS 7.5-minute topographic quadrangles. USGS Information Services, Denver, Colorado.
- 1999 Pearl Harbor USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.
- 2011 U.S. Geological Service Orthoimagery (aerial photograph). USGS Information Services, Denver, Colorado.

Vancouver, George

- 1798 *A Voyage of Discovery to the North Pacific Ocean, and Round the World . . . Performed in the Years 1790–1795*. Vol. 3. G.G. & J. Robinson, London.

Vizenor, Gerald

- 1999 *Manifest Manners: Narratives on Postindian Survivance*. University of Oklahoma Press, Lincoln, Oklahoma.

Waihona 'Aina

- 2020 *The Māhele Database*. Electronic document, <http://waihona.com>

Western Pacific Regional Fishery Management Council

2000 *Draft Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region*. Western Pacific Regional Fishery Management Council, Honolulu.

Westervelt, William D.

1916 *Hawaiian Legends of Volcanoes*. Ellis Press.

1923 Lepe-a-moa (The Chicken Girl of Palama). In *More Hawaiian Folk Tales*, compiled by Thomas G. Thrum. A.C. McClurg and Company, Chicago.

Wilkes, Charles

1970 *Narrative of the U.S. Exploring Expedition, Volume IV*. Republished by The Gregg Press, Upper Saddle River, New Jersey.

Yee, Christian Kaimanu

2013 Kalaeloa Heritage Park. Available online at Pohukainacave.blogspot.com/2013/02/aloha.html

2013 Kukaniloko. Available online at Pohukainacave.blogspot.com/2013/03/kukaniloko.html

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	<i>‘ili ‘āina</i>	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	<i>pu‘u, ‘ili ‘āina</i>	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	<i>‘ili ‘āina</i>	the nose of Pala‘ai	Pukui et al. 1974
Kā‘ilikahi	<i>‘ili ‘āina</i>	snatch once	Pukui et al. 1974
Kalaeloa	<i>‘ili ‘āina</i>	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	<i>‘ili ‘āina</i>	-	-
Kama‘ipipipi	<i>‘ili ‘āina</i>	-	-
Kamilomilo	<i>‘ili ‘āina</i>	to twist	Thrum 1922
Kamoku	<i>‘ili ‘āina</i>	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	<i>loko</i> (pond)	the akule fish enclosure	Pukui et al. 1974
Kapāmuku	<i>loko</i>	the short wall	Pukui and Elbert 1986

Place	Type	Meaning	Source
Kapapapuhi	point, <i>'ili 'āina</i>	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	<i>pu'u</i>	footstep	Thrum 1922
Kaua, Pu'u	<i>pu'u</i>	war hill or fort hill	Pukui et al. 1974
Kaula	Bay	-	-
Kaulaula	<i>'ili 'āina</i>	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 (<i>'ō'io</i>)	Pukui et al. 1974
Kepoe	<i>'ili 'āina</i>	-	-
Kīhewamakawalu	<i>loko</i>	-	-
Kolekole	pass	raw, scarred	Pukui et al. 1974
Ko'olina	village	-	-
Kualaka'i	village, <i>'ili 'āina</i>	<i>Tethys</i> sp. ("sea hare")	Pukui et al. 1974
Ku'ina, Pu'u	<i>pu'u, heiau</i>	-	-
Kunia	<i>'ili 'āina</i>	burned	Pukui and Elbert 1986
Kupaka'akahi	beach	-	-
Ku'ua, Pu'u	<i>pu'u, heiau</i>	relinquished hill	Pukui et al. 1974
Laulaunui	islet	large leaf package	Pukui et al. 1974
Līhe'e	<i>'ili 'āina</i>	cold chill	Pukui et al. 1974
Limaloa	gulch	long arm	Pukui et al. 1974
Loloulu	<i>'ili 'āina</i>	-	-
Makai'i	<i>'ili 'āina</i>	-	-
Makaīwa	gulch	mother of pearl eyes	Pukui et al. 1974
Makakilo, Pu'u	<i>pu'u</i>	observing eyes	Pukui et al. 1974
Makalapa	gulch	ridge features	Pukui et al. 1974
Manawahua, Pu'u	<i>pu'u</i>	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	<i>'ili 'āina</i>	-	-
Maunakapu	peak	sacred mountain	Pukui et al. 1974

Place	Type	Meaning	Source
Maunauna	<i>pu'u</i> , gulch	mountain sent on errands	Pukui et al. 1974
Ma'ūakapua'a	<i>'ili 'āina</i>	-	-
Mo'opunea Pu'u	<i>pu'u</i>	grandchild hill	-
Nalowale	<i>heiau</i>	lost, forgotten	Pukui and Elbert 1986
Nāmo'opuna	gulch	the grandchildren	Pukui and Elbert 1986
Nāpepeiao'ōlelo	<i>'ili 'āina</i>	-	Pukui and Elbert 1986
Niuke'e	<i>'ili 'āina</i>	bent coconut tree	-
'Oki'okilepe	<i>loko</i>	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	<i>pu'u</i>	young lai fish hill	Pukui et al. 1974
Pālāwai	gulch	kind of sea moss	Thrum 1922
Pālehua	<i>pu'u</i>	<i>lehua</i> flower enclosure	Pukui et al. 1974
Palikea	<i>pu'u</i> , ridge	white cliff	Pukui et al. 1974
Pāmoku	<i>loko</i>	-	-
Paupauwela (Poupouwela)	<i>'ili 'āina</i>	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	<i>pōhaku</i>	broad rock	Thrum 1922
Pō'aiwaikele	<i>'ili 'āina</i>	(spelling from Soehren 2009)	-
Polapola	<i>'ili 'āina</i>	improved in health	Pukui et al. 1974
Poliwai	gulch	water bosom	Pukui et al. 1974
Po'ohilo	<i>'ili 'āina</i>	-	-
Poulihale	gulch	dark house	Pukui et al. 1974
Poulihale, Pu'u	<i>pu'u</i>	dark house hill	Pukui et al. 1974
Puali'i	gulch	small flower	Pukui and Elbert 1986
Pua'alu'u	<i>'ili 'āina</i>	diving pig	Pukui et al. 1974
Pu'uloa	<i>'ili 'āina</i> , 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	<i>'ili 'āina</i>	extended water	Pukui and Elbert 1986

APPENDIX D

TRANSPORTATION ASSESSMENT



TECHNICAL MEMORANDUM

Date: January 4, 2019
To: Tracy Camuso, Group 70 International
From: Stephanie Cheng and Madison Roberts, Fehr & Peers
Subject: Pohakupuna Road Residential – Transportation Assessment

SD18-0286

Fehr & Peers has completed a transportation assessment of the proposed Pohakupuna Road residential project in Ewa Beach on the island of Oahu. This memorandum summarizes the assessment of site access, parking, and on-site circulation for the proposed project.

SUMMARY OF KEY FINDINGS

The following findings resulted from our assessment of the site plan and proposed uses:

- As designed, the project will comply with the City and County of Honolulu’s off-street parking and emergency access requirements.
- The project is not expected to result in adverse effects to vehicle traffic or non-auto mobility along Pohakupuna Road or surrounding roadways.
- Sight distance should be adequately maintained at the main site driveway intersection at Pohakupuna Road, as well as for driveways within the project site.

SITE PLAN ASSESSMENT

Project Description

The Pohakupuna Road residential project proposes to develop a gated cluster of 19 detached single-family dwelling units with guest parking and shoreline access. The location of the proposed development is at 91-603 Pohakupuna Road in the Ewa Beach community on the island of Oahu. The site is located approximately 185 feet east of Hailipo Street and is generally bound by



Pohakupuna Road on the mauka side, the shoreline on the makai side, and existing single-family dwellings to the west and east. Access is proposed from Pohakupuna Road only.

Existing Conditions

The 2.74-acre project site is currently vacant and undeveloped. It is zoned for residential use (R-5) and located within a State of Hawaii Special Management Area (SMA).

Primary access to and from the site is provided on Pohakupuna Road. Pohakupuna Road is owned and maintained by the City and County of Honolulu. It is an east-west, two-lane undivided roadway without on-street parking; however, passenger vehicles were observed parked on the unpaved roadway shoulders during our field visit and in Google Street View photos. This roadway provides a local connection between Fort Weaver Road and Papipi Road. The posted speed limit for this roadway is 25 miles per hour. Other roads in the project vicinity are similar two-lane undivided roadways with posted speed limits of 25 miles per hour.

No separate bicycle or pedestrian facilities are provided in the project vicinity. Pedestrians and bicyclists must share the roadway with vehicles, or pedestrians may walk along the unpaved shoulder. TheBus Route 44 operates on Pohakupuna Road in the vicinity of the site and provides service between the southeast corner of the Ewa Beach community (at Popoi Road) and Waipahu Town Center. The closest bus stop is located approximately 340 feet west of the project site, with a second stop located roughly 1,200 feet east of the site. At the west stop, a shelter, bench, and concrete pad are provided for Waipahu-bound transit patrons.

Surrounding Land Uses

The surrounding land use is predominantly single-family residential. Commercial uses are located approximately one-half mile from the site surrounding the Fort Weaver Road/Papipi Road intersection. The closest schools are all located on the east side of Fort Weaver Road between Kuhina Street and North Road, and these facilities include Ewa Beach Elementary School, Ilima Middle School, and James Campbell High School. Signalized pedestrian crossings are provided across Fort Weaver Road at both Kimopelekane Road/North Road and at Aikanaka Road. The proposed project's land use is consistent with surrounding and existing land uses in the area.



Planned Transportation Improvements

According to the Oahu Regional Transportation Plan 2040, the current Oahu Bike Plan, and the City and County of Honolulu’s Executive Program and Budget for Fiscal Year 2018, there are no planned transportation improvements in this area.

Project Assessment

The project includes development of 19 single-family detached residential dwelling units with gated access from Pohakupuna Road.

Trip Generation

The project’s vehicle trip generation was estimated using the *Trip Generation Manual* published by the Institute of Transportation Engineers (ITE 10th Edition). **Table 1** summarizes the estimated trips to be generated by the project.

TABLE 1: PROJECT TRIP GENERATION

ITE Land Use and Code		Units ¹	Daily Rate	AM Peak Hour			PM Peak Hour		
				Total	Inbound	Outbound	Total	Inbound	Outbound
Single-Family Detached Housing (210)		DU	9.44	0.74	0.19	0.56	0.99	0.62	0.37
Land Use	Size	Units ¹	Daily Trips	AM Peak Hour			PM Peak Hour		
Single-Family Detached Housing	19	DU	180	14	4	11	19	12	7

Source: ITE Trip Generation Manual (10th Edition), Notes: ¹DU = Dwelling Unit



The project is forecast to generate 180 daily new vehicle trips to Pohakupuna Road, including 14 trips during the AM peak hour and 19 trips during the PM peak hour. Based on observed traffic and the forecasted trip generation, the proposed project is not expected to have an adverse effect on traffic. The estimated peak hour project trips are not expected to significantly increase delay along the corridor.

Site Access

The project is proposed to have one gated point of access on Pohakupuna Road. The entry gate will be set back approximately 22 feet from Pohakupuna Road, providing adequate area for a vehicle entering the site to wait for the gate to open without impacting operations on Pohakupuna Road. Similarly, the gate will be able to close behind a vehicle exiting the site if a driver has to wait temporarily for a gap in traffic before turning onto Pohakupuna Road. The main project driveway is proposed with a 24-foot cross-section, which will allow for adequate travel in both directions.

Parking

On-site parking will be restricted to driveways, garages, and marked guest parking spaces. On-street parking will be prohibited to maintain 24 feet of clearance for fire and emergency access.

Per the Revised Ordinances of Honolulu, the City and County of Honolulu requires each single-family detached dwelling unit to provide two (2) off-street parking spaces plus one (1) per 1,000 square feet over 2,500 square feet (excluding carport or garage)¹. Based on the parking requirements, the project is required to provide 38 parking spaces. The proposed project includes 16 mauka houses at 2,176 square feet and three (3) makai houses at 2,841 square feet. Each unit will include a 500-square-foot garage to accommodate two (2) parked vehicles. Three (3) guest parking spaces will be provided near the makai dwelling units. Altogether, a total of 41 off-street parking spaces will be provided to serve the project. Therefore, the project exceeds the parking requirement for the proposed use. Additional off-street parking is available on the driveway apron serving each unit with space for at least two (2) cars per unit; except for two (2) of the three (3) makai units with a short driveway or no driveway.

¹ *Revised Ordinances of Honolulu*. Updated October 2018. Table 21-6.1 Off-Street Parking Requirements.



Fire/Emergency Access

The project's driveway will be 24 feet wide, which meets the minimum width requirement for fire and emergency access. At the makai end of the driveway, the hammerhead configuration will provide adequate space for a fire truck or emergency vehicle to turn around and exit the site.

Driveways and Sight Distance

As proposed, the mauka houses are designed with side-entry garages set back approximately 5 feet from the roadway. To maximize sight distance for drivers in the driveway and for those exiting driveways, landscaping or other furniture, signage, mailboxes, etc. should be limited to a height of 2.5 feet so as not to impede sight distance within the setback area.

Similarly, sight distance for drivers in vehicles exiting the site and turning onto Pohakupuna Road should not be impeded by landscaping, monument signage, fencing, etc. All potential visual impediments should be set back at least 10 feet from the edge of the traveled way or be no more than 2.5 feet in height (or pruned above 4 feet in the case of a tree).

Conclusions

As designed, the project will comply with the City and County of Honolulu's off-street parking and emergency access requirements. The project is not expected to result in adverse effects to traffic or active mobility along Pohakupuna Road or surrounding roadways.

APPENDIX E

COASTAL HAZARD ASSESSMENT



Coastal Hazard Assessment

Lot 1420 (91-603 Pohakupuna Road)
Pu'uloa, 'Ewa, O'ahu, Hawai'i

TMK: (1) 9-1-28:40

Prepared for:
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Table of Contents

1. Location and Property Description	1
2. Coastal Flooding	2
2.1 Federal Emergency Management Agency Flood Insurance Rate Map	2
2.2 Sea Level Rise	2
2.3 King Tides	3
2.4 Overall Hazard Assessment	3
3. Shoreline Characteristics and Coastal Processes.....	4
3.1. Waves	4
3.2. Erosion Rate.....	5
3.3. Benthic Habitats	5
4. Potential Littoral Impacts	5
5. Conclusion and Recommendations.....	6

List of Figures

Figure 1. Aerial of Lot 1420 on 91-603 Pohakupuna Road	7
Figure 2. Topography Survey Map	8
Figure 3. Approved Certified Shoreline Survey Map	9
Figure 4. Photo taken of the rocky shoreline of Lot 1420 facing west	10
Figure 5. Photo taken of the rocky shoreline facing east.....	11
Figure 6. Special Management Area Map	12
Figure 7. Flood Hazard Assessment Report and Map.....	13
Figure 8. PacIOOS Sea Level Rise Exposure Map.....	14
Figure 9. NOAA Sea Level Rise Exposure Map	15
Figure 10. Coastal Hazard Intensity Map..	16
Figure 11. Bathymetry by Lot 1420	17
Figure 12. Photo taken at the center along the vegetation line of Lot 1420 facing west	18
Figure 13. Photo taken at the center along the vegetation line of Lot 1420 facing east.	19
Figure 14. Shoreline Study Erosion Map.....	20
Figure 15. Shallow-water Benthic Habitats.....	21
Figure 16. Biological Cover of West O‘ahu Benthic Habitats.....	22
Figure 17. Biological Cover of Benthic Habitats by Lot 1420.....	23

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Coastal Hazard Assessment
Lot 1420 (91-603 Pohakupuna Road)
Pu'uloa, 'Ewa, O'ahu, Hawai'i

TMK: (1) 9-1-28:40

The purpose of this assessment is to identify and describe site-specific conditions related to coastal hazards such as flooding, storm surge, king tides, sea level rise (SLR) and wave action to the property. The assessment will determine the likelihood of impacts from these hazards on the property.

1. Location and Property Description

The property is located at 91-603 Pohakupuna Road on the south shore of O'ahu in Pu'uloa, 'Ewa (Figure 1). It is owned by Jinshi Hawai'i Development Ltd., doing business as Golden Lion 'Ewa Beach LLC. The 2.7-acre parcel is bounded on the north by Pohakupuna Road and on the south by the ocean.

A topographic survey was completed by Engineers Surveyors Hawai'i, Inc. (ESH) in 2018 and revised in 2021 (Figure 2). Based on the topographic survey, a certified shoreline was delineated and approved by the state of Hawai'i in August 2019 (Figure 3). The property elevation at the shoreline starts at mean sea level (MSL) and rises to approximately 5.9 feet MSL at the vegetation line and certified shoreline. The foreshore slope on average is a 17 percent (17% grade). The elevation within the property varies from four (4) feet to seven and a half (7.5) feet from the edge of the vegetation line to Pohakupuna Road, approximately 580 feet inland.

The shoreline of this lot is a fixed, rocky limestone substrate subject to direct wave action (Figure 4 and Figure 5). As shown in Figure 4 and Figure 5, the adjacent properties have constructed concrete walls approximately three (3) feet in height at the top of the bank and extends inland approximately 130 feet.

Figure 6 shows the property lies within the special management area (SMA) for the City and County of Honolulu. The shoreline setback line is specified at 40 feet from the certified shoreline. This is in accordance with the Revised Ordinance of Honolulu (ROH), Article 1, Shoreline Setbacks: Section 23-1.4 Shoreline Setback Line, "the shoreline setback line will be established 40 feet inland from the certified shoreline." In accordance with Section 23-1.7 Subdivision Actions (a)(1)(A), the property may be approved with a 40-foot shoreline setback because it is not within the coastal high hazard district and is characterized by a fixed, rocky shoreline.

2. Coastal Flooding

2.1 Federal Emergency Management Agency Flood Insurance Rate Map

The Flood Insurance Rate Maps (FIRM) prepared by the Federal Management Agency (FEMA) identify areas of flood hazard with a 100-year storm boundary. These are areas that have a one percent (1%) chance of flooding in any given year. For Hawai'i, the FIRM zone and base flood elevation (BFE) values are derived from the merger of a tsunami hazard study with a hurricane coastal hazard study. The zone type and BFE are determined by the worst-case inland flooding extent of the coincident tsunami and hurricane surge hazards. The BFE given on the FIRM is the larger of two computed values. The level of hazard in each area determines the zone classification.

The applicable FIRM shown in Figure 7 indicates that the portion of the property north (inland) of the certified shoreline is designated Zone D¹, while the shoreward edge of the property is designated as Zone VE². The VE zone drawn in Figure 7 is shown to extend ten (10) to 38 feet from the surveyed high-water mark. Within the VE zone, the FIRM designates a BFE of seven (7) feet above MSL, meaning the predicted elevation of coastal flooding may reach a seven-(7) foot elevation (Figure 7) within the VE zone.

2.2 Sea Level Rise

The state of Hawai'i Sea Level Rise Viewer from the Pacific Islands Ocean Observing System (PacIOOS) shows inundation projections for future exposure of 3.2 feet of SLR. The sea level rise exposure area combines passive flooding, annual high-wave flooding and coastal erosion based on the upper-end projection of 3.2 feet of SLR by 2100 as presented in the 5th Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC).³ Based on PacIOOS, the property will experience coastal flooding due to the predicted 3.2 feet SLR (Figure 8). Alternatively, a Sea Level Rise Viewer created by the National Oceanic and Atmospheric Administration (NOAA) predicted three (3) feet SLR, which does not flood the property (Figure 9).⁴

¹ Zone D are areas where flood hazards are undetermined, but possible. ("National Flood Insurance Program Terminology Index," FEMA, July 18, 2020, <https://www.fema.gov/flood-insurance/terminology-index>).

² Zone VE are areas subject to inundation and additional hazards due to tsunami and/or storm wave-induced velocity ("National Flood Insurance Program Terminology Index," FEMA, July 18, 2020, <https://www.fema.gov/flood-insurance/terminology-index>).

³ "Sea Level Rise: State of Hawai'i Sea Level Rise Viewer," PacIOOS, January 8, 2021, <https://www.pacioos.hawaii.edu/shoreline/slr-hawaii/>.

⁴ "Sea Level Rise Viewer," NOAA, Accessed February 8, 2021, <https://coast.noaa.gov/slr>.

Upon further review the different inundations predicted in the viewers are likely attributed to the topographic/bathymetric data utilized in each viewer and not the SLR difference. The PacIOOS uses topography from the U.S. Army Corps of Engineers (USACE) 2013, 1999-2003 topography/bathymetry lidar data surveys, while NOAA uses public, best available and accessible elevation data that combines various data from federal, state and local entities that meet FEMA mapping standards.^{5,6} Both of these data sets are representative of the general study area for the islandwide viewer, but not as accurate as utilizing the site-specific topographic data (Figure 2). The site-specific topographic data (ESH) shows a measured average foreshore elevation of 5.9 feet MSL. Applying the predicted 3.2-foot SLR, it is found that no inundation will occur at this lot location due to SLR alone.

2.3 King Tides

A king tide is defined as the highest tide that will occur when the moon, sun and earth align. These tides typically occur once every four (4) months. Based on the NOAA tidal prediction model for Honolulu, the higher king tides (neap tides) had a water elevation of 1.78 feet above MSL.⁷ Combining this king tide with the 3.2-foot SLR, the maximum still water level will be 4.98 feet above existing MSL. This value is also less than the measured average foreshore elevation of 5.9 feet MSL and, as a result, no inundation will occur for the combined SLR and king tide condition.

2.4 Overall Hazard Assessment

The U.S. Geological Survey (USGS) and the U.S. Department of the Interior (US DOI) compiled research into an atlas prepared in cooperation with the University of Hawai'i, state of Hawai'i Office of Planning and NOAA showing coastal hazards in Hawai'i published in 2004.⁸ Figure 10 the assessment rating from this atlas for the area. The overall hazard assessment (OHA) shows the immediate property area having a moderate to high overall rating of five (5). The study finds the property to have a high hazard level for tsunamis and major storms, due to the general low-lying coastal plain. Stream flooding potential is shown to be moderately high, however, no streams are located near the property. Wave impact at the property is rated moderately high due to the exposure of the property to

⁵ "Hawai'i Sea Level Rise Vulnerability and Adaptation Report," Hawai'i Climate Change Mitigation and Adaptation Commission, page 36, 2017, http://climate.hawaii.gov/wp-content/uploads/2019/02/SLR-Report_Dec2017-with-updated-disclaimer.pdf.

⁶ "Digital Coast Sea Level Rise Viewer," NOAA Office for Coastal Management, January 2017, <https://coast.noaa.gov/data/digitalcoast/pdf/slr-faq.pdf>.

⁷ "Tide Predictions at 1612340, Honolulu, HI," NOAA Tides and Currents, 2021, <https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=1612340>.

⁸ Charles H. Fletcher III, Eric E. Grossman, Bruce M. Richmond, Ann E. Gibbs, "Atlas of Natural Hazards in the Hawaiian Coastal Zone," January 9, 2002, https://pubs.usgs.gov/imap/i2761/sections/3_Oahu.pdf.

tropical storms commonly passing southwest of O‘ahu. Shoreline erosion potential along the ‘Ewa coast is considered moderately low as is the threat of sea level rise. As in the PacIOOS study, the topographic features fronting the property are not accurately depicted. The rocky shoreline fronting the property will prevent erosion and the high foreshore embankment will limit storm wave impacts.

3. Shoreline Characteristics and Coastal Processes

3.1. Waves

The bathymetry (Figure 11)⁹ offshore shows that at the bottom of the beach slope, the water depth quickly drops to two (2) feet below MLLW (2.82 feet below MSL) and increases to 50 feet below MLLW approximately 5,000 feet offshore at about a one-percent (1%) slope. Shallower reef patches occur within this zone extending upward to ten (10) feet below MLLW until the 18-foot depth contour is reached.

Waves impacting this southward-facing shoreline fronting the property are seasonal and originate from either locally generated wind waves or as swell waves from distant storms. The largest waves usually occur during the summer as long period swell waves originating from large storms passing far south of O‘ahu, or as short period storm waves from locally generated storms passing south of O‘ahu.

Less frequently large waves will occur during the winter season as long period swell waves wrapping around Barbers Point from North Pacific storms or as trade wind generated swell wrapping around Diamond Head.

The local bathymetry will cause the larger waves to first break approximately 2,000 to 4,000 feet offshore before reforming and breaking again on the rocky foreshore. Visual observation of the waves and the bathymetry shows that the waves will align parallel to the shoreline as they approach the shore. The typical breaking wave types for this coast are spilling or surging due to the mild sloping bottom and steep coastal fore slope. Reformed waves typically break directly on the rocky shoreline face and do not significantly wash up the slope or reach the wash-up area above the rocky face.

During extreme wave conditions, some wave energy may reach the vegetation line as shown in Figure 12 and Figure 13. The wave wash-up area shows small rock or coral fragments deposited on the limestone base ocean-side of the vegetation line from extreme high-wave activity. The wash-up of waves reaches the

⁹ The Center for Operational Oceanographic Products and Services (CO-OPS) developed a map showing the bathymetry of the waters in feet based on mean lower low water (MLLW). The hydrography and topography are from the National Ocean Service, Coast Survey. Additional data is from the Corps of Engineers, Geological Survey, U.S. Coast Guard, and National Geospatial-Intelligence Agency.

vegetation line, which is located at the certified shoreline at an average foreshore elevation of 5.9 feet MSL.

3.2. Erosion Rate

As the shoreline is composed of a rocky limestone substrate, no erosion is expected to occur along this part of the coastline. This part of the coast was not part of The Shoreline Study Erosion Map compiled by the University of Hawai'i Coastal Geology Group in 2010 due to this hardened shoreline condition (Figure 14).

3.3. Benthic Habitats

Benthic habitats (features at the lowest level of a body of water) are defined by the geomorphologic reef structure, the reef habitat zone and the biological cover description. From the PacIOOS Voyager interactive map interface and the 2007 benthic habitat map completed by the National Ocean Service, Biogeography Branch, the geomorphologic reef structure fronting this shoreline is pavement type (Figure 15). Pavement is flat, low-relief, solid carbonate rock covered with biological cover and organisms that start to hide the underlying surface.

The ocean bottom is a mix of sand, coral fragments, coral and limestone outcroppings. The reef habitat here is classified as a bank/shelf, where there is a flattened platform between the shoreline and deep open ocean waters (Figure 15).

The biological cover of this area has changed over the past 14 years. In 2007, the area fronting the shore consisted mainly of macroalgae (10-50%) (Figure 16). Currently, a higher amount of macroalgae (50-90%) exists (Figure 17). The small portion where sand existed in 2007 remains as uncolonized substrates (90-100%). The uncolonized substrates are classified as substrates with less than ten percent (10%) of any of the biological cover. Further south, sparse turf algae (10-50%) remain.^{10, 11}

4. Potential Littoral Impacts

Littoral processes involve the transport of sand and sediment along a coastline due to wave-induced coastal currents. This process requires a source of material. As the coast fronting this property and extending east and west is composed of a rocky limestone substrate fronted by pavement type benthic material, there will be little or no littoral impacts.

¹⁰ "PacIOOS Voyager," PacIOOS, 2021, <http://www.pacioos.hawaii.edu/voyager/>.

¹¹ T.A. Battista, B.M. Costa, and S.M. Anderson, "2007 Abridged Methods Manual for Shallow-Water Benthic Habitats of the Main Hawaiian Islands," NOAA Technical Memorandum NOS NCCOS 61, September 2007.

5. Conclusion and Recommendations

Based on the property's rocky shoreline and because the property is not considered a coastal high hazard district, Section 23-1.7 (ROH) applies and, therefore, the developer should get an approval for a shoreline setback of 40 feet inland from the certified shoreline. The current development plan shows a setback of 80 feet which is more than adequate for the development.

It is determined here that the topography of the property and development's final grade is greater than the water level from king tides alone and king tides superimposed over 3.2-foot SLR. In addition, utilizing a 40-foot shoreline setback will further minimize potential impacts to the development of the property from wave-induced coastal hazards. The planned development will have no adverse effect on existing coastal processes and there will be no foreseen impact on the development on the property from potential coastal hazards.

However, due to the existing concrete masonry unit (CMU) walls located on the immediate adjacent properties, a potential exists for increased storm wave-induced flooding or tsunami flooding coincident with sea level rise and king tides. This extreme flooding event may impact these walls causing high-velocity flooding and promoting scour at the base of the walls. Therefore, it is recommended that a wall or vegetated berm with a top elevation similar to the adjacent walls — approximately three (3) feet high — be constructed along or immediately landside of the certified shoreline. The wall/berm would prevent additional flooding and scouring around the wall areas during high velocity future scenarios.

A wall will be less costly and will require less maintenance during its life cycle but is not conducive to an open-space concept. A vegetated berm may have better aesthetic qualities but will require regular maintenance and upkeep. According to ROH Chapter 23 Section 1.5 (b), minor structures are permitted if they "do not affect beach processes or artificially fix the shoreline and do not interfere with public access, public views or open space along the shoreline." This recommendation will not affect the shore or public access as it is landside of the certified shoreline. In addition, the wall or berm would minimize landside erosion runoff and reduce the potential for water quality impacts due to wave-induced erosion.



Figure 1. Aerial of Lot 1420 on 91-603 Pohakupuna Road. Reference: Google Earth, Imagery Date - 2021.

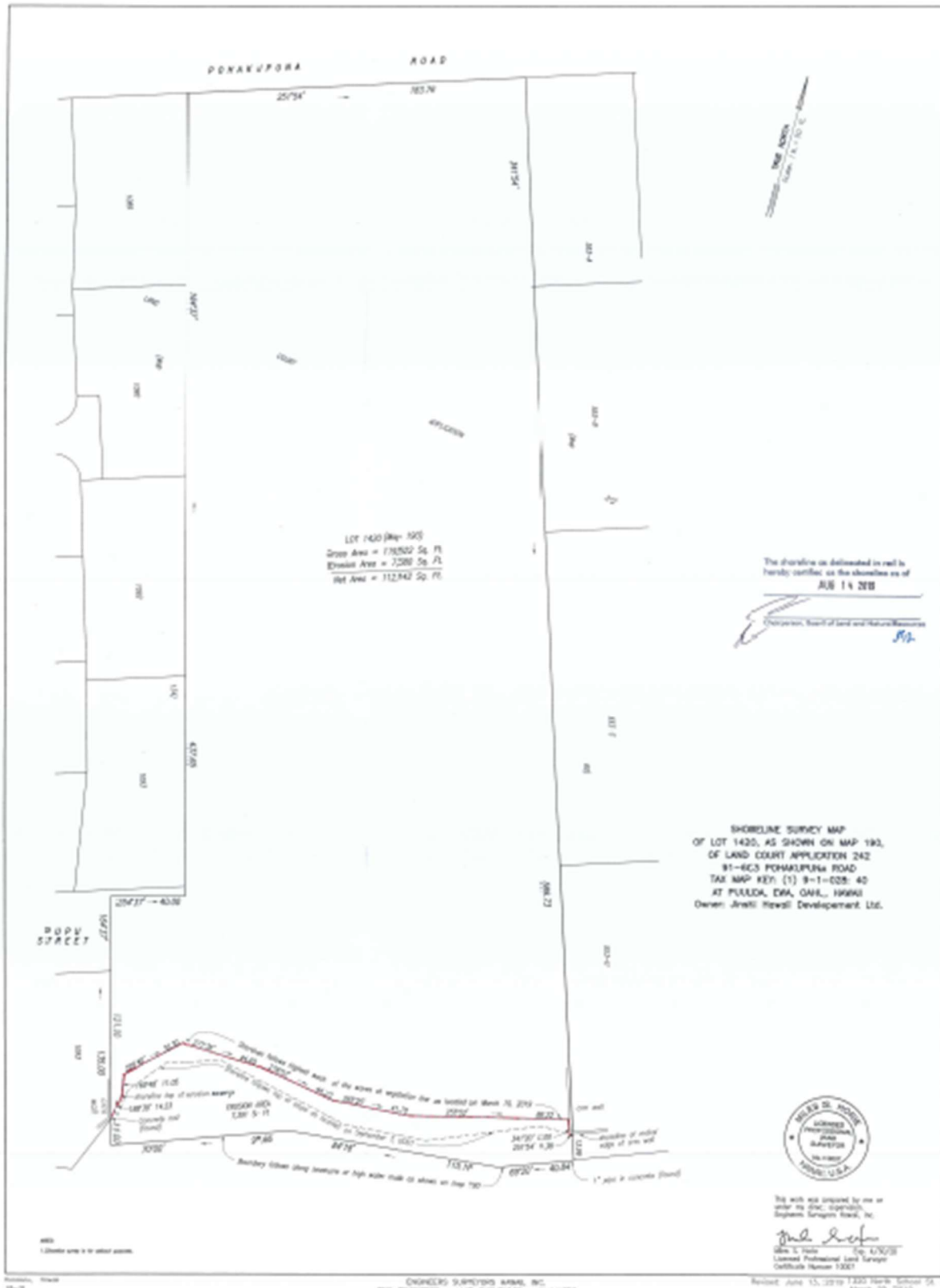


Figure 3. Approved Certified Shoreline Survey Map. Reference: Engineers Surveyors Hawai'i, Inc., Aug. 14, 2019.



Figure 4. Photo taken of the rocky shoreline of Lot 1420 facing west. Reference: EKNA Services, Inc., Jan. 29, 2021.



Figure 5. Photo taken of the rocky shoreline of Lot 1420 facing east. Reference: EKNA Services, Inc., Jan. 29, 2021.

91-603 Pohakupuna Road

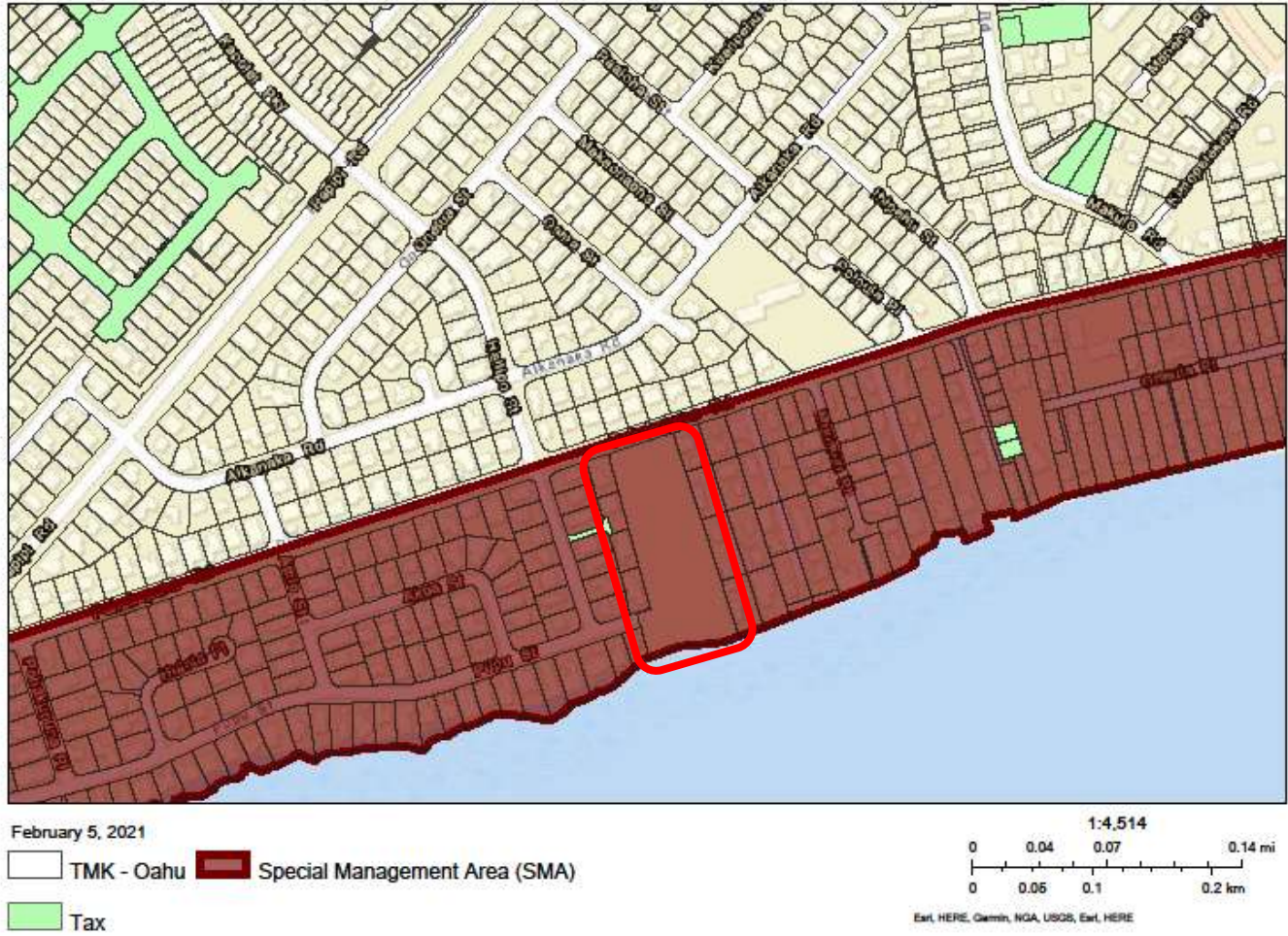


Figure 6. Special Management Area Map. Reference: Hawai'i SMA Locator, Input Date – Sept. 20, 2015, Load Date – June 30, 2020.

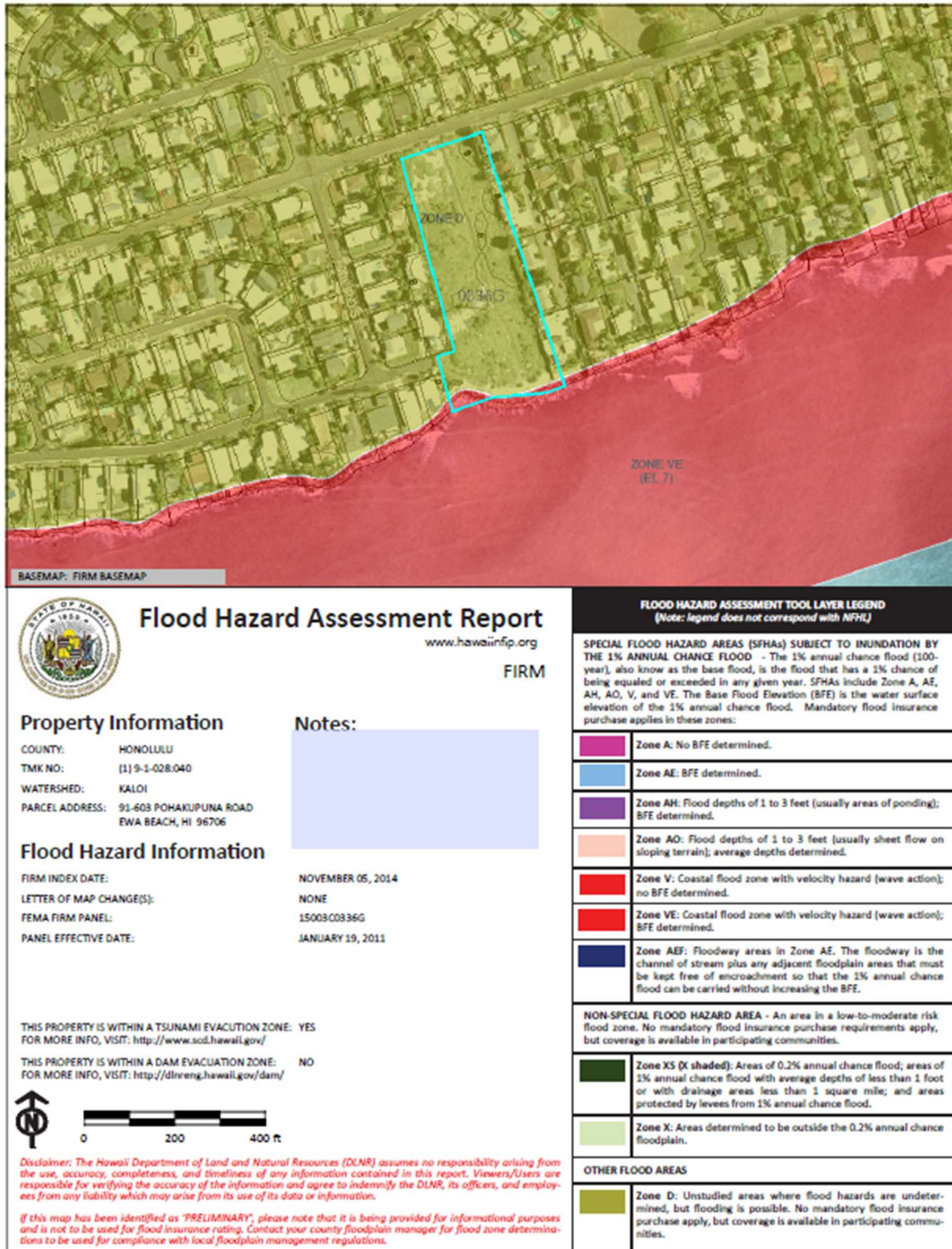


Figure 7. Flood Hazard Assessment Report and Map. Reference: State of Hawai'i, Department of Land and Natural Resources Flood Hazard Assessment Tool based on FIRM, FIRM Index Date – Nov. 5, 2014.



Figure 8. PacIOOS Sea Level Rise Exposure Map. Reference: PacIOOS State of Hawai'i Sea Level Rise Viewer, Jan. 9, 2021.

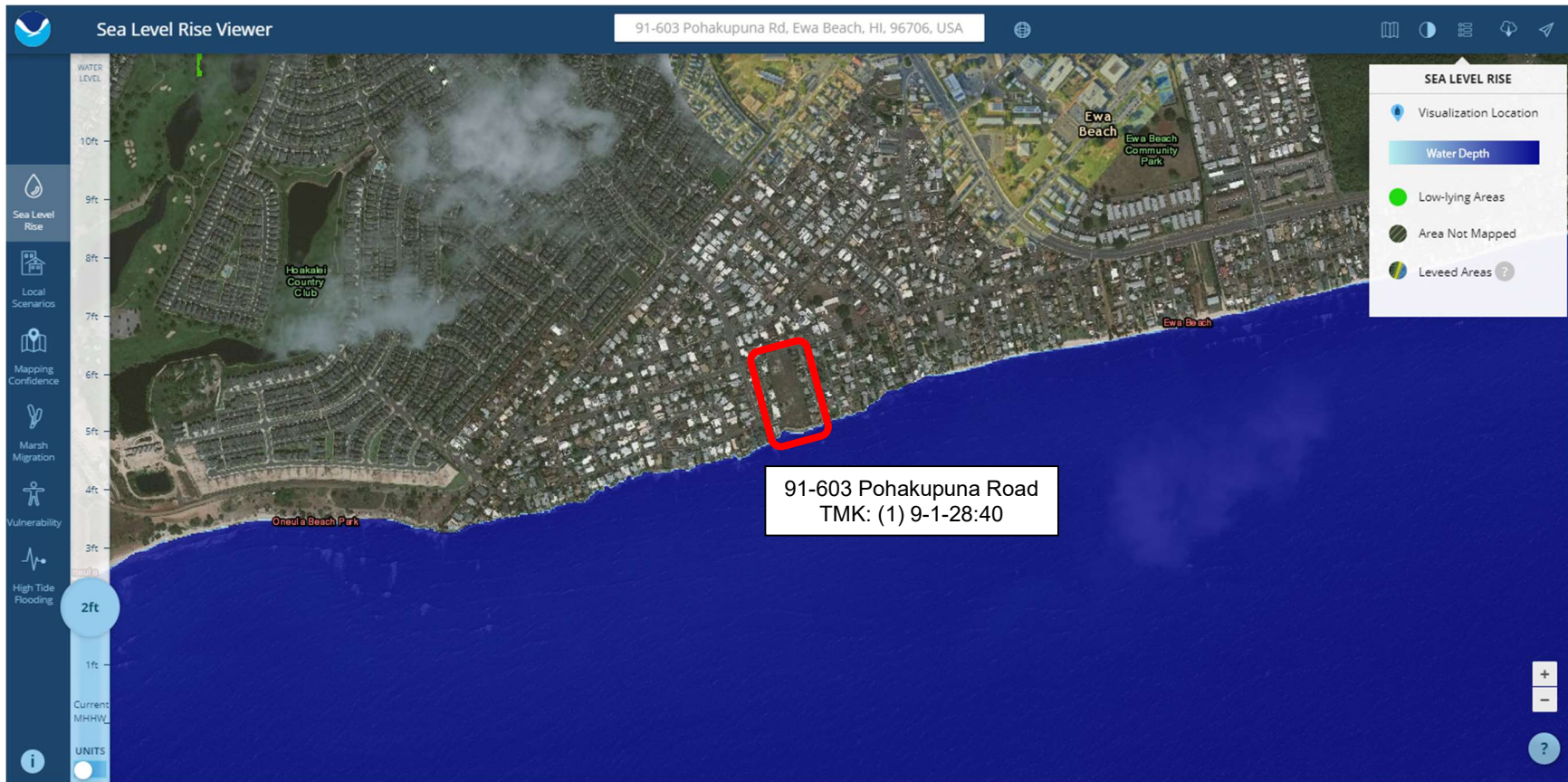
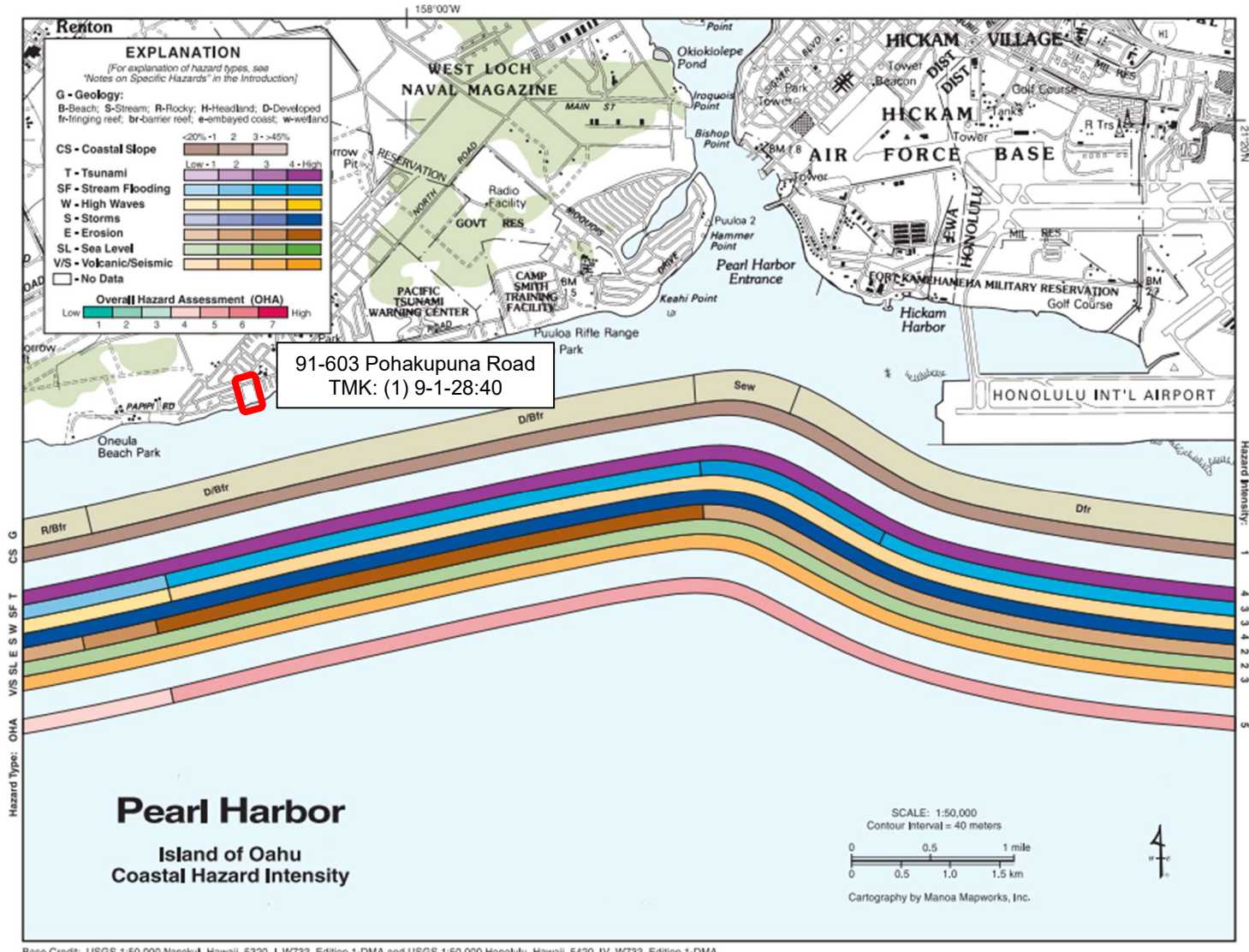


Figure 9. NOAA Sea Level Rise Exposure Map. Reference: NOAA Sea Level Rise Viewer, Accessed Feb. 8, 2021.



Base Credit: USGS 1:50,000 Nanakuli, Hawaii 5320 I W733 Edition 1-DMA and USGS 1:50,000 Honolulu, Hawaii 5420 IV W733 Edition 1-DMA

Figure 10. Coastal Hazard Intensity Map. Reference: USGS and US DOI, "Atlas of Natural Hazards in the Hawaiian Coastal Zone," Jan. 9, 2002.

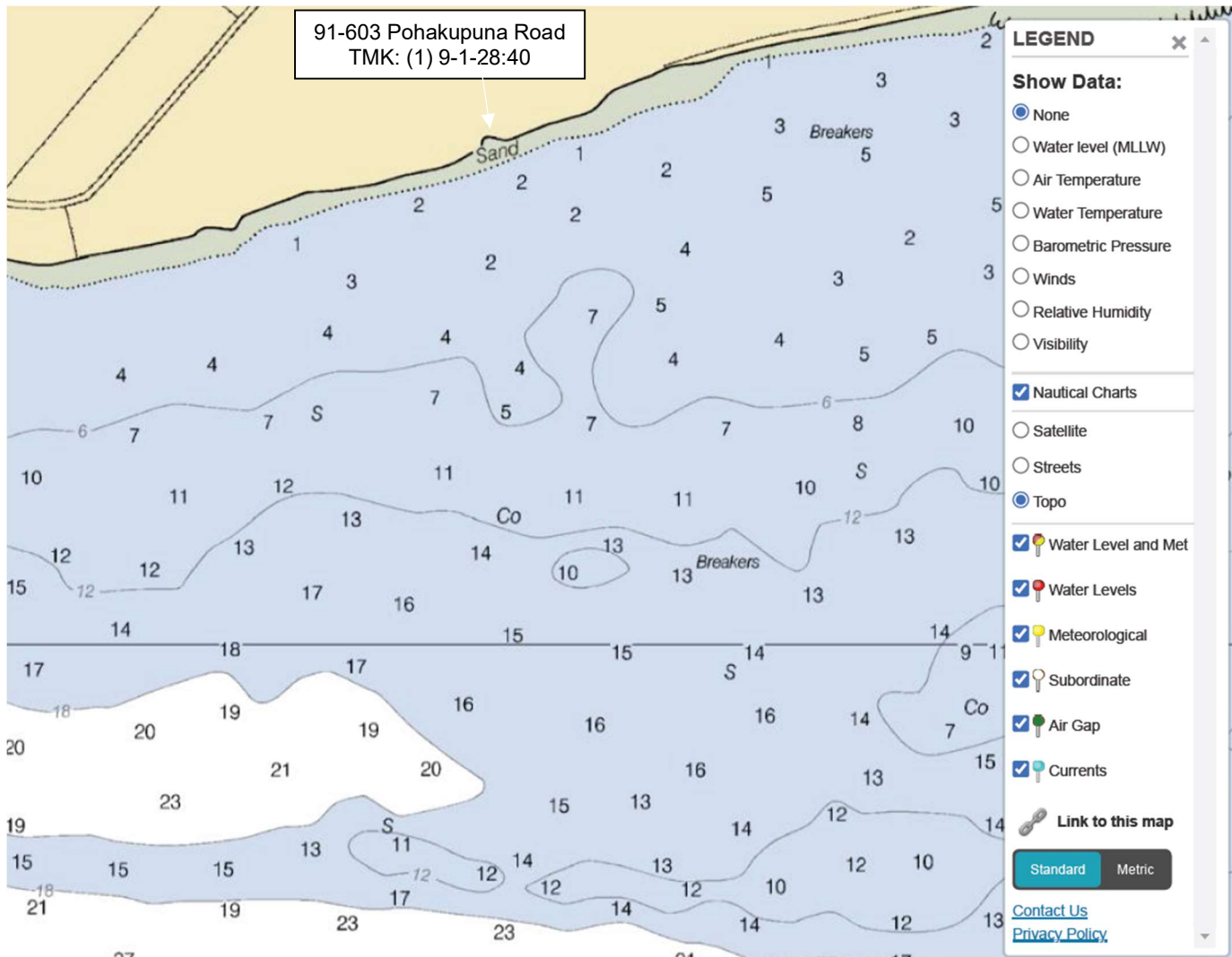


Figure 11. Bathymetry by Lot 1420. Units in feet at MLLW. Reference: CO-OPS Map – NOAA Tides and Currents, Accessed Feb. 7, 2021.



Figure 12. Photo taken at the center along the vegetation line of Lot 1420 facing west. Reference: EKNA Services, Inc., Jan. 29, 2021.



Figure 13. Photo taken at the center along the vegetation line of Lot 1420 facing east. Reference: EKNA Services, Inc., Jan. 29, 2021.

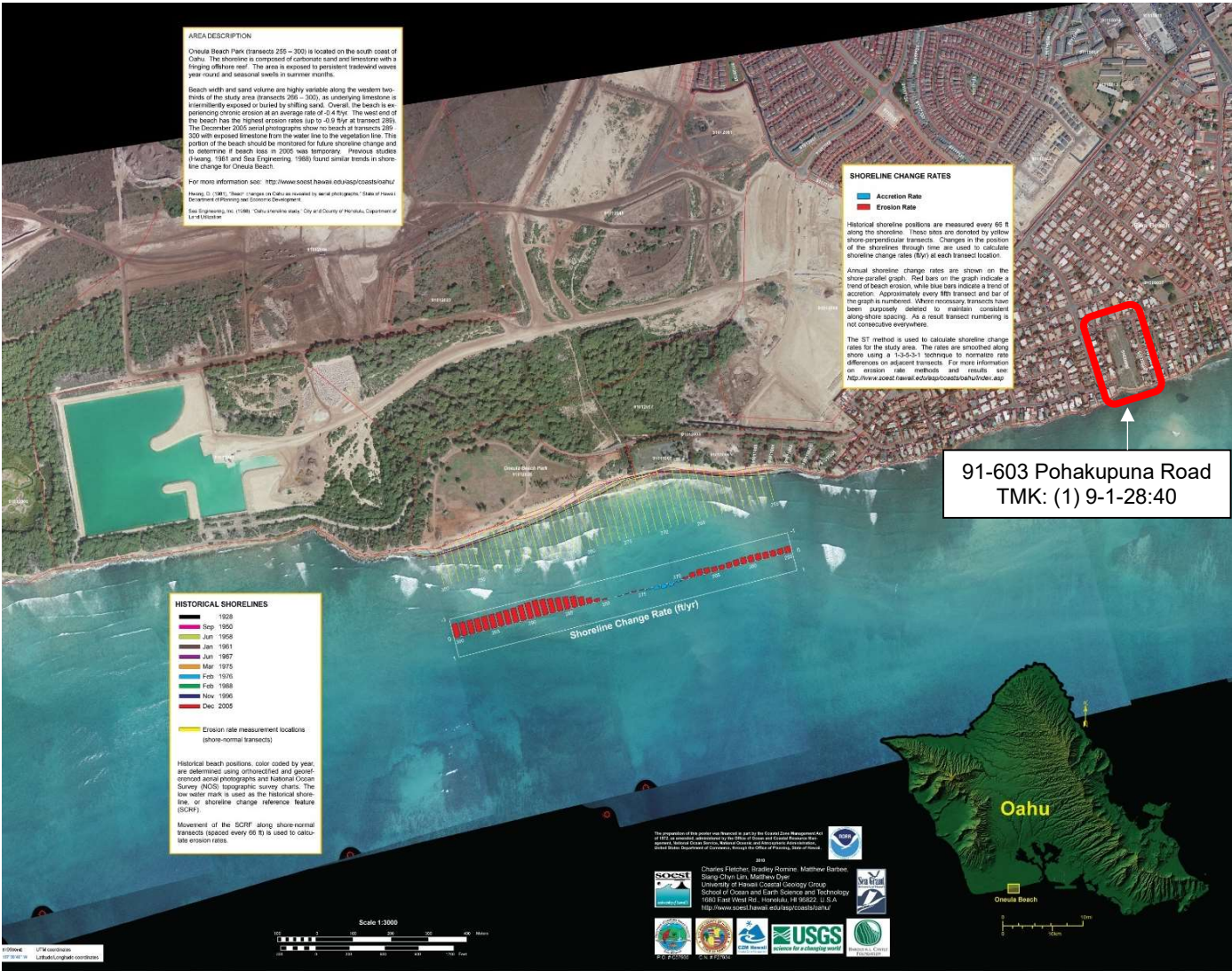


Figure 14. Shoreline Study Erosion Map. Reference: University of Hawai'i School of Ocean and Earth Science and Technology: Coastal Geology Group Hawai'i Coastal Erosion Website, 2010.

Main 8 Hawaiian Islands (Oahu) : Shallow-water Benthic Habitats (Frame 127)

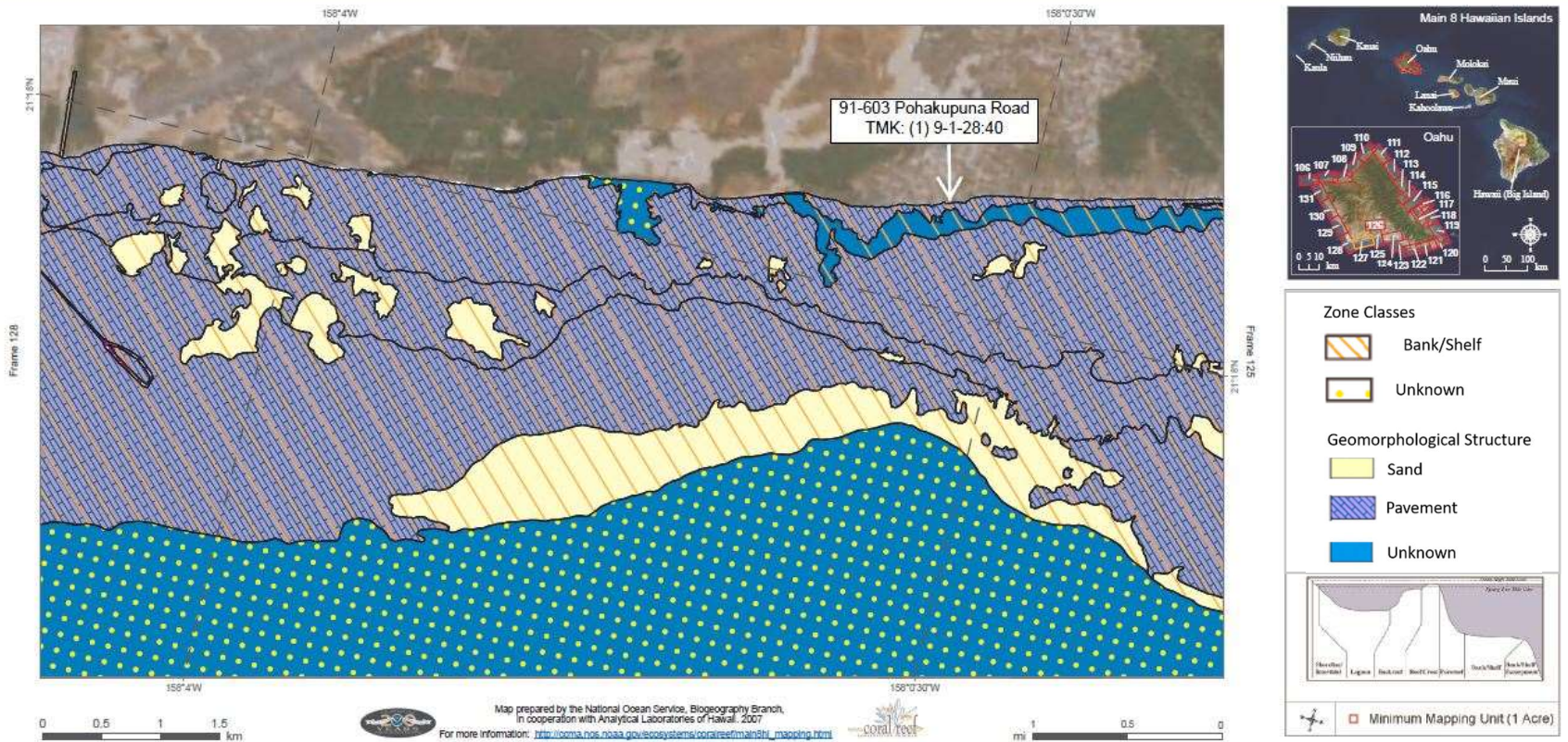


Figure 15. Shallow-water Benthic Habitats. Reference: National Centers for Coastal Ocean Science Data Collections, National Ocean Service: Biogeography Branch, 2007.

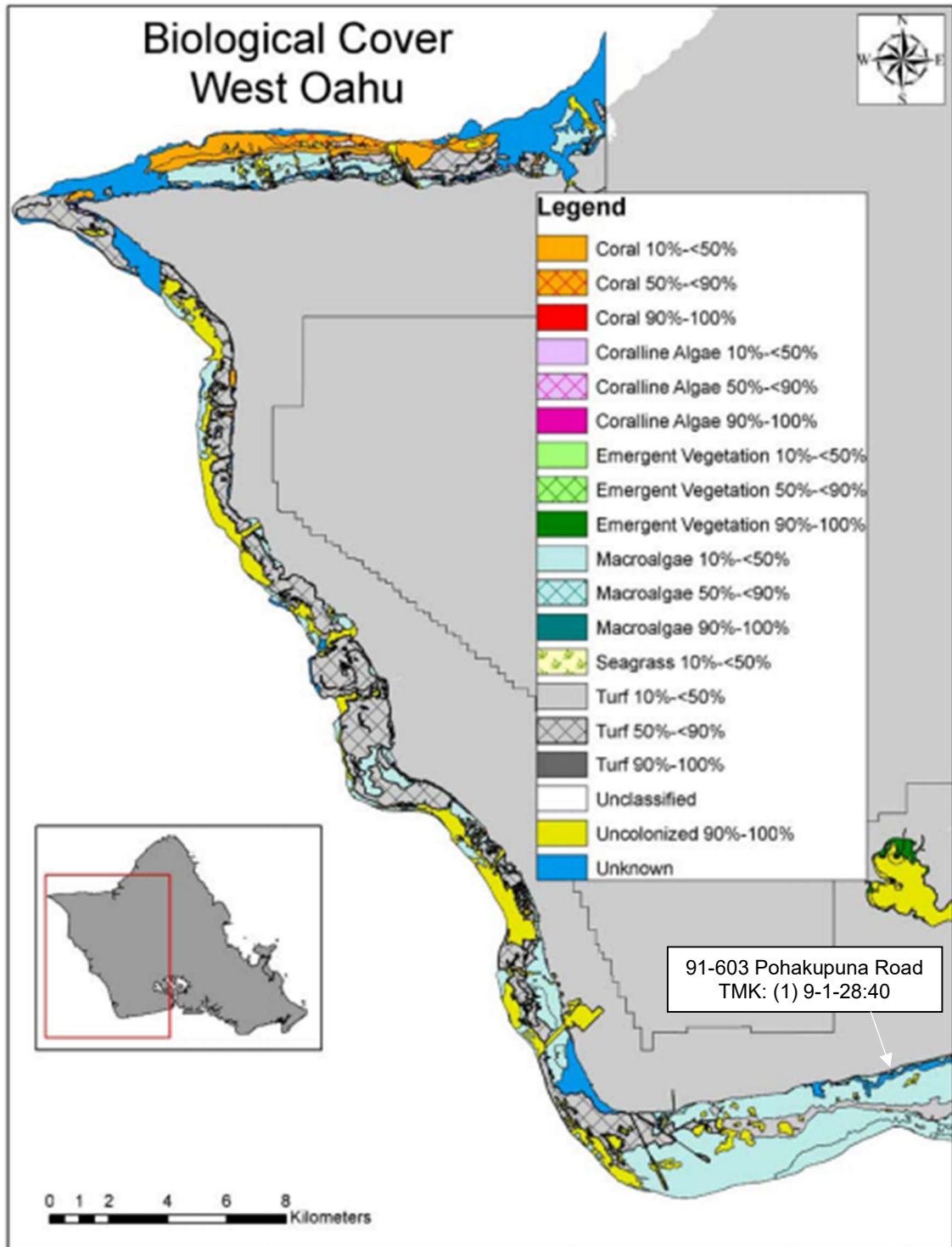


Figure 16. Biological Cover of West O’ahu Benthic Habitats. Reference: British Aerospace (BAE) Systems Sensor Solutions Identification and Surveillance (S2 IS), “Mapping of Benthic Habitats for the Main Eight Hawaiian Islands,” Aug. 1, 2007.



Figure 17. Biological Cover of Benthic Habitats by Lot 1420. Reference: PacIOOS Voyager, Accessed Feb. 5, 2021. Funded in part by National Oceanic and Atmospheric Administration (NOAA) Awards #NA11NOS0120039 and #NA16NOS0120024.

APPENDIX F

LIMITED FLOODING ANALYSIS OF HURRICANE AND
TSUNAMI IMPACTS OF UNDETERMINED FLOOD AREAS



Limited Flooding Analysis of Hurricane and Tsunami Impacts of Undetermined Flood Areas

Lot 1420 (91-603 Pohakupuna Road)
Pu'uloa, 'Ewa, O'ahu, Hawai'i

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Limited Flooding Analysis of Hurricane and Tsunami Impacts of Undetermined Flood Areas

Lot 1420 (91-603 Pohakupuna Road)
Pu'uloa, 'Ewa, O'ahu, Hawai'i

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November 2022



Brian Toshio Ishii

This work was prepared by me or under my supervision.
(Expiration date of the license: 04/30/2024)

This study is for planning purposes only.



Table of Contents

1. Introduction.....	1
2. Location and Property Description.....	2
3. Undeveloped Conditions.....	3
3.1 Topography and Bathymetry.....	3
3.2 Elevation Profiles.....	3
3.3 Surface Roughness.....	5
3.4 Proposed Development.....	6
3.5 Existing Flood Information.....	6
4. Numerical Simulation Models.....	7
5. Hurricane Storm Surge Analysis.....	10
5.1 Hurricane Storm Surge Approach.....	10
5.2 Percent of Occurrence.....	10
5.3 Category 3 Hurricane Parameters.....	11
5.4 Hurricane Inundation Modeling and Analysis.....	12
5.5 Hurricane Inundation.....	12
5.6 Hurricane Inundation – with Sea Level Rise.....	13
6. Tsunami Flood Wave Runup Analysis.....	14
6.1 Tsunami Runup Approach.....	14
6.2 Determining Tsunami Wave Height.....	14
6.3 Tsunami Inundation.....	15
6.4 Tsunami Inundation – with Sea Level Rise.....	15
7. Discussion and Summary of Direct and Cumulative Impacts.....	16
7.1 Direct Impacts.....	16
7.2 Cumulative Impacts.....	21
Appendix A: Figures	
Appendix B: CSHORE and TSUN-2 Outputs	

List of Figures (Appendix A)

Figure 1. Aerial of Lot 1420 on 91-603 Pohakupuna Road..... A1

Figure 2. Topography Survey Map. A2

Figure 3. Approved Certified Shoreline Survey Map..... A3

Figure 4. Photo taken of the rocky shoreline of Lot 1420 facing west..... A4

Figure 5. Photo taken of the rocky shoreline of Lot 1420 facing east. A5

Figure 6. Special Management Area Map..... A6

Figure 7. Digital Elevation Model and Profile Locations for
91-603 Pohakupuna Road Undeveloped Conditions A7

Figure 8. Offshore Digital Elevation Model and Profile Locations for
91-603 Pohakupuna Road A8

Figure 9. Photo taken at the center along the vegetation line of
Lot 1420 facing north. A9

Figure 10. Proposed Development and Inundated Low Elevation Area in the
Proposed Development Preliminary Grading Plan for 91-603
Pohakupuna Road..... A10

Figure 11. Digital Elevation Model and Profile Locations for
91-603 Pohakupuna Road Developed Conditions A11

Figure 12. Flood Hazard Assessment Report and Map. A12

Figure 13. NOAA Historical Hurricane Tracks at a 200 Nautical Mile Radius
from the Project Site A13

Figure 14. Hurricane Flood Calculations for Undeveloped Conditions at Profile 1..... A13

Figure 15. Hurricane Flood Calculations for Undeveloped Conditions at Profile 2..... A14

Figure 16. Hurricane Flood Calculations for Undeveloped Conditions at Profile 3..... A14

Figure 17. Category 3 Hurricane Inundation for 91-603 Pohakupuna Road
Undeveloped Conditions..... A15

Figure 18. Hurricane Flood Calculations for Developed Conditions at Profile 1..... A16

Figure 19. Hurricane Flood Calculations for Developed Conditions at Profile 2..... A16

Figure 20. Hurricane Flood Calculations for Developed Conditions at Profile 3..... A17

Figure 21. Hurricane Flood Calculations for Undeveloped Conditions at Profile 1
with 3.2 ft SLR..... A17

Figure 22. Hurricane Flood Calculations for Undeveloped Conditions at Profile 2
with 3.2 ft SLR..... A18

Figure 23. Hurricane Flood Calculations for Undeveloped Conditions at Profile 3
with 3.2 ft SLR..... A18

Figure 24. Category 3 Hurricane Inundation for 91-603 Pohakupuna Road
Undeveloped Conditions w/ SLR A19

Figure 25. Hurricane Flood Calculations for Developed Conditions at Profile 1
with 3.2 ft SLR..... A20

Figure 26. Hurricane Flood Calculations for Developed Conditions at Profile 2
with 3.2 ft SLR..... A20

Figure 27. Hurricane Flood Calculations for Developed Conditions at Profile 3
with 3.2 ft SLR..... A21

Figure 28. Category 3 Hurricane Inundation for 91-603 Pohakupuna Road
 Developed Conditions w/ SLR A22

Figure 29. Coefficient A vs. Location Plot for O’ahu A23

Figure 30. Coefficient B vs. Location Plot for O’ahu A23

Figure 31. Tsunami Runup Calculations for Undeveloped Conditions at Profile 1..... A24

Figure 32. Tsunami Runup Calculations for Undeveloped Conditions at Profile 2..... A24

Figure 33. Tsunami Runup Calculations for Undeveloped Conditions at Profile 3..... A25

Figure 34. 100-Year Tsunami Inundation for 91-603 Pohakupuna Road
 Undeveloped Conditions A26

Figure 35. Tsunami Runup Calculations for Developed Conditions at Profile 1..... A27

Figure 36. Tsunami Runup Calculations for Developed Conditions at Profile 2..... A27

Figure 37. Tsunami Runup Calculations for Developed Conditions at Profile 3..... A28

Figure 38. Tsunami Runup Calculations for Undeveloped Conditions at Profile 1
 with 3.2 ft SLR..... A28

Figure 39. Tsunami Runup Calculations for Undeveloped Conditions at Profile 2
 with 3.2 ft SLR..... A29

Figure 40. Tsunami Runup Calculations for Undeveloped Conditions at Profile 3
 with 3.2 ft SLR..... A29

Figure 41. 100-Year Tsunami Inundation for 91-603 Pohakupuna Road
 Undeveloped Conditions w/ SLR A30

Figure 42. Tsunami Runup Calculations for Developed Elevations at Profile 1
 with 3.2 ft SLR..... A31

Figure 43. Tsunami Runup Calculations for Developed Elevations at Profile 2
 with 3.2 ft SLR..... A31

Figure 44. Tsunami Runup Calculations for Developed Elevations at Profile 3
 with 3.2 ft SLR..... A32

1. Introduction

The proposed development at 91-603 Pohakupuna Road required the owner to prepare and submit an Environmental Assessment (EA) to the City and County of Honolulu (CCH) prior to the development. Upon review of the Draft EA, CCH provided comments to the owner of the property. Comment three (3) from CCH states:

A flood study, consistent with Section 21A-1.5, ROH. Presently, the flood hazard maps indicate that most of the site has undetermined flood hazards. Although the Draft EA states that a flood study would not be required, a flood study will be required for the purposes of disclosing potential coastal hazards on the shoreline lot. Ultimately, the SMA permit will need to include information provided by the flood study so the DPP and the City Council can analyze the proposal and confirm...

The flood study must consist of a set of documents stamped and signed by a licensed professional engineer, containing adequate and substantiating data, including a flood study, flood data, contours or spot elevations, and any other information necessary to make a determination of the flood hazards present at the site. The study should consider individual and cumulative impacts of different coastal hazards and floods on the site, which may be exacerbated by Sea Level Rise (SLR).

In addition, the applicable portion of Sec. 21 A 1.5 of the Revised Ordinances of Honolulu states:

Sec. 21A-1.5 Special flood hazard areas.

(a) Applicability. This chapter shall apply to all lands within the special flood hazard areas as determined by the director or as delineated on the flood insurance rate maps (FIRM) prepared by the FEMA, or both. The following special flood hazard areas are established:

....Where interpretation is needed as to whether or not a project lies within a certain flood hazard area, or interpretation is needed on the base flood elevation in the floodway, flood fringe or coastal high hazard areas, a request for interpretation of the flood maps shall be submitted to the director for determination. The request shall include the project site and location plan, property lines and dimensions and tax map key. (d) Where flood hazard areas and base flood elevations have not been determined on the flood maps, the director shall obtain and review the information needed to make this determination. A request for interpretation under this section shall be submitted to the director and include three sets of documents, stamped and signed by a licensed professional engineer, containing adequate information and substantiating data consistent with this part, such as flood study, flood data, project site and location plan, property lines and dimension, tax map key, and topographic data, contours or spot elevations based on reference marks on flood maps.

This study is prepared to meet the requirements of CCH's comment from above. There are no streams in the area and the existing VE flood zone identifies that coastal flooding will be either from tsunamis or hurricanes. Therefore, this study will focus on the flooding of the undetermined areas by either hurricanes or tsunamis. The undetermined areas (Zone D) are identified in the Flood Insurance Risk Maps (FIRM) for the subject property, and the undetermined area is the majority of the area on the property.

Therefore, the objectives for the study are:

- to determine the potential flooding (inundation) of the undetermined areas of the property based on potential hurricane and tsunami scenarios; and
- to consider Sea Level Rise (SLR) in the flooding analysis.

Based on the above, EKNA Services, Inc. (EKNA) provides the following flood study for Zone D (Undetermined) of the property. For this flood study, the potential flooding of the property is based on a theoretical tsunami or hurricane that may impact the south shore of O'ahu. The second part of the study, the flood analysis, assesses flooding due to the potential of a 3.2-foot SLR scenario. To develop the inundation depths, EKNA used several numerical models to assess the potential of flooding on the subject property.

2. Location and Property Description

The property is located at 91-603 Pohakupuna Road on the south shore of O'ahu in Pu'u'loa, 'Ewa (Figure 1). It is owned by Jinshi Hawai'i Development Ltd., doing business as Golden Lion 'Ewa Beach LLC. The 2.7-acre parcel is bounded on the north by Pohakupuna Road and on the south by the ocean.

A topographic survey was completed by Engineers Surveyors Hawai'i, Inc. (ESH) in 2022 (Figure 2). Figure 2 shows the property lines for the subject property. Based on the topographic survey, a certified shoreline was delineated and approved by the state of Hawai'i in August 2019 (Figure 3).

The property elevation at the shoreline starts at mean sea level (MSL) and rises to approximately 5.9 feet MSL at the vegetation line and certified shoreline. The foreshore¹ slope on average is a 17 percent (17% grade). The elevation within the property varies from four feet (4') to 7.5 feet from the edge of the vegetation line to Pohakupuna Road, approximately 580 feet inland.

The shoreline of this lot is a fixed, rocky limestone substrate subject to direct wave action (Figure 4 and Figure 5). As shown in Figure 4 and Figure 5, the adjacent properties have constructed concrete walls approximately three feet (3') in height at the top of the bank, which extends inland approximately 130 feet. The property itself has ground characterized as coral rubble and hardscape coral (coral outcrop). Additionally, the

¹ For this study, the foreshore is the area from the shoreline to the top of the bank along the coast.

property is in the Special Management Area (SMA), where areas in the SMA must comply with the Coastal Zone Management objectives, policies, and SMA guidelines (Figure 6).

3. Undeveloped Conditions

This section describes the topography of the property and the bathymetry of the ocean fronting the property. In addition, the section provides an explanation of the three (3) representative elevation profiles used to analyze and compare for inundation for the existing and proposed development, description of roughness coefficients used in the modeling effort, and the existing flooding potential.

3.1 Topography and Bathymetry

The following resources were used to simulate the necessary models for hurricane storm surge and tsunami inundation:

1. Ground elevations taken from the topographic survey completed by Engineers Surveyors Hawai'i, Inc. in 2022 (Figure 2).
2. Offshore elevations were from the 2013 United States Army Corps of Engineers National Coastal Mapping Program (USACE NCMP) Topobathy LiDAR Digital Elevation Model (DEM) in Local Mean Sea Level (LMSL) for O'ahu, Hawai'i.²

3.2 Elevation Profiles

Three (3) representative elevation profiles were selected for runup calculations. The first profile transects the west side of the property, starting at the beginning of the FIRM VE zone and ending at the north end of the property at the property line. Similarly, the second profile transects the east side of the property while the third profile transects the center of the property (Figure 7). The onshore profile elevations are extracted from the 2022 ESH topographic survey by interpolating between elevation points. The topographic survey uses benchmark R-3 with an elevation of 50.57 feet.

For modeling purposes and to remove model boundary layer inconsistencies additional landside (north) points were entered. The additional profile points that are beyond the property limits were extracted from the 2013 USACE LiDAR DEM, which is shown in Figure 8 with one meter resolution.

² United States Army Corps of Engineers. 2013 USACE NCMP Topobathy LiDAR DEM (LMSL): O'ahu, HI. Charleston, South Carolina: Office for Coastal Management, 2013.

Table 1
 Representative Topographic Profiles 1 to 3
 (dx = 26.24 ft)

<u>Distance from start of VE Zone (ft)</u>	<u>Profile 1 Elevations (ft)</u>	<u>Profile 1 Manning's n</u>	<u>Profile 2 Elevations (ft)</u>	<u>Profile 2 Manning's n</u>	<u>Profile 3 Elevations (ft)</u>	<u>Profile 3 Manning's n</u>
0	-5.64	0.045	-4.78	0.045	-5.55	0.045
26.24	-5.31	0.045	-4.52	0.045	-5.54	0.045
52.48	-5.31	0.045	-4.58	0.045	-5.59	0.045
78.72	-5.24	0.045	-4.45	0.045	-5.59	0.045
104.96	-5.66	0.045	-4.67	0.045	-5.48	0.045
131.2	-5.76	0.045	-5.37	0.045	-5.78	0.045
157.44	-5.79	0.045	-5.66	0.045	-5.79	0.045
183.68	-5.47	0.045	-5.74	0.045	-5.44	0.045
209.92	-5.85	0.045	-5.05	0.045	-5.25	0.045
236.16	-5.68	0.045	-4.81	0.045	-4.78	0.045
262.4	-5.33	0.045	-4.56	0.045	-4.78	0.045
288.64	-5.17	0.045	-4.30	0.045	-5.08	0.045
314.88	-5.07	0.045	-4.12	0.045	-4.88	0.045
341.12	-4.24	0.045	-3.97	0.045	-4.83	0.045
367.36	-5.16	0.045	-3.92	0.045	-4.13	0.045
393.6	-4.51	0.045	-3.74	0.045	-4.01	0.045
419.84	-3.94	0.045	-3.58	0.045	-3.60	0.045
446.08	-3.58	0.045	-3.94	0.045	-3.60	0.045
472.32	-3.13	0.045	-3.36	0.045	-3.49	0.045
498.56	-2.80	0.045	-2.98	0.045	-3.36	0.045
524.8	-2.85	0.045	-3.13	0.045	-2.84	0.045
551.04	-3.32	0.045	-2.33	0.045	-2.75	0.045
577.28	-2.53	0.045	0.35	0.045	-0.77	0.045
603.52	-1.52	0.045	3.81	0.045	5.32	0.045
629.76	2.01	0.045	5.43	0.035	5.93	0.035
656	3.81	0.045	4.81	0.035	5.39	0.035
682.24	5.42	0.035	5.03	0.035	4.96	0.035
708.48	4.91	0.035	4.87	0.035	5.05	0.035
734.72	4.96	0.035	4.75	0.035	5.18	0.035
760.96	5.62	0.035	4.99	0.035	5.18	0.035
787.2	6.06	0.035	5.39	0.035	5.41	0.035
813.44	6.20	0.035	5.72	0.035	5.99	0.035
839.68	5.82	0.035	6.02	0.035	6.33	0.035
865.92	5.58	0.035	6.14	0.035	6.44	0.035
892.16	6.01	0.035	6.31	0.035	6.42	0.035
918.4	6.38	0.035	6.31	0.035	6.57	0.035
944.64	6.71	0.035	6.22	0.035	6.50	0.035
970.88	6.76	0.035	6.12	0.035	6.29	0.035
997.12	6.63	0.035	6.08	0.035	6.22	0.035
1023.36	6.33	0.035	6.08	0.035	6.14	0.035
1049.6	6.50	0.035	6.11	0.035	6.25	0.035
1075.84	6.40	0.035	6.08	0.035	6.37	0.035
1102.08	6.27	0.035	5.93	0.035	6.45	0.035
1128.32	6.03	0.035	5.70	0.035	6.54	0.035
1154.56	6.57	0.035	5.85	0.035	6.63	0.035
1180.8	6.90	0.035	6.02	0.035	6.72	0.035

3.3 Surface Roughness

The selection of the surface roughness coefficients (Manning’s “n” values) shown in Table 1 used in the computation of the propagation of water over land. Table 2 shows the range of Manning’s “n” for various coastal terrain conditions.

Table 2
Suggested Values of Manning's n for Various Coastal Terrain Conditions³

n	Conditions
0.015 - 0.025	Very smooth (mud flats, ice, well maintained concrete paved ways, beaches of fine sand)
0.025 - 0.030	Smooth (dried earth, coarse sand beaches, badly maintained concrete paved ways, very thin lawn grass up to 1 cm high)
0.030 - 0.035	Average for developed areas (lawn grass up to 5 cm high, gravel, presence of some buildings, houses, and other obstructions)
0.035 - 0.045	Open coast, relatively smooth and open area (grass up to 10 cm, sparse population of trees*, sparse bush, even bottom)
0.045 - 0.055	Moderately rough open coastal areas (thick grass, uneven bottom consisting of large rocks, coral, etc., presence of trees with low foliage, brush, lava rock, etc.)
0.055 - 0.070	Unusually rough coastal areas (dense brush, dense tree population with exposed roots, coarse lava rock formations)

* Trees with high foliage such that only trunks are exposed to flow

The surface roughness characteristics of the elevation profiles were determined based on information from the 2022 topographic survey by ESH and photographic survey. In general, the surface roughness features of the land topography from the shoreline to the opposite end of the property can be characterized in the following manner: The offshore region and the

³ “Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawai’i.” M & E Pacific for the Pacific Ocean Division, United States Army Corps of Engineers, August 1978.

region between the shoreline and the vegetation line (Figure 4 and Figure 5) can be characterized as a moderately rough coastal area consisting of large rocks and coral (for offshore points), which can be represented by a Manning's $n = 0.045$. For the region between the vegetation line and the north end of the property (Figure 9), the surface roughness can be characterized as sparse grass with some bush and obstruction, which is represented by a Manning's $n = 0.035$. The average roughness characteristic of the entire profile can be represented by a Manning's $n = 0.04$.

3.4 Proposed Development

The proposed development for the site is presented in Figure 10 and was worked on by the developer's project team. The proposed development has an elevated filled base for the construction of houses on the property. The elevated base is located north of the shoreline setback area (80 feet from the shoreline). In the previously prepared Coastal Hazard Assessment (2021) for the proposed project, the shoreline setback was recommended to be 40 feet. The Coastal Hazard Assessment made the determination based on the lack of wave runup and overtopping impacts and due to the rocky (coral) shoreline which does not erode.⁴

The elevated base is delineated by the top-of-bank line with a top elevation ranging from 7.25 feet to 8.0 feet. The ground elevations (top of the base) start at 7.25 feet at the south end of the development and reach 8.25 feet at the north end along Pohakupuna Road. The floor elevation of the residential units is 9.0 feet throughout the property.

For the proposed development, topographic profiles were developed for the same transects as in the undeveloped scenario to provide a comparison of the inundation depths (Figure 11). Similarly, the area north of the property line was extended by the LiDAR DEM performed by the USACE.

3.5 Existing Flood Information

The Flood Insurance Rate Maps (FIRM) prepared by the Federal Management Agency (FEMA) identify areas of flood hazard with a 100-year storm boundary. These are areas that have a one percent (1%) chance of flooding in any given year. For Hawai'i, the FIRM zone and base flood elevation (BFE) values are derived from the merger of a tsunami hazard study with a hurricane coastal hazard study. The zone type and BFE are determined by the worst-case inland flooding extent of the coincident tsunami and hurricane surge hazards. The BFE given on the FIRM is the

⁴ EKNA Services, Inc., *Coastal Hazard Assessment*, November, 2021.

larger of two computed values. The level of hazard in each area determines the zone classification.

The applicable FIRM shown in Figure 12 shows the area requested to be studied by CCH. The portion of the property is designated Zone D, which are areas where flood hazards are undetermined, but possible. Zone D starts from immediately landward of the VE zone and extends landward, beyond the north end of the property.

The FIRM also indicates a narrow band of coastal flooding, designated as Zone VE.⁵ The VE zone drawn in Figure 12 is shown to extend ten (10) to 38 feet from the surveyed high-water mark.

Within the VE zone, the FIRM designates a BFE of seven feet (7') above MSL, meaning the predicted elevation of coastal flooding may reach a seven-foot (7') elevation (Figure 12) within the VE zone.

According to the Flood Insurance Study (FIS) for CCH, this seven-foot (7') elevation only reflects that hurricane storm surge and tsunami hazards may dominate in certain areas. The coast of the James Campbell Industrial Park area, located approximately 3.5 miles west of the project site, has historically been impacted by tsunamis and hurricanes, with the 1946 Alaska earthquake tsunami generating 12-foot-high waves at Barbers Point and incurring damages during both Hurricane Iniki (1992) and Iwa (1982).⁶

4. Numerical Simulation Models

In order to estimate flooding potential from hurricane and tsunami scenarios for the undeveloped topography, developed topography, and future topographies with sea level rise, EKNA chose to use several numerical models. These models are publicly available or are developed with publicly available documentation. The models used in this study are described below:

CSHORE is a one-dimensional cross-shore numerical model for waves, currents, sediment transport and beach profile evolution. CSHORE was developed by USACE and consists of a combined wave and current model based on time-averaged continuity, cross-shore and longshore momentum, wave action and roller energy equations, and

⁵ Zone VE are areas subject to inundation and additional hazards due to tsunami and/or storm wave-induced velocity ("National Flood Insurance Program Terminology Index," FEMA, July 18, 2020, <https://www.fema.gov/flood-insurance/terminology-index>).

⁶ Federal Emergency Management Agency. (2014). Flood Insurance Study: City and County of Honolulu, Hawai'i (Vol. 2).

empirical formulas for irregular wave runup.⁷ CSHORE uses the probabilistic model for irregular wave runup by Kobayashi et al (2008) to calculate the two-percent (2%) exceedance runup.⁸

FUNWAVE-TVD is the Total Variation Diminishing (TVD) version of the Fully Nonlinear Boussinesq WAVE (FUNWAVE) model.⁹ FUNWAVE is a phase-resolving, shock-capturing Boussinesq model for nearshore wave processes. The model was originally developed by Kirby et al. to solve the fully nonlinear Boussinesq equations for long waves based on Wei et al. (1995).^{10,11}

TSUN-2 is EKNA's in-house tsunami runup model that calculates the tsunami inland propagation based on equations from the *Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawai'i*, M&E Pacific, Inc. for USACE, August 1978. This model uses the FEMA-approved tsunami runup methodology and was used on many FIRM map revisions, as part of the Letter of Map Revision (LOMR) process. The LOMRs developed using this model have been approved by FEMA and the various counties.

The methodology described in FEMA's Flood Insurance Study for determining runup due to tsunami inundation follows the paper, *Tsunami Inundation Prediction* (Bretschneider and Wybro, 1976). The governing differential equation¹² for the tsunami inland profile is given by:

$$\frac{dh}{dx} = -\left[\tan \theta + \frac{n^2 g F^2 h^{-\frac{1}{3}}}{(1.486)^2}\right] \left[\frac{F^2}{2} + 1\right]^{-1}$$

where:

h = tsunami wave depth (feet)

x = horizontal distance (feet)

tan θ = vertical rise in ground elevation divided by horizontal rise

⁷ U.S. Army Corps of Engineers (2009) CSHORE (Version 1.0) [Source Code].
<https://sites.google.com/site/cshorecode/documents/release-1-0>.

⁸ Kobayashi, N. 2008. Efficient wave and current models for coastal structures and sediments. In: *Nonlinear Wave Dynamics*. Singapore: World Scientific Publishing Company, 1-21.

⁹ Shi, Fengyan et al. (2019) FUNWAVE-TVD (Version 3.4) [Source Code].
<https://fengyanshi.github.io/build/html/index.html>.

¹⁰ Kirby, J.T. et al. (1998) FUNWAVE (Version 1.0) [Source Code].
<http://resolver.tudelft.nl/uuid:d79bba08-8d35-47e2-b901-881c86985ce4>.

¹¹ Wei, Ge et al. *Journal of Fluid Mechanics*, Volume 294, 10 July 1995, pp. 71 - 92
 DOI: <https://doi.org/10.1017/S0022112095002813>

¹² Bretschneider, C. L., Wybro, P.G (1976). "Tsunami Inundation Prediction." *Coastal Engineering Proceedings*, 1(15), 59. <https://doi.org/10.9753/icce.v15.59>

n = Manning's friction factor

g = gravitational constant (feet/sec²)

F = Froude number ($F = 1$ for nonbore, $F = 2$ for bore formation)

The numerical solution of the above equation was refined in the USACE report,¹³ *Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawai'i* (August 1978) to give the following equation:

$$\Delta x = \frac{\Delta h \left[\frac{F^2}{2} + 1 \right]}{\tan \theta + \frac{n^2 g F^2 h_A^{-1/3}}{(1.486)^2}}$$

where:

Δx = an increment of horizontal distance (feet)

Δh = incremental difference of the tsunami wave depth (feet)

h_A = average tsunami wave depth in the incremental distance Δx (feet)

The TSUN-2 program applies this equation to determine Δh through an iterative method. In the application of the equation, the selection of the Froude number is required depending on whether a bore or non-bore type of tsunami wave formation is expected. Historically there has been no recorded occurrences of a bore type tsunami in the 'Ewa area.¹⁴ Thus, a Froude number of $F = 1$ was chosen to represent a non-bore type tsunami wave formation. The TSUN-2 program allow a maximum input of fifty profile points. Therefore, an increment of 26.24 feet was chosen for the input profile spacing to accommodate the entire length of each profile.

Tsunami propagation is modeled across the VE zone with the wave height ending at 7.8 feet at the shoreline. The wave continues to propagate inland from the VE zone onto the property.

¹³ "Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawai'i." M & E Pacific for the Pacific Ocean Division, United States Army Corps of Engineers, August 1978.

¹⁴ "Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawai'i." (Table 3). M & E Pacific for the Pacific Ocean Division, United States Army Corps of Engineers, August 1978.

5. Hurricane Storm Surge Analysis

5.1 Hurricane Storm Surge Approach

The hurricane storm surge is evaluated based on the category of hurricane that is most likely to occur based on the percent of occurrence from historical data. Wave runup is determined based on the FEMA (2005) "Procedure Memorandum No. 37" that recommends the use of the two-percent (2%) wave runup. The two-percent (2%) runup exceedance corresponds to the height reached by two percent (2%) of the highest run ups.

The approach to evaluate hurricane storm surge inundation is as follows:

- 1) Determine the category of hurricane to be analyzed based on the highest percent of occurrence.
- 2) Determine worst-case still-water level, wave setup and wave height for the determined hurricane category.
- 3) Calculate two-percent (2%) wave runup value using CSHORE.
- 4) Verify CSHORE wave runup results by replicating the highest percent of occurrence hurricane runup in FUNWAVE-TVD.
- 5) Plot runup and profile elevations to determine the inundation limit.

5.2 Percent of Occurrence

To evaluate the percent of occurrence of different hurricane scales, it is necessary to establish an area boundary. For this analysis, a distance of approximately 1,275 miles south starting from the project site is observed. Historical hurricane data used for this study is limited to hurricanes that were categorized at the time of the hurricane within 1,275 miles of the project site. According to the NOAA Historical Hurricane Tracks (Figure 13),¹⁵ 13 hurricanes consist of twenty-three percent (23%) of category 1, fifteen percent (15%) of category 2, forty-six percent (46%) of category 3, eight percent (8%) of category 4, and eight percent (8%) of category 5. The closest hurricane track to the south of O'ahu at a 200 nautical mile radius from the project site, was Hurricane Dot in 1959, classified as category 3 (Figure 13).

In addition, information from the *Hurricane Vulnerability Study for Honolulu, Hawai'i, and Vicinity, Volume 2, Determination of Coastal Inundation Limits*

¹⁵ National Oceanic and Atmospheric Administration, Office for Coastal Management. "Historical Hurricane Tracks." n.d. Accessed April 4, 2022. <https://coast.noaa.gov/hurricanes/#map=4/32/-80>.

for Southern O'ahu from Barbers Point to Koko Head was used.¹⁶ This document is referred to as the *Hurricane Vulnerability Study* in this paper and incorporated by reference. The characteristics of the worst-case hurricane scenario for this property are based on the *Hurricane Vulnerability Study*.

The parameters, or characteristics for the worst-case scenario used for this study from the *Hurricane Vulnerability Study* is based on twenty critical hurricanes in the Central Pacific, and the basic atmospheric and oceanic conditions surrounding Hawai'i.¹⁷ The topography used for the *Hurricane Vulnerability Study* is from the United States Geological Survey (USGS) from aerial photographs taken in 1952, field checked in 1953, revised from aerial photographs in 1977, limited field check in 1982, and map edited in 1983. Selected hydrographic data used were compiled from National Ocean Service/NOAA charts 4110 (1966), 4133 (1967) and hydrographic surveys (1924).¹⁸

5.3 Category 3 Hurricane Parameters

A category 3 hurricane has sustained winds between 96 to 112 knots (111 to 129 miles per hour) that can cause catastrophic damage according to the Saffir-Simpson Hurricane Wind Scale.¹⁹ The *Hurricane Vulnerability Study* uses a worst-case scenario hurricane model for the path of approach from south to southwest. This model is used for our study since the project site is similarly located on the southwest side of O'ahu, with hurricanes typically approaching from the east and passing to the south and west.²⁰

The worst-case scenario serves as one of four scenario hurricanes as the basis for the analysis of coastal hurricane vulnerability. The other three scenario hurricanes are a model and worst-case scenario from the east to southeast, and a model from the south to southwest. The model hurricane is defined as the probable hurricane that will strike the Hawaiian islands in

¹⁶ Bretschneider, Charles, EKNA Services, Inc., "Hurricane Vulnerability Study for Honolulu, Hawai'i, and Vicinity, Volume 2, Determination of Coastal Inundation Limits for Southern Oahu from Barbers Point to Koko Head," May 1985, Exhibit C.

¹⁷ Sea Engineering, Inc., "Hurricane Iniki Coastal Inundation Modeling," August 1993.

¹⁸ Bretschneider, Charles, EKNA Services, Inc., "Hurricane Vulnerability Study for Honolulu, Hawai'i, and Vicinity, Volume 2, Determination of Coastal Inundation Limits for Southern O'ahu from Barbers Point to Koko Head," May 1985, Exhibit C.

¹⁹ "Saffir-Simpson Hurricane Wind Scale," National Hurricane Center and Central Pacific Hurricane Center, Accessed June 3, 2022, <https://www.nhc.noaa.gov/aboutshws.php>.

²⁰ Charles H. Fletcher III, Eric E. Grossman, Bruce M. Richmond, Ann E. Gibbs, "Atlas of Natural Hazards in the Hawaiian Coastal Zone," January 9, 2002, https://pubs.usgs.gov/imap/i2761/sections/3_O'ahu.pdf.

the future, based on the characteristics of hurricanes that struck the islands prior to 1984.

Worst-case characteristics include a maximum sustained wind speed of 100 knots, a maximum gust of 120 knots, a minimum sea level pressure of 952 millibars, and an eye diameter of 20 nautical miles when the hurricane is 300 miles, or one day away from an island.²¹ The maximum sustained wind speed of 100 knots is a category 3 hurricane.²² The parameters used for a category 3 hurricane were obtained from the runup summary results table in the report for Location 63, which is approximately 2.03 miles from the project site.

5.4 Hurricane Inundation Modeling and Analysis

CSHORE is applied to each of the representative profiles of the project site using site-specific and worst-case category 3 hurricane parameters. The input profile spacing is one foot (1') for both CSHORE and FUNWAVE-TVD. Results from CSHORE are compared to those of FUNWAVE-TVD, to allow for a direct comparison of hurricane runup elevations and distances for each representative profile of the project site.

5.5 Hurricane Inundation

The worst-case category 3 hurricane parameters were acquired from the *Hurricane Vulnerability Study*. The still-water level accounts for high tide and storm surge. The following are parameters for a worst-case category 3 hurricane implemented in both models:

1. The existing still-water level is 3.86 feet LMSL, which is comprised of the tidal height, inverted barometer tide and wind setup from the Hurricane Vulnerability Study;
2. The wave height is 4.32 feet from the Hurricane Vulnerability Study; and
3. The constant incident wave angle is 45 degrees.

Flood profiles were plotted for each hurricane flood scenario using maximum water depths from FUNWAVE-TVD calculations.

Figure 14 to Figure 16 present hurricane inundation profiles for undeveloped conditions. The figures show the flood elevation for the

²¹ Ibid.

²² "Saffir-Simpson Hurricane Wind Scale," National Hurricane Center and Central Pacific Hurricane Center, Accessed June 3, 2022, <https://www.nhc.noaa.gov/aboutsshws.php>.

undeveloped scenario based on the worst-case hurricane has an elevation of approximately four feet (4') above MSL.

As the four-foot (4') elevation does not exceed the property's foreshore elevation of approximately six feet (6'), there is no inland inundation. Therefore, there is no hurricane-induced flooding in the undetermined areas (Zone D) based on the undeveloped topography. Figure 17 shows the estimated extent of the hurricane inundation for the undeveloped scenario and is similar to the FIRM map.

The developed scenario without SLR would be the same as the undeveloped scenario without SLR. As the inundation does not exceed the foreshore elevation, the developed area would not be flooded in this worst-case scenario (Figure 18 to Figure 20).

5.6 Hurricane Inundation – with Sea Level Rise

For this scenario the theoretical still-water level with SLR is 7.06 feet LMSL. This proposed still-water level is comprised of the tidal height, inverted barometer tide and wind setup from the Hurricane Vulnerability Study. In addition, the LMSL was increased by 3.2 feet, thereby reducing the land elevations by 3.2 feet. The change in LMSL relocated the shoreline slightly to the north.

Flood profiles were plotted for each hurricane flood scenario using maximum water depths from FUNWAVE-TVD calculations. Figure 21 to Figure 23 present hurricane inundation profiles for the SLR scenario. The figures show a hurricane flood elevation of approximately 7.4 feet at the shoreline and propagates inland for all profiles. The inundation depth is two feet (2') or less approximately 150 feet from the south property line for the three (3) profiles, and less than 0.5 foot at 570 feet inland from the south property line for the three (3) profiles. Therefore, there is some flooding of the undetermined area with this SLR scenario. Figure 24 shows the estimated extent of the hurricane inundation on the property for this SLR scenario.

The proposed development with SLR inundation profiles are shown on Figure 25 to Figure 27 and shows that the inundation ends as it reaches the base (fill) area, or the limits of grading delineation line, of the proposed development. As the proposed development held a conservative view of the flooding potential, the design maintained the BFE throughout the project area, even though the FIRM maps considered the flooding potential as undetermined. Figure 28 presents the inundation contours on the property for the developed scenario with SLR.

6. Tsunami Flood Wave Runup Analysis

The tsunami flood analysis was based on the TSU-2 model effort and compared to the FEMA FIRM maps for the site. To start the property was located on FIRM maps as the aerial overlay shows the property on the FIRM maps. The analysis looked at four scenarios: the undeveloped topographic elevations, the proposed development grading plan, the undeveloped topographic elevations adjusted by SLR of 3.2 feet, and the proposed development grading plan adjusted by SLR of 3.2 feet.

6.1 Tsunami Runup Approach

The tsunami overland propagation is evaluated using the FEMA-approved tsunami runup methodology. The tsunami event under consideration is the 100-year event, as defined by the Flood Insurance Study (FIS) report for the City and County of Honolulu, Hawai'i.

The approach to evaluate tsunami overland propagation is as follows:

- 1) Determine tsunami wave elevation.
- 2) Input the appropriate bathymetric and topographic data
- 3) Perform tsunami runup propagation calculations for Profiles 1 to 3 using the TSUN-2 model.
- 4) Apply SLR by adjusting elevation profiles to reflect 3.2 feet rise in MSL.
- 5) Plot runup and profile elevations to determine the inundation limit.

6.2 Determining Tsunami Wave Height

Tsunami wave elevation calculation used in this study follows the methodology described in the FEMA Flood Insurance Study for the City and County of Honolulu, Hawai'i (2014). The methodology uses the frequency of occurrence distribution of the ten largest tsunamis occurring from 1837 to 1964 in Hilo and is represented by the following "least-square" method equation:

$$h = -B - A \log_{10} F$$

where:

h = elevation of maximum tsunami-wave crest above mean sea level (feet)

F = frequency per year of occurrence (1/year)

A = intercept coefficient (feet)

B = slope coefficient (feet)

A tsunami wave height having a 1% chance of being equaled or exceeded in any given year, with a frequency of occurrence $F = 0.01$, is also referred to as the 100-year recurrence interval or 100-year event. The coefficients of the shoreline tsunami wave height used in the above equation were obtained from Figure 29 and Figure 30 for Location 89, which represents the location of the project site.²³ Substituting these coefficients for a 100-year event yields a shoreline tsunami wave height of 7.8 feet above MSL.

6.3 Tsunami Inundation

The inundation for the three (3) profiles are shown on Figure 31 to Figure 33. The analysis shows that the 100-year tsunami flood would potentially inundate up to 350 feet inland from the south property line with the undeveloped land topography. The one-foot (1') inundation depth occurs at a minimum of approximately 220 feet inland from the south property line. The wave height at the foreshore reaches a maximum of almost ten feet (10') elevation as the wave runups up the foreshore. The analysis shows a maximum surface water elevation of 8.7 feet at the end of the VE zone which is higher than the BFE of seven feet (7') as stated in the FIRM. Figure 34 shows the tsunami inundation based on the 100-year tsunami for the undeveloped scenario.

Figure 35 to Figure 37 show the three (3) profiles for the proposed development. The one-foot inundation depth occurs at a minimum of approximately 140 feet from the south property line. The new grading would reduce the distance of the beginning of the one-foot inundation depth by at least 80 feet inland from the south property line.

6.4 Tsunami Inundation – with Sea Level Rise

Figure 38 to Figure 40 show the inundation profiles for the undeveloped topography with SLR, showing inundation occurs throughout the entire property. The one-foot inundation depth occurs at a minimum of 520 feet from the south property line, which is close to the entire length of the

²³ Houston, James Robert., Carver, Robert D., Markle, Dennis G.. Tsunami-wave Elevation Frequency of Occurrence for the Hawaiian Islands: Final Report. United States: Department of Defense, Department of the Army, Corps of Engineers, Waterways Experiment Station, Hydraulics Laboratory, 1977.

property, which is a maximum of 589 feet. The inundation profiles for this scenario are shown on Figure 41.

The inundation profiles for the proposed developed with SLR are shown in Figure 42 to Figure 44. With the proposed development grading plan, the one-foot inundation depth occurs at a minimum of 360 feet from the south property line. The new grading would reduce the distance of the beginning of the one-foot inundation depth by at least 160 feet inland from the south property line.

7. Discussion and Summary of Direct and Cumulative Impacts

The following is a discussion of the direct and cumulative impacts on the property and the proposed development. The discussion includes the impacts of a 3.2 feet SLR, as requested by CCH. In general, the analysis indicates that the potential inundation within the undetermined area is dominated by 100-year tsunami flooding. The analysis is based on the existing topographic survey developed in 2022 for the undeveloped condition. The hurricane and tsunami analysis were performed on the proposed residential development topography (2022) provided by Engineers Surveyors Hawaii, Inc.

7.1 Direct Impacts

Existing Sea Level Condition and Undeveloped Scenario.

Table 3 shows the inundation elevations and distances for the existing topography with no development. The hurricane analysis shows the hurricane inundation elevation is approximately four feet (4') at the south property line. The inundation continues to approximately 40 feet inland from the south property line, measured to the one-foot (1') inundation depth. The inundation ends within the VE zone and does not flood the undetermined area based on the undeveloped topography. The hurricane inundation profiles are shown in Figure 14 to Figure 16.

The tsunami inundation analysis shows that the water surface elevation at the end of the VE zone is approximately 8.7 feet. This elevation is higher than the BFE from the FIRM map (Figure 12). The inundation on the east side of the property is slightly deeper and extends into the property to about 350 feet due to the lower land elevations. The inundation on all the profiles end as the land elevation reaches approximately seven feet (7') MSL. As the inundation extends approximately halfway into the property, a portion of the undetermined flood areas, as depicted on the FIRM, does flood. The maximum inundation depth in the undetermined area is approximately five

feet (5') for all three profiles at the end of the VE zone. The tsunami inundation profiles are shown in Figure 31 to Figure 33.

Table 3
Hurricane and Tsunami Inundation Summary
Existing Sea Level Condition and Undeveloped Topography

Profile	Distance From South Property Line of One-foot (1') Inundation Depth (feet)	Max Inundation Depth in Undetermined Area (feet)	Extent of Inundation in Undetermined Area from End of VE Zone (feet)
Hurricane Inundation			
Profile 1	40	0**	N/A*
Profile 2	10	0**	N/A*
Profile 3	-20*	0**	N/A*
Tsunami Inundation			
Profile 1	260	4.5	260
Profile 2	290	5.2	330
Profile 3	220	5.0	270

Note: * Negative distance is toward the ocean. ** No inundation at undetermined area (end of VE Zone to north property line).

Existing Sea Level Condition with Proposed Development Scenario.

The proposed development regrades the property from the 60-foot setback limit, with the development starting at the 80-foot setback. The proposed development raises the ground elevation, with the residential structures having a base floor elevation of nine feet (9'). The common/recreational area has a pavilion at a floor elevation of eight feet (8') and a pool deck at 7.8 feet elevation.

The proposed development topographic map show a low area in the middle of the property, approximately one foot (1') to 1.5 feet below the base floor elevations of the residential structures (Figure 10). The low area is delineated by the eight-foot (8') contour, which is highlighted in Figure 10. The area is dominated by the access roadway and associated parking (shaded light blue area). Due to the low area in the middle of the property (depicted by Profile 3), the one-foot (1') inundation depth begins earlier than the west (depicted by Profile 1) and east side (depicted by Profile 2) of the property.

The summary of the inundation elevations and distances for the hurricane and tsunami scenarios with the proposed development is shown in Table 4. The analysis of the proposed development grading plan without SLR shows the hurricane inundation elevations and inundation distance are the same as the undeveloped condition without SLR. The hurricane profiles are shown in Figure 18 to Figure 20.

The tsunami inundation depths and inundation distances from the shoreline are substantially reduced with the proposed development due to the proposed raised grades. The maximum inundation depth in the undetermined area is approximately 5 feet (5') at the end of the VE zone at Profiles 1 and 2. The inundation distance from the south property line extends 190 to 230 feet, impacting the recreation (pool) and common area (pavilion) on the south side of the development.

The inundation depth over the recreation area is about one foot (1') to about 1.7 feet. The deeper penetration into the property occurs in Profile 3. Profile 3 is located in the lower elevation area below the eight-foot (8') contour. The inundation elevation for the tsunami for the three profiles is shown in Figure 35 to Figure 37. The tsunami inundation does not exceed the base floor elevation of most southern residences (close to the shoreline).

Table 4
Hurricane and Tsunami Inundation Summary
Existing Sea Level Condition with Proposed Development

Profile	Distance From South Property Line of One-foot (1') Inundation Depth (feet)	Max Inundation Depth in Undetermined Area (feet)	Extent of Inundation in Undetermined Area from End of VE Zone (feet)
Hurricane Inundation			
Profile 1	40	0**	N/A**
Profile 2	10	0**	N/A**
Profile 3	-20*	0**	N/A**
Tsunami Inundation			
Profile 1	150	4.7	150
Profile 2	160	5.0	160
Profile 3	140	3.7	230

Note: * Negative distance is toward the ocean. ** No inundation at undetermined area (end of VE Zone to north property line).

Sea Level Rise Condition and Undeveloped Scenario.

A SLR of 3.2 feet would result in increased inundation of the property during both hurricane and tsunami events due to significant changes in the land elevation. The summary of hurricane and tsunami inundation levels and distances is shown in Table 5.

Table 5
Hurricane and Tsunami Inundation Summary
Sea Level Rise Condition (3.2 feet) with Undeveloped Topography

Profile	Distance From South Property Line of One-foot (1') Inundation Depth (feet)	Max Inundation Depth in Undetermined Area (feet)	Extent of Inundation in Undetermined Area from End of VE Zone (feet)
Hurricane Inundation			
Profile 1	530	3.7	530
Profile 2	610	3.0	580
Profile 3	220	2.8	570
Tsunami Inundation			
Profile 1	550	7.2	530
Profile 2	650	7.5	580
Profile 3	520	7.5	570

Figure 21 to Figure 23 shows the hurricane inundation for the three profiles. Although the inundation covers the property, the inundation depth for most of the property is between one foot (1') to two feet (2'). The maximum inundation depth is 3.7 feet at the end of the VE zone and decreases to two feet (2') at approximately 120 feet inland from the south property line. The inundation depth remains about one foot (1') for the northern portion of the property.

Figure 38 to Figure 40 shows the tsunami inundation on the profiles through the property. The tsunami inundates the undetermined area with an inundation depth of approximately 7.5 feet at the end of the VE zone and decreases to one foot (1') or less at the northern border.

Sea Level Rise Condition with the Proposed Development Scenario.

Table 6 provides a summary of the inundation depths and distances with 3.2 feet of SLR based on the proposed development topography. Figure 25 to Figure 27 presents the hurricane inundation analysis with 3.2 feet of SLR. The maximum inundation depth in the undetermined area occurs at the end of the VE zone at 3.4 feet. The hurricane inundation is not expected to impact the development as the floor elevations are above the expected inundation elevations.

Figure 42 to Figure 44 show the tsunami inundation profiles for the 3.2-foot SLR scenario based on the proposed development topography. The maximum inundation depth in the undetermined area occurs at the end of the VE zone at approximately seven feet (7'). The analysis shows that the tsunami inundation will be about three feet (3') over the base floor elevation of the southernmost residential units. The inundation reduces to a one-foot (1') depth about 380 feet from the southern property line for Profiles 1 and 2. Note the shoreline has moved north due to SLR. The residential structure located in the northern half of the property will have no or little inundation impacts. As Profile 3 depicts the low area of the potential development, the inundation travels further inland. The distance from the southern property line to the one-foot (1') inundation depth is about 440 feet. However, only the roadway and parking areas are impacted.

Table 6
Hurricane and Tsunami Inundation Summary
Sea Level Rise Condition (3.2 feet) with Proposed Development

Profile	Distance From South Property Line of One-foot (1') Inundation Depth (feet)	Max Inundation Depth in Undetermined Area (feet)	Extent of Inundation in Undetermined Area from End of VE Zone (feet)
Hurricane Inundation			
Profile 1	130	3.7	100
Profile 2	90	3.1	90
Profile 3	100	2.9	100
Tsunami Inundation			
Profile 1	390	7.4	420
Profile 2	360	7.2	410
Profile 3	440	6.2	510

7.2 Cumulative Impacts

The cumulative impacts analysis is based on the impact analysis of the proposed project in addition to past, present, and future projects. The main cumulative impact of this proposed project is based on the previous development of the area and adjacent properties. There are no known projects that are currently being developed or planned to be developed in the immediate vicinity of the proposed development.

The inundation on the property will occur with or without the development. The previous development on the adjacent properties has constructed barriers (such as concrete walls) along the top of the foreshore bank, as seen in photos (Figure 4 and Figure 5). The adjacent properties have walls with a height of approximately three feet (3'). However, the subject property and proposed development do not have any walls along the coast.

Due to these existing walls, the subject property will flood, while adjacent properties with walls will have less of a potential flooding issue. In addition, as inundation occurs, the existing walls on the neighboring properties will increase the flood potential for this property.



APPENDIX A: FIGURES



Limited Flooding Analysis of Undetermined Areas



Figure 1. Aerial of Lot 1420 on 91-603 Pohakupuna Road. Reference: Google Earth, Imagery Date - 2021.

Limited Flooding Analysis of Undetermined Areas

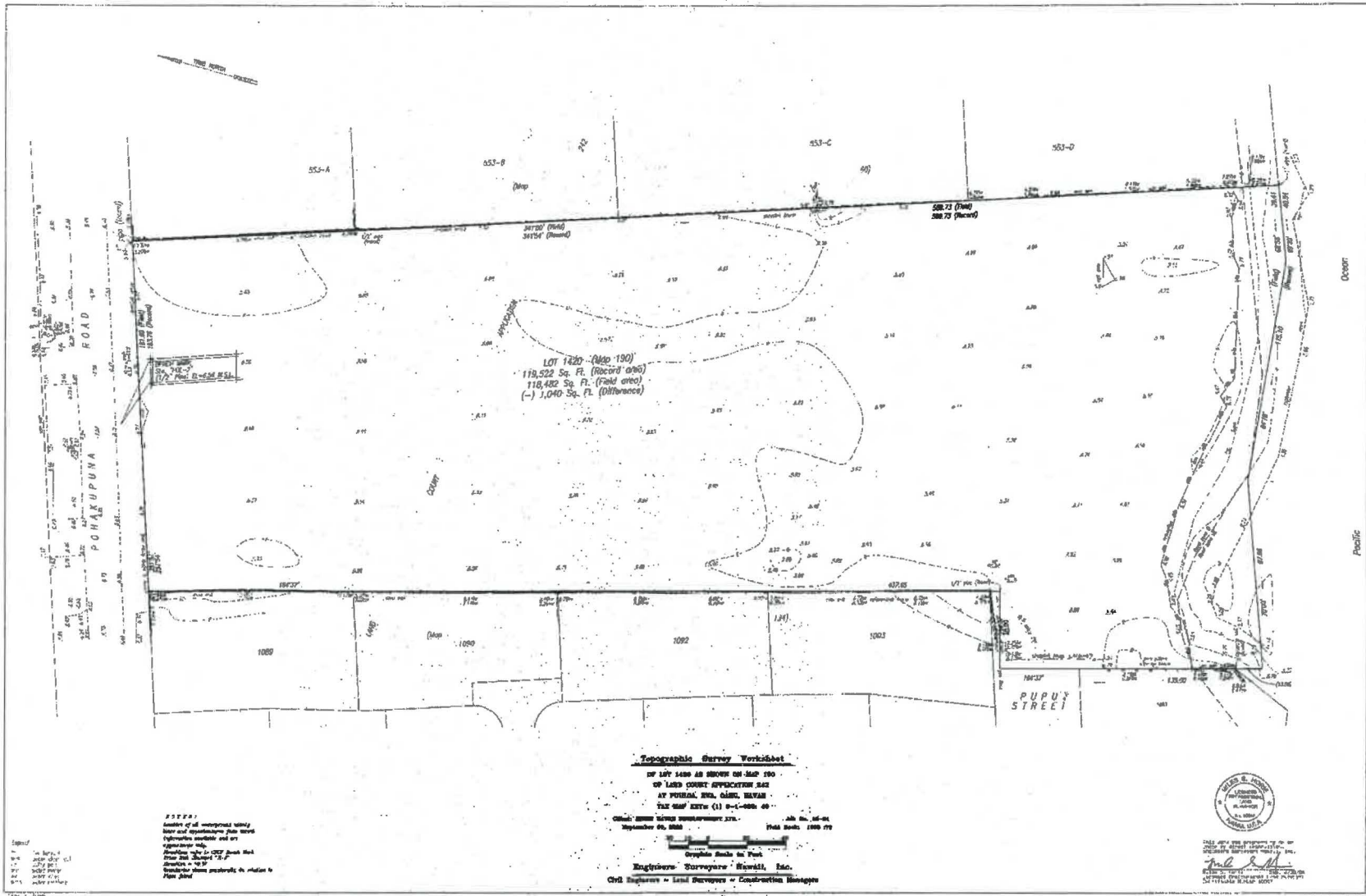


Figure 2. Topography Survey Map. Reference: Engineers Surveyors Hawaii, Inc., Feb. 4 2021.

Limited Flooding Analysis of Undetermined Areas

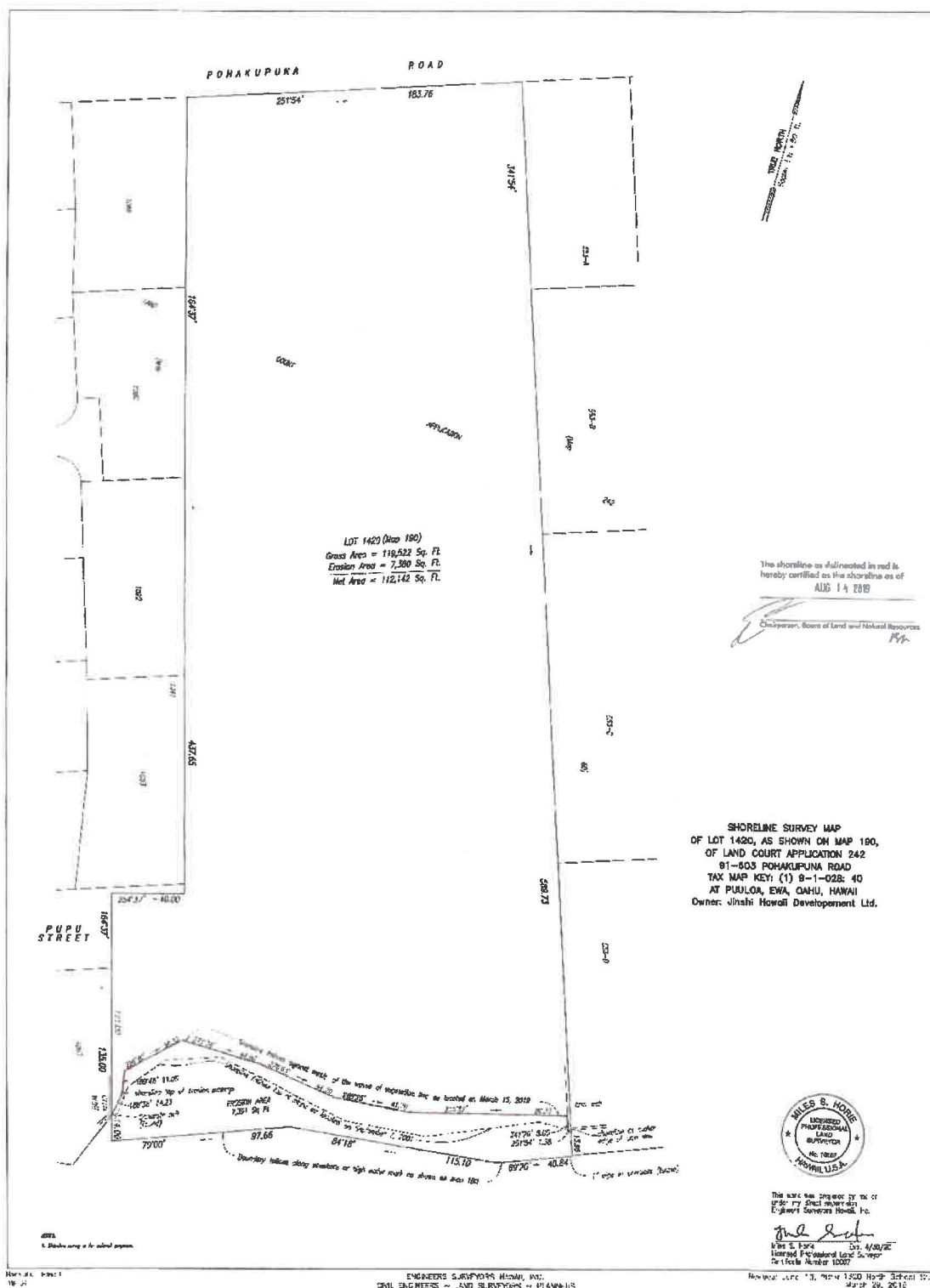


Figure 3. Approved Certified Shoreline Survey Map. Reference: Engineers Surveyors Hawai'i, Inc., Aug. 14, 2019.



Figure 4. Photo taken of the rocky shoreline of Lot 1420 facing west. Reference: EKNA Services, Inc., Jan. 29, 2021.



Figure 5. Photo taken of the rocky shoreline of Lot 1420 facing east. Reference: EKNA Services, Inc., Jan. 29, 2021.

91-603 Pohakupuna Road

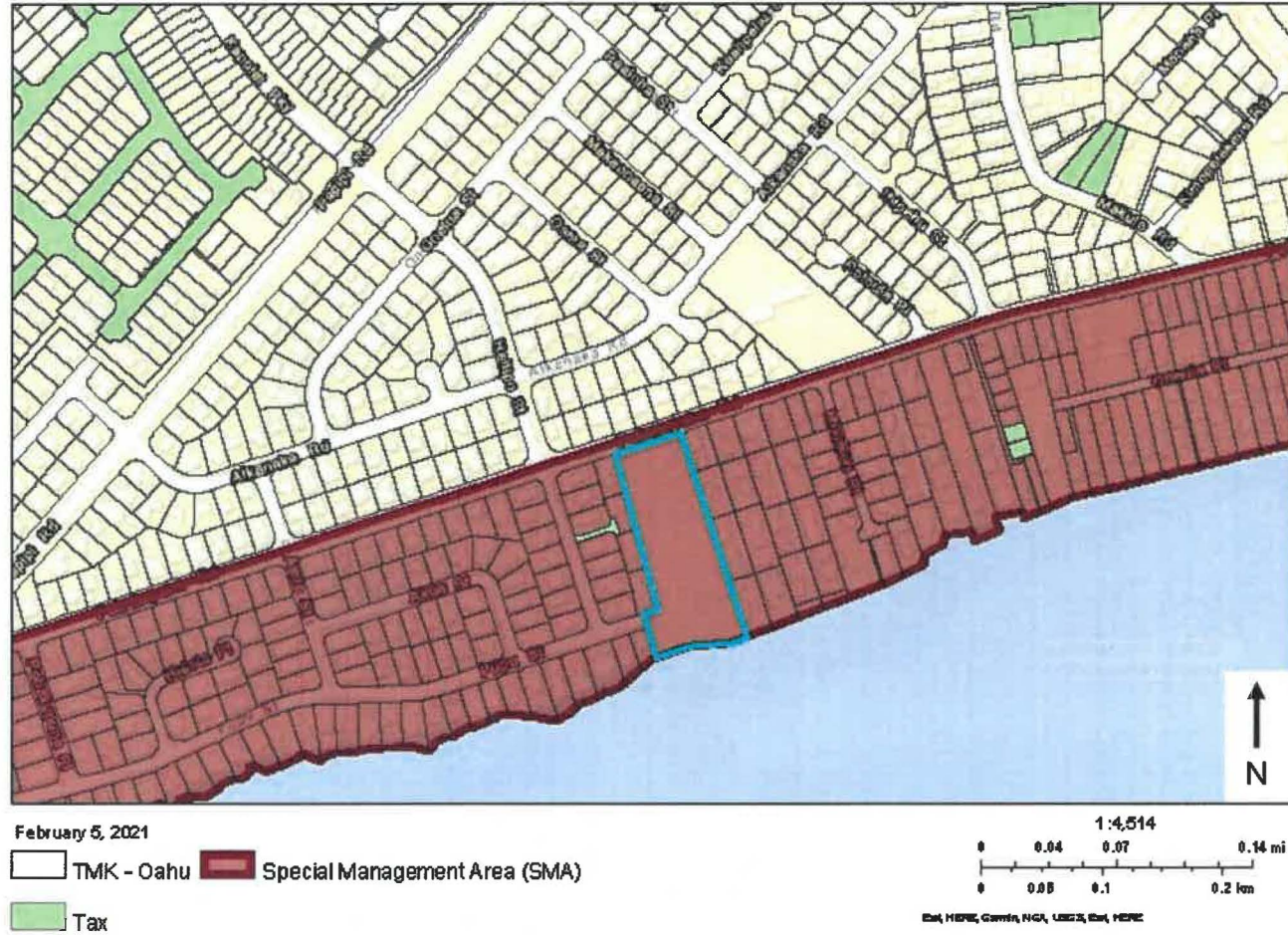


Figure 6. Special Management Area Map. Reference: Hawai'i SMA Locator, Input Date – Sept. 20, 2015, Load Date – February 05, 2021.

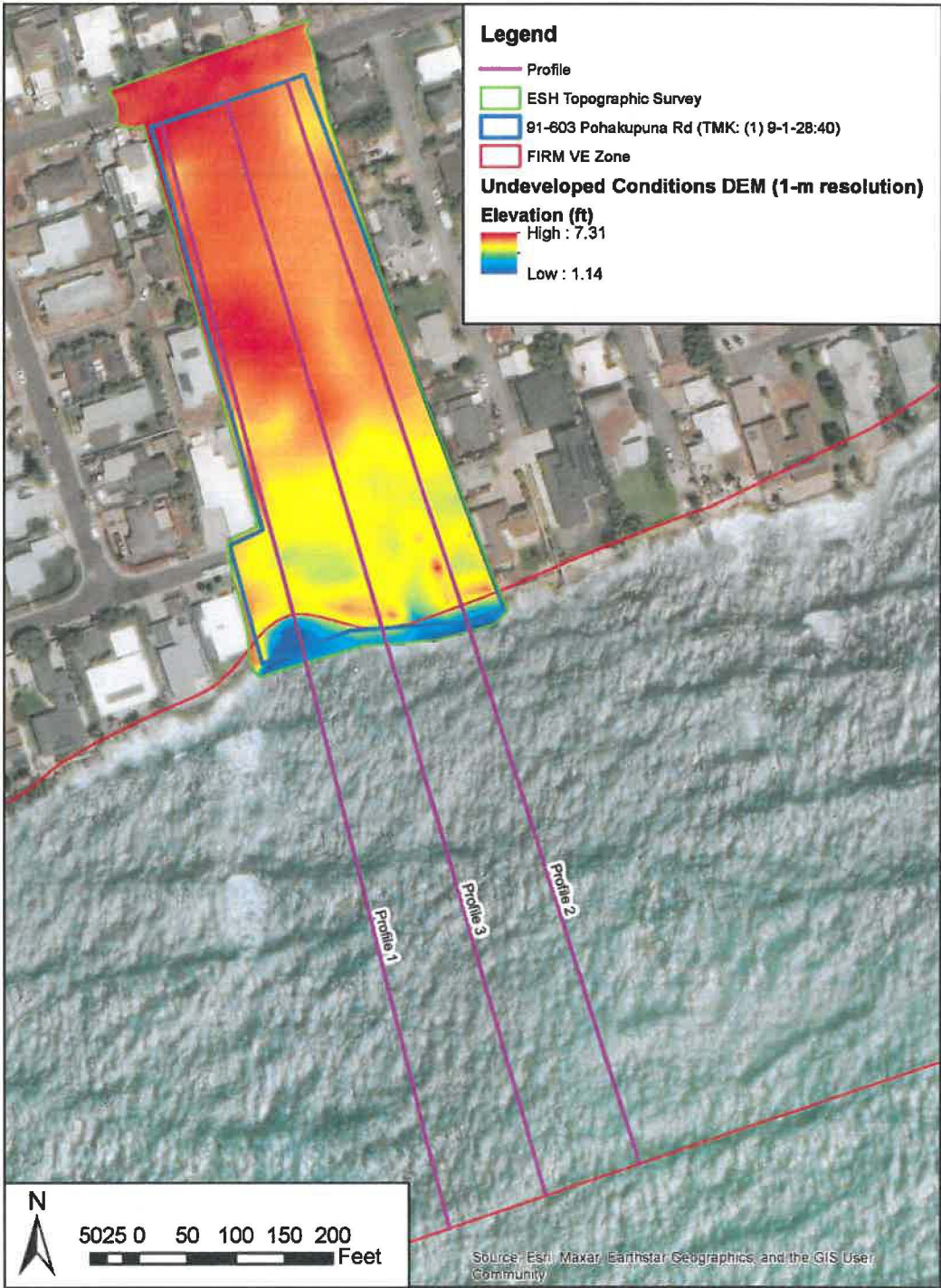


Figure 7. Digital Elevation Model and Profile Locations for 91-603 Pohakupuna Road Undeveloped Conditions

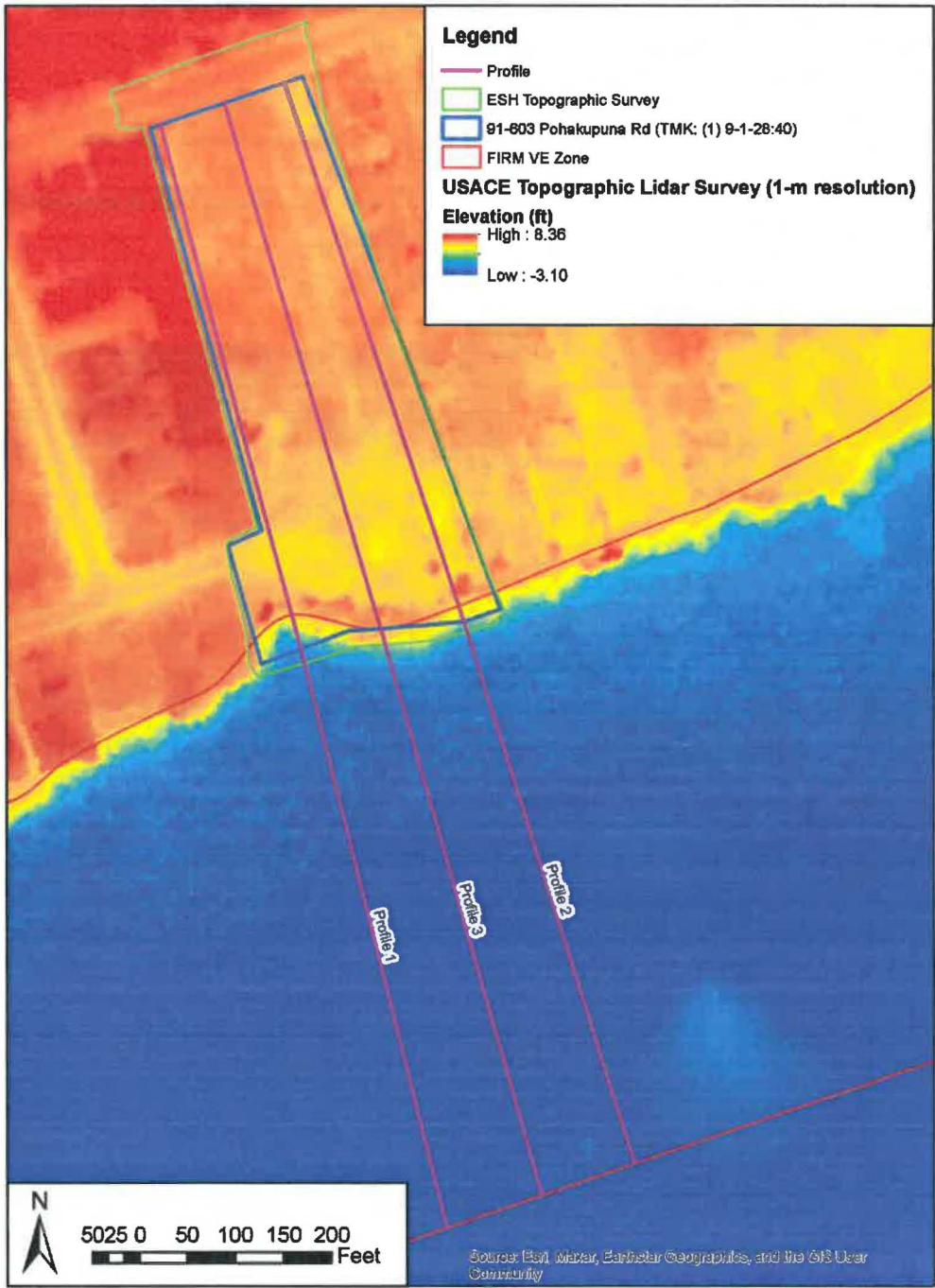


Figure 8. Offshore Digital Elevation Model and Profile Locations for 91-603 Pohakupuna Road



Figure 9. Photo taken at the center along the vegetation line of Lot 1420 facing north. Reference: EKNA Services, Inc., Jan. 29, 2021.

Limited Flooding Analysis of Undetermined Areas

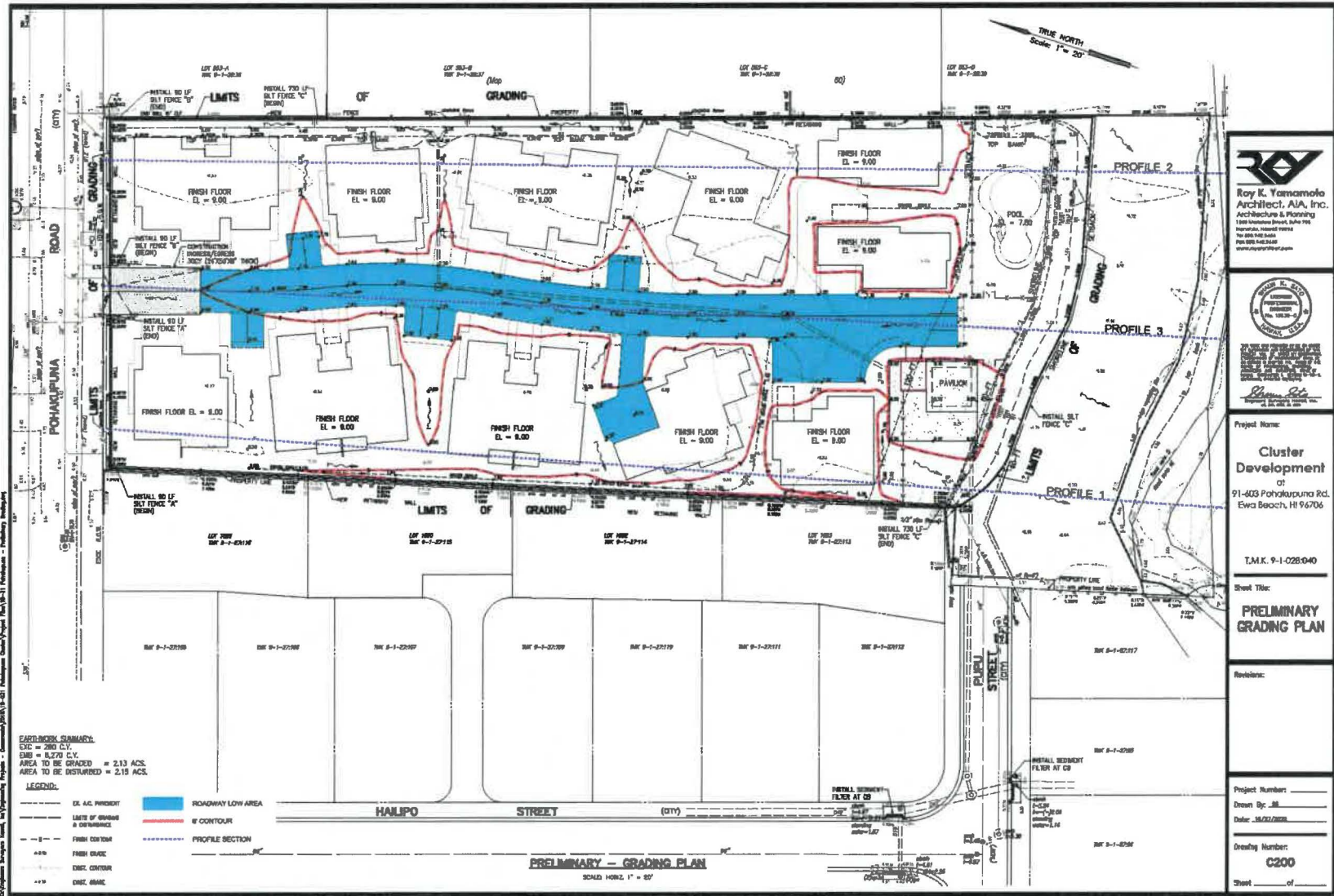


Figure 10. Proposed Development and Inundated Low Elevation Area in the Proposed Development Preliminary Grading Plan for 91-603 Pohakupuna Road

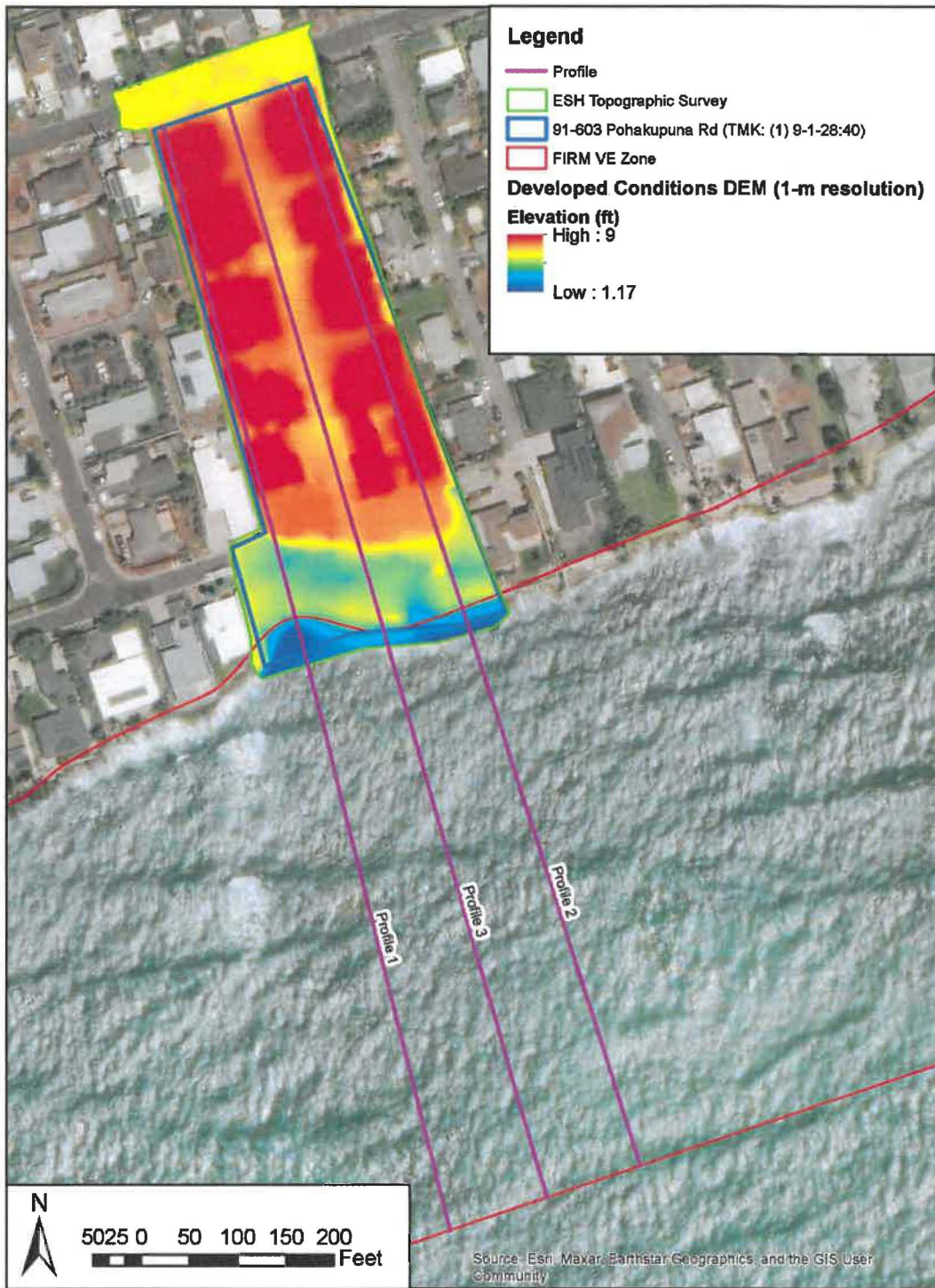


Figure 11. Digital Elevation Model and Profile Locations for 91-603 Pohakupuna Road Developed Conditions

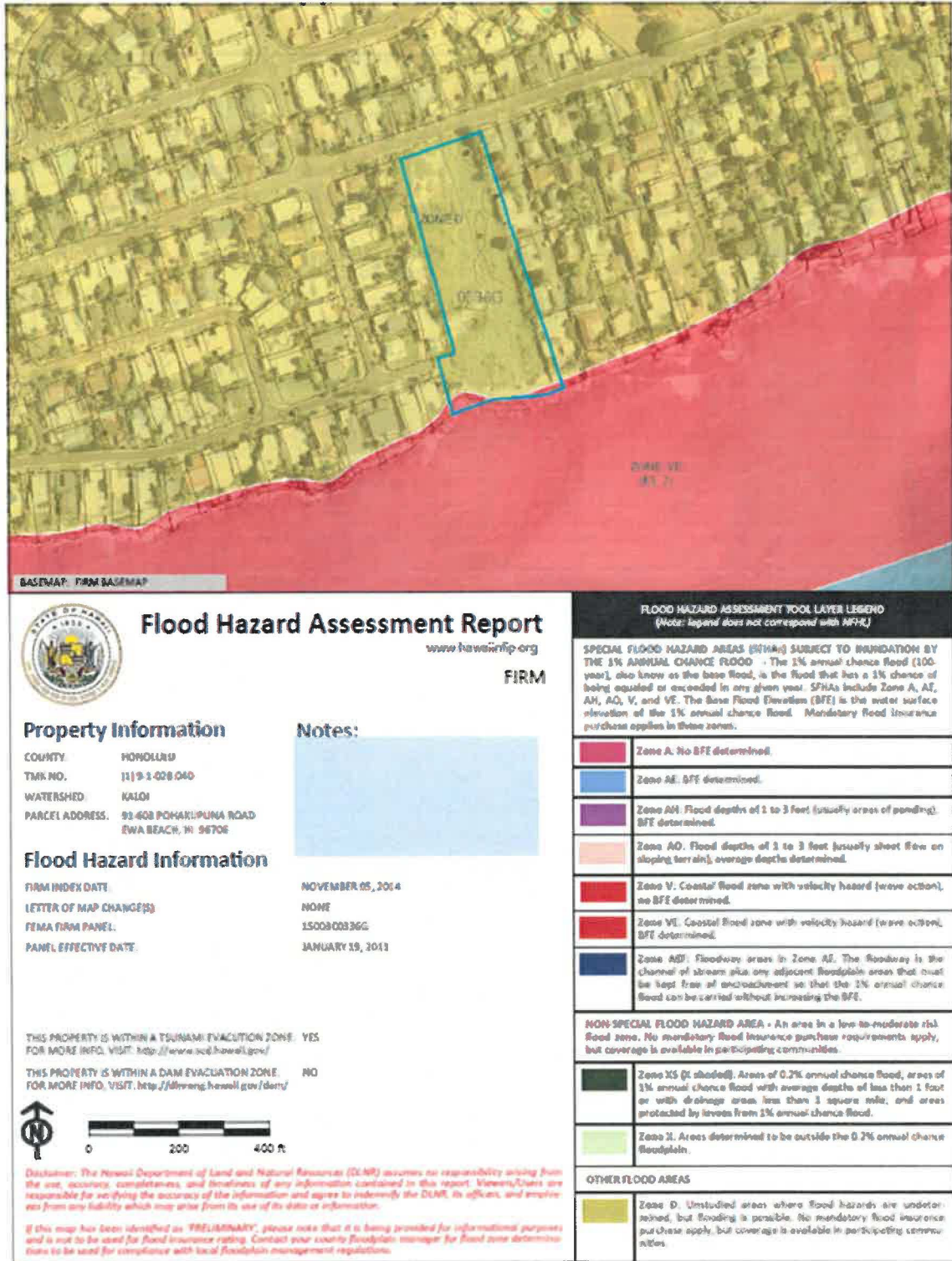


Figure 12. Flood Hazard Assessment Report and Map. Reference: State of Hawai'i, Department of Land and Natural Resources Flood Hazard Assessment Tool based on FIRM, FIRM Index Date – Nov. 5, 2014.

Limited Flooding Analysis of Undetermined Areas

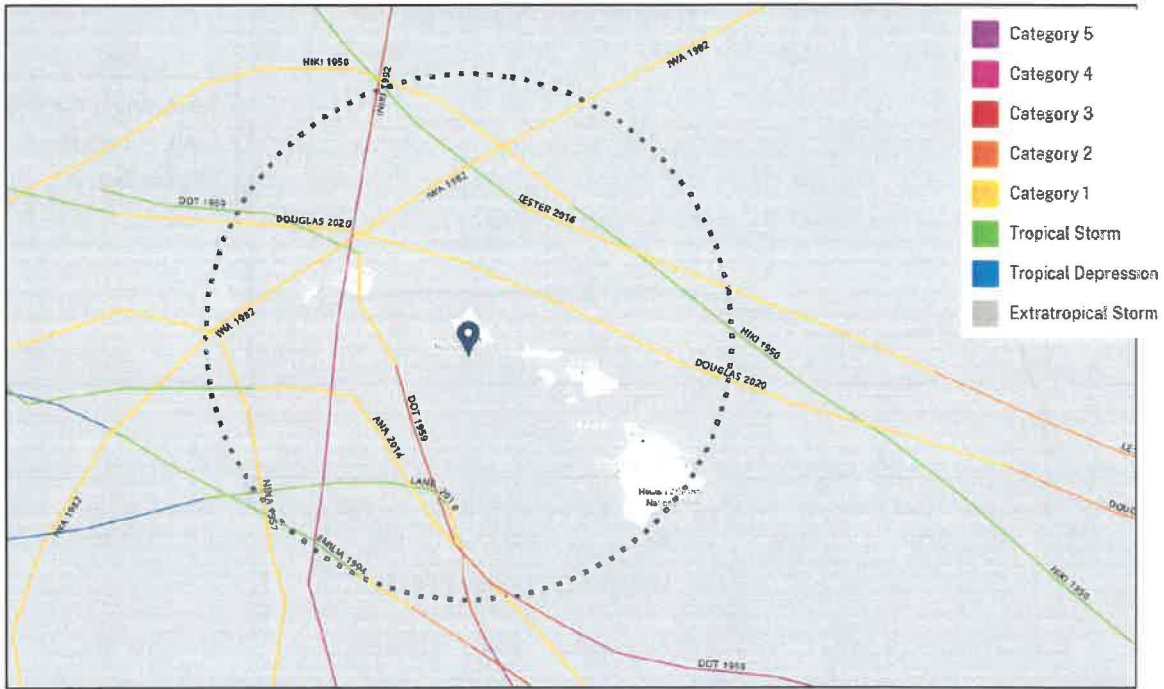


Figure 13. NOAA Historical Hurricane Tracks at a 200 Nautical Mile Radius from the Project Site

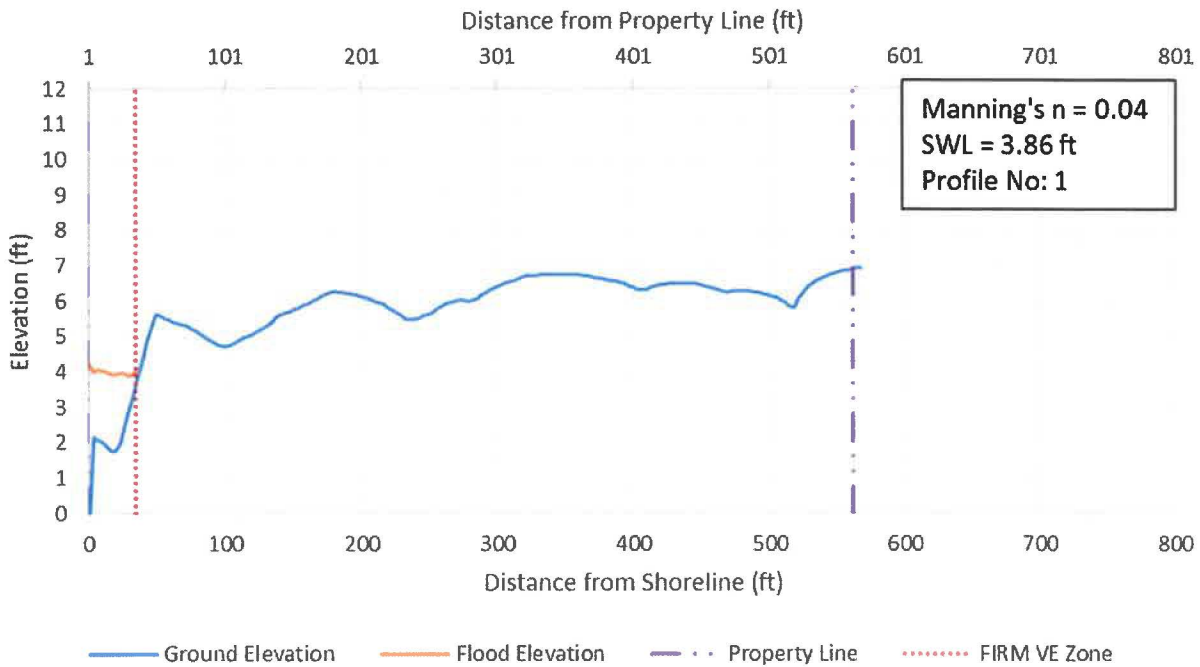


Figure 14. Hurricane Flood Calculations for Undeveloped Conditions at Profile 1

Limited Flooding Analysis of Undetermined Areas

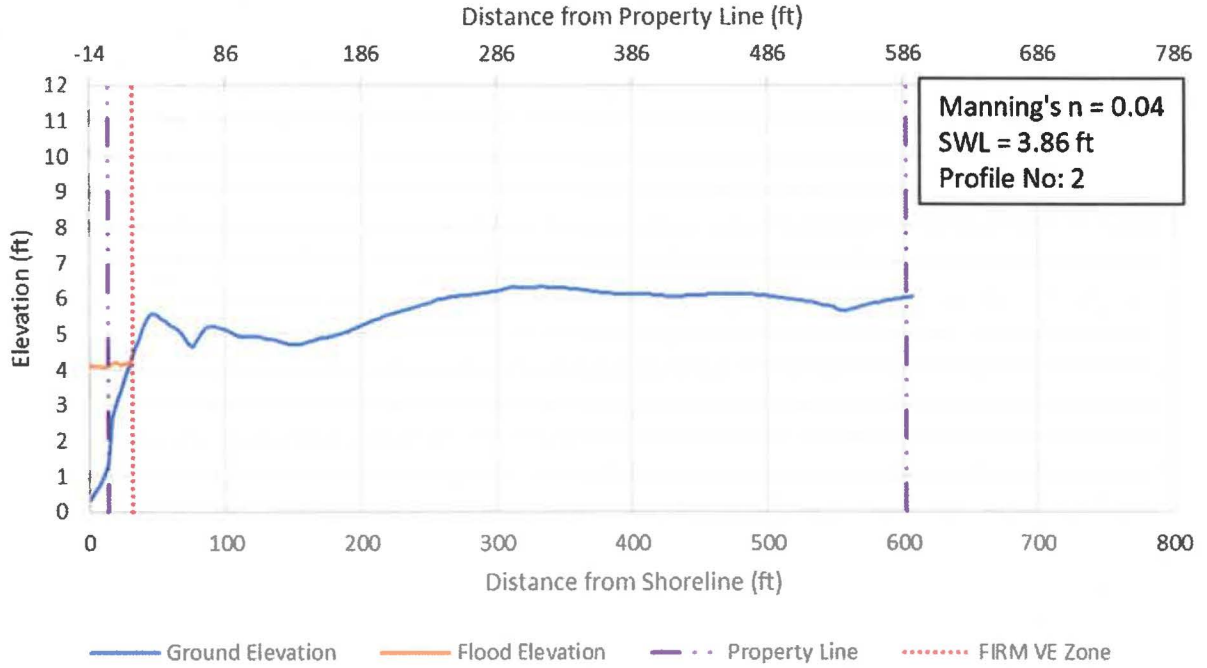


Figure 15. Hurricane Flood Calculations for Undeveloped Conditions at Profile 2

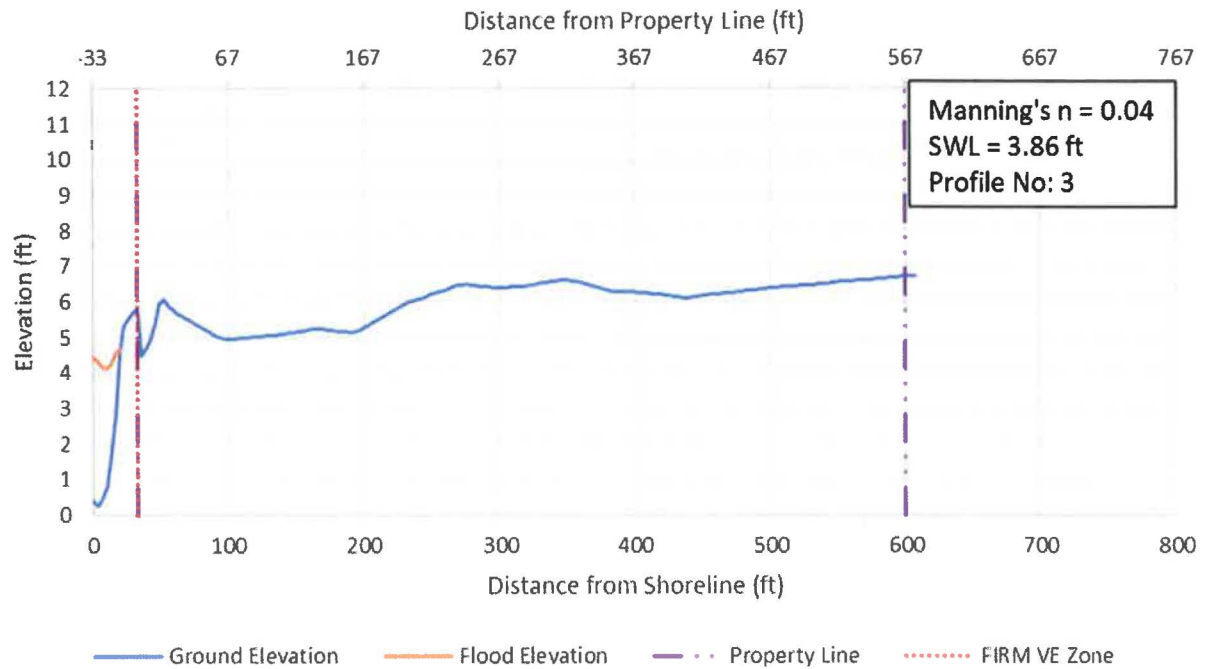


Figure 16. Hurricane Flood Calculations for Undeveloped Conditions at Profile 3



Figure 17. Category 3 Hurricane Inundation for 91-603 Pohakupuna Road Undeveloped Conditions

Limited Flooding Analysis of Undetermined Areas

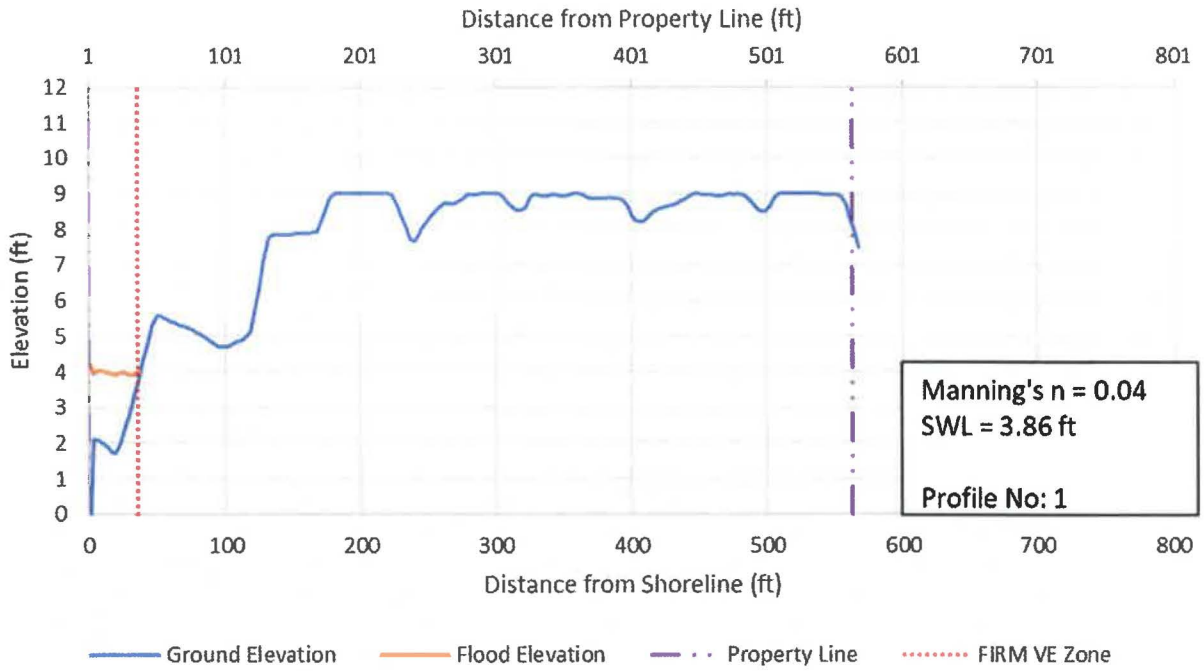


Figure 18. Hurricane Flood Calculations for Developed Conditions at Profile 1

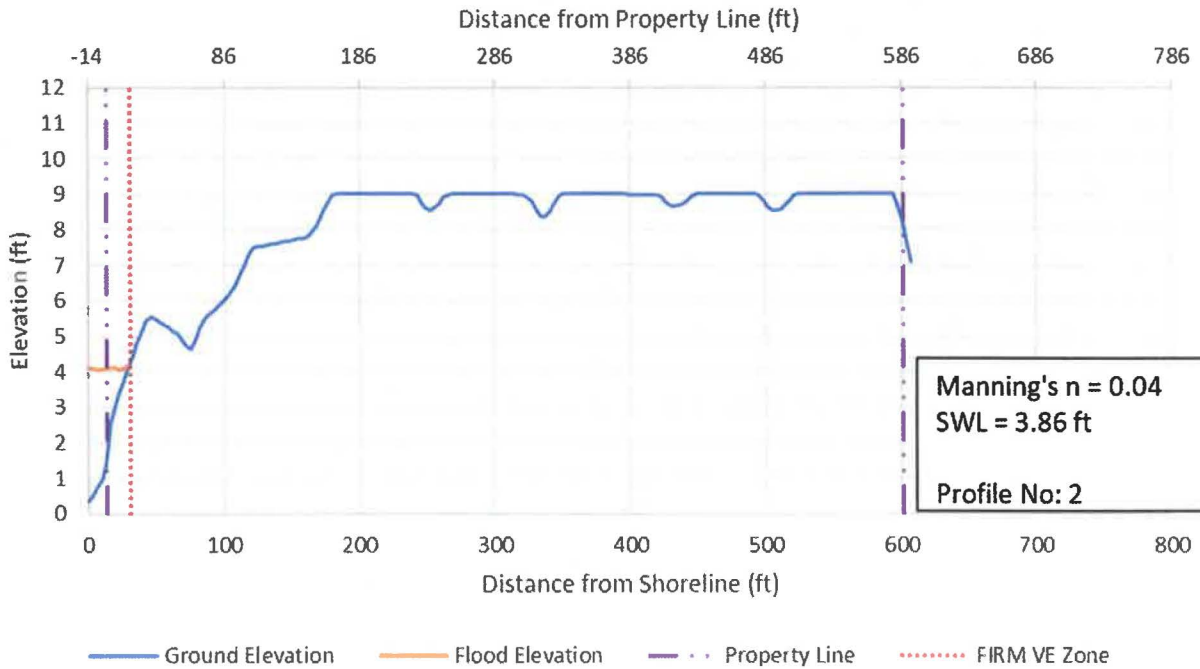


Figure 19. Hurricane Flood Calculations for Developed Conditions at Profile 2

Limited Flooding Analysis of Undetermined Areas

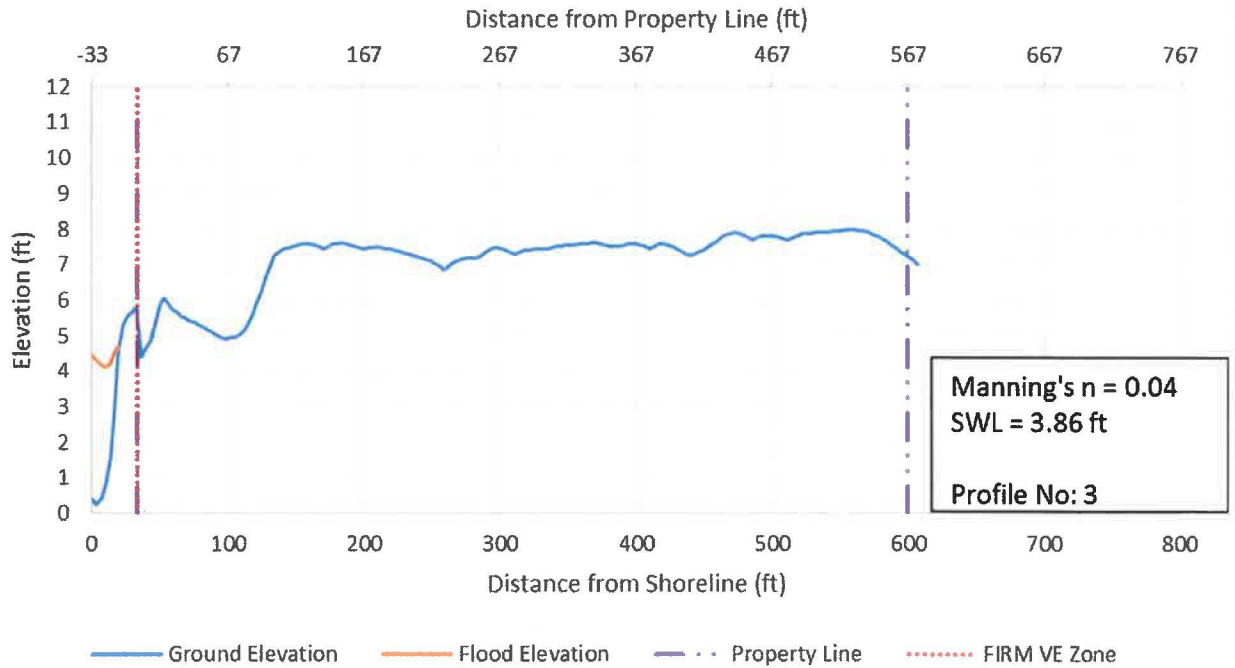


Figure 20. Hurricane Flood Calculations for Developed Conditions at Profile 3

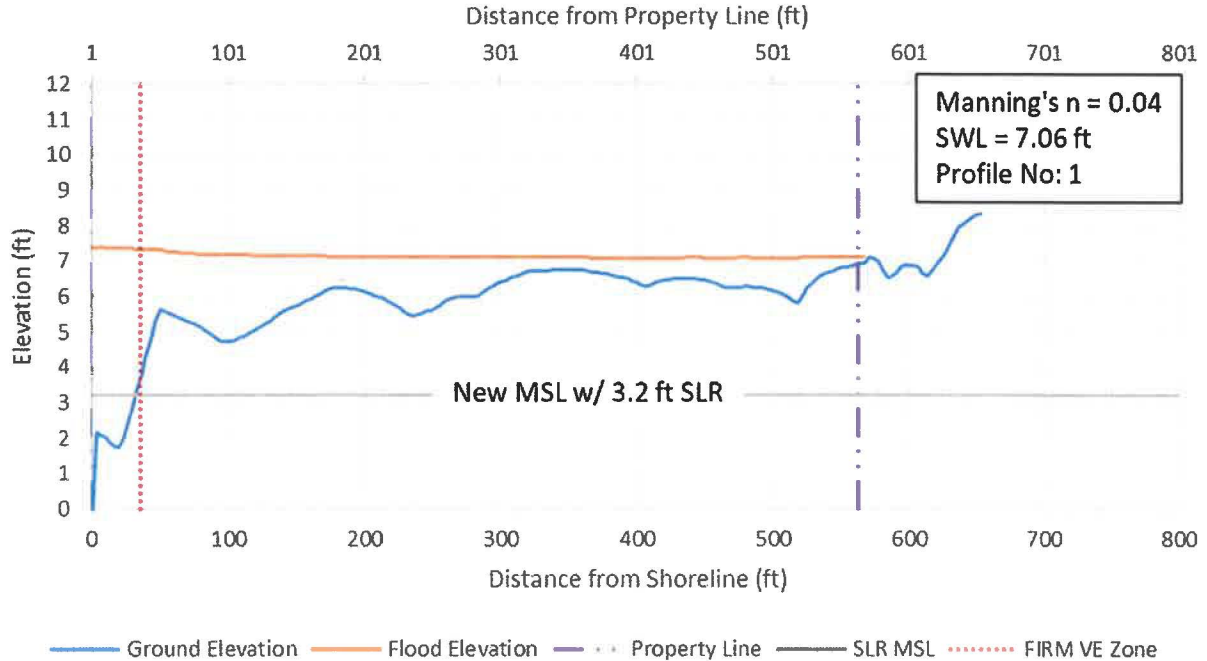


Figure 21. Hurricane Flood Calculations for Undeveloped Conditions at Profile 1 with 3.2 ft SLR

Limited Flooding Analysis of Undetermined Areas

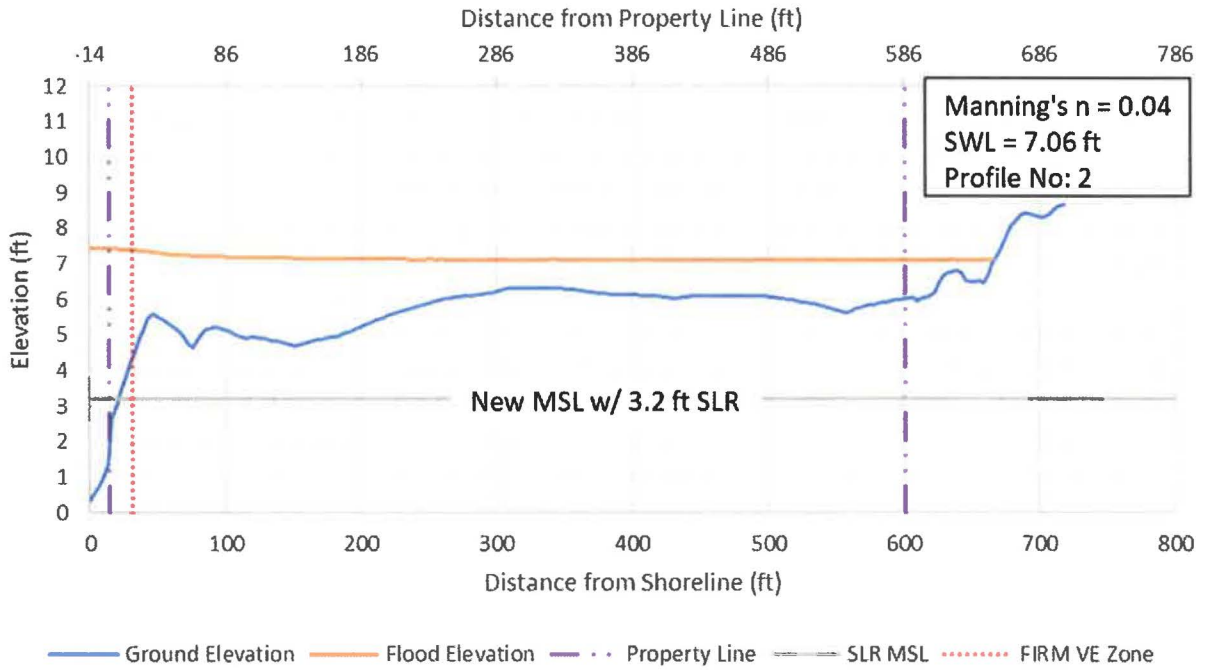


Figure 22. Hurricane Flood Calculations for Undeveloped Conditions at Profile 2 with 3.2 ft SLR

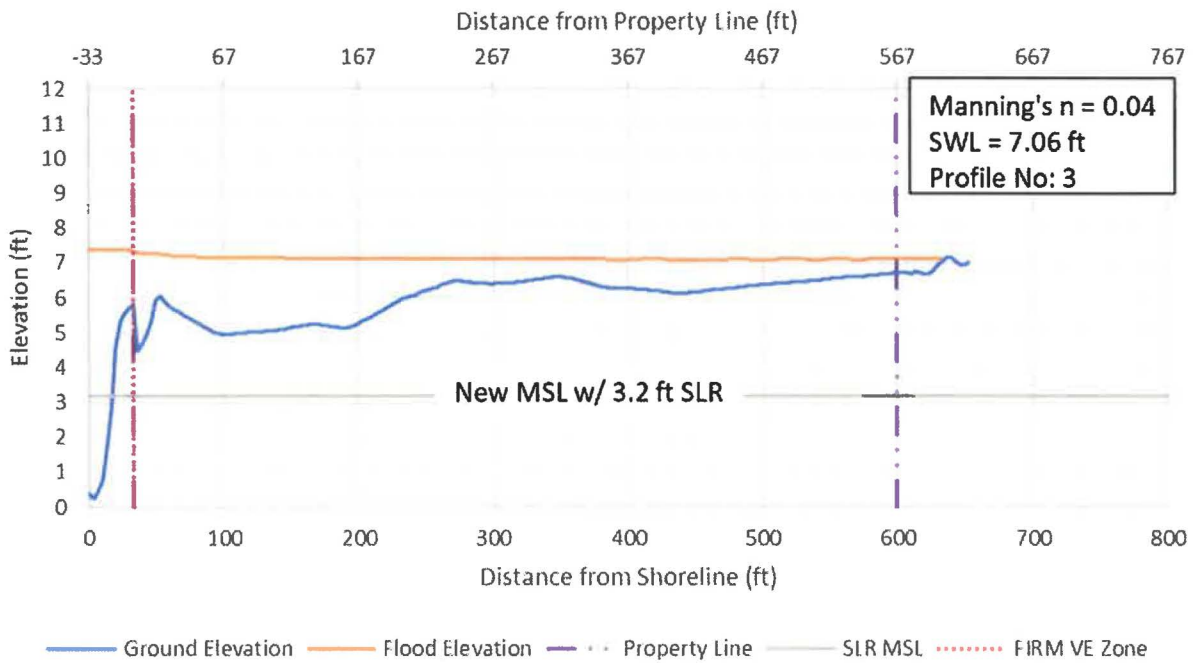


Figure 23. Hurricane Flood Calculations for Undeveloped Conditions at Profile 3 with 3.2 ft SLR

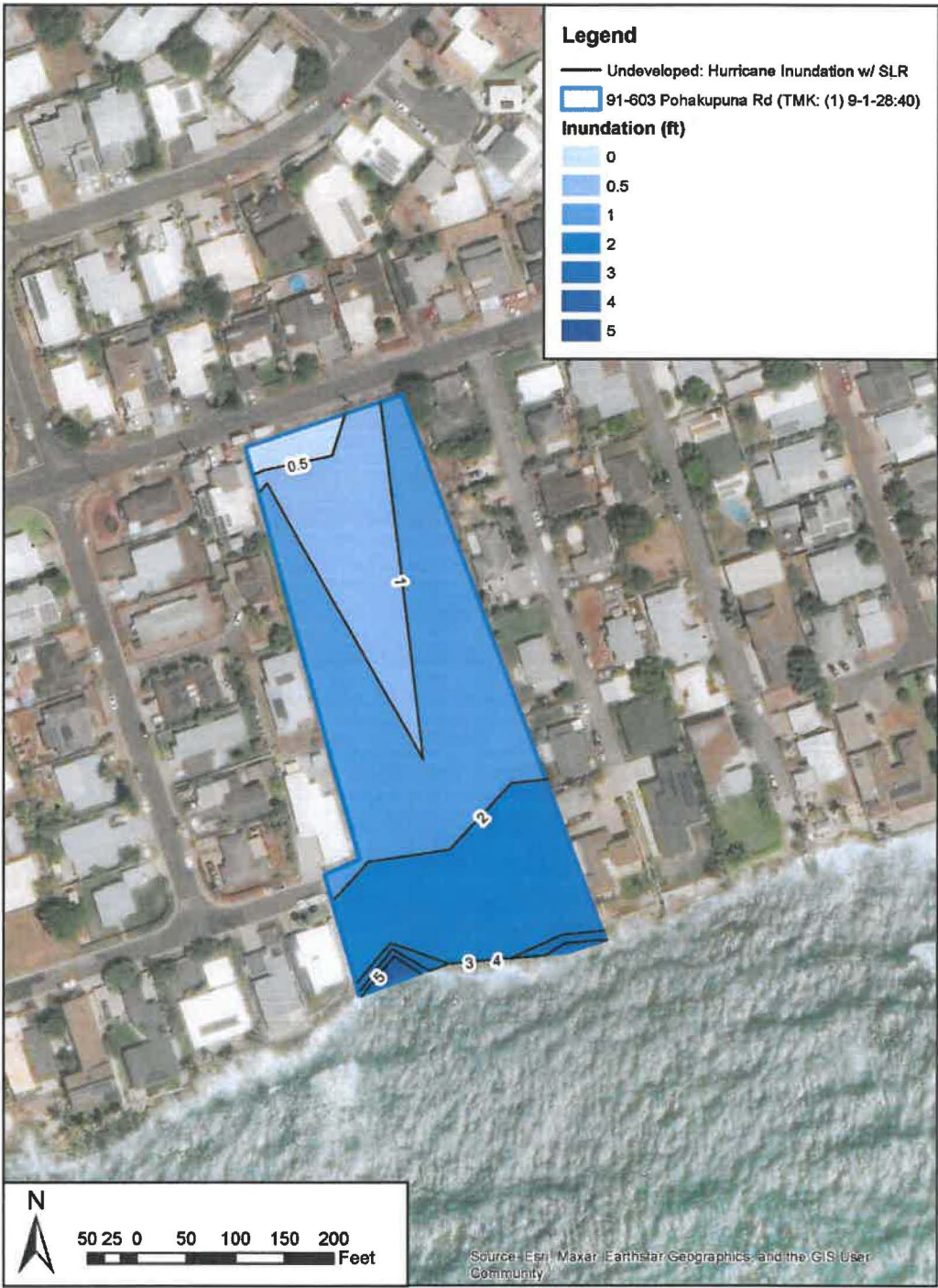


Figure 24. Category 3 Hurricane Inundation for 91-603 Pohakupuna Road Undeveloped Conditions w/ SLR

Limited Flooding Analysis of Undetermined Areas

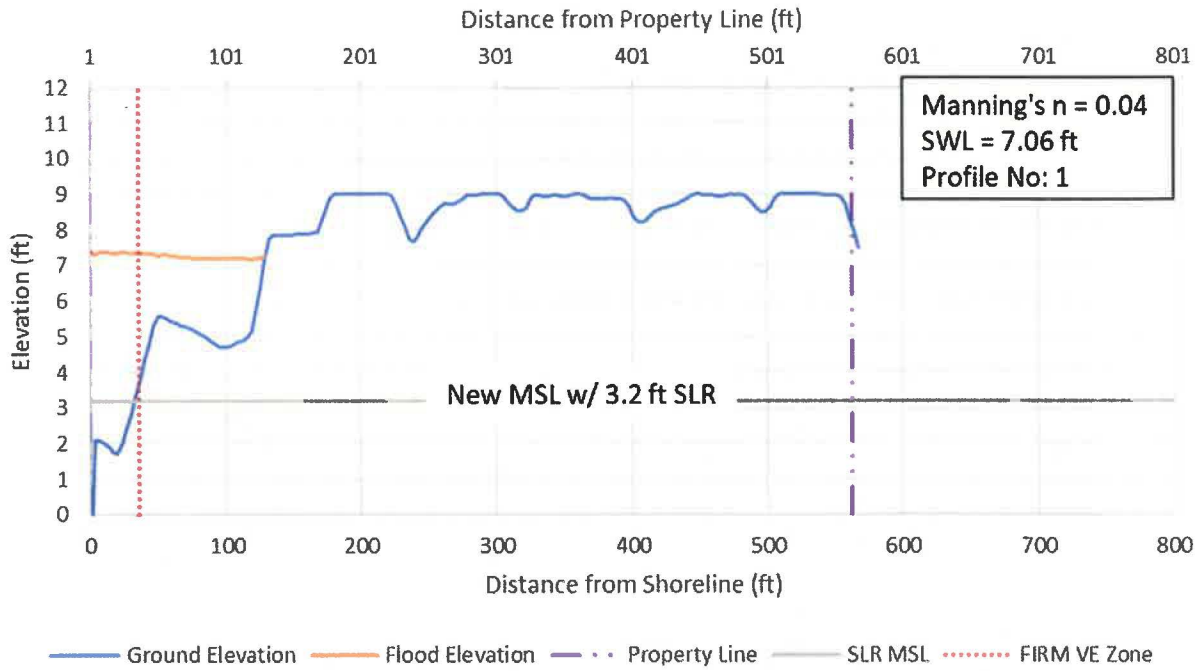


Figure 25. Hurricane Flood Calculations for Developed Conditions at Profile 1 with 3.2 ft SLR

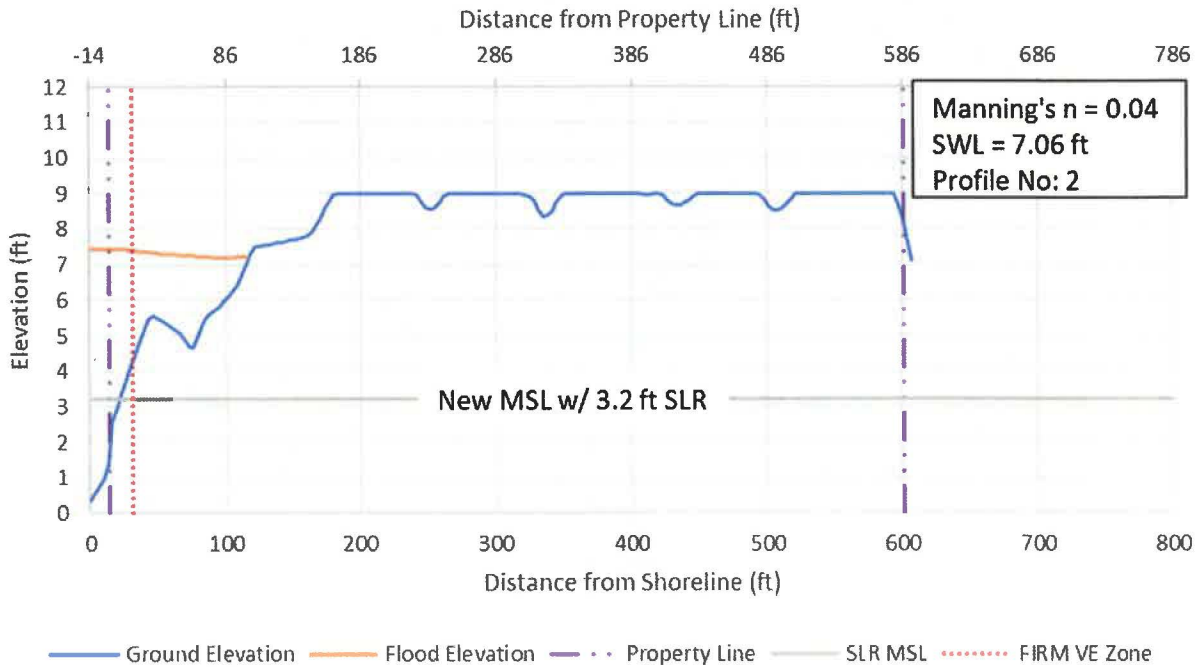


Figure 26. Hurricane Flood Calculations for Developed Conditions at Profile 2 with 3.2 ft SLR

Limited Flooding Analysis of Undetermined Areas

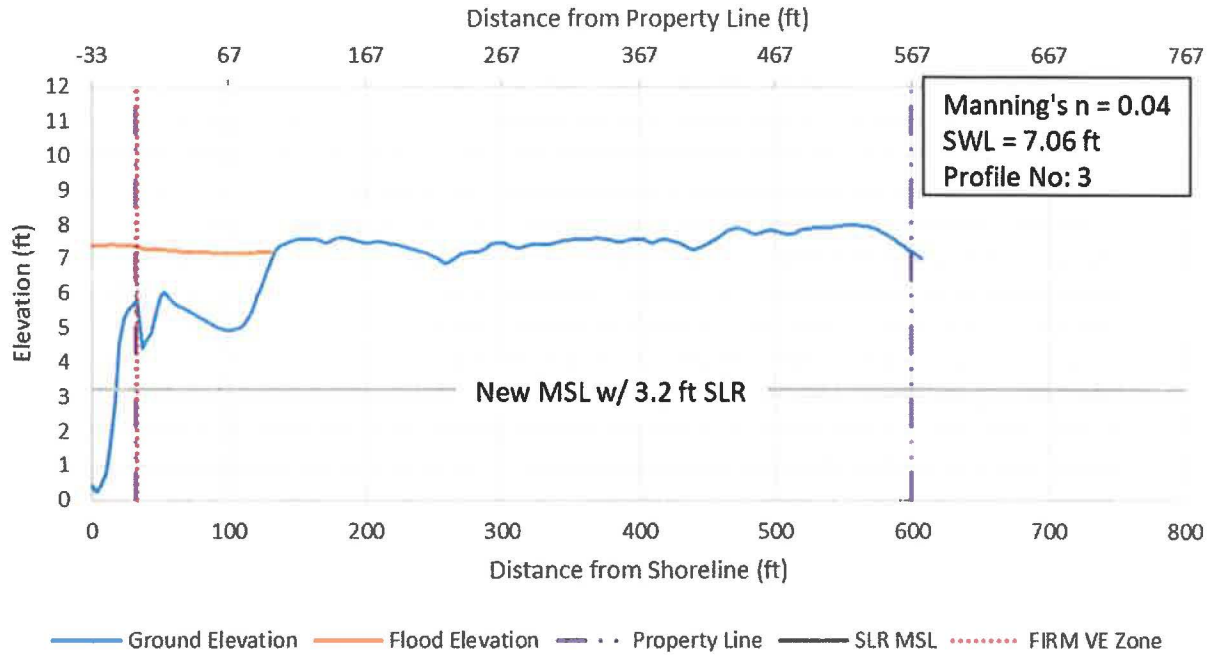


Figure 27. Hurricane Flood Calculations for Developed Conditions at Profile 3 with 3.2 ft SLR



Figure 28. Category 3 Hurricane Inundation for 91-603 Pohakupuna Road Developed Conditions w/ SLR

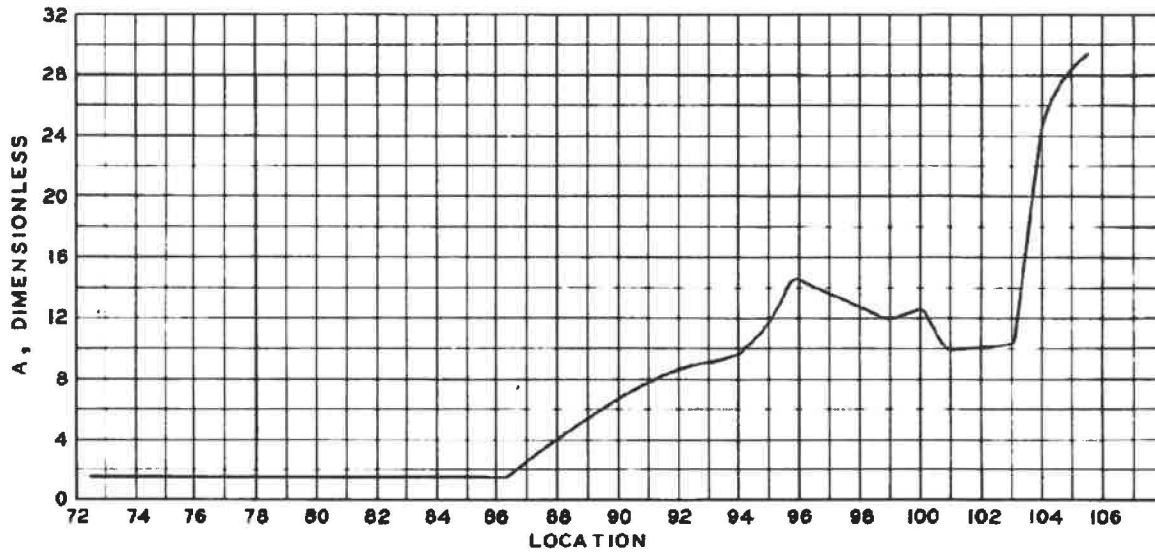


Figure 29. Coefficient A vs. Location Plot for O'ahu²⁴

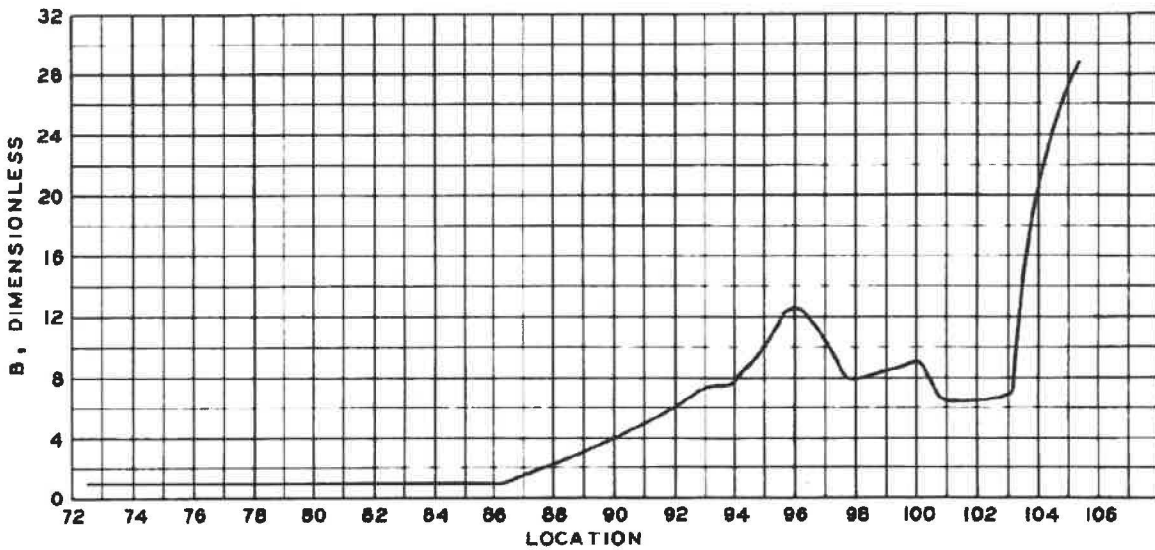


Figure 30. Coefficient B vs. Location Plot for O'ahu²⁵

²⁴ Houston, James Robert., Carver, Robert D., Markle, Dennis G.. Tsunami-wave Elevation Frequency of Occurrence for the Hawaiian Islands: Final Report. United States: Department of Defense, Department of the Army, Corps of Engineers, Waterways Experiment Station, Hydraulics Laboratory, 1977.

²⁵ Ibid.

Limited Flooding Analysis of Undetermined Areas

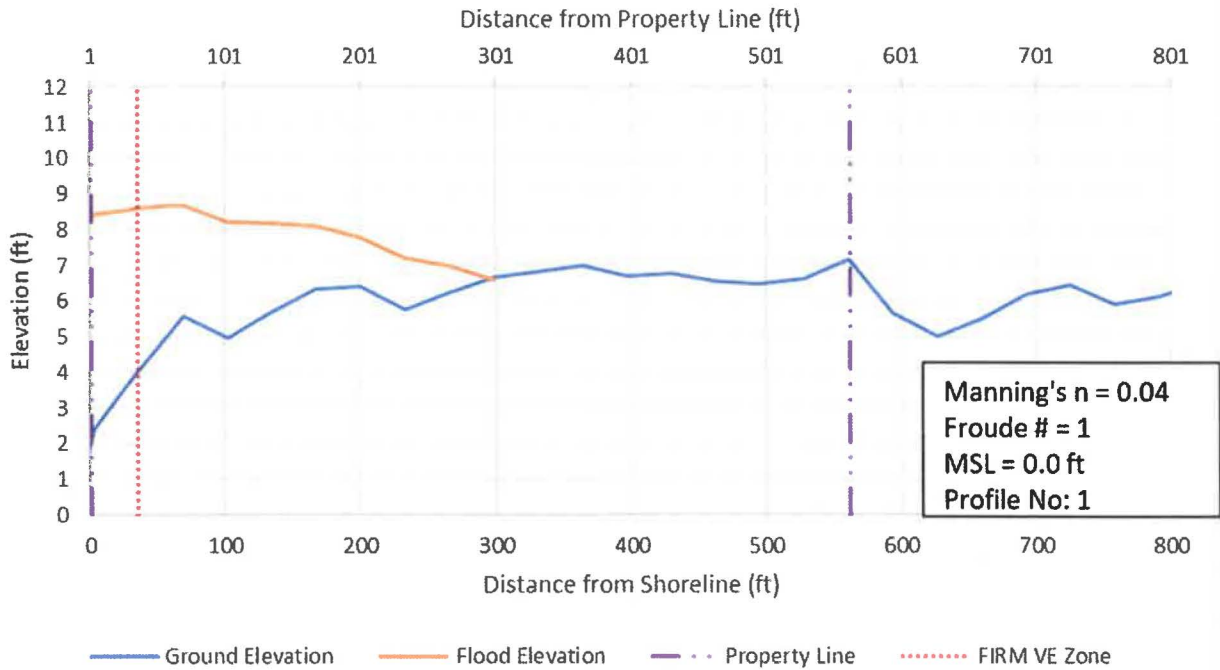


Figure 31. Tsunami Runup Calculations for Undeveloped Conditions at Profile 1

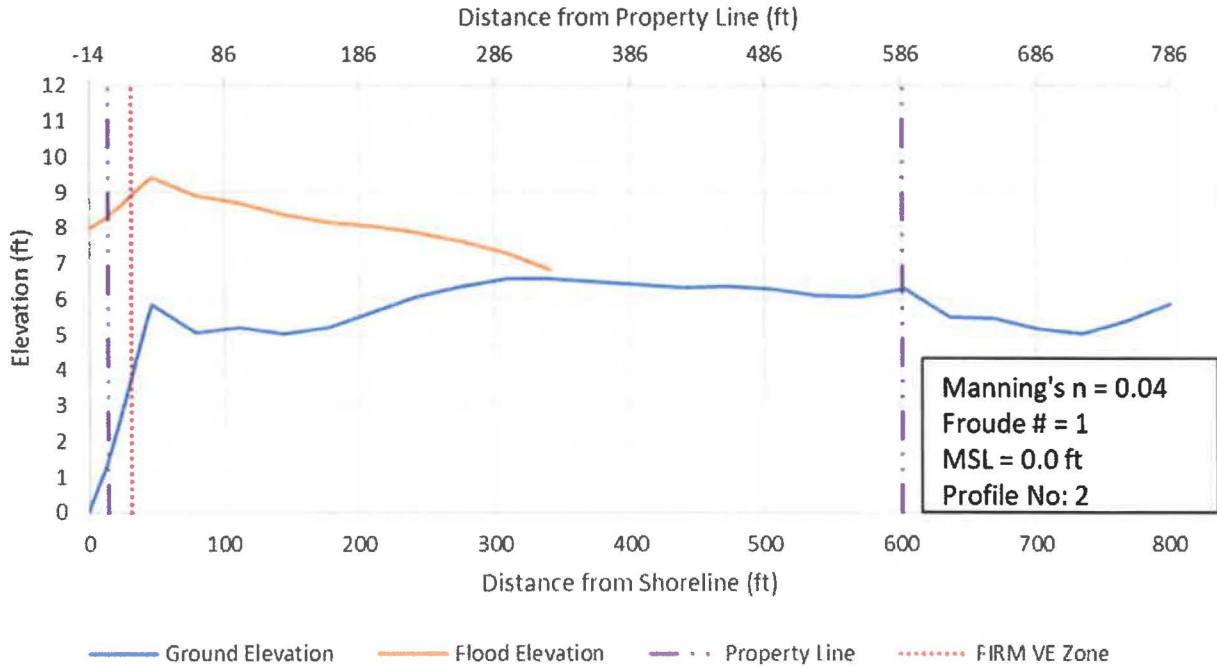


Figure 32. Tsunami Runup Calculations for Undeveloped Conditions at Profile 2

Limited Flooding Analysis of Undetermined Areas

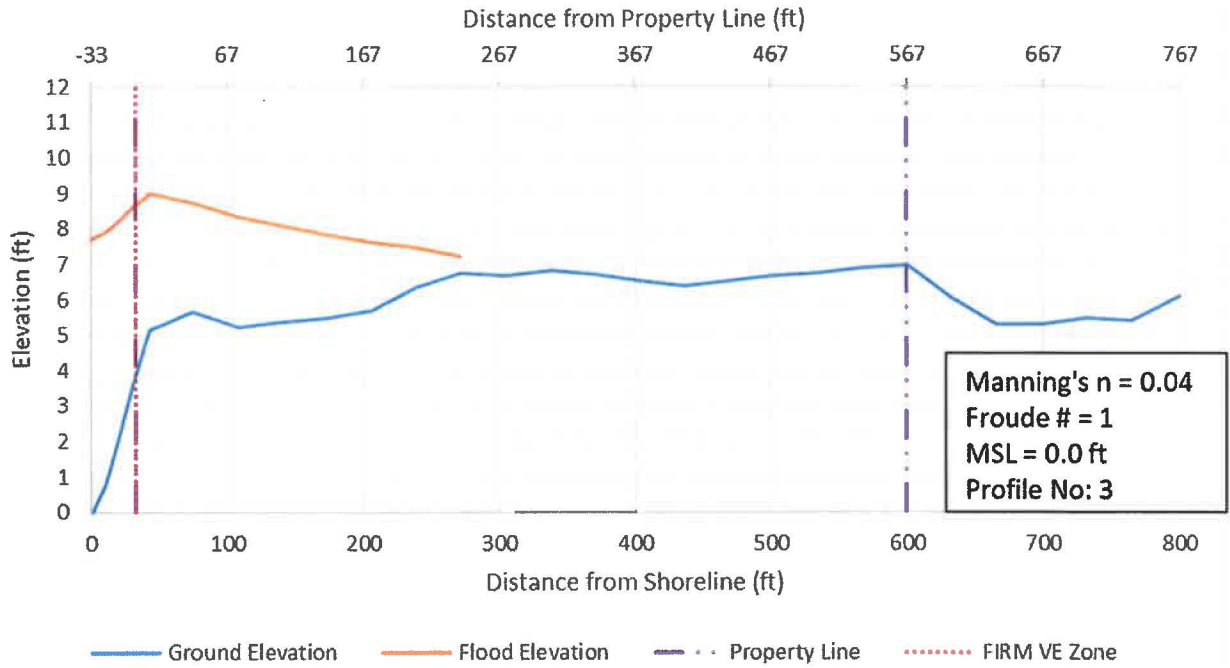


Figure 33. Tsunami Runup Calculations for Undeveloped Conditions at Profile 3

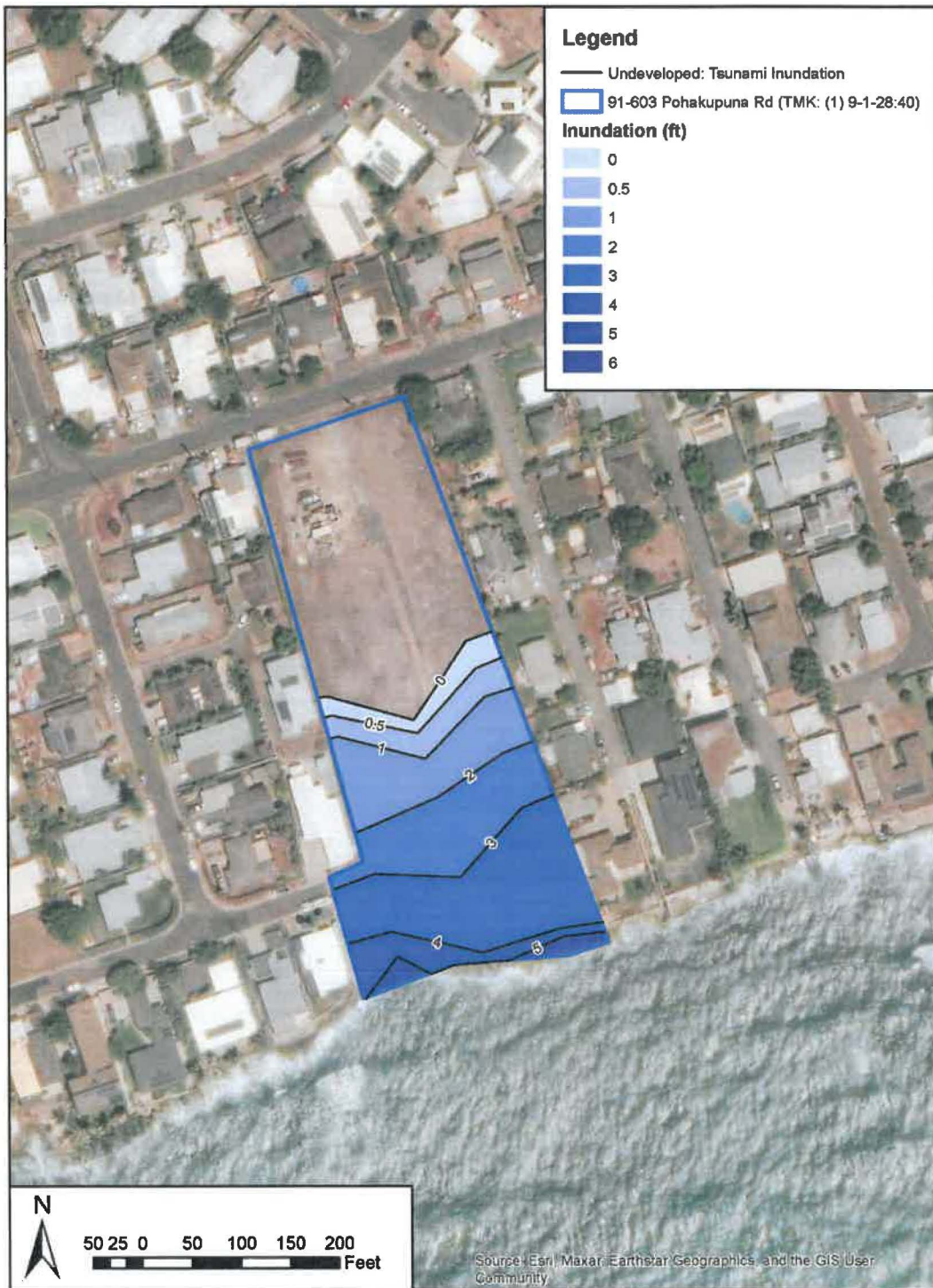


Figure 34. 100-Year Tsunami Inundation for 91-603 Pohakupuna Road Undeveloped Conditions

Limited Flooding Analysis of Undetermined Areas

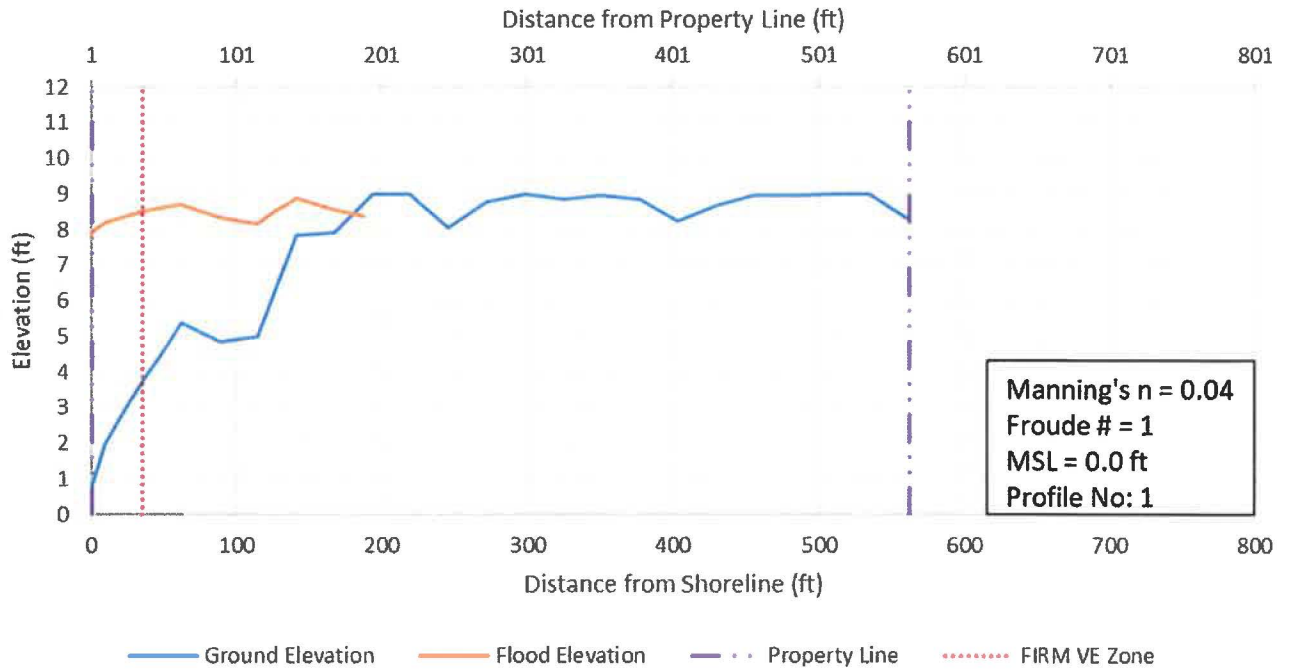


Figure 35. Tsunami Runup Calculations for Developed Conditions at Profile 1

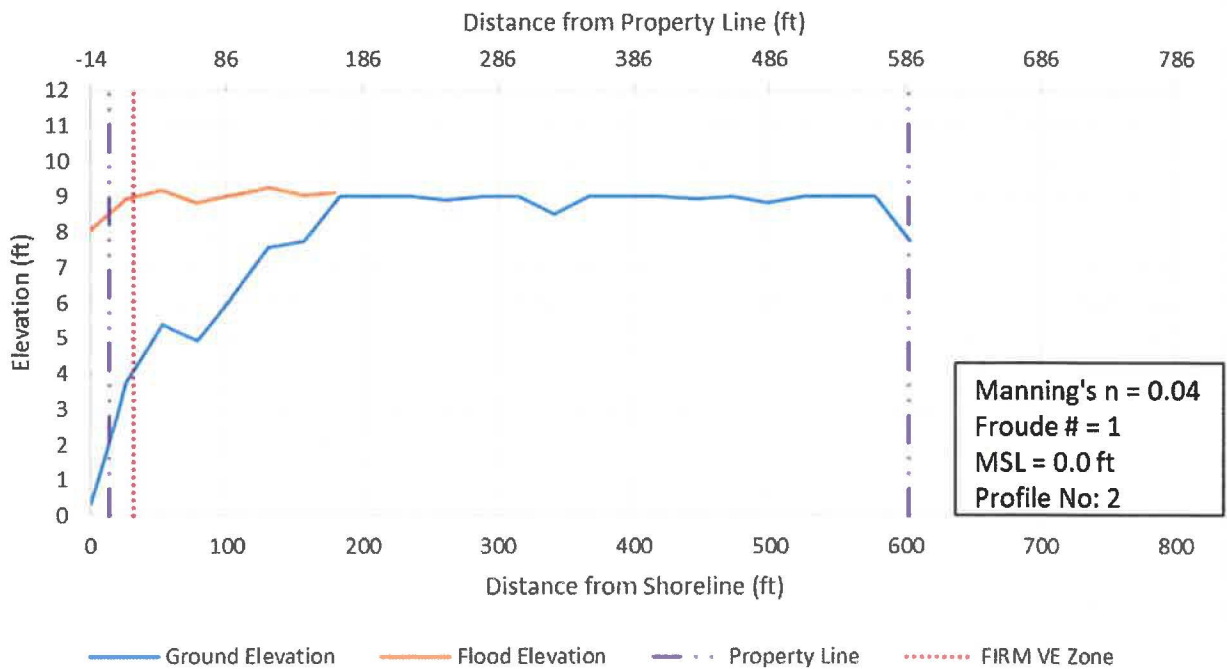


Figure 36. Tsunami Runup Calculations for Developed Conditions at Profile 2

Limited Flooding Analysis of Undetermined Areas

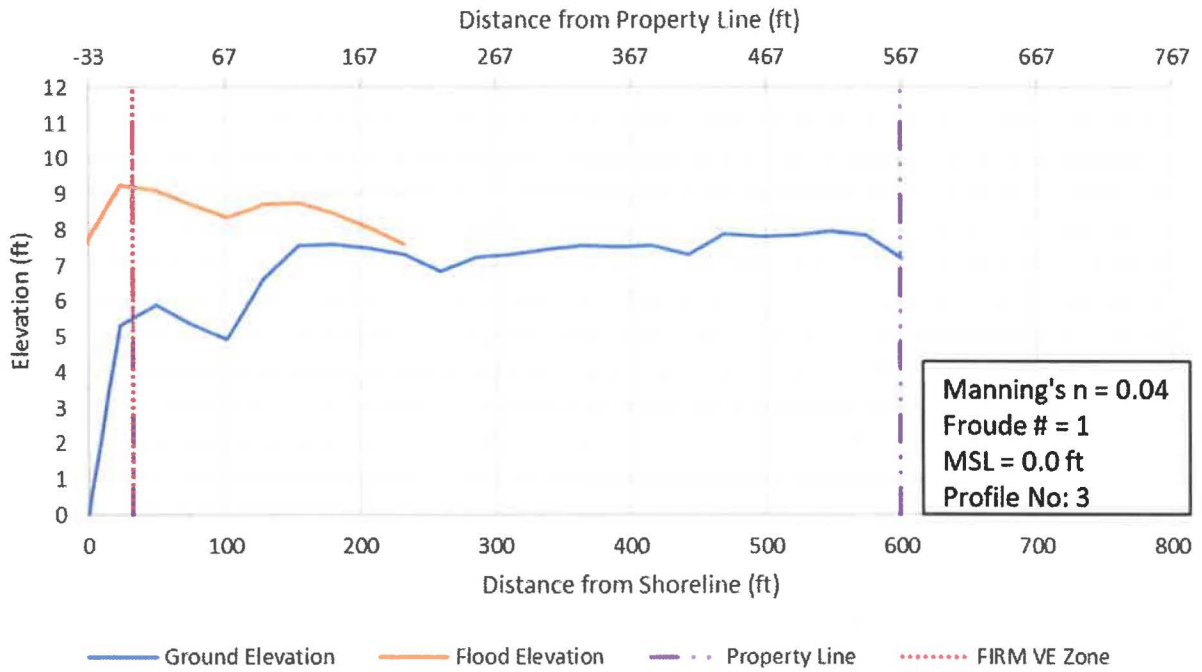


Figure 37. Tsunami Runup Calculations for Developed Conditions at Profile 3

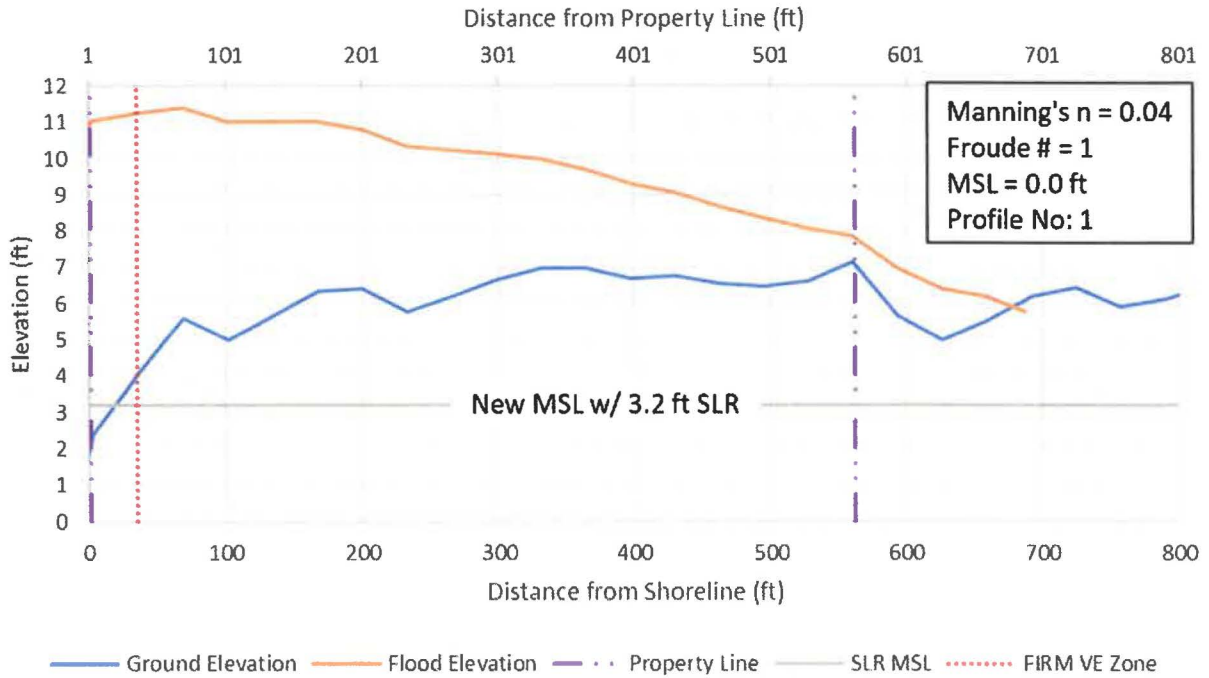


Figure 38. Tsunami Runup Calculations for Undeveloped Conditions at Profile 1 with 3.2 ft SLR

Limited Flooding Analysis of Undetermined Areas

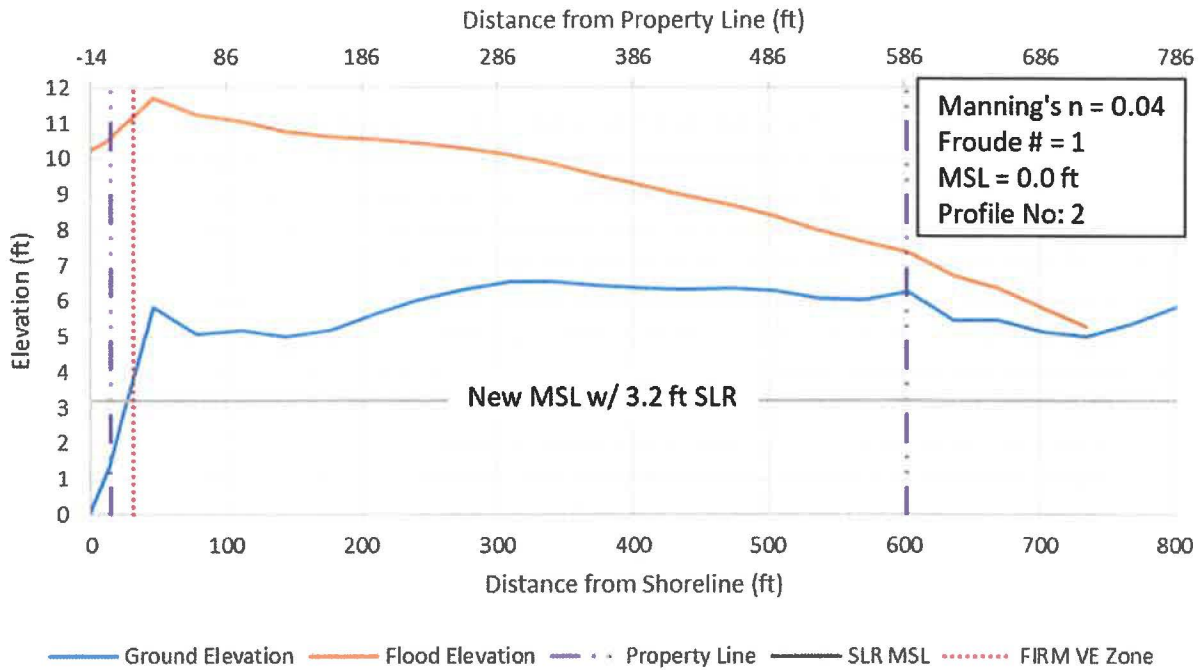


Figure 39. Tsunami Runup Calculations for Undeveloped Conditions at Profile 2 with 3.2 ft SLR

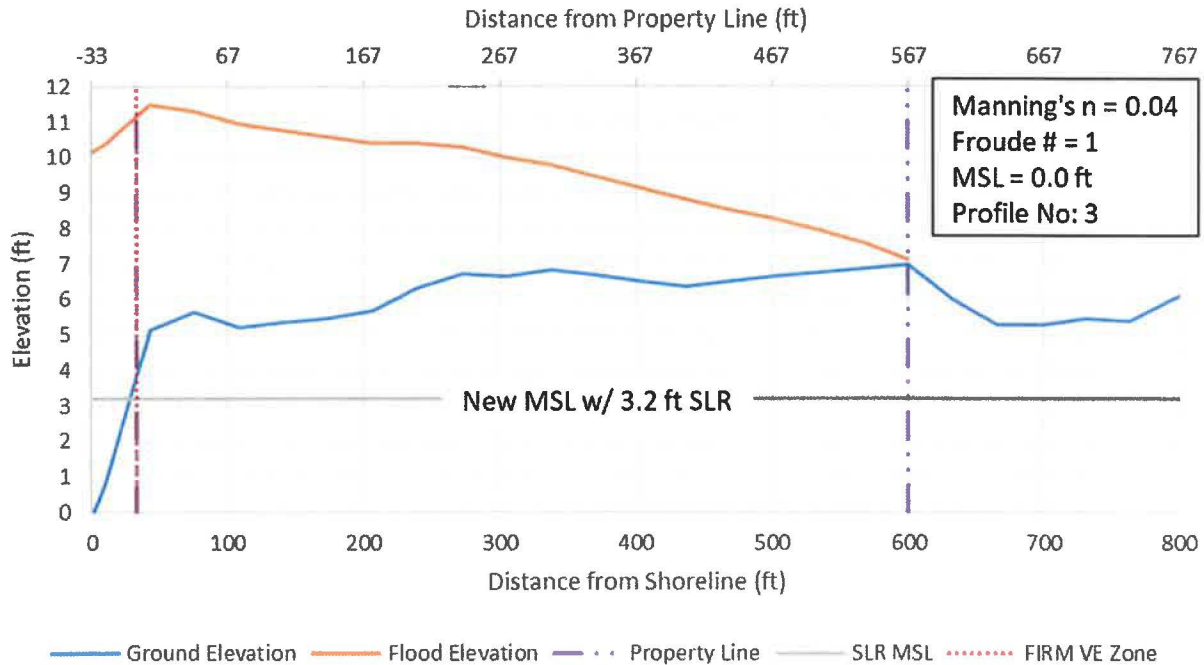


Figure 40. Tsunami Runup Calculations for Undeveloped Conditions at Profile 3 with 3.2 ft SLR

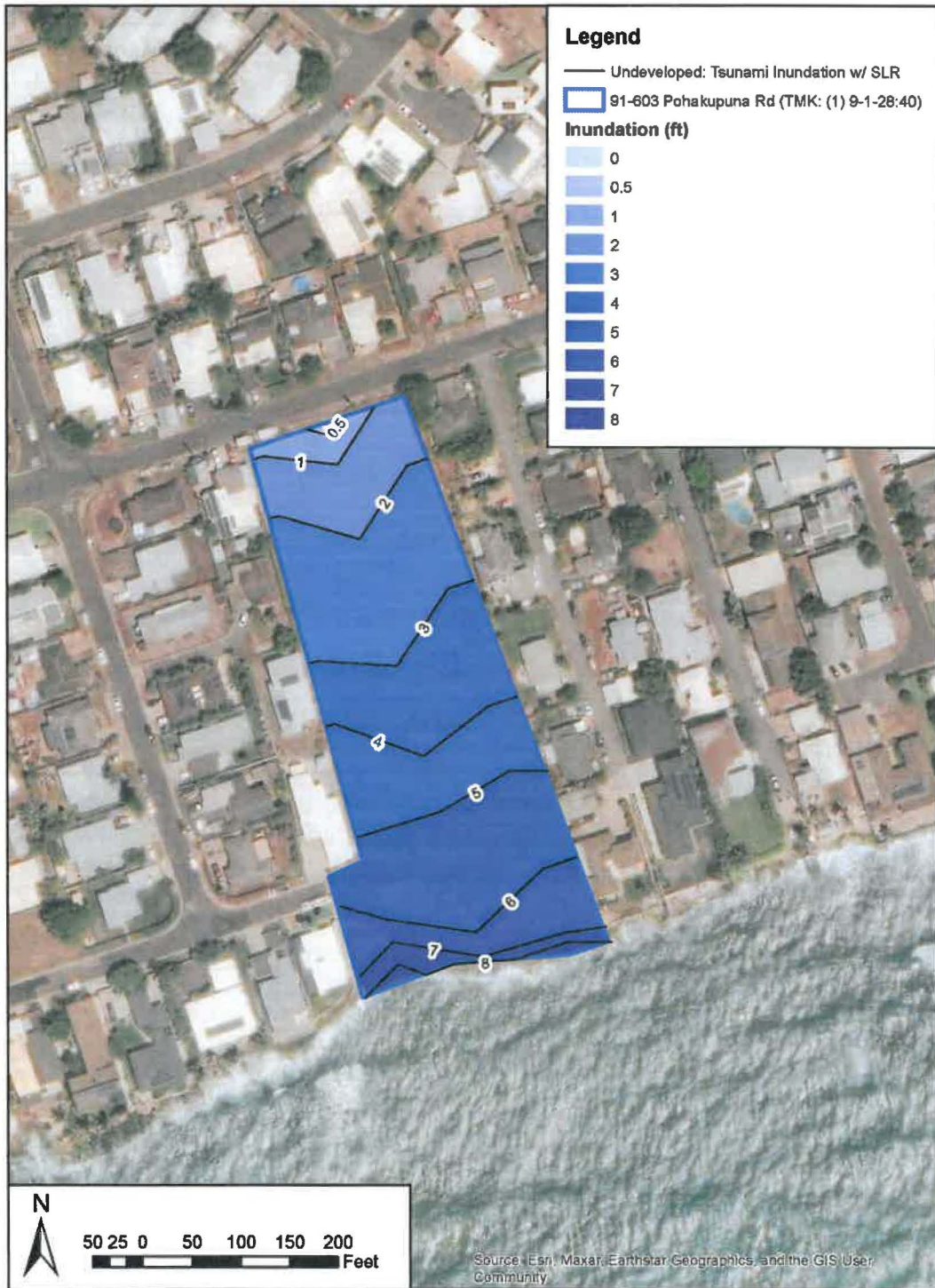


Figure 41. 100-Year Tsunami Inundation for 91-603 Pohakupuna Road Undeveloped Conditions w/ SLR

Limited Flooding Analysis of Undetermined Areas

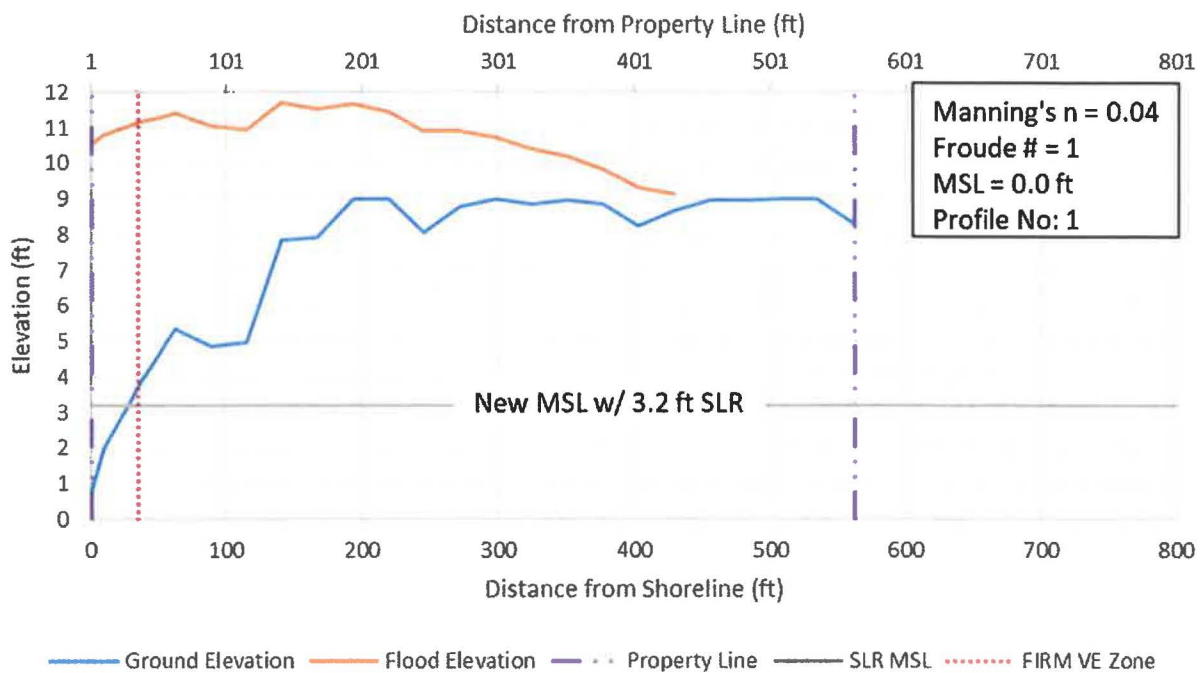


Figure 42. Tsunami Runup Calculations for Developed Elevations at Profile 1 with 3.2 ft SLR

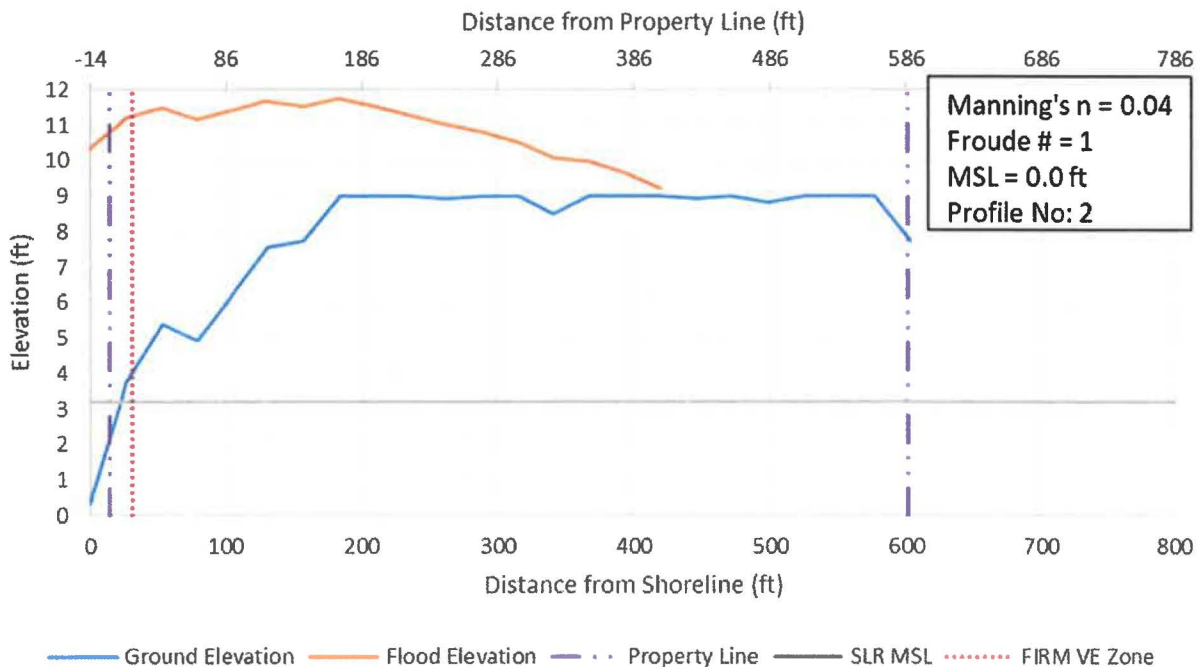


Figure 43. Tsunami Runup Calculations for Developed Elevations at Profile 2 with 3.2 ft SLR

Limited Flooding Analysis of Undetermined Areas

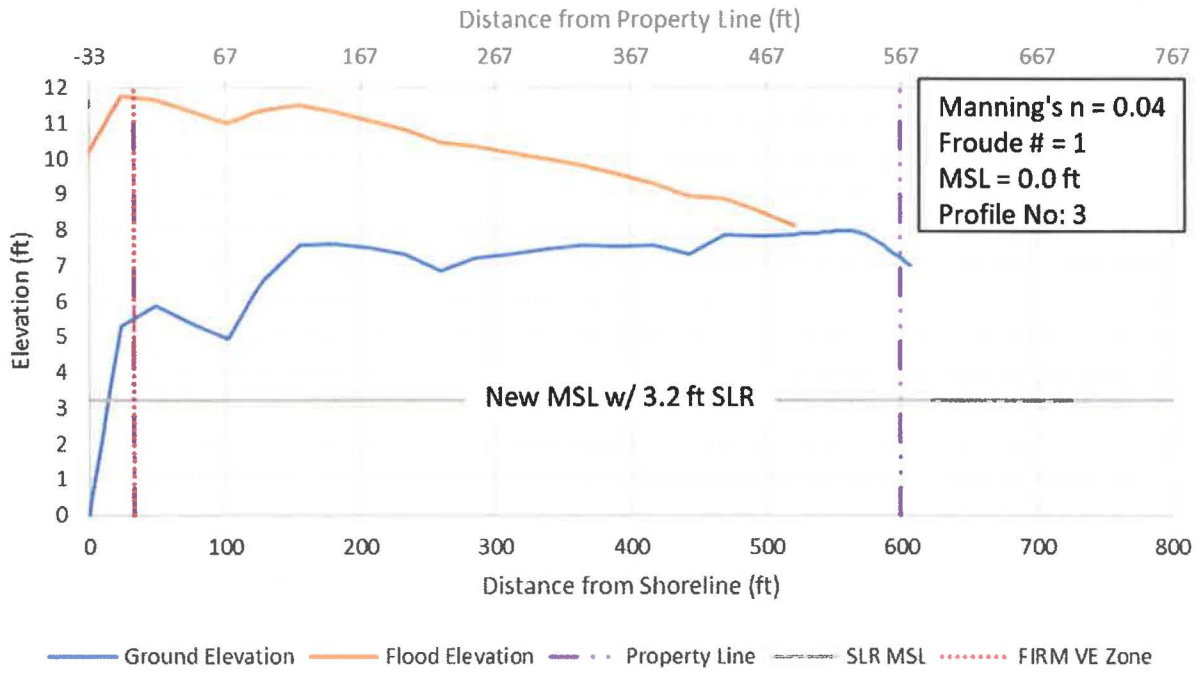


Figure 44. Tsunami Runup Calculations for Developed Elevations at Profile 3 with 3.2 ft SLR