



HAWAII COMMUNITY
DEVELOPMENT AUTHORITY



**KAKA'KO
KALAELOA**

Neil Abercrombie
Governor

Brian Lee
Chairperson

Anthony J. H. Ching
Executive Director

461 Cooke Street
Honolulu, Hawaii
96813

Telephone
(808) 594-0300

Facsimile
(808) 594-0299

E-Mail
contact@hcdaweb.org

Web site
www.hcdaweb.org

FILE COPY

MAY 08 2014

Ref. No.: PL KALAELOA 17.9.3

April 24, 2014

Ms. Jessica Wooley, Director
Office of Environmental Quality Control
Department of Health
State of Hawaii
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL
14 APR 28 P 1:57

Dear Ms. Wooley:

With this letter, the Hawaii Community Development Authority ("HCDA") hereby transmits the Draft Environmental Assessment and anticipated finding of no significant impact ("DEA-AFONSI") for the Kalaeloa East Energy Corridor situated at Tax Map Keys: 9-1-013: 095, 9-1-069: 003, Franklin D. Roosevelt Avenue, and Tripoli Street in 9-1-013: no parcel numbers, in the Ewa district on the island of Oahu for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, two copies of the DEA-AFONSI, an Adobe Acrobat PDF file of the DEA-AFONSI, and an electronic copy of the OEQC Publication Form in Microsoft Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

If there are any questions, please contact Ms. Tesha Malama at 620-9643, or Ms. Joanne Hiramatsu or Mr. Daniel Alexander at Belt Collins Hawaii at 521-5361.

Sincerely,

Anthony J. H. Ching
Executive Director

AJHC/TM:ak

- Encs.: One hard copy of the OEQC Publication Form
- Two hard copies of the DEA-AFONSI
- One compact disk with the DEA-AFONSI and OEQC Publication Form
- c: Ms. Joanne Hiramatsu, Belt Collins Hawaii

**AGENCY ACTIONS
SECTION 343-5(B), HRS
PUBLICATION FORM (FEBRUARY 2013 REVISION)**

OFFICE OF ENVIRONMENTAL QUALITY CONTROL
14 APR 28 P1:57
RECEIVED

Project Name: Kalaeloa East Energy Corridor
Island: O'ahu
District : 'Ewa
TMK: 9-1-013: 095, 9-1-069:003, Franklin D. Roosevelt Avenue and Tripoli Street in 9-1-013: no parcel numbers.
Permits: Kalaeloa Development Permit, Building and Grading Permits, National Pollutant Discharge Elimination System, and Easements across United States Navy and City and County of Honolulu owned parcels.

Proposing/ Determination Agency: State of Hawai'i, Hawai'i Community Development Authority
Address: 461 Cooke Street
City, State, Zip: Honolulu, Hawai'i 96813
Contact and Phone: Tesha Malama: 808-692-7245

Consultant: Belt Collins Hawai'i
Address: 2153 North King Street, Suite 200
City, State, Zip: Honolulu, Hawai'i 96819
Contact and Phone: Joanne Hiramatsu: 808-521-5361

Accepting Agency: State of Hawai'i, Hawai'i Community Development Authority
Address: 461 Cooke Street
City, State, Zip: Honolulu, Hawai'i 96813
Contact and Phone: Tesha H. Malama: 808-692-7245

Send Comments To:
Consultant: Belt Collins Hawai'i
Address: 2153 North King Street, Suite 200
City, State, Zip: Honolulu, Hawai'i 96819
Contact and Phone: Joanne Hiramatsu: 808-521-5361

Status (check one only):

DEA-AFONSI

Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.

FEA-FONSI

Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

FEA-EISPN

Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.

__ Act 172-12 EISPN

Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.

__ DEIS

The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.

__ FEIS

The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__ Section 11-200-23
Determination

The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.

__ Section 11-200-27
Determination

The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

__ Withdrawal (explain)

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

The State of Hawai'i, Hawai'i Community Development Authority (HCDA), is proposing to upgrade the electrical and communication distribution system within a corridor along the eastern boundary of the Kalaeloa Community Development District. The proposed action would: replace the existing U.S. Navy (Navy) 4.16 kilovolt (kV) distribution lines with new Hawaiian Electric Company (HECO) overhead 12kV electrical distribution lines on 65-foot poles along Essex Road and extend the system along Essex Road to Tripoli Street and along Tripoli Street to Coral Sea Road; reconnect the Navy's electrical system by installing 45-foot poles along Gambier Bay Street and Bismark Sea Street; and install 12kV electrical distribution lines on existing poles along Franklin D. Roosevelt Avenue and on a section of Bismark Sea Street.

The overarching purpose for the proposed action is to support HCDA's redevelopment plans for the Kalaeloa Community Development District. The proposed action is needed for three primary reasons: 1) to modernize the electrical distribution system; 2) to facilitate the transfer of the electrical distribution system in the former Barbers Point Naval Air Station from the Navy to HECO; and, 3) to provide a future option for the installation of 46kV line to support possible future alternative energy facilities. The future 46kV line is not part of this project. If and when a future alternative energy facility is proposed, the facility's developer will be responsible for preparing an environmental assessment for both the alternative energy facility and the 46kV line.

DRAFT ENVIRONMENTAL ASSESSMENT KALAELOA EAST ENERGY CORRIDOR

Kalaeloa, 'Ewa District, Island of O'ahu, Hawai'i



DRAFT ENVIRONMENTAL ASSESSMENT

KALAELOA EAST ENERGY CORRIDOR

Kalaeloa, 'Ewa District, Island of O'ahu, Hawai'i

Tax Map Keys: 9-1-013:095 and 096; 9-1-069:003

Franklin D. Roosevelt Avenue and Tripoli Street in 9-1-013: no parcel number

April 2014

Prepared for:

Hawai'i Community Development Authority

Prepared by:

Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, HI 96819

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APPENDICES

Appendix A	<i>An Archaeological Inventory Survey Report for the Kalaeloa East Energy Corridor Improvements, Honouliuli Ahupua‘a, ‘Ewa, O‘ahu, Hawai‘i, [Tax Map Key (1) 9-1-013]</i>
Appendix B	<i>Cultural Impact Assessment for the East Kalaeloa Energy Corridor in the Kalaeloa Community Development District, Honouliuli Ahupua‘a, ‘Ewa, O‘ahu, Hawai‘i, Tax Map Key (1) 9-1-013</i>
Appendix C	<i>Report of Findings: Terrestrial Vegetation and Wildlife Surveys, East Kalaeloa Energy Corridor, ‘Ewa, O‘ahu, Hawai‘i.</i>
Appendix D	Preconsultation Letters

ACRONYMS AND ABBREVIATIONS

ac	acre
BMP (s)	Best Management Practices (s)
BPNAS	Barbers Point Naval Air Station
BPNASRC	Barbers Point Naval Air Station Redevelopment Commission
BRAC	Base Realignment and Closure
CAB	Clean Air Branch, Department of Health (State of Hawai'i)
CIA	Cultural Impact Assessment
City	City and County of Honolulu
corridor	The proposed project corridor
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act of 1972
DBEDT	Department of Business, Economic Development and Tourism (State of Hawai'i)
DHHL	Department of Hawaiian Home Lands (State of Hawai'i)
DOH	Department of Health (State of Hawai'i)
DOT	Department of Transportation (State of Hawai'i)
DP	Development Plan
ELF	Extremely low frequency
EMF	Electromagnetic field
EMS	Emergency Medical Services (City and County of Honolulu)
EPA	Environmental Protection Agency
EBS	Environmental Baseline Survey
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HAR	Hawai'i Administrative Rules
HCDA	Hawai'i Community Development Authority (State of Hawai'i)
HECO	Hawaiian Electric Company
HFD	Honolulu Fire Department (City and County of Honolulu)
HIARNG	Hawaii Army National Guard (State of Hawai'i)
HMC-West	Hawaii Medical Center-West
HPA	Health Protection Agency (United Kingdom)
HPD	Honolulu Police Department (City and County of Honolulu)
HRS	Hawai'i Revised Statutes
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IRP	Installation Restoration Program
Kalaeloa	Kalaeloa Community Development District
KHLF	Kalaeloa Heritage and Legacy Foundation

kilovolt	kV
KEEC	Kalaleloa East Energy Corridor
MCAS	Marine Corps Air Station
msl	mean seal level
mG	milligauss
NAVY	U.S. Navy
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OR&L	Oahu Railway and Land Company
POI	Point of Interest
Queen's	Queen's Health System
ROW (s)	Right-of-way (s)
SCS	Scientific Consultant Services, Inc.
SHPD	State Historic Preservation Division (State of Hawai'i)
SMA	Special Management Area
SOBA	Southern Oahu Basal Aquifer
State	State of Hawai'i
TMK	Tax map key
UIC	Underground injection control
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	U. S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WHO	World Health Organization
WWTP	Wastewater Treatment Plant

GENERAL INFORMATION

Project:	Kalaeloa East Energy Corridor
Location:	Kalaeloa, 'Ewa District, Island of O'ahu, Hawai'i
Proposed Action:	The proposed action calls for the installation of: 12 kilovolt (kV) electrical distribution lines and 65-foot poles along Essex Road and Tripoli Street; 12kV electrical distribution lines and 45-foot poles along Gambier Bay Street and Bismark Sea Street (portion); and 12kV electrical distribution lines on existing poles along Franklin D. Roosevelt Avenue and on a section of Bismark Sea Street. Existing U.S. Navy (Navy) lines and poles within this corridor, where possible, would be removed.
Proposing Agency:	Hawai'i Community Development Authority, State of Hawai'i
Approving Agency:	Hawai'i Community Development Authority, State of Hawai'i
Recorded Fee Owner:	State of Hawai'i, City and County of Honolulu (City), and the U.S. Navy
Anticipated Determination:	Anticipated Finding of No Significant Impact
Property Profile:	
TMK	9-1-013:095; 9-1-069:003 Franklin D. Roosevelt Avenue and Tripoli Street in 9-1-013: no parcel numbers.
Land Area	Approximately 20,700 linear feet of overhead electrical lines will be installed on power poles within rights-of-way and parcels of varying widths.
Existing Use:	Roads, Golf Course, and Open Space
Proposed Use:	Overhead 12kV power and communications distribution system
Land Use Designations:	
State Land Use	Urban District
County Zoning	F-1 Federal and Military Preservation District, AG-1 Restricted Agricultural District
'Ewa Development Plan (2013)	Parks and Golf Courses, Industrial, Residential and Low Density Apartment
Kalaeloa Master Plan—Preferred Land Use	Recreation, Recreation/Cultural, Institutional: School/Cultural Center, Mixed Use: Moderate Intensity
Kalaeloa Community Development District Rules—Regulating Plan (2012)	Planned Roadway, T2 Rural/Open Space Zone, T3 General Urban Zone
Special Management Area (SMA)	Not within the SMA

Major Approvals Required:

Kalaeloa Development Permit, Building and Grading Permits, National Pollutant Discharge Elimination System, Easements across U.S. Navy and City owned parcels.

1 INTRODUCTION

The Hawai'i Community Development Authority (HCDA) is proposing to upgrade the electrical and communication distribution system within a corridor along the eastern boundary of the Kalaeloa Community Development District (Kalaeloa) in the 'Ewa District, Island of O'ahu. The proposed action would: replace the existing U.S. Navy (Navy) 4.16 kilovolt (kV) distribution lines with new Hawaiian Electric Company (HECO) overhead 12kV electrical distribution lines on 65-foot poles (56 feet above ground and 9 feet below ground) along Essex Road and extend the system along Essex Road to Tripoli Street and along Tripoli Street to Coral Sea Road; reconnect the Navy's electrical system by installing 45-foot poles (36-39 feet above ground and 6-9 feet below ground) along Gambier Bay Street and Bismark Sea Street (portion); and install 12kV electrical distribution lines on existing poles along Franklin D. Roosevelt Avenue and on a section of Bismark Sea Street. After construction, ownership of the new and upgraded lines on Bismark Sea Street and Gambier Bay Street would be turned over to the Navy. The affected properties are owned by the State of Hawai'i (State), City and County of Honolulu (City), and the Navy. See Figure 1-1.

This section identifies the reasons for the proposed action, provides background information, and describes the environmental review associated with this proposed action.

1.1 PURPOSE AND NEED

This proposed upgrade is needed for the following reasons:

- 1) The upgrade will provide a modern electrical distribution system that will serve current and future development within Kalaeloa. The current 4.16kV and 11kV electrical system served the former Barbers Point Naval Air Station (BPNAS) that originated in the 1940's. Currently, the system serves both military and non-military users. The Kalaeloa Infrastructure Master Plan Update (2010) suggested replacing the existing electrical system to meet the projected needs of the Kalaeloa redevelopment.¹

This modernized system is needed to provide a 12kV electrical distribution system that: provides reliable power for a portion of Kalaeloa, which will support the Kalaeloa redevelopment plans and not interrupt military operations during the fulfillment of its mission; and begins the process to provide private electrical service to both military and non-military users.

- 2) The upgrade will facilitate the transfer of the electric distribution system from the Navy to HECO. The Navy ownership of the system is a hold-over from the former BPNAS. With the closure of BPNAS in 1999 and the conveyance of surplus Navy land to the State and City, the Navy must eventually divest itself from providing utility services within Kalaeloa. Due to the condition and construction of the existing system, HECO, as a public utility company, has declined to accept the Navy's electrical system, which does not meet HECO's standards and will require extensive and costly upgrades and replacement.

¹ Hawai'i Community Development Authority. October 2010. *Kalaeloa Infrastructure Master Plan Update*.

It is noted that the Navy is currently divesting itself of the potable water and sewer services within Kalaeloa. The prospective utilities purchaser has recently filed documents with the Public Utilities Commission regarding the said purchase.

- 3) Finally, the design of the 65-foot power poles will provide a future option for the installation of a 46kV line to export power from possible future alternative energy facilities to HECO's energy grid. The future 46kV line is not part of this project. If and when a future alternative energy facility is proposed, the facility's developer will be responsible for preparing an environmental assessment for both the alternative energy facility and the 46kV line.

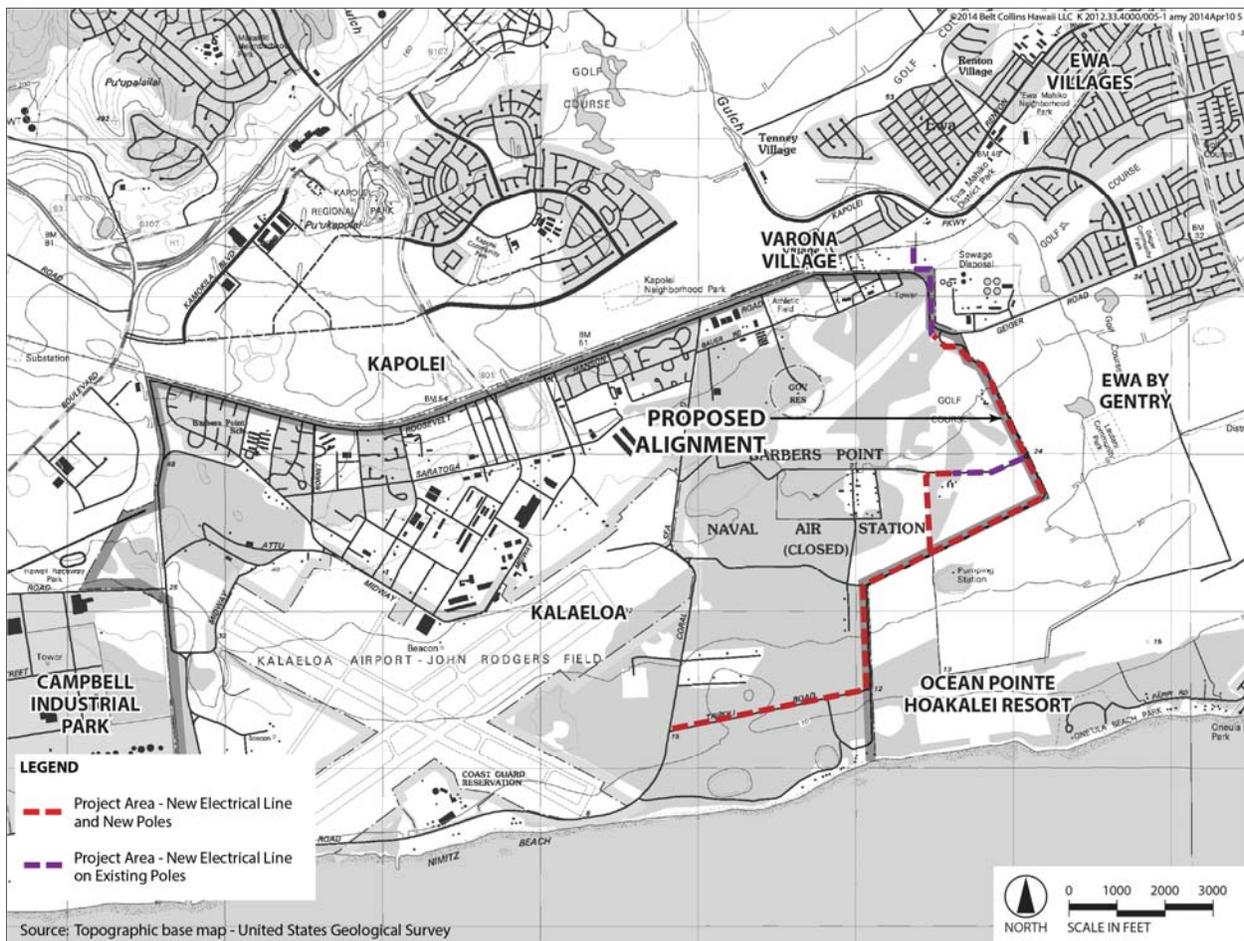


Figure 1-1. Location Map

1.2 ENVIRONMENTAL REVIEW

This EA has been prepared because State funds and State and City lands are being used for the proposed action. It has been prepared in accordance with Chapter 343, Hawai'i Revised Statutes, and Title 11, Chapter 200, Hawai'i Administrative Rules (HAR). The HCDA anticipates a Finding of No Significant Impact for the proposed action.

The proposed action also includes work on the Navy electrical system and the use of Navy land, i.e. Essex Road/Barbers Point Golf Course parcel (tax map key [TMK] 9-1-013:095). After a review of the project and its potential impacts, the Navy will determine the appropriate course of action that is in accordance with National Environmental Policy Act of 1969 and Navy rules and regulations. It is anticipated that a Categorical Exclusion for utility upgrades will be determined.

1.3 PROPOSED AGENCY ACTION AND ACCEPTING AGENCY

For this proposed action, the HCDA is both the proposing and the accepting agency.

Act 184 of the 2002 State Legislature gave HCDA the responsibility to redevelop Kalaeloa. Since then HCDA has prepared the Kalaeloa Master Plan (2006) and the Kalaeloa Infrastructure Master Plan Update (2010); and HAR Chapter 15-215, the Kalaeloa Community Development District Rules (2012) was adopted. Under those plans and rules, the processing of this proposed action represents HCDA's role as both an implementing and administrative/regulatory agency.

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2 PROPOSED ACTION AND ALTERNATIVES CONSIDERED

This section describes the proposed action, identifies the estimated cost, outlines the preliminary schedule, and briefly summarizes the alternatives considered.

2.1 PROPOSED ACTION

The proposed action calls for: the installation and upgrading of overhead 12 kilovolt (kV) electrical distribution lines and poles along Essex Road, Tripoli Street, Gambier Bay Street, and Bismark Sea Street (portion) to replace the existing 4.16 kV overhead lines; the installation of 12 kV electrical distribution lines on existing poles along Franklin D. Roosevelt Avenue and on a section of Bismark Sea Street; and the removal of existing U.S. Navy (Navy) poles and lines along a section of Franklin D. Roosevelt Avenue. See Figure 2-1.

The proposed project corridor (corridor) is approximately 20,700 feet long. The overhead 12kV electrical lines would be installed on new 65-foot poles along Essex Road and Tripoli Street and on 45-foot poles along Gambier Bay Street and Bismark Sea Street (portion). The project corridor width is defined by the road rights-of-way (ROWs). The 65-foot would be buried to a depth of approximately 9 feet leaving approximately 56 feet above ground level. The 45-foot poles would be buried to a depth of approximately 6-9 feet leaving approximately 36-39 feet above ground level. See Figure 2-2.

The 65-foot poles are intended to accommodate future 46kV electrical transmission lines, though these lines are not part of the proposed action.

In areas where new 12kV lines would be installed on existing poles (along an approximately 3,200-foot long sections of the corridor), installation would occur through the use of existing roads and access areas; therefore the action would result in minimal additional disturbance of the corridor in these sections.

In areas where new poles would be installed (along an approximately 17,500-foot long section of the corridor), disturbance of the corridor would be limited to the excavation and placement of the power poles at approximately 200-foot intervals, the installation of ancillary equipment, and the removal of existing Navy poles located within the corridor. The electrical and communication overhead lines would have laterals to properties located along Franklin D. Roosevelt Avenue, Essex Road, and Tripoli Street. The installation would also include individual meters, overhead and at-grade transformers, and other ancillary utility equipment.

The specific location of the electrical lines and poles within the ROW would be coordinated with the Navy, State of Hawai'i (State), City and County of Honolulu (City), and utility companies that have existing facilities within the corridor. No street lights are proposed to be installed onto the poles at this time.

2.1.1 CONNECTION TO THE EXISTING HAWAIIAN ELECTRIC COMPANY SYSTEM

The proposed action calls for connecting to the Hawaiian Electric Company (HECO) 12kV system paralleling Renton Road and installing approximately 2,100 feet of 12kV lines onto the HECO poles recently installed for the Kalaeloa Renewable Energy Park¹ project that extends south through a City parcel (tax map key [TMK] 9-1-069:003) and through the Franklin D. Roosevelt Avenue parcel (no TMK). After the installation of the new lines is complete, the existing Navy poles and 4.16kV lines that run adjacent to the HECO poles on Franklin D. Roosevelt Avenue would be removed.

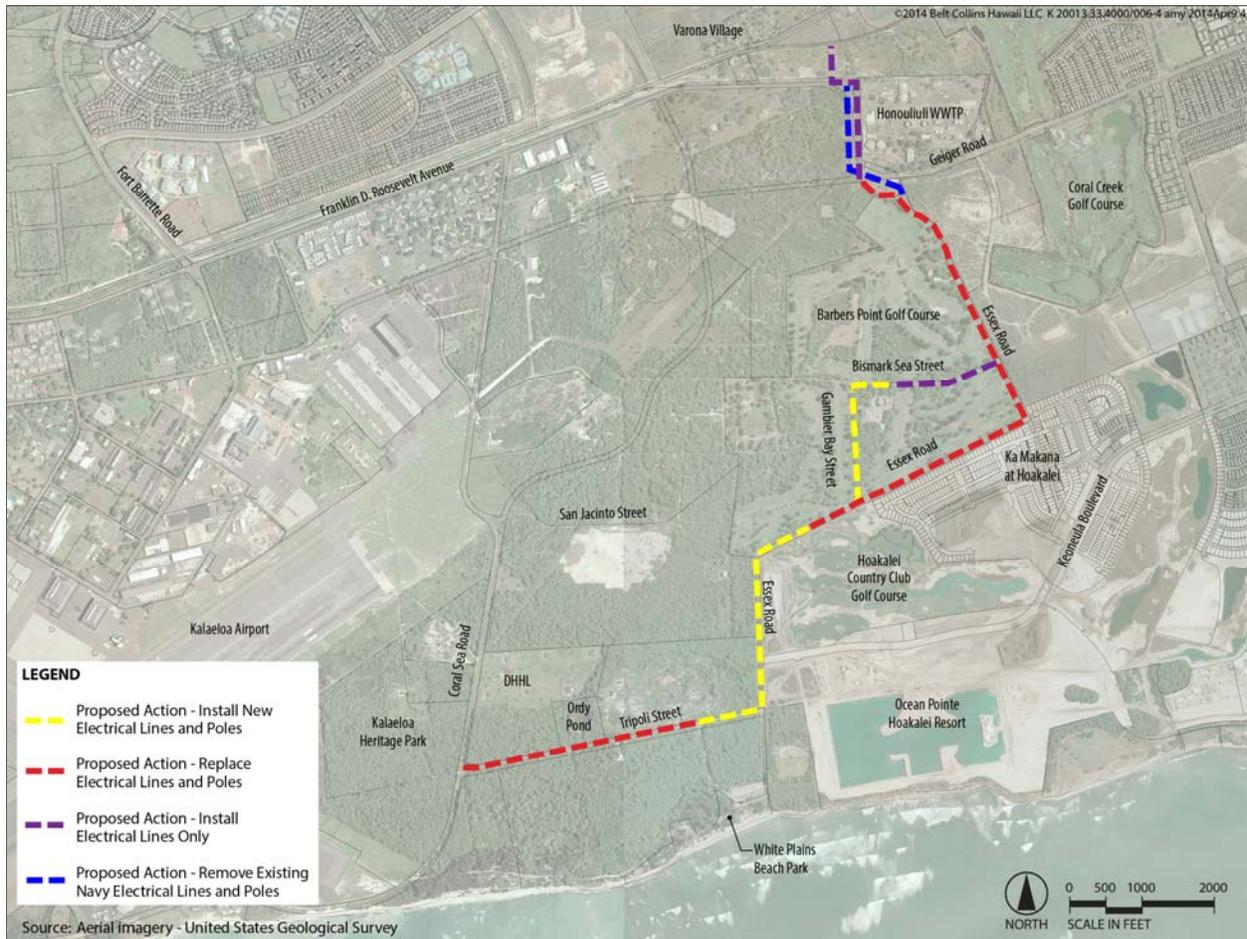


Figure 2-1. Project Corridor

2.1.2 CORRIDOR ALONG ESSEX ROAD

The corridor along Essex Road from Franklin D. Roosevelt Avenue to Tripoli Street is approximately 10,700 feet. The proposed action calls for the installation of 12kV electrical distribution lines on 65-foot poles (56 feet above ground) along Essex Road. This action is described below in three road segments: (1) a segment that runs from north to south along the east side of the Barbers Point Golf Course, adjacent to the Ewa by Gentry property, (2) a segment that runs from east to west along the south side of the Barbers Point Golf Course, adjacent to the Ocean Pointe/Hoakalei Resort property;

¹ U.S. Department of the Navy. January 2013. *Final Environmental Assessment, Kalaeloa Renewable Energy Park*.

and (3) a narrow road segment that runs from north to south from the Barbers Point Golf Course to Tripoli Street.

Essex Road segment along the Ewa by Gentry property: From the existing HECO poles, the new 12kV electrical lines and poles run alongside Essex Road and adjacent to TMK 9-1-013:096, and then enter into the Barbers Point Golf Course property, TMK 9-1-013:095, and follow along the west side of Essex Road, which runs from north to south along the east Kalaeloa boundary line. The proposed action would place the 12kV electrical lines and poles on the west side of the Essex Road pavement. The new electrical lines would be about 50 feet from the property line. The existing electrical lines and poles, located on the east side of the Essex Road pavement between the road pavement and the property line, would be removed.

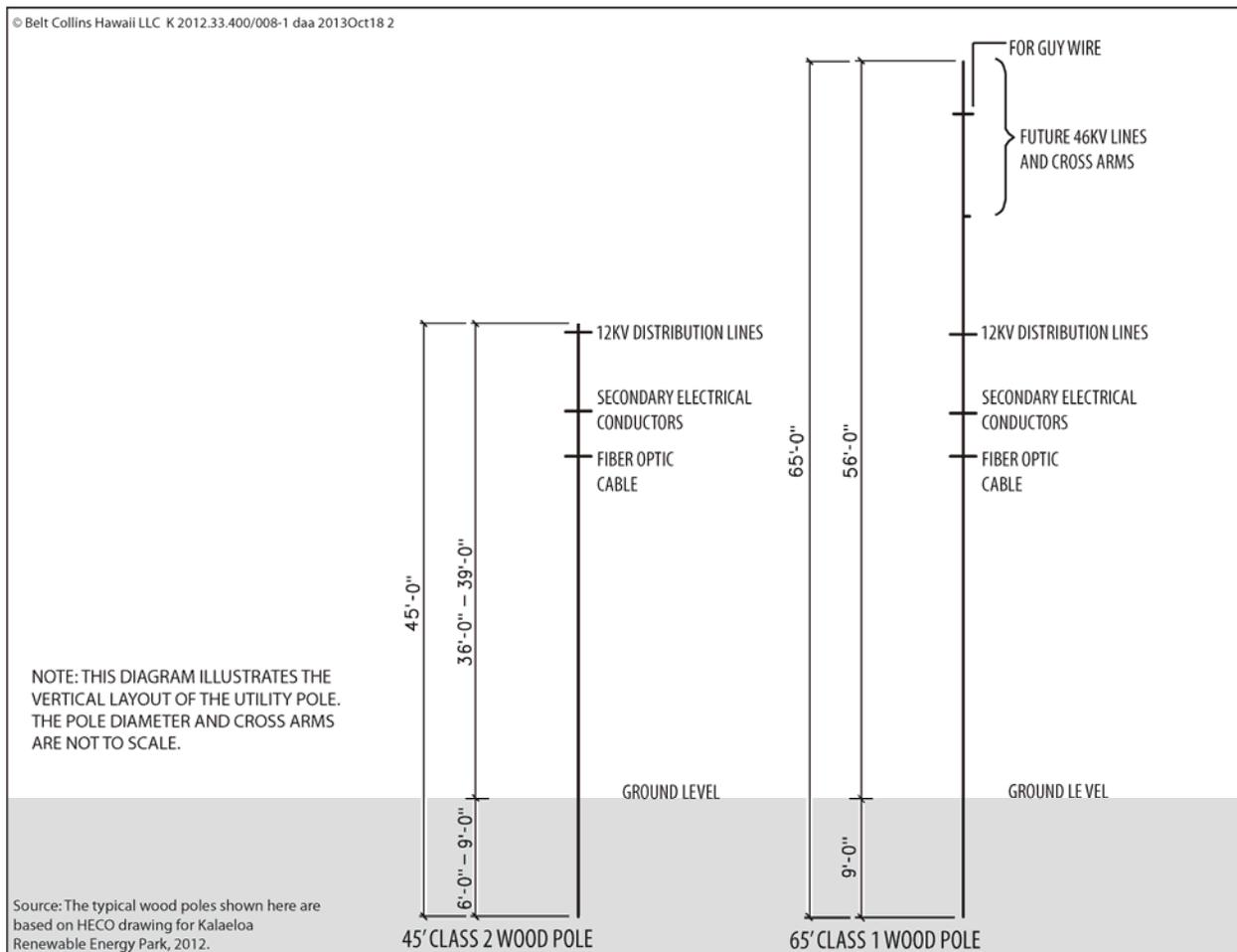


Figure 2-2. Diagram of Typical 65-foot and 45-foot Utility Pole

Essex Road segment along Ocean Pointe/Hoakalei Resort property: The new 12kV electrical lines and poles make a 90 degree turn and run westerly along the southern Kalaeloa boundary line, north of the Ocean Pointe/Hoakalei Resort property. The new electrical lines would be in approximately the same alignment as the existing electrical lines that are approximately 50 to 60 feet from the Ocean Pointe/Hoakalei Resort property line. Portions of the existing electrical system would need

to be removed before installation of the new electrical poles and lines, which is the reason for the re-connection described in Section 2.1.4. After the new electrical lines are installed, the remaining existing electrical lines, poles, and ancillary equipment would be removed and disposed of appropriately.

Essex Road segment from Barbers Point Golf Course to Tripoli Street: The new 12kV electrical lines and poles would then run southward and follow along the west side of Essex Road from the Barbers Point Golf Course to Tripoli Street. The corridor, situated between the Ocean Pointe/ Hoakalei Resort property line and the Navy's former trap and skeet range parcels (TMK 9-1-013:039 and 042), is approximately 40 feet wide with approximately 20 feet of pavement and 5-foot and 15-foot shoulders on the east and west side, respectively. The proposed action would place the 12kV electrical lines and poles within the 15-foot wide shoulder on the west side of the pavement.

2.1.3 CORRIDOR ALONG TRIPOLI STREET

The corridor along Tripoli Street is approximately 4,200 feet from Essex Road to Coral Sea Road. The right-of-way is 80 feet wide with a 20-foot paved roadway, an approximately 28-foot wide unpaved shoulder on the mauka side, and an approximately 32-foot wide unpaved shoulder on the makai side. The existing Navy electrical lines and poles are located in the mauka shoulder and run from the White Plains access road to Coral Sea Road.

The proposed action would install the 12kV electrical lines on 65-foot poles (56 feet above ground) within the mauka shoulder of Tripoli Street. The new 12kV electrical lines and poles would be in approximately the same location as the existing electrical lines. After the new electrical lines are installed, the existing lines, poles, and ancillary equipment would be removed and disposed of appropriately. The replacement of the existing electrical system is not expected to preclude other uses within the 80-foot right-of-way.

2.1.4 CORRIDOR ALONG GAMBIER BAY STREET-BISMARK SEA STREET

To construct the Essex Road segment along the Ocean Pointe/Hoakalei Resort property, a re-connection to the Navy's electrical system along San Jacinto Street needs to be made. The portion of the corridor along Essex Road, Gambier Bay Street and Bismark Sea Street is approximately 4,500 feet in length. The proposed action would install the 12kV electrical lines on 45-foot poles (36-39 feet above ground level) along Essex Road to Gambier Bay Street, along Gambier Bay Street to Bismark Sea Street, and along Bismark Sea Street to an existing pole on Bismark Sea Street. The existing Navy poles along an approximately 1,100-foot section of Bismark Sea Street connecting to the Essex Road segment would be re-used. A new HECO meter would be installed at this location, and 12kV electrical lines would be installed to the San Jacinto Street connection. After the Essex Road segment along the Ocean Pointe/Hoakalei Resort property is completed, another HECO meter would be installed for the San Jacinto Street service, and the approximately 800 feet of temporary 12kV electrical lines on 45-foot poles along Essex Road would be removed; the result being only one electrical pole alignment providing service on Essex Road along the Ocean Pointe/Hoakalei Resort property. After construction activities are complete, the new and upgraded electrical lines on Gambier Bay Street and Bismark Sea Street would be owned by the Navy. Both Gambier Bay Street and Bismark Sea Street are unsubdivided roads that are part of the Barbers Point Golf Course parcel (TMK 9-1-013:095).

2.2 PROJECT SCHEDULE AND ESTIMATED COST

The estimated cost of the proposed action is approximately \$3,000,000. The source of funding for the new overhead electrical lines would involve State funds through the Hawai'i Community Development Authority. Prior to construction, project design needs to be completed and permits need to be secured. Construction is anticipated to begin after permits are secured and would be completed in approximately 24 months.

2.3 ALTERNATIVES CONSIDERED

A No Action Alternative and four action alternatives were reviewed to meet the purpose and need of this infrastructure project. The No Action Alternative, an underground ductline alternative along the proposed alignment, two alternative north-south corridors, and an east-west corridor, are reviewed and evaluated in the following sections. See Figure 2-4 for a map of the action alternatives considered.

2.3.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, the existing antiquated electrical system in the east Kalaeloa area would continue to serve both military and non-military users. See Figure 2-3 for the existing electrical system.

The Navy has previously indicated that it would eventually cease maintenance of its aging electrical system (installation began in the 1940's) and that the system would consequently become non-functional. Additionally, the Navy may not provide electrical service to future users or existing users with greatly increased electrical demand. Finally, the Navy has advised existing users to submit electrical service requests to HECO so that HECO could begin planning to provide service within Kalaeloa.

The shared and aged system means that the military users would continue to have an insecure and unreliable electrical supply. The Navy is maintaining the existing electrical system; however the funds available for maintaining the existing infrastructure are limited. Subsequently, although there have been recent power outages, repairs to the system may not be of high priority.

The No-Action Alternative would result in the following:

- Future development could be thwarted by the lack of an adequate electrical system.
- Existing users could move out of Kalaeloa because of the unreliability of the electrical service.
- For military operations, such as those of the U.S. Coast Guard who would directly benefit from the proposed action, an unreliable electrical service would hamper their ability to fulfill missions, which could jeopardize life, national security or both.
- No impact or change to the existing natural man-made environment would occur, and as a consequence, the existing environmental setting would continue to prevail.

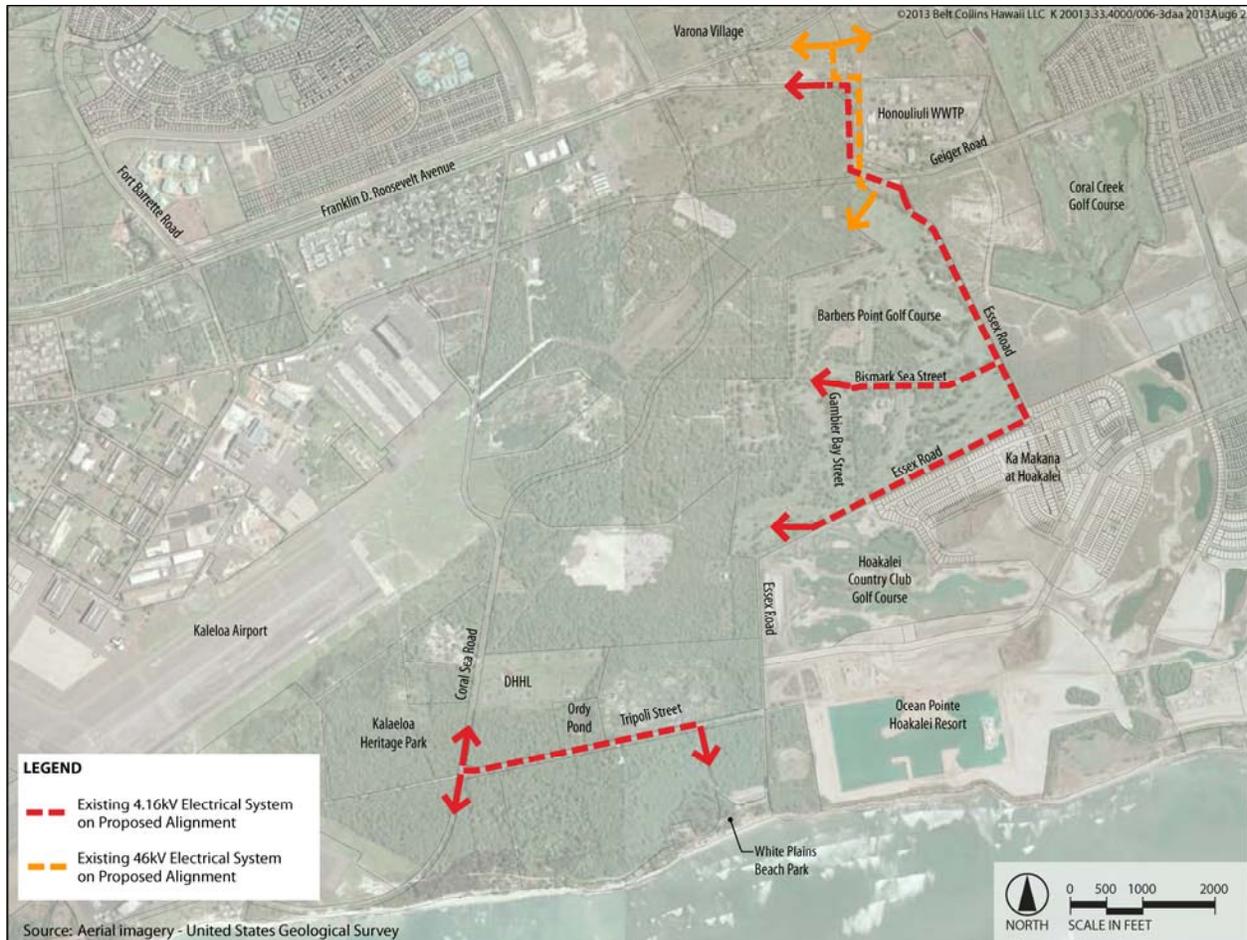


Figure 2-3. Existing Electrical System on Project Corridor

2.3.2 ALTERNATIVE 1 – UNDERGROUND DUCTLINE ALTERNATIVE

As an alternative to the proposed action, underground ductline installation was considered. This alternative would follow the proposed overhead alignment with underground conduits installed on Essex Road, Gambier Bay Street, Bismark Sea Street and Tripoli Street, and overhead lines installed on the existing HECO poles along the Franklin D. Roosevelt Avenue section.

Implementation of this alternative would require trench excavation of approximately 17,500 linear feet along Essex Road, Gambier Bay Street, Bismark Sea Street and Tripoli Street. The existing electrical system along these streets would be removed.

The connection to the HECO 12kV system would be made by installing approximately 2,100 feet of overhead lines onto the existing HECO poles along the Franklin D. Roosevelt section. After the installation of the new lines was complete, the existing Navy poles and 4.16kV lines that run adjacent to the HECO poles on Franklin D. Roosevelt Avenue would be removed. The underground ductline alternative action in this section would be the same as the proposed action.

The underground ductline alternative would have some advantages compared to the proposed action including reducing collision hazards to birds from the overhead lines, eliminating the need

for Federal Aviation Administration (FAA) review of potential impacts to Kalaeloa Airport operations, reducing risks to the utility lines from storm damage, and reducing any potential visual/aesthetic impacts from the overhead lines. Underground installation would also negate the need to install the approximately 800 linear feet of temporary electrical line and poles on Essex Road (described in Section 2.1.4).

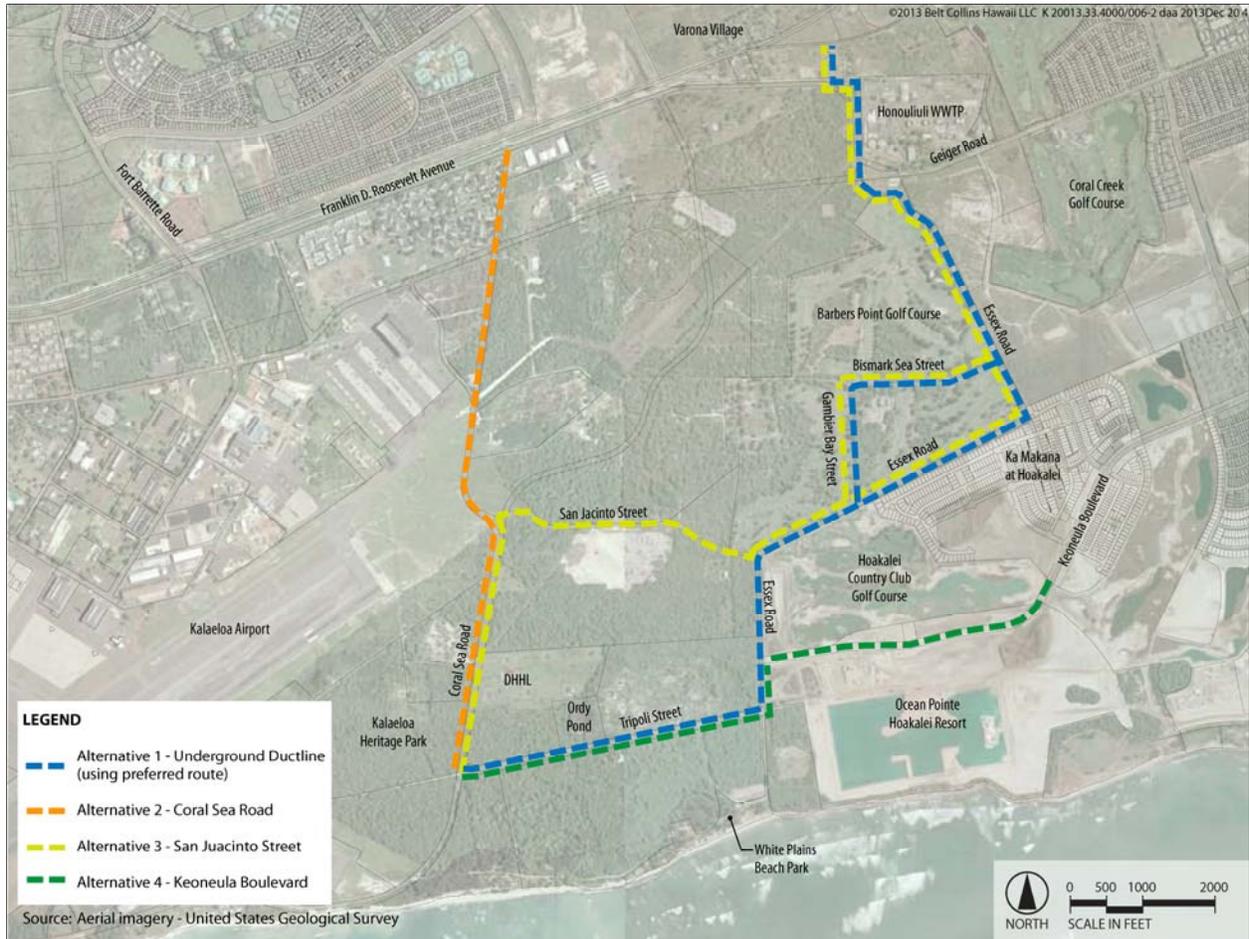


Figure 2-4. Action Alternatives

The underground alternative has several disadvantages compared to the proposed action, including increased potential impact to archaeological and cultural resources, increased potential impacts related to construction, and high cost. Underground installation would require excavation along most of the project corridor, which would increase the potential for impacts to archaeological site numbers 1730, 1731, 1734, 5106, 5111, and 5112, and possible unknown archaeological and cultural resources within the corridor. Archaeological site 1730 contains 182 Hawaiian components and 12 sinkholes and meets National Register Significance Criteria a, c and d. The installation of an underground ductline would require additional construction relative to the overhead lines and poles, which would increase the potential for impacts from construction activities. Underground installation is typically five times more costly than overhead installation; thus this alternative is cost prohibitive. The Kalaeloa Infrastructure Master Plan Update recommends installing underground utilities in unison with roadway improvements. The plan proposes upgrades to both

Essex Road and Tripoli Street, at which time the possibility of undergrounding the electrical system could be considered.

2.3.3 ALTERNATIVE 2 – CORAL SEA ROAD

The Kalaeloa Infrastructure Master Plan Update proposes underground utility lines on Coral Sea Road. This alternative would follow Coral Sea Road from Franklin D. Roosevelt Avenue to Tripoli Street. A large section of Coral Sea Road is in close proximity to the Kalaeloa Airport runway 22L. Due to the proximity to the runway and FAA regulations, overhead lines are not an option in this section. Therefore, this alternative considers underground electrical utility installation.

Implementation of this alternative would require trench excavation of approximately 8,900 linear feet along Coral Sea Road. The existing electrical system along this street would be removed.

This alternative would have advantages similar to those of Alternative 1. The primary advantages relative to the proposed action include reducing collision hazards to birds from the overhead lines, reducing risks to the utility lines from storm damage, and reducing any potential visual/aesthetic impacts from the overhead lines.

Similar to the Alternative 1, this alternative would have prohibitive cost and would be counter to the Kalaeloa Infrastructure Master Plan Update recommended approach of installing underground utilities in unison with roadway improvements. The Kalaeloa Infrastructure Master Plan Update recommends roadway improvements on Coral Sea Road; installing the underground electrical system as a stand-alone project would lead to greater overall costs of the infrastructure improvements in this corridor.

Archaeological site 5094, recommended for preservation, is located along the east side of Coral Sea Road. This site contains over 5 Hawaiian components and over 20 sinkholes, meets National Register Significance Criteria c and d, and has been determined eligible for the National Register of Historic Places. Further study would need to be conducted to determine whether the site is within Coral Sea Road right-of-way and would therefore prohibit construction of an underground electrical system.

Due to the close proximity to Kalaeloa Airport runway 22L construction activities would potentially impact airport operations.

This alternative would not provide HECO service to a number of secondary beneficiaries from the electrical system improvements, including Barbers Point Golf Course, White Plains Beach Park and Cottages, the proposed Kalaeloa Regional Park, users west of Honouliuli Wastewater Treatment Plant, and potential future users in Essex Road and Tripoli Street areas.

2.3.4 ALTERNATIVE 3 – SAN JACINTO STREET

An alternative that splits off from the proposed action at San Jacinto Street and connects to Coral Sea Road was considered. This alternative would be identical to the proposed action from Franklin D. Roosevelt Avenue to San Jacinto Street. From the intersection of Essex Road and San Jacinto Street, this alternative would follow San Jacinto Street to Coral Sea Road; due to the proximity to the Kalaeloa Airport this section would utilize both overhead and underground lines, the exact location of where the lines went underground would have to be determined through consultation with FAA.

From the intersection with Coral Sea Road, this alternative would be identical to Alternative 2, consisting of underground ductlines installation south to the intersection with Tripoli Street.

Implementation of this alternative would require a combination of overhead installation and trenching for underground installation. Installation would occur through the use of existing roads. Implementation would also require the removal of existing Navy lines along the alignment. An approximately 2,400-foot portion of the existing Navy lines in the San Jacinto Street section traverses southwest from San Jacinto Street to Coral Sea Road; this portion has no existing service road and crosses Critical Habitat Lowland Dry Unit 11. Construction activities associated with removal of the poles and lines in this portion, which would include clearing and grubbing for access, would likely impact the critical habitat area.

There are a number of archaeological sites in close proximity to the San Jacinto Street section of this alternative. Archaeological site 5101, located along the south side of San Jacinto Street, contains World War II features from anti-aircraft battery complex and is recommended for preservation. Two additional sites in the vicinity of San Jacinto Street, site 1745 containing a sinkhole complex and site 5100 containing a Hawaiian habitation complex, are recommended for further data recovery. Further archaeological study would be needed to determine the exact location of the sites. The need for this alternative to involve underground installation on a portion of San Jacinto Street would make it difficult, if not impossible, to avoid impacts to the archaeological sites.

The Coral Sea Road portion of this alternative would be identical to Alternative 2 between San Jacinto Street and Tripoli Street and would have the same advantages and disadvantages relative to the proposed action.

One of the major secondary beneficiaries of the electrical system improvements under the proposed action is the proposed Kalaeloa Regional Park. Under this alternative the future park would not be serviced by the upgraded electrical system.

2.3.5 ALTERNATIVE 4 – KEONEULA BOULEVARD EXTENSION

An alternative that provides an east-west connection through the Ocean Pointe neighborhood was considered. The 'Ewa Development Plan proposes an extension of Keoneula Boulevard west to Essex Road, connecting approximately 700 feet north of the intersection with Tripoli Street. This alternative would involve HCDA connecting onto the underground lines installed by the Ocean Pointe/Hoakalei developer, HASEKO, from the existing terminus of Keoneula Boulevard approximately 4,300 linear feet to Essex Road. From Essex Road, this alignment would be identical to the proposed action. This connection would potentially require agreements and easements between HCDA, HASEKO, and others.

The City requires that all utility lines in new subdivisions be installed underground; this standard would apply to utility lines along Keoneula Boulevard. The Keoneula Boulevard section of this alternative would have similar advantages and disadvantages of other underground alternatives (Alternatives 1, 2, and portions of 3) relative to the proposed action.

The 'Ewa Highway Master Plan identifies a completion date of 2020 for the Keoneula Boulevard extension. This timeline for completion of the roadway extension is not compatible with the purpose and need of this infrastructure project, therefore the underground electrical ductlines in

this section would need to be constructed as a stand-alone project. Construction of the underground electrical ductlines in advance of other improvements within the Keoneula Boulevard extension right-of-way would require coordination with HASEKO and the City.

The majority of the Keoneula Boulevard section of this alternative would be within the One'ula Archaeological District, which in 1986 was declared eligible for inclusion in the National Register of Historic Places. For development within Ocean Pointe/Hoakalei, HASEKO has entered into an agreement with the State Historic Preservation Officer, the National Advisory Council on Historic Preservation, the U.S. Army Corps of Engineers, and the Office of Hawaiian Affairs to provide for the data collection and preservation and interpretive program for six preservation sites located within three preservation areas.² As with other construction projects, work would stop if any archaeological resources are encountered. This alternative assumes that the electrical distribution lines within Keoneula Boulevard will be available and can be extended into Kalaeloa. However, because this is a resort-residential development, the availability of ductlines for a 46kV sub-transmission lines may not be available or appropriate. Pursuit of this course of action would be done by potential future users.

² HASEKO (Ewa) Inc. Docket No. A89-651/Annual Progress Report, January 28, 2013.

3 AFFECTED ENVIRONMENT

This chapter reviews the affected environment and identifies potential impacts and mitigating measures.

3.1 LAND USE AND LAND TENURE

3.1.1 EXISTING CONDITIONS

Regional Context: The project corridor is located within Kalaeloa, the former Barbers Point Naval Air Station (BPNAS). To the north of Kalaeloa are the City of Kapolei, various Kapolei residential communities, and the 'Ewa Villages, including Varona Village. To the east are the growing communities of Ewa by Gentry and the Ocean Pointe/Hoakalei Resort. To the west are Kapolei Business Park, Campbell Industrial Park, and the Kalaeloa Commercial Harbor. To the south is the Pacific Ocean. See Figure 3-1.

Existing Use: Portions of the project corridor consisting of Essex Road, Gambier Bay Street and Bismark Sea Street are unsubdivided roadways within the U.S. Navy's (Navy's) Barbers Point Golf Course parcel (tax map key [TMK] 9-1-013:095). The tax map does not indicate any road easements associated with these roads. Tripoli Street is a road right-of-way (ROW) that is owned by the City and County of Honolulu (City). Franklin D. Roosevelt Avenue is a road ROW that is owned by the State of Hawai'i (State). See Figure 3-1.

Surrounding Land Use: Some of the nearby land uses include the Kalaeloa Airport and State Department of Hawaiian Home Lands (DHHL) lots to the west, Kapolei to the northwest, Varona Village/'Ewa Villages to the north and northeast, the Ewa by Gentry and Ocean Pointe/Hoakalei Resort communities to the east and the Pacific Ocean to the south. See Figure 3-1.

North of Franklin D. Roosevelt Avenue and outside of the project corridor is the former Oahu Railway and Land Company (OR&L) ROW. Abutting Franklin D. Roosevelt Avenue on a section of the project corridor where electrical lines will be installed on existing Hawaiian Electric Company (HECO) poles is the City's Honouliuli Wastewater Treatment Plant (WWTP). Starting from near the intersection of Franklin D. Roosevelt Avenue and Essex Road, the project corridor follows Essex Road to Tripoli Street. Starting from the north, Essex Road is along the edge of Navy's Barbers Point Golf Course. East of Essex Road is the Ewa by Gentry development, including two vacant parcels and the Coral Creek Golf Course. Zoning on the parcels indicate they may be future industrial and residential uses. Essex Road makes a 90 degree turn and runs westerly with the Ka Makana at Hoakalei residential project and the Hoakalei Country Club Golf Course to the south. The Essex Road segment that turns south from the Barbers Point Golf Course to Tripoli Street is bordered by the Ocean Pointe/ Hoakalei wetland and "marina" area to the east and on the west by the Navy's former northern and southern trap and skeet ranges. The former trap and skeet range parcels are heavily vegetated and have been identified as Critical Habitat Lowland Dry Unit 11 by the U.S. Fish and Wildlife Service (USFWS).

Tripoli Street is bordered by the Navy's former southern trap and skeet range and Ordy Pond to the immediate north. On the south side of Tripoli Street are the Navy's former small arms and machine gun ranges, and the Navy's White Plains Beach Park. The Navy's former ranges are heavily vegetated and have been identified on city plans as the future Kalaeloa Regional Park.

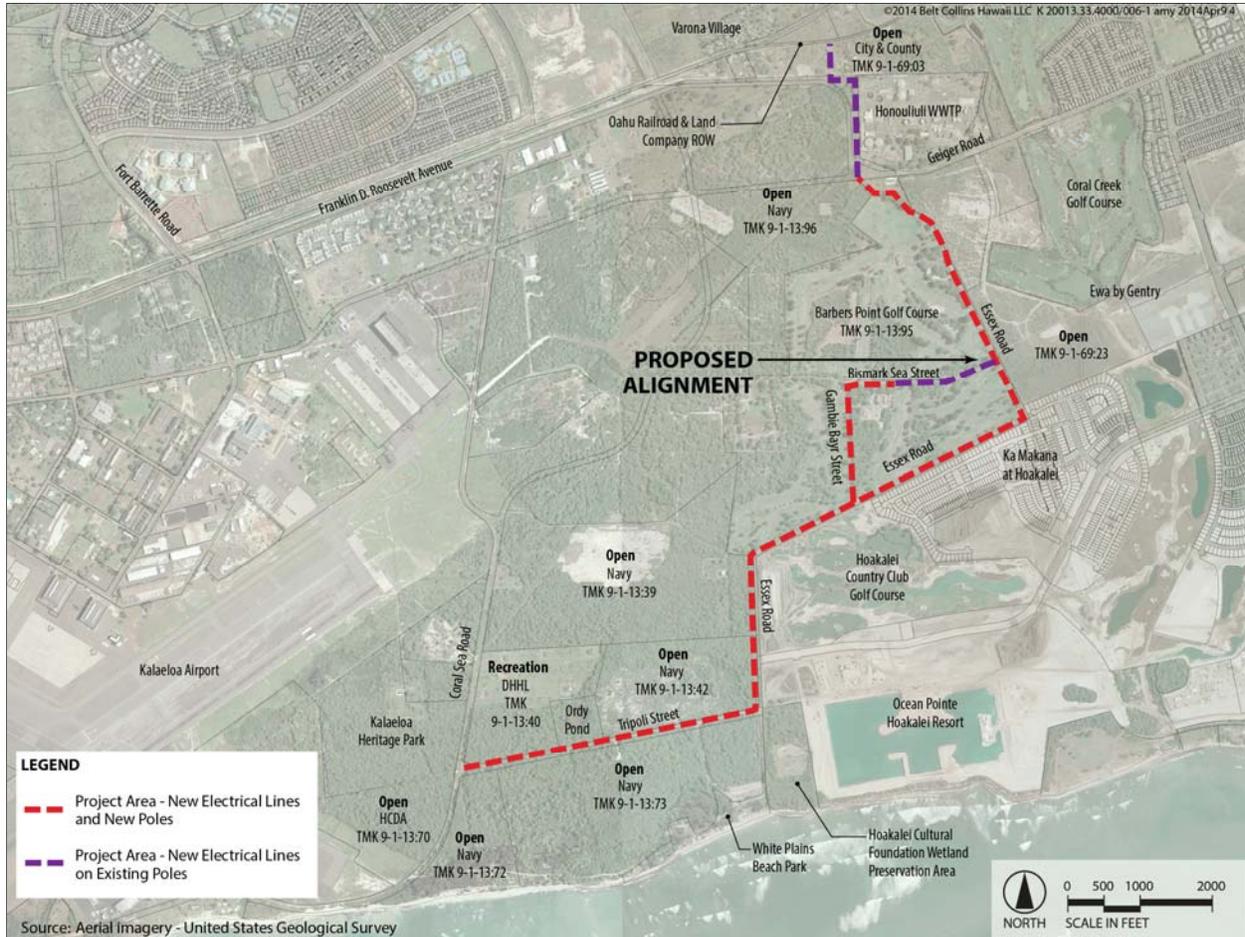


Figure 3-1. Existing Land Use

On the west side of Tripoli Street-Coral Sea Road intersection is the site of the Kalaeloa Heritage Park. In 2011, the Kalaeloa Heritage and Legacy Foundation (KHLF) was granted a Right-of-Entry to the property. KHLF, with the assistance of volunteers, has been uncovering pristine cultural features within the site.¹

Land Conveyance: The Hawai'i Community Development Authority (HCDA) reported at the end of 2012 that the following Base Realignment and Closure (BRAC) parcels had been awarded: Parcels 13071-A and 13071-D (U.S. Coast Guard [USCG]); 13073-A and 13061-C (Department of Transportation [DOT]); 13073-C, 13073-E and 13074-A (HCDA). In addition, six parcels and three parcels were pending to City Department of Parks and Recreation and HCDA, respectively. Notable

¹ Kalaeloa Heritage and Legacy Foundation. June 21, 2013. *Kalaeloa Landowners Summit presentation*.

for the proposed action are the remaining parcels along Tripoli Street identified as to-be-determined and parks. The to-be-determined parcels are three environmentally sensitive areas (Critical Habitat 11 and Ordy Pond). The parks parcel on Tripoli Street is the City's future Kalaeloa Regional Park sites.²

3.1.2 POTENTIAL IMPACTS AND MITIGATION MEASURES

Short-term impacts are expected to occur primarily during project construction. Heavy equipment and vehicles will be employed during the site preparation stage. Construction work on the site will consist of clearing the work area and preparing it for excavation, excavating pole footings to a depth as great as 9 feet, hauling the excavated material away to a City-approved disposal site, installation of the new power poles, backfilling of the power poles with contaminant-free soil, installing 12 kilovolt (kV) electrical line, removal of replaced Navy power poles, and returning the overall site to its pre-construction condition.

Installation of the overhead lines and poles will involve work primarily within the road shoulder area. Heavy equipment that would typically be employed during the construction operation include drill rigs, hop toes, cranes, boom trucks, concrete trucks, dump trucks, flatbed trucks, and diesel power generators. Completion of the overhead lines will also involve work by HECO, Hawaiian Telcom Inc., and Oceanic Time Warner Cable forces who will employ drill rigs, cranes, boom trucks and other construction vehicles. Drill rigs will be utilized to excavate holes for pole and guy anchor setting. All other construction vehicles will be utilized to construct the equipment pads, erect poles, string lines, and set equipment to complete the installation.

The roads in the project corridor are paved, and most already contain Navy overhead utilities lines. The installation of the HECO overhead 12kV electrical lines will require coordination with the Navy and other utility companies that have facilities currently located on the existing Navy poles. Service laterals from the existing Navy electrical line into the adjacent parcels will need to be reconnected to the upgraded 12kV electrical distribution system.

Once construction is completed, activities within the road and utility corridor will resume. No existing land use, structure, or building will be displaced, and no new land uses will be created. Electrical and communications connections will be more accountable to specific users, and service will be improved.

3.2 GEOLOGY, SOILS, AND TOPOGRAPHY

3.2.1 EXISTING CONDITIONS

Geology: Kalaeloa is located in the 'Ewa Plain of O'ahu in an area that has been formed by millions of years of sedimentation from the upland regions of the Ko'olau and Wai'anae Mountains. During the early years of the island formation, O'ahu underwent a period of rise, submersion, and rise resulting in the creation of a coral reef around the landform and later the development of a coral substratum in the 'Ewa Plain. Today, the coral has solidified and is a hard limestone layer at and beneath the surface of the ground.

² State of Hawai'i, Hawai'i Community Development Authority. 2013. *2012 Annual Report*.

Kalaeloa is located at the edge of the Schofield Plateau on the coastal plain, which is composed of inter-bedded coral reef and alluvial volcanic sediments (“caprock”) overlying basalt (volcanic rock). The caprock ranges from 50 to 400 feet thick along the northern boundary of Kalaeloa and from 750 to 1,000 feet thick along the coast. The upper 100 feet of caprock is marine sediment, consisting mainly of coral reef with minor layers of shell fragments and beach sands.

Kalaeloa gradually slopes from mauka to makai. The area contains a number of solution cavities of various sizes, which are products of the original reef structure. Some of the cavities have been filled and plugged with sediment, and others have been enlarged or otherwise shaped through solution by groundwater forming sinkholes of various sizes. Deep and occasionally very broad sinkholes have been found within Kalaeloa.³

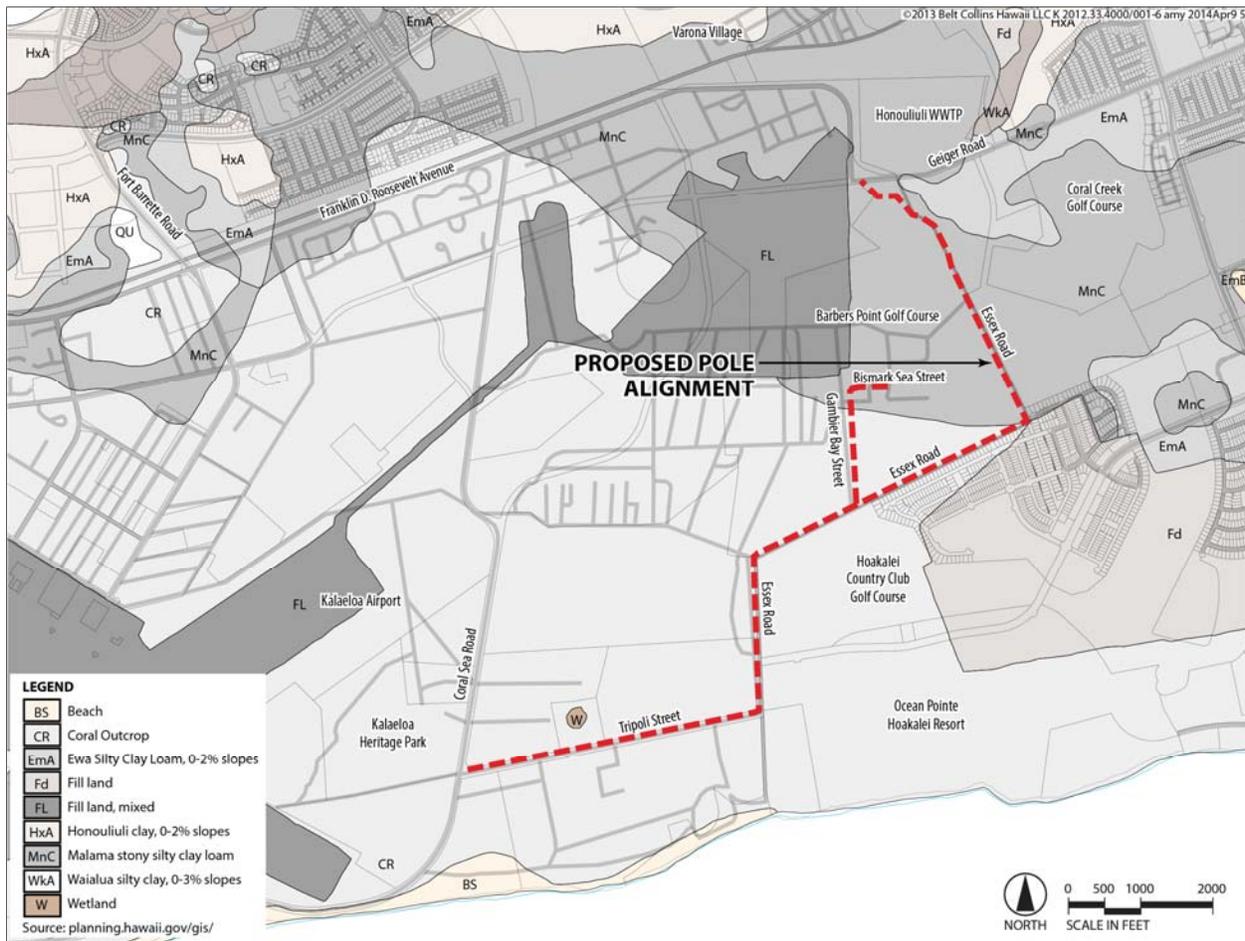


Figure 3-2. Soil Types

Soils: The U.S. Department of Agriculture Soil Survey (1972) classifies most of Kalaeloa’s soil as coral outcrop (see CR in Figure 3-2). This soil type consists of coral or cemented calcareous sand with a

³ Scientific Consultant Services, Inc. April 2014. *An Archaeological Inventory Survey Report for the Kalaeloa East Energy Corridor Improvements, Honouliuli Ahupua’a, ‘Ewa District, O’ahu Island, Hawai’i.* Prepared for Belt Collins Hawaii LLC.

thin layer of red soil deposited in cracks, crevices, and depressions in the coral outcrop. See Figure 3-2.

Along the northern edge of Kalaeloa the soil type is classified as Mamala stony silty clay loam, 0 to 12 percent slopes (see MnC in Figure 3-2). This soil type is shallow, well-drained, and formed in alluvium deposited over coral limestone and consolidated calcareous sand. Stones, mostly coral rock fragments, are common in the surface layer and profile.⁴

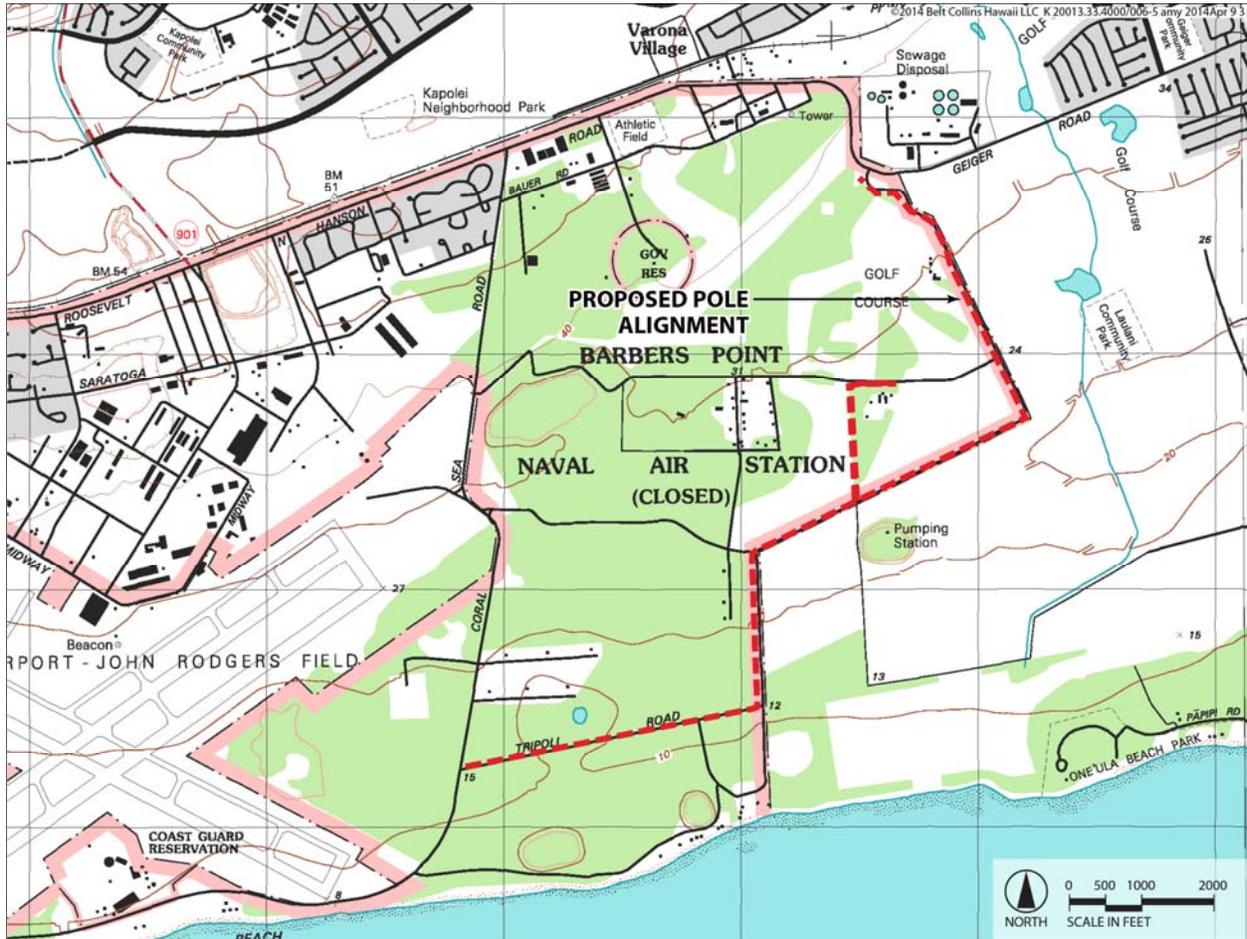


Figure 3-3. U.S. Geological Survey Quadrangle Map

The airport and airfield areas are classified as filled lands (see FL in Figure 3-2) that are composed of dredged reef material and other imported material.⁵

The Agricultural Lands of Importance to the State of Hawai‘i maps indicate that Kalaeloa is an urban area and, therefore, its agricultural potential is not classified.⁶

⁴ U.S. Department of Agriculture. 1972. *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.*

⁵ U.S. Department of Agriculture. 1972. *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.*

Topography: The project corridor is relatively flat. Over the corridor's 20,700 foot length, the elevation ranges from 44 feet above mean sea level (msl) at near Renton Road to about 12 feet above msl along Tripoli Street. See Figure 3-3.

3.2.2 POTENTIAL IMPACTS AND MITIGATION MEASURES

The installation of the power poles into the mamala and coral outcrop soil types is not expected to be a problem since the Navy's power poles already exist along most of the project corridor. The excavated soil can be stockpiled and reused, if appropriate, as fill after the old poles are removed.

The relatively flat topography minimizes runoff and erosion potentials. The coral outcrop and thin soil are generally not suitable for large scale agricultural production. Best Management Practices (BMPs) will be implemented as part of the grubbing permit to control soil erosion and dust from the proposed action.

Sinkholes were found in the property to the west of Essex Road between the golf course and Tripoli Street. Sinkholes in the area were historically important features and are potential archaeological sites. An archaeological field survey of previously known sites was conducted for this Draft Environmental Assessment and no sinkholes were identified in the archaeological sites within 5 meters (16.4 feet) of the project corridor (see Section 3.4 for more discussion). As a precaution, the contractor will be instructed to stop work if a sinkhole is discovered during pole excavation, work will be halted and the State Historic Preservation Division (SHPD) and other appropriate agencies would be notified.

Within the project corridor, there are drywells along Essex Road in the golf course area. The poles will be sited to minimize their impact on these drywells.

3.3 HYDROLOGY

3.3.1 WATER RESOURCES

The annual average rainfall in the 'Ewa District is about 20 inches. The heavier rainfall months occur during November to March and the lowest rainfall months occur during June and July. ⁷

3.3.2 GROUND WATER

The 'Ewa District is in the Pearl Harbor Aquifer Sector Area of the State's Hawaii Water Plan Hawaii Water Resource Protection Plan.⁸ Kalaeloa is located within the 'Ewa Caprock-Kapolei and 'Ewa Caprock-Pu'uloa subregional hydrologic units of the Pearl Harbor Aquifer. The caprock formation allows for a large amount of brackish water, which is recharged by surface flow, rainfall, and other sources, and has been pumped and utilized for agriculture and other uses.⁹

⁶ State of Hawai'i, Department of Agriculture. 1977. *Agricultural Lands of Importance to the State of Hawaii (ALISH)*.

⁷ Juvik, S. and J. Juvik. 1998. *Atlas of Hawaii, Third Edition*.

⁸ State Commission on Water Resource Management. June 2008. *Hawaii Water Plan: Water Resource Protection Plan*.

⁹ State Commission on Water Resource Management. June 2008. *Hawaii Water Plan: Water Resource Protection Plan*.

The groundwater in the Kalaeloa area is brackish and consists of permeable marine sediment layers that are "...in direct contact with the ocean."¹⁰ The depth to ground water varies from about 60 feet along north Kalaeloa to zero along the coast. There is horizontal movement in the marine layer, but limited vertical movement due to the strata of less permeable alluvial layers.¹¹

The underground injection control (UIC) line was established by the State Department of Health (DOH) as a boundary between potable and non-potable ground water sources. In general, restrictions on injection wells depend upon whether the well is located mauka (inland) or makai (seaward) of the UIC line.¹²

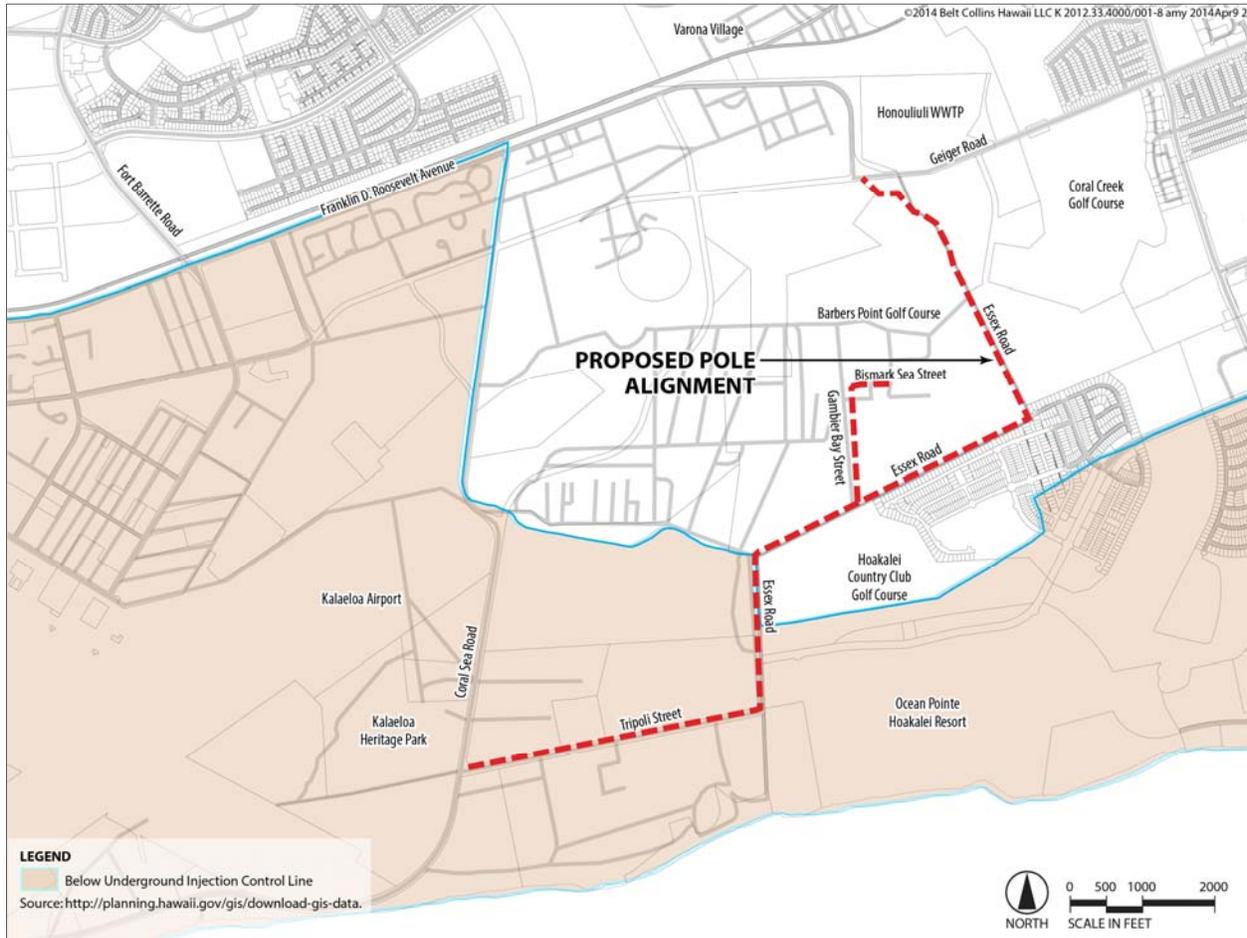
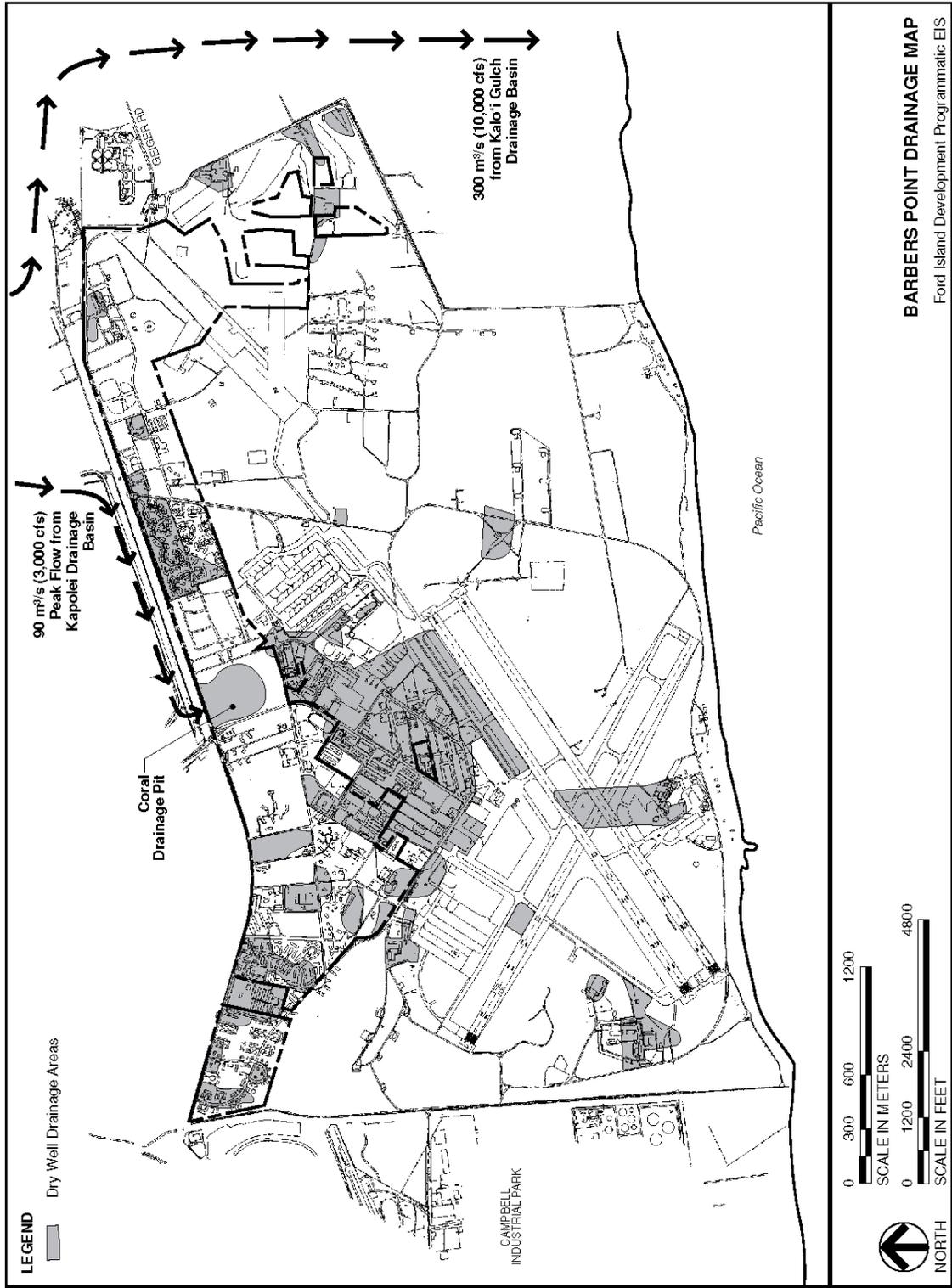


Figure 3-4. Underground Injection Control Line.

¹⁰ U.S. Navy. June 1994. *Environmental Baseline Survey for Naval Air Station Barbers Point, Oahu, Hawaii*.

¹¹ U.S. Navy. June 1994. *Environmental Baseline Survey for Naval Air Station Barbers Point, Oahu, Hawaii*.

¹² State of Hawai'i Department of Health. *Underground Injection Control Program*. September, 12 2013. <http://health.hawaii.gov/sdwb/uicprogram>.



BARBERS POINT DRAINAGE MAP
Ford Island Development Programmatic EIS

Source: Navy, 2002. "Final Programmatic Environmental Impact Statement, Ford Island Development Volume I."

Figure 3-5. Drainage Map .

For the proposed action, the project corridor along Tripoli Street and a portion of Essex Road seaward of the golf course are within the non-potable groundwater source area. The remainder of Essex Road upland of the UIC line is within the potable groundwater source area.¹³ See

Figure 3-4.

3.3.3 SURFACE WATER

There are no perennial or intermittent streams flowing through Kalaeloa. Runoff from the lands north of Kalaeloa and east of Fort Barrette Road either flows toward Kalo'i Gulch or into the lower channel/detention basin located north of Renton Road, outside of Kalaeloa. The lower channel/detention basin overflows, via a box culvert, into a coral pit within Kalaeloa, located east of Enterprise Avenue and south of Franklin D. Roosevelt Avenue. Near and within the project corridor, surface water is collected and disposed of within drywells or low lying areas, which include Ordy Pond located on the north side of Tripoli Street. See Figure 3-5.

3.3.4 POTENTIAL IMPACT AND MITIGATION MEASURES

The installation of the new power lines will require excavation for the power poles and removal and filling of the old power poles. The depth of the pole excavation is expected to be about 9 feet. It is anticipated that the excavated material will be stockpiled and used as fill where the old poles were removed.

Four of the new poles are located where existing ground elevation is between 7 and 10 feet above msl; therefore, excavation work may encounter groundwater as existing records show groundwater levels to be near sea level. Extra care will be taken during excavation along Tripoli Street, where existing ground elevations are between 7 and 15 feet above msl.

Dewatering may be required; however, the Contractor's means/methods may not require obtaining a National Pollutant Discharge Elimination System (NPDES) permit for dewatering. Therefore, obtaining an NPDES permit for dewatering will be left up to the Contractor.

3.4 ARCHAEOLOGICAL AND CULTURAL RESOURCES

3.4.1 ARCHAEOLOGICAL RESOURCES

This section summarizes the archaeological inventory survey report prepared by Scientific Consultant Services, Inc. (SCS) for the project corridor. The report is based on field surveys conducted during December 2013 and January 2014 and a review of relevant documents and databases.¹⁴ The report is included as Appendix A.

The report describes the project corridor as crossing through an area with pre- and post-contact activities. Remaining rock features including walls, enclosures, and both modified and unmodified sinkholes, represent pre-contact Hawaiian activities including habitation, agriculture, and burials. In the early post-contact period, the arid and hot area contained very few recorded cultural

¹³ State of Hawai'i, Department of Health. July 6, 1984. *Underground Injection Control Program Quadrangle Maps*.

¹⁴ Scientific Consultant Services, Inc. March 2014. *An Archaeological Inventory Survey Report for the Kalaeloa East Energy Corridor Improvements, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island, Hawai'i*. Prepared for Belt Collins Hawaii LLC.

settlements, with the exception of the area's sinkholes which retain water and moist soils and were used into the 19th century. During the 19th century, commercial ranching became widespread in the area and then with the introduction of artesian wells, sugarcane and other commercial agricultural productions became prevalent. During the 20th century, the BPNAS led to significant military activities in the area. Numerous archaeological sites from these different periods have been documented.

The report notes that previous archaeological investigations in the vicinity of the project area have documented archaeological sites representing pre- and post-contact Hawaiian agriculture and habitation sites, post-contact ranching features, and military features. For a map of the previously-recorded sites in the Kalaeloa area, see Figure 3-6; note that the site locations are approximate.

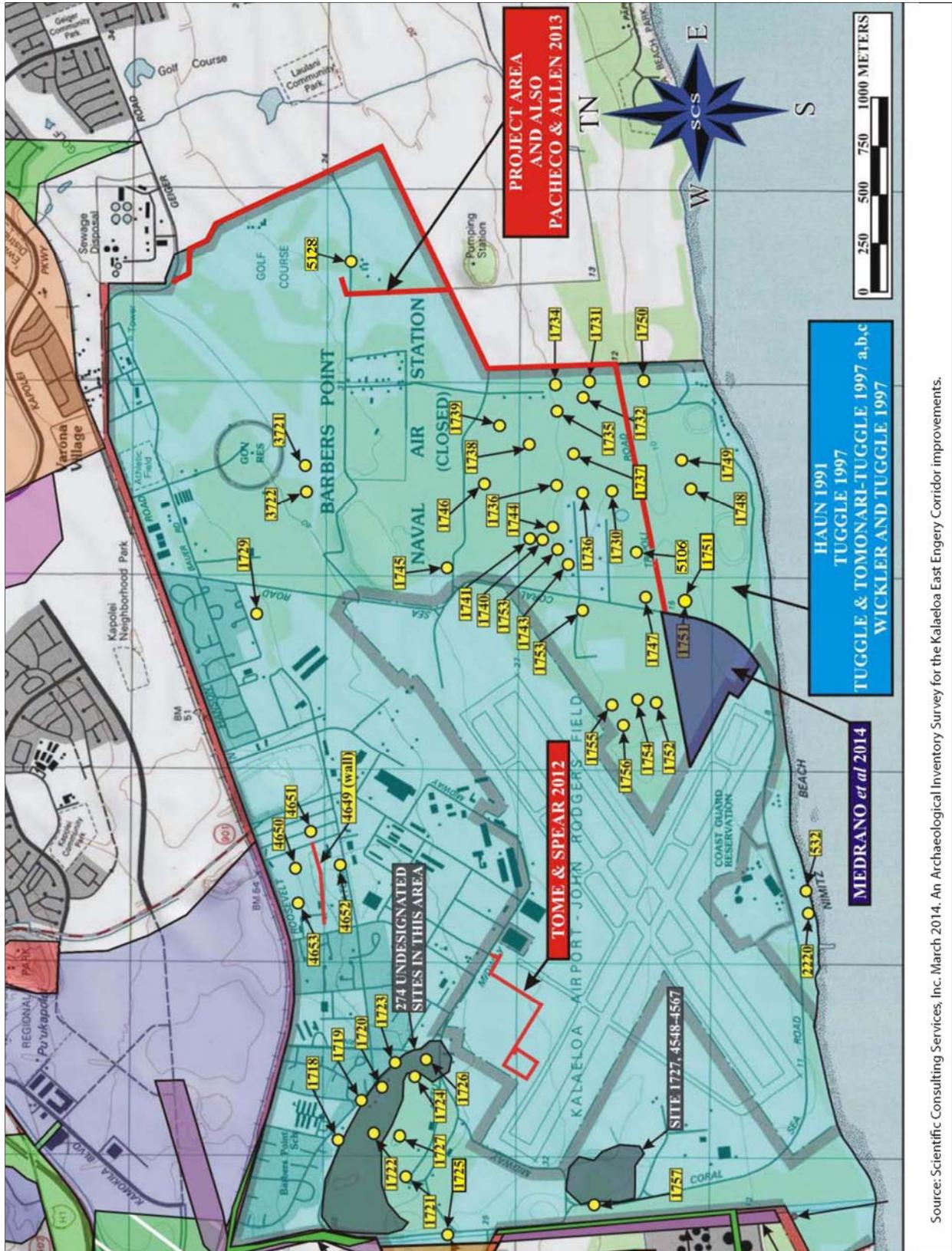
Of particular concern for the proposed action are three sites that were previously identified as being adjacent to or within five meters (16.4 feet) of the project corridor. The three sites are:

- Site 50-80-12-1731, on west side of Essex Road, is a pre- and/or early post-contact Hawaiian habitation complex comprised of enclosures, cairns, and a stoned-line fire pit.
- Site 50-80-12-1734, on the west side of Essex Road, is a pre- and/or early post-contact Hawaiian habitation and agriculture complex comprised of enclosures, cairns, mounds and groups of mounds, modified outcrops, modified sinkholes, and a paved remnant.
- Site 50-80-12-5106, on the north side of Tripoli Street extending from near Ordy Pond to near Coral Sea Road, is a military training facility comprised of a grenade range, barbed wire, and a stacked stone military feature.

The project corridor crosses through the One'ula Archaeological District, which in 1986 was declared eligible for inclusion in the National Register of Historic Places (NRHP). The One'ula Archaeological District is still considered eligible and the nomination may eventually be completed by SHPD. The One'ula Archaeological District consists of various pre- and post-contact sites, including the historical mapped settlement of One'ula from the pre-contact Hawaiian period, which is located a significant distance to the east of the project corridor. The One'ula Archaeological District contains all or portions of seven sites in the vicinity of the project corridor, including 50-80-12-1734, which was previously documented to exist in close proximity to the project corridor and is described above.

The Marine Corps Air Station (MCAS) Ewa Field installation was attacked by the Japanese military in 1941 and is currently being assessed for potential eligibility for the NRHP as a battlefield. While the determination and extent of any listed site is yet unknown, comments from the Navy indicated that the areas of the project alignment near the intersection of Essex Road and Franklin D. Roosevelt Avenue are of greatest concern due to the proximity to the runway.¹⁵

¹⁵ S. Keyes (Naval Facilities Engineering Command – Hawai'i), personal communication. December 9, 2013.



Source: Scientific Consulting Services, Inc. March 2014. An Archaeological Inventory Survey for the Kalaheo East Energy Corridor improvements.

Figure 3-6. Archaeological Sites.

Field work conducted for the report involved a 100% pedestrian surface survey of the project corridor and a limited subsurface survey involving shovel probes taken at six targeted locations. Findings from the surveys, revealed three new sites within the project area and the absence of any previously recorded sites within the project corridor. The subsurface investigation focused on areas of the project corridor near sites 50-80-12-1731, -1734, and -5106, which were identified as of concern due to being previously documented as adjacent to or very near the project corridor; analysis of the excavated materials revealed no presence of the subject sites. The three new sites located comprised a total of 12 surface features and were identified as military construction. The report evaluated the significance of the sites, as outlined in HAR 13-275-6, and found all the sites to be significant under Criterion d, for information content only. The list below provides information on these three sites. Appendix A provides more details on the three sites, including maps and pictures of all features.

- Site 50-80-12-7572, on the east side of Gambier Bay Street, is comprised of 10 surface features including 7 concrete manholes, a concrete water meter housing, a concrete borehole housing, and a concrete slab. Based on feature type and construction materials, the site was interpreted as a military sewer and water system.
- Site 50-80-12-7573, near the intersection of Gambier Bay Street and Bismark Sea Street, includes a single feature – a concrete slab with post molds. Based on location, feature type, and construction materials, the site was interpreted as military-era fence that had been set up to divide the road into two lanes.
- Site 50-80-12-7574, on the north shoulder of Essex Road, is comprised of a single feature – twenty-four 1.82 meter (6 feet) square concrete slabs extending 44 meters (144.3 feet). Based on feature type and construction materials, the site was interpreted as a sidewalk remnant associated with MCAS Ewa.

3.4.2 CULTURAL RESOURCES

This section summarizes the Cultural Impact Assessment (CIA) prepared by Kaimipono Consulting Services for the project corridor. The CIA is based on ethnographic research (two oral history interviews) and analysis, and a review of relevant cultural literature research.¹⁶ The CIA was conducted in accordance with State Environmental Council *Guidelines for Assessing Cultural Impacts*.¹⁷ The report is included as Appendix B.

Following the Environmental Council Guidelines, the geographic extent of the CIA extended well beyond the project corridor to include the *ahupua'a* (traditional sub-district land unit) of Honouliuli and the *moku* (traditional district land unit) of 'Ewa.

¹⁶ Kaimipono Consulting Services. September 2013. *Cultural Impact Assessment for the East Kalaeloa Energy Corridor in the Kalaeloa Community Development District, Honouliuli Ahupua'a, 'Ewa, O'ahu, Hawai'i*. Prepared for Belt Collins Hawaii LLC.

¹⁷ State of Hawai'i. 1997. *Guidelines for Assessing Cultural Impacts*. Adopted by the Environmental Council, November 11, 1997.

Cultural literature provides history on the project corridor and the surrounding area; this is found in Traditional Hawaiian literature in the form *mo'olelo* (legends), *oli* (chants), and *mele* (songs). One *mo'olelo* explains how 'Ewa's boundaries were created:

When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by that name. The stone that strayed. Eventually the stone was found at Pili o Kahe. This is a spot where two small hills of the Waianae range come parallel on the boundary between Honouliuli and Nanakuli¹⁸.

'Ewa was regarded in traditional times for its diversity, including taro lands, springs, streams and rivers, and fishponds, as well as hot and arid plains. The hot and arid plains were found in the Honouliuli *ahupua'a*, the area of the project corridor.

The ethnographic research included interviews of two cultural consultants familiar with the area: "Uncle" Shad Kane a cultural practitioner whose work includes serving on the 'Ewa Moku O'ahu Island Burial Council and as board member on the Kalaeloa Heritage and Legacy Foundation; and, "Uncle" Henry Chang Wo a cultural practitioner and expert on *limu* (seaweed). The two consultants provided information on the history, presence, cultural importance, and use of land, cultural, water, and marine resources in the area. The summary of the cultural consultant's information is presented in the following in four resource categories.

Land Resources and Uses. The lands of 'Ewa and Honouliuli provide signs as to history of the area. "Uncle" Shad points out a number of features from the different periods of the area's history, including the Kualaka'i trail from traditional times, burials from the Sandalwood era, and remnants of crashed planes from the Military era. Part of the natural history can be seen in the dominance of non-native vegetation; "Uncle" Shad explains that Kalaeloa Heritage and Legacy Foundation is working to remove non-native vegetation and restore native plant populations.

Cultural Resources and Uses. Hawaiian (pre- and post-contact) cultural resources are found in *wahi pana* (sacred places), *heiau* (places of worship), burial sites, cultural gathering places, and in sites where the remains of the ancient past are tangible. These cultural resources are found through 'Ewa and Honouliuli. Sun, water, and coral played an important role in Hawaiian culture in the area, as "Uncle" Shad explains:

The sun beats down on us every day here in Kapolei. So, I'm sharing that to give you an understanding, how the sun shaped a subsistence lifestyle, how it shaped the cultural landscape, and manner which all aspects of these people's lives, the construction of

¹⁸ Sterling, E. and C. Summers. 1978. *Sites of O'ahu*.

their house site, the manner which they set up, the areas where they set up their habitation sites, their temporary sites, their permanent house sites, and all aspects of their life. ...

You look around here, I see absolutely no river. ... So these people, such as the Kalaeloa Heritage Park, those people who resided here, the archaeological sites within this Heritage Park, it's obvious that these people realized that water was in sinkholes, and they settled. They established a lifestyle, they built their hale, they built the structures they needed to live a subsistence lifestyle around water, sinkholes, and agricultural mounds. ...

(Another) thing of significance about this geographic region, with respect to the project, is the unique architecture of all the structures within this geographic region. Nowhere else in the Hawaiian Islands are you going to find cultural structures built of coral.

Water Resources and Uses. In the Honouliuli *ahupua'a*, which is known for its hot and arid climate, water was historically a very important resource. Fresh water in the area was limited to sinkholes, springs, and ponds, which played a crucial role in providing life for humans, flora, and fauna. "Uncle" Shad describes sinkholes as visible parts of the underground river systems that run through the area's karst structure (within the coral caprock); depending on the flow of water the sinkholes would either serve as agricultural sinkholes or drinking water sinkholes. These water resources remain important today. "Uncle" Shad, who as part of his work with Kalaeloa Heritage and Legacy Foundation participates in caring for Ordy Pond, notes that the pond serves as habitat for fish and birds, including the Hawaiian stilt.

Marine Resources and Uses. In the history of 'Ewa and Honouliuli the sea has been a great resource, providing fishing and gathering, as well as recreation. 'Ewa was regarded for its abundance of *limu* (seaweed). "Uncle" Henry is an expert on *limu* and provided information on the importance of *limu* and the interconnection between *limu* and the surrounding environment. *Limu* was traditionally gathered for food and the practice continues today. The plant plays a role in sustaining the coastal ecosystem of fish and reef. Beyond the ocean waters, the plant is dependent on inflows of fresh water, particularly from underground rivers as "Uncle" Henry explains:

"You see that pālahalaha, that green sea lettuce, you could have spot that from maybe 50 yards. As you approach it, you could have seen the limu. And that limu would tell you that I have fresh water coming out."

"Uncle" Henry notes the danger to *limu* and the rest of the coastal ecosystem from runoff and sedimentation and emphasizes the importance of taking appropriate measures to minimize runoff and to minimize the use of potentially harmful chemicals such as fertilizers and insecticides.

3.4.3 POTENTIAL IMPACTS AND MITIGATION MEASURES

A number of pre- and post-contact archaeological sites are located in the area surrounding the project corridor. The archaeological field survey identified three new sites within the project corridor and found no evidence of sites previously documented to be within or near the project

corridor. The three new sites were identified as military installations and evaluation of the significance of the sites, as outlined in HAR 13-275-6, found all the sites to be significant under Criterion d, for information content only. Given the proximity of sites 50-80-12-1731, -1734, and -5106, orange construction fencing or high-visibility flagging will be posted along the project corridor boundary, to ensure construction activities don't inadvertently encroach on these sites. Archaeological monitoring would be programmed into the project's construction work. If any unexpected find is uncovered during excavation, construction work will be halted in the immediate area of the find and the SHPD will be notified.

The CIA determined that there is no obvious direct impact to cultural resources, access to them, or cultural practices. However, due to the possibility that construction could affect water sources (through surface run-off and/or penetration of underground freshwater sources) or encounter previously-filled sinkholes and cave systems containing cultural remains, the CIA recommends that cultural monitoring be programmed into the project's construction work. During construction, an on-call cultural consultant would be retained and would be contacted if any archaeological resources are uncovered. The cultural consultant would serve as a liaison between HCDA and the community.

3.5 FLORA AND FAUNA

This section summarizes the biological report prepared by ICF Jones & Stokes, Inc. and LeGrande Biological Surveys, Inc. for the project corridor. The report is based on field surveys conducted during April 2013 and a review of relevant documents and databases.¹⁹ The report is included in Appendix C. See Figure 3-7 reprinted from the report shows identified sensitive areas.

3.5.1 FLORA

The report notes 106 plant species within the project corridor. A complete list is included as part of the attached report (Appendix C). Ninety-eight of the species observed are alien to Hawai'i. The other 8 species are native to Hawai'i and are as follows:

- Endemic species
 - *Sicyos pachycarpus* Hook. & Arn. (common name: Kupala, anunu)
 - *Santalum ellipticum* Gaudich. (common name: 'Iliahi alo'e, sandalwood)

- Indigenous species
 - *Heliotropium curassavicum* L. (common name: Kipukai)
 - *Cassytha filiformis* L. (common name: Kauna'oa pehu)
 - *Sida fallax* Walp. (common name: 'Ilima)
 - *Plumbago zeylanica* L. (common name: 'Ilie'e)
 - *Solanum americanum* Mill. (common name: glossy nightshade, popolo)
 - *Waltheria indica* L. (common name: 'uhaloa)

¹⁹ ICF Jones & Stokes, Inc. and LeGrande Biological Surveys, Inc. July 2013. *Report of Findings, Terrestrial Vegetation and Wildlife Surveys, East Kalaeloa Energy Corridor, 'Ewa, O'ahu, Hawai'i*. Prepared for Belt Collins Hawaii LLC.

No plant species listed as Threatened, Endangered, or Species of Concern²⁰ was observed.

The vegetation observed along the project corridor is dominated by alien species with scattered native species along segments of the project corridor. The following is a brief description of observed vegetation along the project corridor by segments:

- **Varona Village segment:** This segment from Franklin D. Roosevelt Avenue to near the former OR&L ROW is dominated by weedy grasses and shrubs including buffelgrass (*Cenchrus ciliaris*), swollen fingergrass (*Chloris barbata*), kiawe (*Prosopis pallida*), opiuma (*Pithecellobium dulce*), and koa haole (*Leucacena leucocephala*). Also observed were scattered native 'ilima, uhaloa, and popolo.
- **Franklin D. Roosevelt Avenue segment:** The shoulder area along the Honouliuli WWTP is predominantly alien grasses. Large areas were observed as recently cleared and ground covered with kiawe wood chips. The alien Zulu-giant or carrion flower plant (*Stapelia gigantea*) lined the edge of the roadway.
- **Essex Road-Geiger Road segment:** This section was observed as recently cleared with shrubs of koa haole, opiuma, and weedy grasses around the edge.
- **Gambier Bay Street and Bismark Sea Street segment and Essex Road segment along the Barbers Point Golf Course:** This area included a mixture of kiawe forest, maintained golf course, and ornamental plantings. The kiawe forest areas are dominated by buffelgrass with scattered khaki weed (*Alternanthera pungens*), Christmas berry (*Schinus terebinthifolius*) and native 'ilima and uhaloa. The ornamental trees planted along the alignment included monkeypod (*Samanea saman*), coconut (*Cocos nucifera*), kukui (*aleurites moluccana*), and earpod (*Entereolobium cyclocarpum*).
- **Essex Road segment south of the Barbers Point Golf Course:** This roadway segment is closed to vehicle traffic and adjacent to the former Northern and Southern skeet and trap ranges. The area is dominated by weedy vegetation including kiawe trees mixed with opiuma and koa haole and an understory of Guinea grass and buffelgrass. The biologists observed a single sandalwood or 'iliahi alo'e tree on the east side of Essex Road. An earlier survey had observed two sandalwood trees.²¹ Other observed native species along this segment included anunu, popolo, and uhaloa.
- **Tripoli Street segment:** This segment is dominated by large kiawe trees. Buffelgrass and swollen fingergrass dominate the shoulder of the roadway. Other plants observed include: ivy gourd (*Coccinea grandis*) and purple allamanda (*Allamanda blanchetii*), Guinea grass (*Panicum maximum*), koali ai (*Ipomoea obscura*), and false mallow (*Malvastrum coromandelianum*).

²⁰ U.S. Fish and Wildlife Service. 2010. *Hawaiian Island Plants: Updated August 3, 2010 Listed and Candidate Species, as Designated under the U.S. Endangered Species Act*.

²¹ Whistler, A. 2012. *Botanical Survey for the 'Ewa Plains 'Akoko (Chamaesyce skottsbergii var. kalaeloana), Northern and Southern Trap and Skeet Range, Former Naval Air Station Barbers Point, O'ahu, Hawai'i*. Prepared for Department of Navy, Naval Facilities Engineering Command Pacific & BRAC PMO West.

The biological report identified the following areas next to the project corridor:

- 'Ewa Plains 'Akoko Preserve: Lot 13058-D, the former Northern Trap and Skeet Range, has been set aside as a preserve for the endangered 'Ewa Plains 'akoko (*Chamaesyce skottsbergii* var. *kalaeloan*). This is an extremely rare plant species found only in the Kalaeloa area of O'ahu.^{22,23}
- Critical Habitat Lowland Dry-Unit 11: On September 18, 2012, Lots 13058-D and 13508-G, the former Northern and Southern Trap and Skeet Ranges, respectively, were designated as Critical Habitat Lowland Dry-Unit 11 by the USFWS under 50 CFR Part 17 for the 'Ewa Plains 'akoko (77 FR 181, 57648).²⁴

3.5.2 FAUNA

The biological survey observed or heard 264 individual birds from 21 species and 15 separate families along the project corridor. The identified birds included 19 naturalized alien species, the Pacific golden plover (*Pluvialis fulva*)—an indigenous migratory species, and the Black-necked stilt (*Himantopus mexicanus knudseni*)—an endemic resident and listed endangered species. Two ducks were observed that were possibly listed endangered Hawaiian ducks or Koloa (*Anas wyvilliana*). Other birds protected under the Migratory Bird Treaty Act of 1918 that were observed include the Northern cardinal (*Cardinalis cardinalis*), House finch (*Carpodacus mexicanus*), Cattle egret (*Bulbulcus ibis*), Pacific golden plover (*Pluvialis fulva*), and Northern mockingbird (*Mimus polyglottos*).

Indian mongoose were observed in the golf course, identified by tracks on Essex Road and heard in the brush areas along Tripoli Street. Feral cats were observed and identified by tracks or sound around golf course.

The survey observed no amphibians or reptiles, but identified numerous insect species, particularly along Essex Road and Tripoli Street. Observed insects included green darner dragonfly (*Anax junius*), globe skimmer dragonfly (*Pantala flavescens*), reseat skimmer dragonfly (*Orthemis ferruginea*), black saddlebags dragonfly (*Tramea lacerata*), Chinese skimmer dragonfly (*Crocothemis servilia*), familiar blue damselfly (*Enallagma civile*), Rambur's fork-tail damselfly

²² Whistler, A. 2012. *Botanical Survey for the 'Ewa Plains 'Akoko (Chamaesyce skottsbergii* var. *kalaeloana*), Northern and Southern Trap and Skeet Range, Former Naval Air Station Barbers Point, O'ahu, Hawai'i. Prepared for Department of Navy, Naval Facilities Engineering Command Pacific & BRAC PMO West.

²³ Wagner, W. and D. Herbst. 1999. "Supplement to the Manual of the flowering plants of Hawaii," in *Manual of flowering plants of Hawaii, Revised Edition*. University of Hawaii Press and Bishop Museum Press, Honolulu, Hawai'i.

²⁴ U.S. Fish and Wildlife Service. 2012. *Final Rule formally designated Lowland Dry-Unit 11 as Critical Habitat under 50 CFR Part 17 for the 'Ewa Plains 'akoko*. September 18, 2012 (77 FR 181, 57648).

(*Ischnura ramburi*), carpenter bee (*Xylocopa sonorina*), passion vine butterfly (*Agraulis vanilla*), painted lady butterfly (*Vanessa cardui*), western pygmy-blue butterfly (*Brephidium exilis*), Lantana scrub hairstreak butterfly (*Strymon bazochiii*), and the cabbage butterfly (*Pieris rapae*). A large garden spider (*Argiope appensa*) and many unidentified spiders were found along Essex Road. During the evening observations, gnats and dragon flies were observed. No native Hawaiian yellow-faced bees (*Hylaeus* spp.) were observed among the 'ilima (*Sida fallax* Walp.) and morning glory (*Ipomoea* spp.) blossoms.

The report notes there have been additional avian species observed in the Kalaeloa vicinity by other surveys. These include the Black-crowned night heron or 'auku'u (*Nycticorax nycticorax hoactli*), great frigate bird or 'iwa (*Regata minor palmerstoni*), sanderling (*Calidris alba*), ruddy turnstone (*Arenaria interpres*), wandering tattler or 'ulili (*Heteroscelus incanus*), house sparrow (*Passer domesticus*), barn owl (*Tyto alba*), and the State-listed Endangered Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*). The federally-listed Endangered Hawaiian Black-necked stilt (*Himantopus mexicanus knudseni*) has also been documented in the area, including nesting activity at Ordy Pond.

The clearance of the mangrove forest around Ordy Pond by the Navy has created foraging and nesting areas for the Black-necked stilts. This may result in an increase in the stilt population and in the number of flights over the project corridor.

The listed Endangered Hawaiian hoary bats, or 'ope'ape'a (*Lasiurus cinereus semotus*) might visit the project area and vicinity. The bats feed at night on insects, including those attracted to lights, e.g. street lights. The bats rely on echolocation to detect the power lines and poles.

3.5.3 PROBABLE IMPACTS AND MITIGATION MEASURES

While the plant and wildlife habitats along the project corridor have been highly modified by humans and are now largely occupied by alien flora and fauna, several species of concern exist in the area. Of concern are: the designated Critical Habitat area for the listed Endangered 'Ewa Plains 'akoko which is immediately adjacent to the project corridor, the Listed Endangered Black-necked stilt which was observed in the area, and the listed Endangered Hawaiian hoary bat which is likely to occur in the area.

No listed, proposed, or candidate Endangered or Threatened plant species were found within the project corridor. The 'Ewa Plains 'Akoko Preserve and Critical Habitat Lowland Dry-Unit 11 border the project corridor. By limiting construction activities to the planned area, any impacts to the 'Ewa Plains 'akoko plants and their protected habitat areas will be minimized.

The possibility of Black-necked stilt and Hawaiian hoary bat collisions with new power poles, electrical lines and guy lines was considered as a potential impact. Existing research on the topic suggests that the risks of such collisions are minimal.²⁵

²⁵ ICF Jones & Stokes, Inc. and LeGrande Biological Surveys, Inc. July 2013. *Report of Findings, Terrestrial Vegetation and Wildlife Surveys, East Kalaeloa Energy Corridor, 'Ewa, O'ahu, Hawai'i*. Prepared for Belt Collins Hawaii LLC.

Ordy Pond has been identified as a likely habitat area for the Listed Endangered Black-necked stilt. A portion of Tripoli Street may drain toward Ordy Pond. BMPs will be employed to minimize soil erosion and runoff.

In order to mitigate potential impacts to Hawaiian hoary bats, construction would minimize the removal of trees over 15 feet in height and would not remove any of these trees during the breeding season between June 1 and September 15. This approach is consistent with guidance from the USFWS and will minimize potential impacts to Hawaiian hoary bats.

3.6 PUBLIC HEALTH AND SAFETY

3.6.1 FLOOD HAZARD

The Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency (FEMA) does not show floodways or riverine flood zones across the project corridor. The FIRM

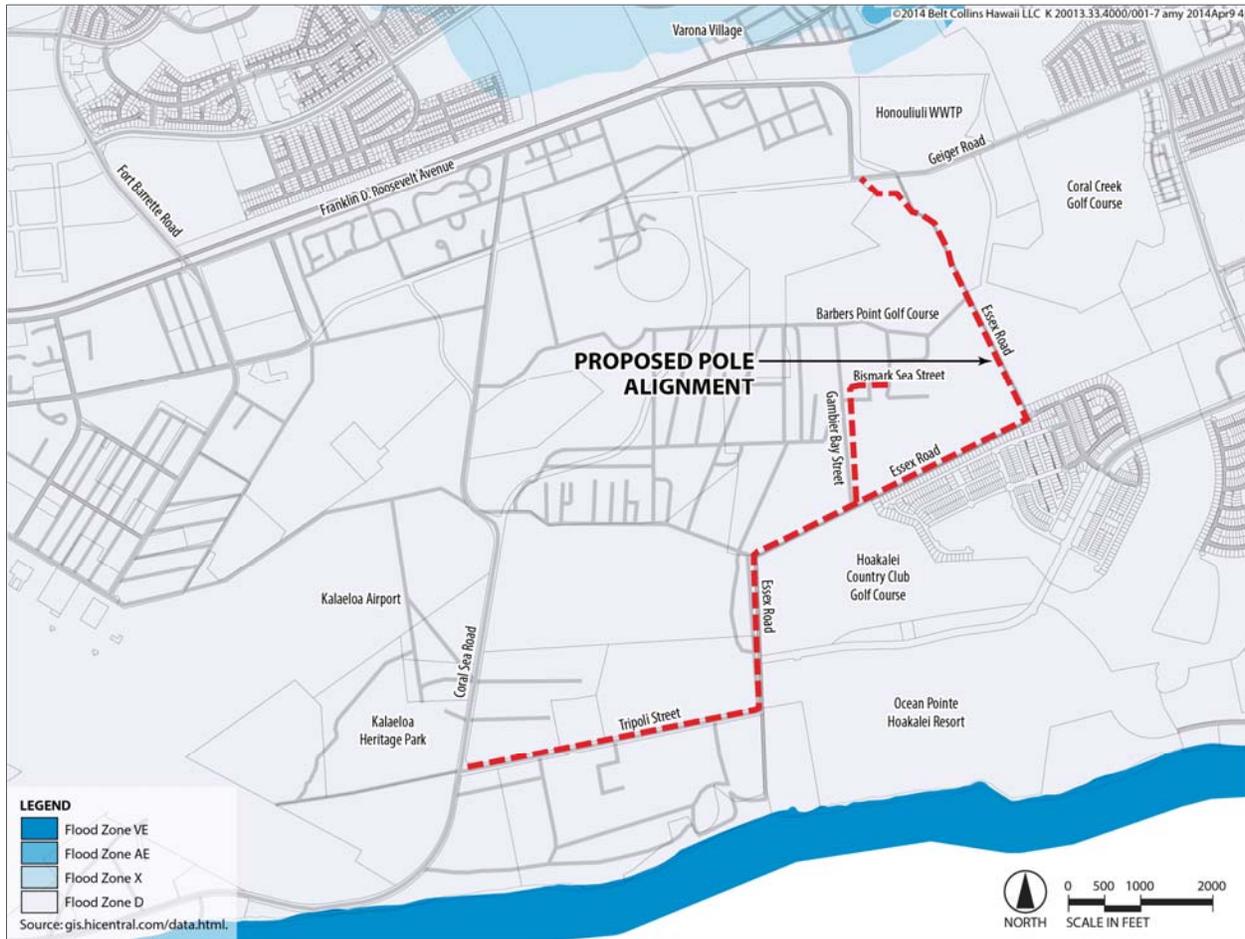


Figure 3-8. FIRM.

indicates that the project corridor is located in Flood Zone D, which is an area where flood hazards are undetermined, but possible.²⁶

Along the shoreline, the FIRM indicates Flood Zone VE, which is defined by FEMA as “...a coastal area with 1% or greater chance of flooding and an additional hazard associated with storm waves.” The project corridor along Tripoli Street is located about 1,400 to 1,900 feet from the shoreline; and is located about 1,400 feet upland of the area designated as Flood Zone VE. See Figure 3-8.

3.6.2 TSUNAMI EVACUATION ZONE

The Tsunami Evacuation Zone maps were prepared by the City’s Department of Emergency Management and other agencies in 2010. The maps were based upon updated scientific techniques and technology that were not available when the previous maps were prepared. The current map shows the tsunami evacuation zone as extending from the shoreline and along Tripoli Street. See Figure 3-9.

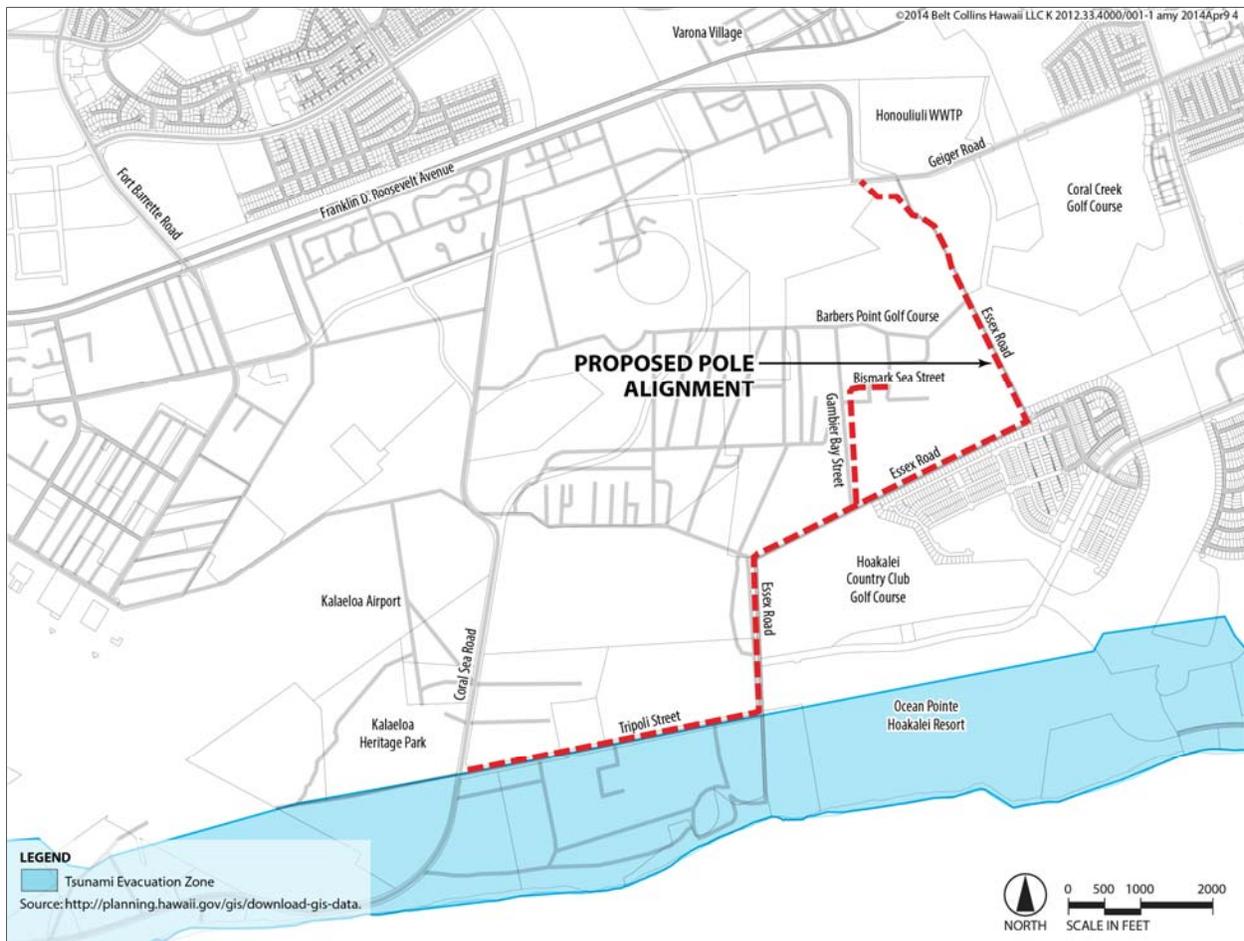


Figure 3-9. Tsunami Evacuation Zone Map

²⁶ Federal Emergency Management Agency. 2011. *Flood Hazard Areas shapefile and metadata*. Obtained from <http://planning.hawaii.gov/gis/download-gis-data/>

3.6.3 EARTHQUAKE

Earthquakes in Hawai'i, according to the U.S. Geological Survey, are linked to volcanic and tectonic activities. The movement of magma from active volcanoes on the island of Hawai'i cause many small earthquakes every year. The larger tectonic quakes are caused by structural weakness at the volcano's base or movement deep within the earth's crust.

In 2006, the State experienced the strongest recorded earthquake in 23 years. The 6.7-magnitude earthquake from west of the island of Hawai'i caused island-wide blackouts on O'ahu and Maui.

On O'ahu, the earthquake caused automatic switches and operators to shut down the Kahe and Waiau power plants to protect the equipment. According to HECO, "...the transmission and distribution system remained in full service with the exception of the Koolau-Wailupe #1 46kV line which automatically transferred its load to backup circuits."²⁷

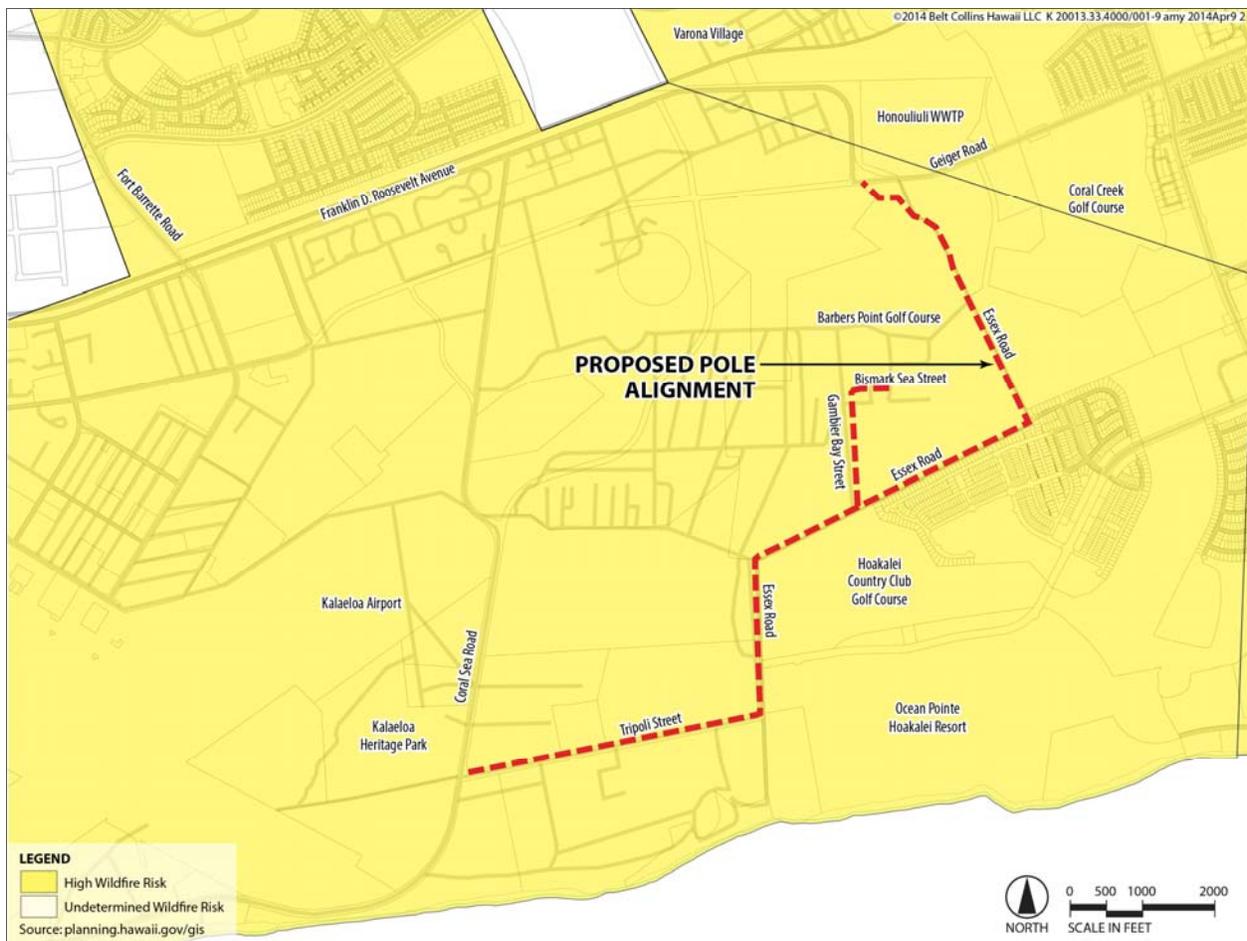


Figure 3-10. Communities at Risk from Wild-land Fires Map

²⁷ Hawaiian Electric Company. December 28, 2006. *Investigation of 2006 Oahu Island-Wide Power Outage*. PUC Docket Number 2006-0431.

3.6.4 BRUSHFIRES

Brushfires can occur on open space parcels in the 'Ewa District. The State Department of Land and Natural Resources Division of Forestry and Wildlife identified and mapped at-risk wild-land – urban interface communities. Much of the 'Ewa Plain, including the area surrounding the project corridor, was rated as having a high risk from wild-land fires.²⁸ See Figure 3-10. News articles have reported brushfires on a 3-acre open area in 'Ewa Village and a 50-acre open area in 'Ewa Beach.

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The project corridor abuts heavily vegetated open space parcels along Essex Road and Tripoli Street. These parcels are owned by the Navy (TMK 9-1-13: 39, 49, 42, 72, 73) and the State (TMK 9-1-13:40, 67, 70).

3.6.5 NAVIGABLE AIRSPACE

The Kalaeloa Airport is operated by the State. Hours of operation are from 6 am to 10 pm, but it is always available as an alternate airfield for the Honolulu International Airport. The airport is used by the USCG, Hawaii National Guard, Honolulu Community College Commercial Aviation program, general aviation users, and touch and go training. According to the DOT-Airports Division, there were 112,830 air operations in 2010.³¹

The Kalaeloa Airport has two parallel runways, 4R-22L and 4L-22R, and one crosswind runway, 11-29. Runways 4R-22L and 4L-22R are 8,000 feet and 4,500 feet in length, respectively. Runway 11-29 is 6,000 feet in length.³²

Federal regulations require the filing of Form 7460-1: Notice of Proposed Construction or Alteration with the Federal Aviation Administration (FAA) for the following circumstances:

- Any construction or alteration exceeding 200 feet above ground level;
- Any construction or alteration:
 - Within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 1,200 feet;
 - Within 10,000 feet of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet;

²⁸ State of Hawai'i. Department of Land and Natural Resources, Division of Forestry and Wildlife. 2007. *Communities at Risk from Wild-land fires* (gis metadata). Available at <http://files.hawaii.gov/dbedt/op/gis/data/finerisk.txt>

²⁹ Star-Advertiser. November 9, 2011. *Firefighters put out Ewa Villages brush fire*. Reported by Star-Advertiser staff.

³⁰ Star-Advertiser. January 5, 2013. *Crews battle 50-acre brush fire in Ewa Beach*. Reported by Star-Advertiser staff.

³¹ State of Hawai'i, Department of Transportation, Airports Division. 2013. Kalaeloa Airport Air Traffic Statistics. Available at <http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/oahu-pre-world-war-ii/kalaeloa-airport-air-traffic-statistics>

³² State of Hawai'i, Department of Transportation, Airports Division. 2013. Kalaeloa Airport. Available at <http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/oahu-pre-world-war-ii/kalaeloa-airport>

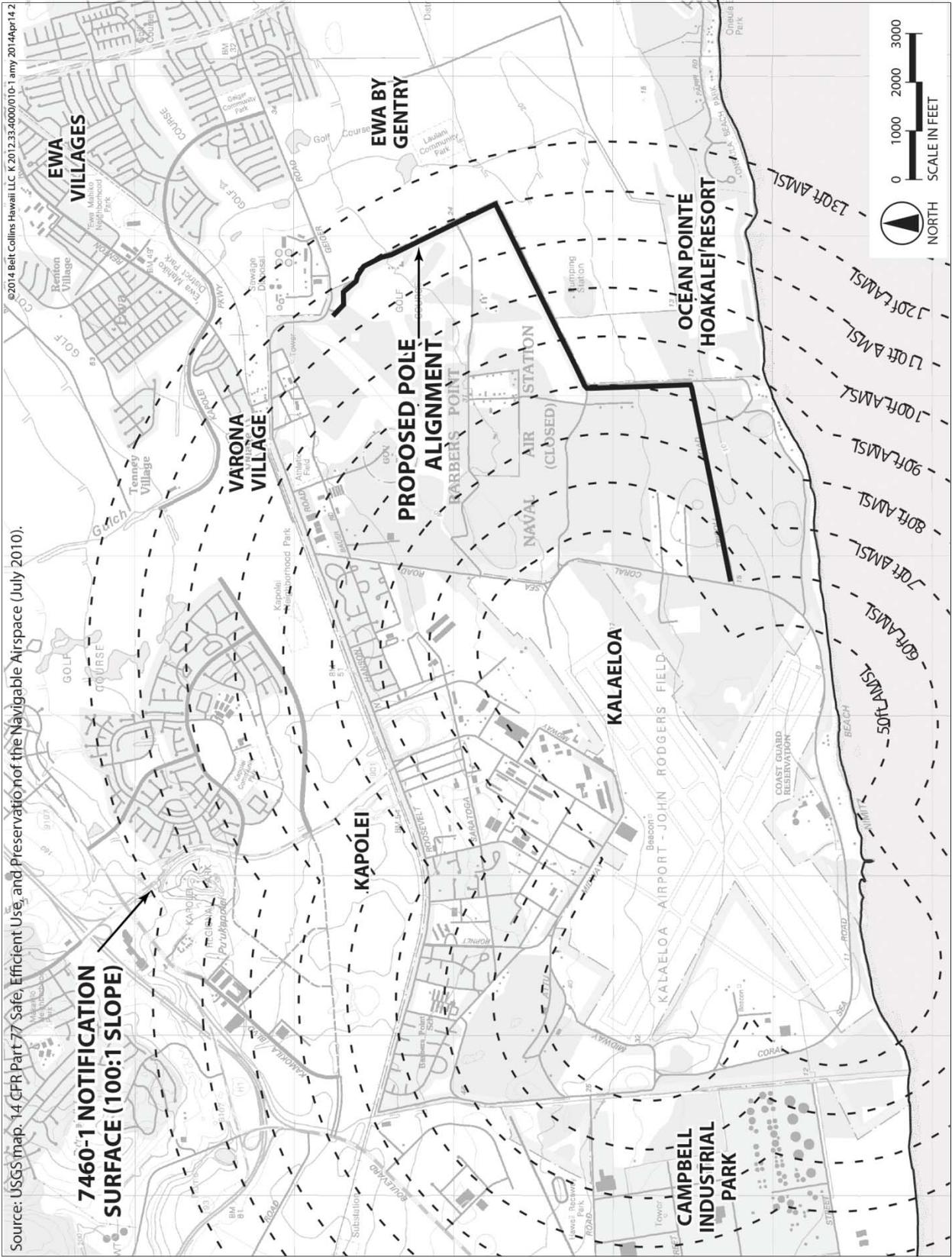


Figure 3-11. Kalaheo Airport 7460-1 Notification Surface Heights.

- Within 5,000 feet of a public use heliport which exceeds a 25:1 surface;
- Any highway, railroad or other traverse way whose prescribed adjusted height would exceed the above noted standards;
- When requested by the FAA;
- Any construction or alteration located on a public use airport or heliport regardless of location.

The project corridor is located from approximately 5,000 to 9,000 feet from the Kalaeloa Airport's 8,000-foot runway. Based on an airport elevation of 30 feet and power pole heights of 56 feet, the proposed poles may exceed the 100:1 surface. See Figure 3-11 for approximate notification surface heights.

A Form 7460-1 for the proposed power poles was submitted to FAA in July 2013. In August 2013, the FAA determined that the proposed power poles do not pose a hazard to air navigation.

3.6.6 ELECTROMAGNETIC FIELDS

Existing Conditions: Extremely low frequency (ELF) electromagnetic fields (EMFs) are produced by power lines, wiring in buildings, and electrical equipment and devices. Comments on the proposed action from residents have indicated a concern for EMF from power lines, especially from the future 46kV overhead power line.

Within the project corridor, there are 46kV electrical lines at Franklin D. Roosevelt Avenue. The existing electrical system on the remainder of the project corridor consists of 4.16kV electrical lines along Essex Road, Bismark Sea Street, and Tripoli Street.

The existing electrical lines along the Essex Road are about 50 to 60 feet from the Ocean Pointe/Hoakalei property line. The Ka Makana at Hoakalei residential lots to the east of Essex Road are at the property line and those to the south of Essex Road are an additional 20 feet away from this lot line. The proposed project would replace these existing lines in approximately the same location.

Background: The power line EMFs consist of an electric field and a magnetic field with different characteristics. The electric field is produced by the electric current in the wire, while the magnetic field is produced by electric current moving through the wire. Both fields are strongest at the source and become weaker with distance from the source. The electric field can be blocked by walls and objects, while the magnetic field is not as easily blocked and can pass through walls and objects. Table 3-1 provides details on how EMFs reduce over distance.

The placement of electrical lines into underground ducts uses the ground and concrete encasement to block electric fields radiating from the line source. While the ground and concrete encasements do not block magnetic fields, the close placement of multiple electrical lines within the underground ducts causes the magnetic fields from each line to partially neutralize each other.

Table 3-1. Electrical Lines and EMF			
Electrical Line	Location in relation to electrical line	Magnetic Fields (milligauss [mG])	Electric Field (volts per meter)
132kV	Directly under the line	5-20	1,000-2,000
	25 meters (82 feet) away from the line	0.5-2	100-200
	100 meters (328 feet) away the line	0.1-0.4	2-20
11kV	Directly under the line	2-5	200
	25 meters (82 feet) away from the line	0.2-0.5	10-20
	100 meters (328 feet) away the line	<0.1	<1

Source: National Grid. 2009. *Electric and Magnetic Fields: The Facts*.

The concerns regarding EMFs came into focus with a 1979 report on the possibility of an association between EMF and childhood leukemia.³³ Many studies have been done since to verify the results or to identify other health concerns regarding EMF. Several agencies and organizations over the years have compiled and reviewed these studies for confirmation of EMF effects and to seek guidance in addressing such effects, if any. The National Grid, an international electricity and gas company, reviewed the studies of the following agencies and organizations:³⁴

- The National Academy of Sciences/National Research Council, 1999.
- The National Institute of Environmental Health Sciences, 2002.
- International Agency for Research on Cancer, 2002.
- U.K. National Radiological Protection Board Report of an Advisory Group on Non-Ionizing Radiation, 2001.
- International Commission on Non-Ionizing Radiation Protection Standing Committee on Epidemiology, 2002.
- U.K. Health Protection Agency, 2004.
- Work Health Organization (WHO), June 2007.

In general, the conclusions of these health reviews, according to the publication by the National Grid have indicated:³⁵

- *None of the panels concluded that EMF is established as the cause of any long-term, adverse effect on health.*

³³ Wertheimer, N. and E. Leeper. 1979. *Electrical Wiring Configurations and Childhood Cancer*. In American Journal of Epidemiology, 109: 3.

³⁴ National Grid. November 2009. *Electric and Magnetic Fields*. Downloaded from www.nationalgridus.com.

³⁵ National Grid. November 2009. *Electric and Magnetic Fields*. Downloaded from www.nationalgridus.com.

- *At very high field levels, EMF can cause nerve and muscle stimulation. However, the field levels found in our environment are far too low to cause these effects.*
- *The strongest evidence of a potential relationship between EMF and health was from epidemiology studies of childhood leukemia. Some studies reported statistical associations between childhood leukemia and magnetic field exposures, while others did not. The data from these studies were combined in a “pooled analysis” so that the investigators could have a larger sample size with which to work. The pooled analysis reported a small association between childhood leukemia and estimates of long term average exposure to magnetic fields above 3-4 mG. However, the panels did not conclude that magnetic fields were likely to be a cause of childhood leukemia, because of the lack of support from animal and cellular studies and the role of other factors could not be ruled out. In particular, the WHO recommended conducting further research to understand what could be causing the small statistical association observed in the pooled analyses.*
- *No consistent increases in cancer were reported in animal studies, nor did researchers find a mechanism that would explain how magnetic fields could initiate disease at the cellular level.*

There are no federal standards for power line related ELF EMFs. Some locales have enacted power line standards. See Table 3-2.

Table 3-2. State Transmission Line Standards and Guidelines					
State	Electric Field		Magnetic Field		
	On R.O.W.*	Edge R.O.W.	On R.O.W.	Edge R.O.W.	
Florida	8 kV/m ^a	2 kV/m	--	150 mG ^a	(max. load)
	10 kV/m ^b			200 mG ^b	(max. load)
Minnesota	8 kV/m	--	--	250 mG ^c	(max. load)
Montana	7 kV/m ^d	1 kV/m ^e			
New Jersey	--	3 kV/m			
New York	11.8 kV/m	1.6 kV/m	--	200 mG	(max. load)
	11.0 kV/m ^f				
	7.0 kV/m ^d				
Oregon	9 kV/m	--	--	--	
*R.O.W. = right-of-way (or in the Florida standard, additional areas adjoining the right-of-way). dV/m = kilovolt per meter. One kilovolt = 1,000 volts. ^a For lines of 69-230 kV. ^b For 500 kV lines. ^c For 500 kV lines on certain existing R.O.W. ^d Maximum for highway crossings. ^e May be waived by the landowner. ^f Maximum for private road crossings.					
Source: National Institute of Environmental Health Sciences, National Institute of Health. June 2002. <i>EMF Electric and Magnetic Fields Associated with the Use of Electric Power.</i> (Questions and Answers Booklet downloaded from EMF Rapid at http://www.niehs.nih.gov/emfrapid/booklet/standard)					

In the State, the DOH has a policy of “prudent avoidance” as written in its 1994 statement:³⁶

“The Department of Health, in response to continuing but inconclusive scientific investigation concerning electric and magnetic fields (EMF) from low-frequency power sources, recommends a “prudent avoidance” policy. “Prudent avoidance” means that reasonable, practical, simple, and relatively inexpensive actions should be considered to reduce exposure.

A cautious approach is suggested at this time concerning exposure to electric and magnetic fields (EMF) around low-frequency sources, such as electric appliances and power lines. The existing research data on possible adverse health effects, including cancer, are inconclusive and not adequate to establish or quantify a health risk. For example, the biological mechanisms that might underlie any apparent relationship between EMF and cancer, it is a very small increase. Other epidemiological studies suggest that there is no increased risk.

The Department of Health will continue to collect and evaluate information on possible health hazards associated with electric and magnetic fields. If adequate data ever become available to establish what level may be harmful, appropriate standards will be established.”

The HCDA standards for power lines within the Kalaeloa favor undergrounding of power lines.³⁷ The HCDA Draft Kalaeloa Master Plan - Infrastructure Master Plan Update proposes undergrounding of utility lines within the district.³⁸ The infrastructure plan, however, includes overhead 46kV electrical transmission lines along the Saratoga Boulevard in west Kalaeloa and along planned Kualaka'i Parkway extension in east Kalaeloa. The Plan provides for exceptions where roadways are yet to have been upgraded, with the intention that utilities would be undergrounded at the time the road is improved.³⁹

At the City and County level, the roadway standards call for underground utilities, where appropriate. For an urban area like Kalaeloa, it seems reasonable that the City will want underground utilities for visual aesthetics and safety reasons.

Proposed Action: The installation of the 12kV electrical lines and poles will largely follow the alignment of the existing 4.16kV Navy electrical lines in the project corridor. Along the Franklin D. Roosevelt section the 12kV electrical line will be installed on existing HECO poles with existing 46kV electrical lines.

³⁶ State of Hawai'i, Department of Health. January 19, 1994. *DOH Policy Relating to Electric and Magnetic Fields from Power-Frequency Sources.*

³⁷ State of Hawai'i. September 2012. Chapter 215 of Title 15, Hawai'i Administrative Rule, entitled *Kalaeloa Community Development District Rules.*

³⁸ State of Hawai'i, Hawai'i Community Development Authority. October 2010 Draft. *Kalaeloa Infrastructure Master Plan Update.* Prepared by Belt Collins Hawai'i LCC.

³⁹ State of Hawai'i, Hawai'i Community Development Authority. October 2010 Draft. *Kalaeloa Infrastructure Master Plan Update.* Prepared by Belt Collins Hawai'i LCC.

The distance of the proposed electrical lines from the adjoining property lines is approximately 50 feet from the future Ewa by Gentry, 50-60 feet from the Ka Makana at Hoakalei/Ocean Pointe, and 45 feet to the Hoakalei Country Club Golf Course properties.

The proposed action is designed such that 46kV electrical lines could be accommodated on the 65-foot poles. However, the proposed action is limited to the installation of 12kV electrical lines. The possibility of installing 46kV electrical lines on the project corridor to provide a connection between potential alternative energy projects and the HECO grid would need to be included with future alternative energy project proposals. The environmental review for these alternative energy projects would need to include 46kV overhead and underground lines as project options.

3.6.7 HAZARDOUS AND REGULATED MATERIALS

The former use of Kalaeloa as a naval air station included the use of hazardous and regulated materials on the property. The management of these materials is based upon a number of federal regulations including:⁴⁰

- Installation Restoration Program (IRP) established under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA);
- Defense Environmental Restoration Program established under the Superfund Amendments and Reauthorization Act of 1986;
- Resource Conservation and Recovery Act;
- Regulatory Compliance Program; and
- Environmental Restoration Program established by the Navy.

With the transfer of federal property to a non-federal entity, the CERCLA requires that the federal government provide the following:

- the transferee notice of hazardous substances;
- a covenant in the deed stating that remedial action has been taken prior to the transfer;
- provisions for additional actions by the federal government, as needed; and
- a perpetual right-of-access in favor of the federal government.

As part of the BRAC process, numerous studies and environmental assessment were produced as part of the process for transferring the federal property for reuse by non-federal entities. The following documents were reviewed to identify some of the Points of Interest (POI) and IRP sites along the project corridor. Therefore, this is a limited list and is not intended to be a comprehensive nor up-to-date listing.

- U.S. Navy. June 1994. Environmental Baseline Survey (EBS) for Naval Air Station Barbers Point, Oahu, Hawaii.

⁴⁰ U.S. Navy. August 2011. Final Environmental Assessment, *Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point*.

- U.S. Navy. August 2011. Final Environmental Assessment, Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, Oahu, Hawaii.
- U.S. Navy. January 2002. Final Programmatic Environmental Impact Statement, Ford Island Development, Pearl Harbor, Hawaii, Volume 1.

The Navy's 1994 EBS for BPNAS identified areas of potential environmental concern, i.e. POI and IRP sites based on earlier Navy reports. This 1994 EBS included several properties with POI and IRP sites adjacent to the project corridor and one POI site, the Barbers Point Golf Course, where the project corridor passes through. The following is a brief description of these sites.

- POI-43--Golf course buildings 1089 and 1855 (TMK 9-1-13:095). Building 1089 was identified due to its use as a pest control shop, garage/storage facility. Waste materials handled included waste oil and solvents, sewage sludge with high metals content, and pesticide/herbicide containers. The sewage sludge was used as a soil conditioning at the golf course. The waste oil and solvents were at one time disposed of in a dry well at the facility, but is currently collected and disposed off-site. Building 1855 was listed due to its use as a golf cart storage and maintenance yard. Waste materials included waste oil, solvents, and battery acid.⁴¹

A site study in 2000 of playable and non-playable golf course areas found metal concentrations above the screening criteria in the southwestern and eastern portions of the site where sandblast grit had been used.⁴²

- POI-44--Former firing ranges (TMK 9-1-13:039, 042, 072, 073). There are one carbine and pistol, two machine gun, and two trap and skeet shooting ranges. The potential contaminant was lead shots on the surface and subsurface areas of the ranges. The closest firing range to the project corridor was the southern trap and skeet shooting range located along the north side of Tripoli Street. The site, according to the Navy, has been partially cleaned for transfer to the State. Portions of the site were not cleaned due to nearby endangered plants and archaeological/cultural features ⁴³

The two machine gun ranges and the carbine and pistol range were located south of Tripoli Street. In 1999 to 2000, removal action was conducted on the carbine and pistol range and one machine gun range. No action was needed for the remaining machine gun range. The sites were deemed suitable for unrestricted reuse under CERCLA.⁴⁴

- IRP-02--Ordy Pond (TMK 9-1-13:041). Ordy Pond, a shortened version of "Ordnance Pond," is a 270-foot diameter water-filled sinkhole that was used for disposal of ordnance-related

⁴¹ U.S. Navy. June 1994. *Environmental Baseline Survey for Naval Air Station Barbers Point, Oahu, Hawaii*.

⁴² U.S. Navy. September 2009. *Findings of Suitability to Transfer Lots 13058-D and 13058-G (Former Northern Trap and Skeet Range and Former Southern Trap and Skeet Range Property), Former Naval Air Station Barbers Point, Oahu, Hawaii*.

⁴³ U.S. Navy. August 2011. *Final Environmental Assessment, Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, Oahu, Hawaii*.

⁴⁴ U.S. Navy. September 2009. *Findings of Suitability to Transfer Lots 13058-D and 13058-G (Former Northern Trap and Skeet Range and Former Southern Trap and Skeet Range Property), Former Naval Air Station Barbers Point, Oahu, Hawaii*.

scrap materials from the late 1960's to the 1970's, although there is no record of the exact materials. In the 1980's, materials such as pallets, manuals, packing materials, and agitene drums were disposed on in the pond. Studies have identified heavy metals, polychlorinated biphenyl, pesticides and other organic compounds.⁴⁵ According to the 2011 Final Environmental Assessment for the property, a human health risk assessment of the site indicated that it was safe for unrestricted land use.⁴⁶

- POI-49--Regional groundwater system under the entire installation. An evaluation of POI-49 in 1999 found low levels of hazardous substances that were not a threat to human health or the environment. The groundwater under the installation is not used for potable water and would need desalination to be potable. A no action Record of Decision was signed for this POI.⁴⁷

The 1994 EBS also noted that reported surface fluctuations in the pond may suggest a potential hydraulic connection with the ocean. A recent environmental assessment, however, noted that the pond is now nearly sealed from any hydraulic connection due to the settlement of fine sediments over time.⁴⁸

3.6.8 PROBABLE IMPACTS AND MITIGATION MEASURES

Flooding and storm waves are expected to have minimal or no adverse impact due to the project's location away from the shoreline and flood hazard areas. Tsunami impacts would be dependent upon the magnitude of the wave event as the project corridor is situated on the mauka side of the tsunami evacuation zone border.

The power poles may incur some damage from brushfires. Proper landscape maintenance along the corridor, combined with the proximity of the Kapolei and Ocean Pointe fire stations, would minimize the potential of damage from brushfires. Implementation of effective fire management plans by adjacent property owners would also help to mitigate brushfires.

The impact from earthquakes on the electrical lines is expected to be minimal based on the events in 2006 when the power outages were caused by the powering down of the power plants and not due to the failure of transmission or distribution system.

The impact to navigable airspace by the proposed action has been evaluated by the FAA and they have determined that the new power poles do not pose a hazard to air navigation.

⁴⁵ U.S. Navy. June 1994. *Environmental Baseline Survey for Naval Air Station Barbers Point, Oahu, Hawaii*.

⁴⁶ U.S. Navy. August 2011. *Final Environmental Assessment, Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, Oahu, Hawaii*.

⁴⁷ U.S. Navy. September 2009. *Findings of Suitability to Transfer Lots 13058-D and 13058-G (Former Northern Trap and Skeet Range and Former Southern Trap and Skeet Range Property), Former Naval Air Station Barbers Point, Oahu, Hawaii*.

⁴⁸ U.S. Navy. August 2011. *Final Environmental Assessment, Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, O'ahu, Hawai'i*.

The proposed 12kV electrical lines are anticipated to have minimal impacts from EMF. The EMFs from the proposed 12kV electrical lines is expected to be reduced at adjoining properties by the distance of the overhead lines. HECO designs and builds facilities consistent with DOH policy and State construction standards on overhead and underground lines. Should there be concern about EMF levels, HECO provides EMF information packets to its customers and conducts home measurements of magnetic fields on request.⁴⁹

The likelihood of impacts from hazardous or regulated materials is anticipated to be minimal. The southern trap and skeet shooting range is adjacent to Tripoli Street, but no hazardous materials are anticipated within the project corridor. Potential concerns will be coordinated with the Navy prior to assignment of any easements on federal property for the project corridor. These concerns would be mitigated prior to transfer of the easements and work on the new electrical system.

3.7 AIR QUALITY

3.7.1 EXISTING CONDITIONS

On a regional basis, the Clean Air Branch (CAB) of the DOH, as part of its statewide pollution control responsibilities, regulates air emissions at source facilities in nearby Campbell Industrial Park, e.g. HPOWER, Chevron Refinery, and Kalaeloa Partners Cogeneration Plant. The CAB also maintains a monitoring station in the Kapolei Business Park which indicated that the readings from 2007 to 2011 did not exceed Federal and State standards for the following criteria pollutants: Carbon Monoxide (CO), Sulfur Dioxide (SO₂), and Particulate Matter (M10 and 2.5).⁵⁰

At the local level, air quality at the project corridor can be affected by a number of man-made and natural sources. Existing stationary sources include the nearby Honouliuli WWTP and other industrial facilities. Mobile sources include motor vehicles on the main roads, e.g. Geiger Road, Franklin D. Roosevelt Avenue, Coral Sea Road, and Tripoli Street. Area sources might include construction and maintenance activities on areas adjoining the project corridor. Natural sources include brushfires such as occurred on 3 acres in 'Ewa Village⁵¹ and 50 acres in 'Ewa Village.⁵²

The effect of the sources on air quality is potentially small due to the limited amount of source activities along the project corridor. Additionally, air pollutants along the project corridor can be dissipated by the prevailing winds, which on O'ahu blow from the northeast direction and out to sea.⁵³

3.7.2 PROBABLE IMPACTS AND MITIGATION MEASURES

The proposed action is expected to affect air quality as part of the construction activities related to installation of the power poles. This short-term impact would include emissions from construction vehicles and equipment and from dust created by the excavation, stockpiling, and hauling of soil

⁴⁹ Hawaiian Electric Company. June 2010. *Electric and Magnetic Fields (EMF) Fact Sheet*. Downloaded from HECO.com.

⁵⁰ State of Hawai'i Department of Health. 2012. *Annual Summary 2011 Air Quality*.

⁵¹ Star-Advertiser. November 9, 2011. Firefighters put out Ewa Villages brush fire. Reported by Star-Advertiser staff.

⁵² Star-Advertiser. January 5, 2013. Crews battle 50-acre brush fire in Ewa Beach. Reported by Star-Advertiser staff.

⁵³ Juvik, S. and J. Juvik. 1998. *Atlas of Hawaii, Third Edition*.

and other materials during the power pole installations. Mitigation measures would be based on BMPs prepared for the grubbing permits. These measures might include periodically wetting down excavated material and unpaved construction areas, use of dust screens, and managing the amount of areas uncovered.

No air quality impacts are anticipated from the 12kV electrical distribution lines and poles after their installation.

3.8 NOISE

3.8.1 EXISTING CONDITIONS

The ambient noise sources in Kalaeloa include vehicle traffic on the roadways, tenant activities in nearby properties, and air traffic from the Kalaeloa Airport. The noise from the air traffic varies with proximity to the airport and flight paths.

Noise sensitive receptors to the project site include the businesses, residents, and recreational users along the project corridor. North of the project corridor, there are the residents and businesses along Franklin D. Roosevelt Avenue and at Varona Village; on the east there are the residents at the Ocean Pointe/Hoakalei Resort developments and golfers at the Coral Creek Golf Course and Hoakalei Country Club Golf Course; on the south side are the White Plains Beach Park users; and on the west side are the golfers at the Navy Barbers Point Golf Course.

3.8.2 PROBABLE IMPACTS AND MITIGATION MEASURES

During construction, short-term, temporary noise is expected to occur. Some of the noisy equipment that may be used includes drill rigs, hop toes, cranes, boom trucks, concrete trucks, dump trucks, flatbed trucks, and diesel power generators. Use of noise suppressant devices, such as mufflers, will help to reduce objectionable noise levels.

Construction will occur in a mobile fashion over a projected approximately 24 month period. The source of the noise will not be stationary, but will move from one area to another as installation of poles and lines and removal of old poles progresses along the project corridor. There will be no construction in the evenings or at night. Construction activities will comply with the DOH, Chapter 11-46, Community Noise Control regulations. Compliance with these regulations will be part of the project's construction contract and responsibility of the selected contractor.

No noise quality impacts are anticipated from the 12kV electrical distribution lines and poles after their installation.

3.9 CIRCULATION AND TRAFFIC

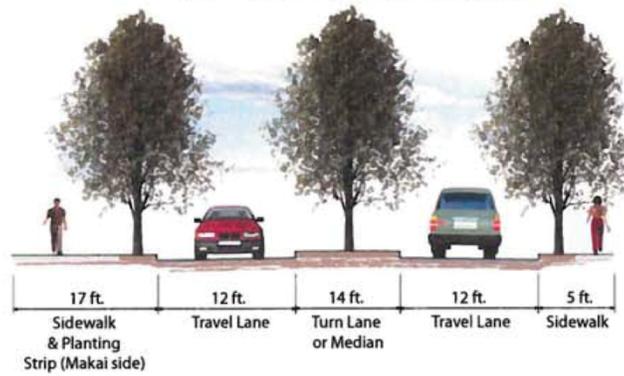
3.9.1 EXISTING CONDITIONS

Access into Kalaeloa consists of Fort Barrette Road/Enterprise Avenue into central Kalaeloa, Kamokila Boulevard to Franklin D. Roosevelt Avenue from the west, Renton Road via Philippine Sea Street to Franklin D. Roosevelt Avenue from the east, and Geiger Road from the east. Circulation across Kalaeloa is achieved via Franklin D. Roosevelt Avenue.

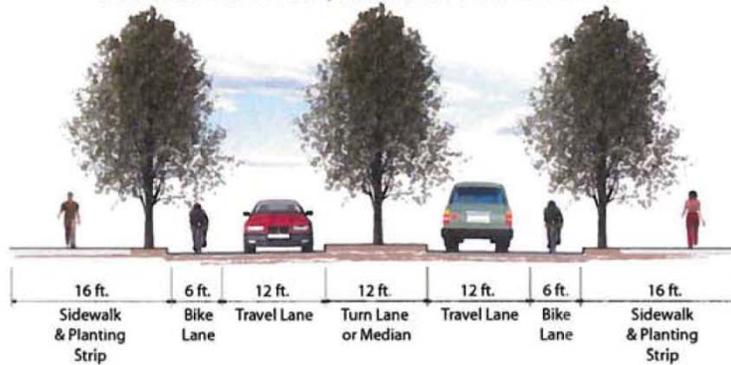
B. 2-Lane Street and Bicycle Lanes (ROW = 44')
 West Perimeter Road, Coral Sea Road, Tripoli Street



C. 2-Lane Avenue with Median/Turn Lane (ROW = 60')
 Franklin D. Roosevelt Avenue



F. 2-Lane Avenue with Median/Turn Lane and Bicycle Lanes
 Kualakai Parkway (ROW = 80')
 Coral Sea Road (ROW = 60' with 6 foot sidewalk),
 Malakole Street Ext, Kamokila Boulevard Ext



Source: Chapter 215 of Title 15, Hawaii Administrative Rules, entitled "Kalaeloa Community Development District rules" is adopted. September 2012.

Figure 3-13. Thoroughfare Sections

From the project corridor, Essex Road is accessed via Geiger Road and Franklin D. Roosevelt Avenue and Tripoli Street is accessed from Coral Sea Road via Franklin D. Roosevelt Avenue.

Essex Road, Gambier Bay Street, and Bismark Sea Street are unsubdivided roads within the Barbers Point Golf Course. Tripoli Street is an 80-foot ROW with 20-foot pavement and 28 to 32-foot shoulders. These roadways have no curbs, gutters, sidewalks, or street lights.

3.9.2 FUTURE ROADWAY IMPROVEMENTS

The Kalaeloa Community Development District Rules identifies the major thoroughfares that are the framework for redeveloping Kalaeloa (see Figure 3-12). Saratoga Avenue becomes an east-west corridor connecting Kamokila Boulevard extension to Geiger Road. Coral Sea Road becomes a north-south corridor connecting Franklin D. Roosevelt Avenue to Tripoli Street. A new road, the Kualaka'i Parkway extension, would cut through east Kalaeloa and connect to Ke'oneula Boulevard in the Ocean Pointe/Hoakalei Resort development. A short section of Essex Road would connect Kualaka'i Parkway to Tripoli Street. See Figure 3-13 for thoroughfare sections.

It is noted that the Navy is currently conducting a determination of eligibility for the 1941 airfield pavement, through which both Saratoga Avenue and Kualaka'i Parkway extension cross through. Upon completion of the Navy's determination, the alignment of Saratoga Avenue and Kualaka'i Parkway will be reviewed.

Bikeways. The Kalaeloa Community Development District Rules' Thoroughfare Plan identifies which thoroughfares will eventually include bike lanes. The Plan proposes bike lanes within Coral Sea Road, Kualaka'i Parkway extension, Saratoga Avenue, Tripoli Street and the Essex Road segment connecting Tripoli Street to Kualaka'i Parkway. The Plan defines six-foot bicycle lane widths, which includes the two-foot wide road gutter. See Figure 3-13 for thoroughfare sections.

3.9.3 PROBABLE IMPACTS AND MITIGATION MEASURES

The proposed action generally follows along the same alignment of the existing power lines and, therefore, is not expected to adversely impact the implementation of the circulation and bikeway plans. The use of overhead power lines and poles allow for flexibility in re-routing the electrical distribution system to follow the implementation of the future circulation system and to allow the undergrounding of electrical and communication systems as these streets are designed and built.

3.10 INFRASTRUCTURE

3.10.1 WATER

Potable Water: The existing water system in Kalaeloa is owned by the Navy. The system consists of: a deep well located above Farrington Highway, two 1.0 million gallon concrete water storage tanks, a chlorination/fluoridation treatment facility, and transmission/distribution lines that connect to the various facilities within Kalaeloa. Distribution lines are typically located within existing road ROWs. There are existing waterlines within: Essex Road, along the majority of the segment along Ocean Pointe/Hoakalei Resort property; within Tripoli Street, from White Plains access road to Coral Sea Road; and within the Gambier Bay Street and Bismark Sea Street corridors.

It is noted that a potable water master plan was not provided within the Kalaeloa Infrastructure Master Plan Update.

Non-Potable Water. The Honouliuli WWTP provides R1 water for non-potable irrigation to the Barbers Point Golf Course via an existing 16-inch line along the Essex Road segment along the Ewa by Gentry property. The line reduces to 12-inch diameter and turns west to the existing 50,000 gallon R1 reservoir within the Barbers Point Golf Course.⁵⁴

The Kalaeloa Infrastructure Master Plan Update proposes new R1 mains along Coral Sea Road, Saratoga Avenue, and Tripoli Street. The existing non-potable water line along Essex Road will remain for golf course irrigation.⁵⁵

3.10.2 SEWER

The sewer collection system in Kalaeloa is owned by the Navy and consists of gravity lines, force mains, and lift stations in existing roads and utility ROWs. The treatment of the collected wastewater occurs at the City's Honouliuli WWTP next to the project corridor. Within the Essex Road segment along the Ewa by Gentry property, an existing 4-inch sewer force main runs from the golf clubhouse toward the existing 21-inch sewer line along Geiger Road that goes to the Honouliuli WWTP.

The Kalaeloa Infrastructure Master Plan Update proposes new sewer mains and/or sewer force mains along Coral Sea Road, Saratoga Avenue and Tripoli Street; and proposes to replace the existing 21-inch sewer line along Geiger Road with a new 30-inch sewer line to Honouliuli WWTP.⁵⁶

3.10.3 ELECTRICITY, TELEPHONE, AND CABLE TV

The existing electrical system is owned by the Navy and consists of overhead and underground 4.16kV and 11.5kV power distribution lines. HECO provides redundant 46kV transmission lines to an existing Navy substation near the intersection of Saratoga and Enterprise Avenue.⁵⁷

Within the project corridor, an existing 4.16kV distribution line runs along the Essex Road segment along the Ewa by Gentry property, along the Essex Road segment along the Ocean Pointe/Hoakalei Resort property, and then heads west towards San Jacinto Street. An existing 4.16kV also splits off from Essex Road and heads west along Bismark Sea Street. An existing power line along Tripoli Street extends from Coral Sea Road to the White Plains access road and recreation area.⁵⁸

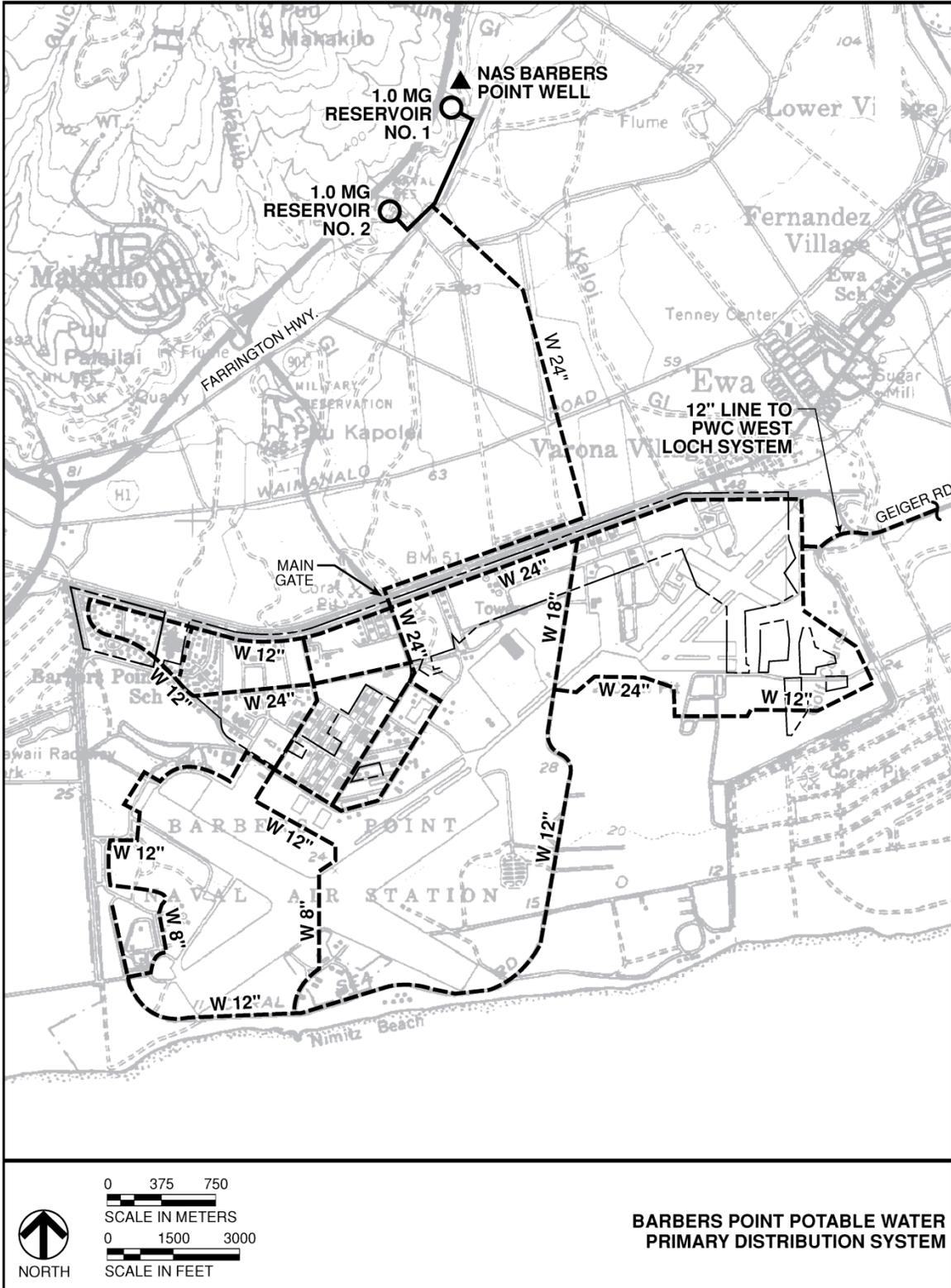
⁵⁴ State of Hawai'i, Hawai'i Community Development Authority. October 2010. *Draft Kalaeloa Master Plan - Infrastructure Master Plan Update*.

⁵⁵ State of Hawai'i, Hawai'i Community Development Authority. October 2010. *Draft Kalaeloa Master Plan - Infrastructure Master Plan Update*.

⁵⁶ State of Hawai'i, Hawai'i Community Development Authority. October 2011 Draft. Kalaeloa Infrastructure Master Plan Update.

⁵⁷ State of Hawai'i, Hawai'i Community Development Authority. October 2011 Draft. *Kalaeloa Infrastructure Master Plan Update*.

⁵⁸ Ron N.S. Ho and Associates, Inc. No date. Existing Electrical Distribution Map. From AutoCAD file.



Source: Navy. 1999. Environmental Impact Statement for the Disposal and Reuse of Naval Air Station Barbers Point, Hawaii.

Figure 3-14. Water System.

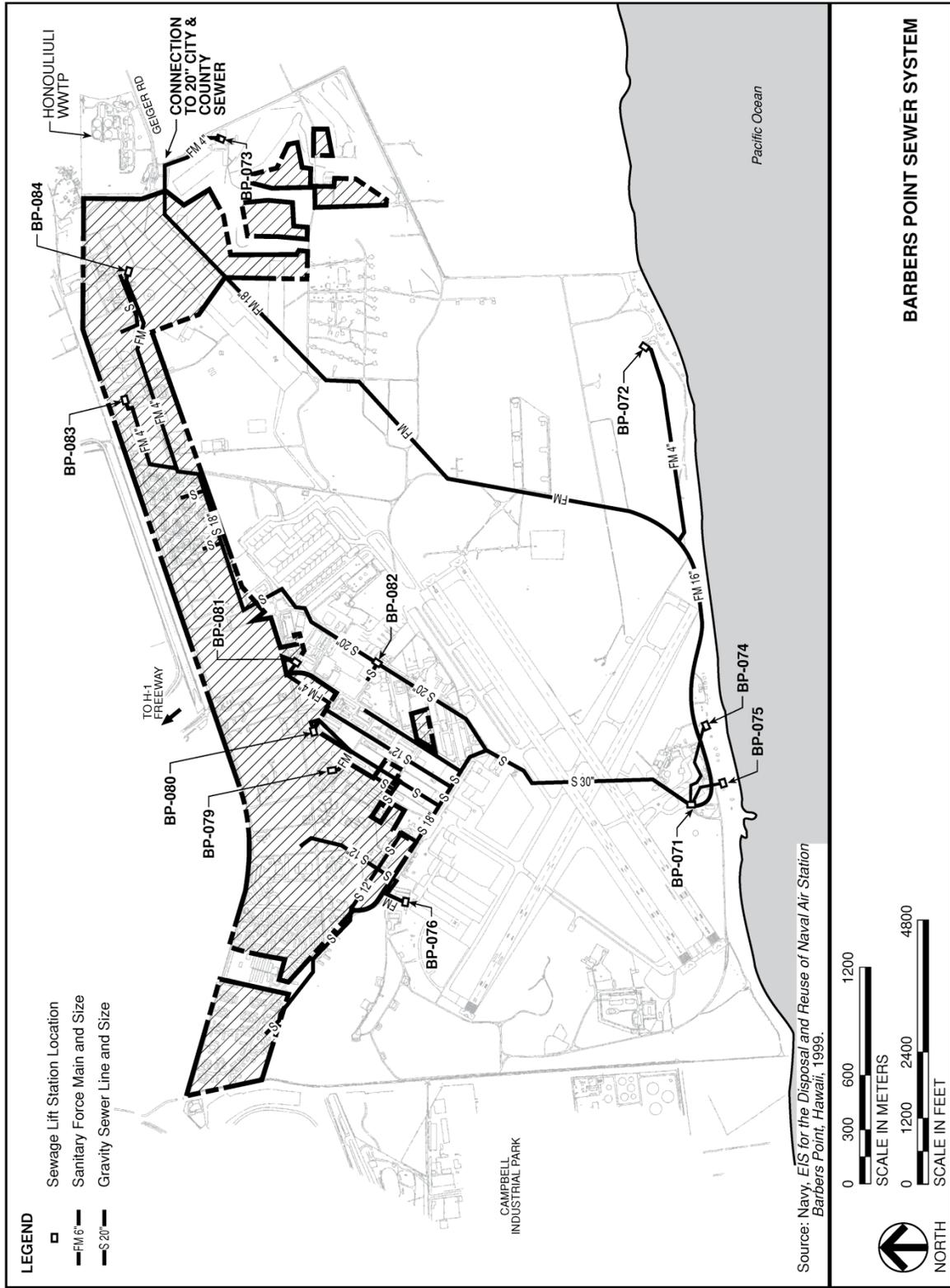


Figure 3-15. Sewer System.

Maintenance of the electrical system, if required, is being done by the Navy. While existing users are being serviced, the Navy has indicated that no new users will be serviced.

The communication lines consist of telephone lines and cable television lines owned and maintained by Hawaiian Telecom and Oceanic Time Warner Cable, respectively. Telecommunication service to the DHHL properties is provided by Sandwich Isle Communications.

The Kalaeloa Infrastructure Master Plan Update proposes new underground electrical and communications conduits along Coral Sea Road, Saratoga Avenue and Tripoli Street. The plan proposes new overhead electrical and communication lines on Kualaka'i Parkway extension.⁵⁹

3.10.4 FUEL AND GAS LINES

No fuel or military gas lines are located along the project corridor.^{60 61} The tax map shows that the only fuel or gas line easements near the project corridor are within the Honouliuli WWTP parcel, which adjoins the project corridor. Fuel lines owned by Chevron Oil Co. (two 8-inch diameter and one 4-inch diameter) follow the Oahu Railroad and Land Company ROW along and outside of Kalaeloa's boundaries.⁶²

3.10.5 DRAINAGE

There are no perennial or intermittent streams flowing through Kalaeloa. Runoff from the lands north of Kalaeloa and east of Fort Barrette Road flow either towards Kalo'i Gulch or into the lower channel/detention basin located north of Renton Road, outside of Kalaeloa. The lower channel/detention basin overflows, via a box culvert, into a coral pit within Kalaeloa; located east of Enterprise Avenue and south of Franklin D. Roosevelt Avenue. Near and within the project corridor, surface water is collected and disposed of within drywells or low lying areas; which includes Ordy Pond that is located on the north side of Tripoli Street.

3.10.6 PROBABLE IMPACTS AND MITIGATION MEASURES

The design and construction of the proposed 12kV electrical system will be coordinated with the other existing utility companies, city agencies, and property owners. The power poles will be situated to avoid sewer, water, and gas lines, as well as, dry wells within the project corridor. Once the poles are in place, the electrical and communication lines can be installed by the various utility companies and the old lines and poles removed. There should be a minimal inconvenience to the utility customers during construction and improved service thereafter.

⁵⁹ State of Hawai'i, Hawai'i Community Development Authority. October 2011 Draft. *Kalaeloa Infrastructure Master Plan Update*.

⁶⁰ U.S. Navy. 2002. *Final Programmatic Agreement, Environmental Impact Statement. Ford Island Development*.

⁶¹ U.S. Navy. 1999. *Final Environmental Impact Statement – Disposal and Reuse of Naval Air Station Barbers Point, Hawaii*.

⁶² State of Hawai'i, Hawai'i Community Development Authority. 2011. *Final Environmental Assessment – Kalaeloa Energy Corridor*. Prepared by Belt Collins Hawaii LLC.

3.11 PUBLIC SERVICES AND FACILITIES

3.11.1 POLICE, FIRE, AND EMERGENCY SERVICES

The Honolulu Police Department's Patrol District No. 8 provides police services to the 'Ewa and Wai'anae area. The district is divided into Sector 1 (Makua, Mākaha, Wai'anae, and Mā'ili), Sector 2 (Nānākuli, Ko Olina, Campbell Industrial Park, Makakilo) and Sector 3 (Kapolei, 'Ewa, 'Ewa Beach, Kalaeloa). The district station is on Kamokila Boulevard in nearby Kapolei and a sub-station is located in Wai'anae. Navy properties are protected by Navy personnel from West Loch.

The Honolulu Fire Department (HFD) Battalion No. 9 provides fire protection services to the 'Ewa and Wai'anae areas. The 'Ewa Beach Fire Station No. 24 is on Kaileolea Drive in nearby Ocean Pointe; the battalion headquarters, Kapolei Fire Station No. 40, is on Lauwiliwili Street in the Kapolei Business Park; the East Kapolei Fire Station No. 44 is on Kinoiki St.; and the Makakilo Fire Station No. 35 is on Makakilo Drive. The Kapolei station also responds to hazardous material incidents. Fire protection for federal properties is provided by the Federal Fire Department. Fire protection for Kalaeloa Airport is provided by the DOT's aircraft rescue and firefighting facilities.

The City Department of Emergency Services provides ambulance services throughout O'ahu through its Emergency Medical Services Division (EMS). Kalaeloa is within the EMS Makakilo Emergency Services Response Area. EMS ambulances are stationed nearby at the Kapolei Fire Station and the 'Ewa Villages Golf Course. The Navy has an agreement with EMS for ambulance services. HFD also co-responds with first responder emergency services.

3.11.2 MEDICAL CENTERS

Emergency medical services are limited in 'Ewa due to the closing of Hawaii Medical Center West (HMC-West) in 2011. The center provided full hospital services, as well as acute care and emergency services. Current services in the area include private practices and the Kapolei Medical Park on Fort Barrette Road which provides urgent care, family care, internal medicine, and outpatient medical services.

In 2012, the Queen's Health System (Queen's) announced it would be reopening the HMC-West facility as the Queen's Medical Center-West Oahu in 2014. The facility, according to Queen's, will provide both emergency and hospital services to the surrounding community.

3.11.3 PARKS AND RECREATION AREAS

Parks and recreation areas in the vicinity of Kalaeloa include some beach parks (One'ula Beach Park and Barbers Point Beach Park), regional parks (Kapolei Regional Park), and golf courses (Hoakalei Country Club, Coral Creek, Kapolei, 'Ewa Villages, West Loch, 'Ewa Beach, and Hawaii Prince).

Within Kalaeloa and project corridor, the parks and recreation areas include Navy beach parks (White Plains Beach Park, Nimitz Beach cottages and recreation area) and the Navy's Barbers Point Golf Course. Future recreation areas include the City's proposed Kalaeloa Regional Park on the shoreline area along Tripoli Street on properties to be conveyed by the Navy.

3.11.4 SCHOOLS

The project corridor is located within the Leeward School District. The schools most proximate to the project corridor include the following:

- Elementary schools: Mauka Lani, Makakilo, Kapolei, and Barbers Point
- Middle school: Kapolei Middle School
- High school: Kapolei High School

3.11.5 SOLID WASTE

The City has the Waimanalo Gulch Landfill north of the ‘Ewa Plain and H-POWER refuse to energy plant in the Campbell Industrial Park to accommodate solid waste disposal.

Demolition and construction debris from the excavation, removal of old poles and installation of new poles would be disposed of in accordance with State and City requirements. The majority of the debris would include the excavated material from the excavation operation.

3.11.6 PROBABLE IMPACTS AND MITIGATION MEASURES

The proposed action is not expected to generate an increase in demand for police, fire, emergency response, medical services, schools, parks, and recreation areas.

During construction, police traffic control services may be needed for the Franklin D. Roosevelt Avenue, Essex Road and Geiger Road area.

During construction, solid waste generated from construction activities would go either to a recycler or to a licensed debris landfill, such as the PVT Landfill in Nānākuli. The impact on the area’s solid waste facilities is anticipated to be minor.

The proposed action is not anticipated to impact parks and recreations areas. The project corridor runs adjacent to the proposed Kalaeloa Regional Park within the Tripoli Street ROW. The placement of power poles within the Tripoli Street ROW is not anticipated to preclude other uses or planned improvements. Potential visual and aesthetic impacts to the park from the proposed overhead lines are discussed in Section 3.12.

3.12 VISUAL AND AESTHETIC RESOURCES

3.12.1 EXISTING CONDITIONS

The ‘Ewa Plain occupies a relatively flat section of the ‘Ewa District that extends from Ko Olina to Pearl Harbor. There are almost 20 miles of ocean and Pearl Harbor shoreline. Mauka of the ‘Ewa Plain are two distinct mountain features: the southern portion of the Wai‘anae Mountains and the central portion of the Ko‘olau Mountain Range. The project area is relatively flat and many parts are surrounded by dense vegetation which limits view of or from the area. In places, mountain views are visible from the project area.

The *‘Ewa Development Plan*⁶³ identifies important visual landmarks and significant public views and vistas in the area, two of which are relevant to the project area: vistas of the shoreline over the ‘Ewa

⁶³ City and County of Honolulu. 2013. *‘Ewa Development Plan*.

Plain from H-1 Freeway and general mauka and makai views. The project area runs immediately adjacent to the proposed Kalaeloa Regional Park; however due to the flat topography and vegetation the project area is not visible from the coastal areas. The project area is not visible from White Plains Beach Park. The *'Ewa Development Plan* provides guidance for minimizing the visual impact of overhead power lines through providing sufficient width to permit the growth of landscaping adjacent to lines, where feasible.

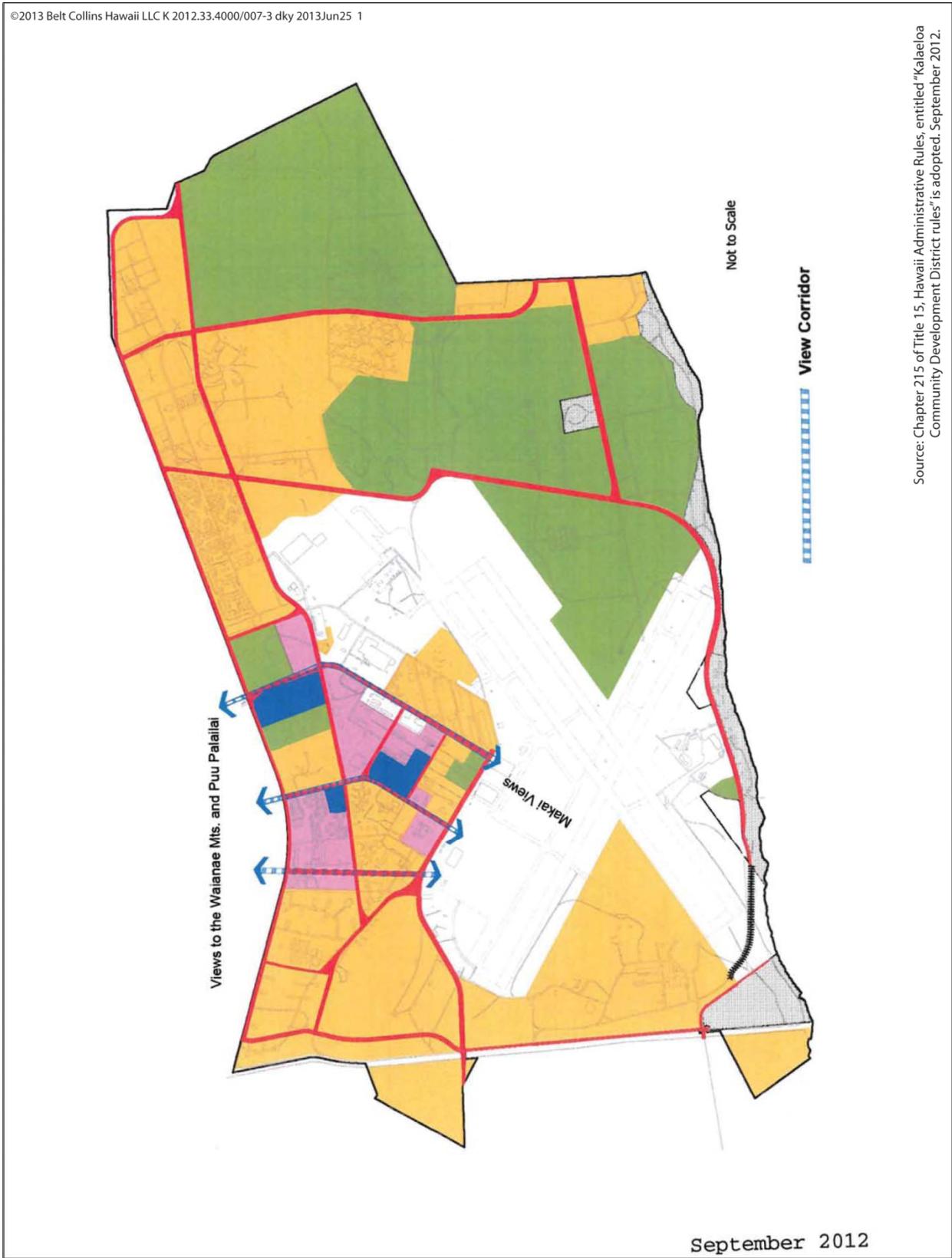
The *Kalaeloa Rules*⁶⁴ identifies view corridors, in which there are additional regulations to ensure mauka and makai views are preserved. All the identified view corridors are in central Kalaeloa, a large distance away from the project corridor (see Figure 3-16).

3.12.2 PROBABLE IMPACTS AND MITIGATION MEASURES

The proposed action includes approximately 20,700 linear feet of overhead electrical lines. Approximately 3,200 linear feet of overhead lines will be installed on existing poles on Franklin D. Roosevelt Avenue and on a section of Bismark Sea Street. Across the remaining approximately 17,000 linear feet of the project corridor, overhead electrical lines and new power poles will be installed. Along Essex Road and Tripoli Street 65-foot high poles (approximately 56 feet above ground) will be installed, and along Gambier Bay Street and Bismark Sea Street 45-foot high poles (approximately 36-39 feet above ground) will be installed. Along approximately 11,500 linear feet of the project area there are existing overhead lines; in these areas the existing 40-foot poles will be replaced with either 45-foot or 65-foot poles. The existing poles are placed at intervals of approximately 155 feet, whereas the new poles will be placed at intervals of approximately 200 feet, which will mean a reduction in the number of poles in areas. The portions of the project area that have existing overhead lines include Essex Road adjacent to the Ka Makana at Hoakalei residential area and most of Tripoli Street adjacent to the proposed Kalaeloa Regional Park; in these sections the existing 40-foot poles will be replaced with 65-foot poles. In these areas, the visual impact of the taller poles would be minimal as overhead lines will remain unchanged and there will be a reduction in the number of poles in areas. The majority of the approximately 5,500 feet of project area where there are not existing overhead lines is on a portion of Essex Road which is currently not open for public use; the new overhead lines and power poles will be visible from the Hoakalei Country Club Golf Course. On Gambier Bay Street 45-foot poles will be installed along an approximately 1,600-foot section that currently has no existing lines; the new overhead lines and power poles will be visible from the Barbers Point Golf Course. Due to the distance of proposed action from H-1 Freeway (over two miles) there will be no impact on the vistas of shoreline from H-1 Freeway.

Visual and aesthetic impacts from the 12kV electrical distribution lines are anticipated to be minor. The wooden poles will blend in with the existing vegetation in the area. Since the project is replacing existing power poles, the view will be similar to existing conditions.

⁶⁴ State of Hawai'i. September 2012. Chapter 215 of Title 15, Hawai'i Administrative Rule, entitled Kalaeloa Community Development District Rules.



Source: Chapter 215 of Title 15, Hawaii Administrative Rules, entitled "Kalaeloa Community Development District rules" is adopted. September 2012.

September 2012

Figure 3-16. Kalaeloa Rules View Corridors.

The Kalaeloa Infrastructure Master Plan Update⁶⁵ indicates that when full build-out of planned roadway improvements occurs, the undergrounding of utilities could be constructed in unison with the roadway improvements. Sections of the proposed corridor that the plan recommends for roadway improvements include Tripoli Street, portions of Essex Road and Franklin D. Roosevelt Avenue.

3.13 SOCIO-ECONOMIC SETTING

3.13.1 EXISTING AND ANTICIPATED CONDITIONS

The eastern side of the Kalaeloa Redevelopment District has no residential areas. Recreational uses include the Barbers Point Golf Course, next to the project corridor, and beach areas south of Tripoli Street. To the east, the Ocean Pointe/Hoakalei area is under development. Parts of the Ka Makana at Hoakalei neighborhood near Essex Road have been built. The Hoakalei Country Club Golf Course is also located across from the Kalaeloa Redevelopment District, near the project corridor.

Additional development is expected in both Kalaeloa and Ocean Pointe/Hoakalei areas. Recreational uses could eventually be located in lands near the energy corridor within Kalaeloa. At Hoakalei, a commercial area could be located along the road that is planned to connect to Tripoli Street.⁶⁶

Residential growth is anticipated in both areas, if not in the immediate vicinity of the East Energy Corridor. Within Ocean Pointe, the population is expected to increase from 3,800 in 2005 to 10,117 in 2035. Within Kalaeloa, the population is expected to increase from 1,547 to 10,534, according to the City's Department of Planning and Permitting.⁶⁷

3.13.2 PROBABLE IMPACTS AND MITIGATION MEASURES

The energy corridor will support existing uses along the southern and eastern sides of Kalaeloa. No adverse impact on local communities and populations is expected, since the corridor does not run through populated areas. Future residential growth will not be in or immediately adjacent to the energy corridor.

⁶⁵ State of Hawai'i, Hawai'i Community Development Authority. 2010. *Kalaeloa Infrastructure Master Plan Update – 2010 Draft*.

⁶⁶ State of Hawai'i. September 2012. Chapter 215 of Title 15, Hawai'i Administrative Rule, entitled Kalaeloa Community Development District Rules.

⁶⁷ The projections cited here were developed in 2009, so 2005 is taken as a base year. The Kalaeloa area for which population figures are cited includes Campbell Industrial Park as well as Kalaeloa. The projections are posted at <http://www.honoluluudpp.org/Portals/0/pdfs/planning/demographics2/Projections/2000-2035byDPSA.pdf>

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4 FEDERAL, STATE, AND COUNTY LAND USE AND ENVIRONMENTAL POLICIES

4.1 FEDERAL LAWS

The proposed action involves the use of U.S. Navy (Navy) property and work on the existing Navy power and communication distribution system in east Kalaeloa. The following is a review of the project's consistency with federal environmental policies and objectives.

4.1.1 COASTAL ZONE MANAGEMENT ACT OF 1972

The federal Coastal Zone Management Act of 1972 (CZMA) establishes a program for management, development, and protection of the nation's coastal zone. The states are authorized to develop and implement their own Coastal Zone Management (CZM) program, hence the Hawai'i CZM Program. The Office of Planning under the State Department of Business, Economic Development and Tourism (DBEDT) is designated as the lead agency to administer this program in Hawai'i. The individual counties of the state of Hawai'i are responsible for identifying and establishing the Special Management Areas (SMA) and shoreline setback areas of their jurisdiction.

Discussions of the project's relationship to the Hawai'i CZM Program and City and County of Honolulu's (City's) SMA are provided respectively, in Sections 4.2.3 and 4.3.6 of this chapter.

4.1.2 RIVERS AND HARBORS ACT OF 1899

The Rivers and Harbors Act is the oldest federal environmental law in the United States (U.S.). This Act makes it illegal to discharge refuse matter of any kind into the navigable waters of the U.S. without a permit. The Rivers and Harbors Act also makes it illegal to excavate, fill, or alter the course, condition, or capacity of any port, harbor, channel, or other navigable waters and their tributaries without a permit. Although many activities covered by the Rivers and Harbor Act are regulated under the Clean Water Act, the Rivers and Harbors Act retains independent vitality. The Act is administered by the U.S. Army Corps of Engineers.

The proposed action will involve digging to install the new utility poles. No waters of the U.S. are expected to be encountered. Man-made drainage features occur in the project's general vicinity: one to the east of Fort Barrette Road following the southern border of Kapolei Villages, and one planned to the west of Fort Barrette Road following Oahu Railway and Land Company's (OR&L's) western right-of-way (ROW) route. East of the Kalaeloa Redevelopment Area, the waters of Kalo'i Gulch have been directed through golf course flood control facilities to a lagoon within the Ocean Pointe/Hoakalei development. Construction of the new energy corridor will not impact these new drainage systems.

4.1.3 SECTION 1424(E) OF THE SAFE DRINKING WATER ACT OF 1974

The proposed project is located in the Southern O'ahu Basal Aquifer (SOBA). According to the Safe Drinking Water Act of 1974 (amended in 1986 and 1996), Section 1424(e), the Environmental Protection Agency (EPA) can prohibit federal funding for projects located in areas that overlie a sole source aquifer, if such projects threaten that aquifer. For federal-aid projects that could affect

the SOBA, a water quality assessment must be prepared and submitted to EPA for review. The current project is not receiving federal funding so this condition does not apply.

4.1.4 ENDANGERED SPECIES ACT OF 1973

The purpose of the Endangered Species Act is to protect critically imperiled species and to conserve the ecosystems upon which they depend. The Act's provisions encompass plants and invertebrates as well as vertebrates. The U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration, which includes the National Marine Fisheries Service, administer the Act.

Section 7 of the Endangered Species Act requires that federally-funded projects not jeopardize species listed as threatened or endangered or adversely modify designated critical habitats. A faunal survey of Barbers Point Naval Air Station (BPNAS) was conducted by Botanical Consultants in 1984.¹ A wide variety of avifauna was observed, but introduced species were most common. A flora and fauna survey conducted for this environmental assessment (described in Section 3.5) observed primarily introduced species in the project corridor. The survey observed the presence of the listed Endangered Hawaiian stilt in the project area and concluded that there was a high likelihood, based on environmental conditions and historical sightings, that the listed endangered Hawaiian hoary bat used the area. A section of the project is adjacent to a designated critical habitat area for the listed endangered 'Ewa Plains 'akoko plant. Through implementation of the mitigation measures described in Section 3.5, the project is unlikely to have any adverse impact on the listed species.

4.1.5 MIGRATORY BIRD TREATY ACT OF 1918

The purpose of the Migratory Bird Treaty Act is to protect migratory birds and birds native to the U.S. The Act prohibits the unregulated "taking" of covered species, which is defined as "hunting, pursuing, killing, possessing or transporting any migratory bird, nest, egg or part thereof." The Act extends to all bird species native to the U.S., even those that are not migratory. The Act is administered by the USFWS.

The flora and fauna survey conducted for this EA identified six species in the project area that are covered under the Migratory Bird Treaty Act. Through implementation of the mitigation measures described in Section 3.5, the project is unlikely to have any adverse impact on the covered species.

4.1.6 NATIONAL HISTORIC PRESERVATION ACT OF 1966

The National Historic Preservation Act of 1966 is legislation intended to preserve historical and archaeological sites in the U.S. The Act created the National Register of Historic Places (NRHP), the list of National Historic Landmarks, and in Hawai'i, the State Historic Preservation Division (SHPD). The Act requires that actions that are federally funded, authorized, or implemented take into account the effect that the proposed project will have on any district, site, building, structure, or object that is included in or eligible for inclusion on the NRHP. Section 106 of the Act sets up a process involving coordination and consultation with the local SHPD. Section 6E-8 of the Hawai'i Revised Statutes (HRS) establishes similar responsibilities for State projects to be reviewed by SHPD.

¹ Botanical Consultants. 1984. *Flora and fauna report of Naval Air Station, Barbers Point, O'ahu, Hawai'i*.

Section 3.4 of this document, entitled “Archaeological and Cultural Resources,” explains that archaeological and cultural studies have been conducted for the project corridor. Through the mitigation measures described in Section 3.4.3, the project is unlikely to have any adverse impact on archaeological and cultural resources. Consultation with SHPD will be conducted in accordance with Section 106 and Section 6E-8.

4.1.7 ENVIRONMENTAL JUSTICE

Executive Order 12898 regarding Environmental Justice requires each federal agency and federal aid recipients to take appropriate steps to identify and address “disproportionately high and adverse human health or environmental effects” of federal projects on minority or low income populations. Similar non-discrimination protection is provided by Title VI of the Civil Rights Act of 1964, as amended.

The proposed energy corridor will not discriminate against any particular group. It does not cut through any residential area. All customers of the new electrical and communications system, whether of a minority or majority ethnic group, or whether in a high-income, middle-income, or low-income group of the population, will benefit from the project. The proposed improvement will also occur in existing public ROWs, and no land takings or condemnations will be performed.

4.1.8 PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH AND SAFETY RISKS

Executive Order 13045 calls on federal agencies to ensure that their policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. The proposed energy corridor is located in an existing road ROW and along roads within an existing golf course property and does not cut through any residential area. The proposed energy corridor is not anticipated to pose any disproportionate risks to children.

4.2 STATE POLICIES AND STATUTES

4.2.1 STATE LAND USE LAW

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

The project site within Kalaeloa is located in the Urban District. Lands in this district encompass urban environments where existing development and foreseeable growth are anticipated and planned. See Figure 4-1.

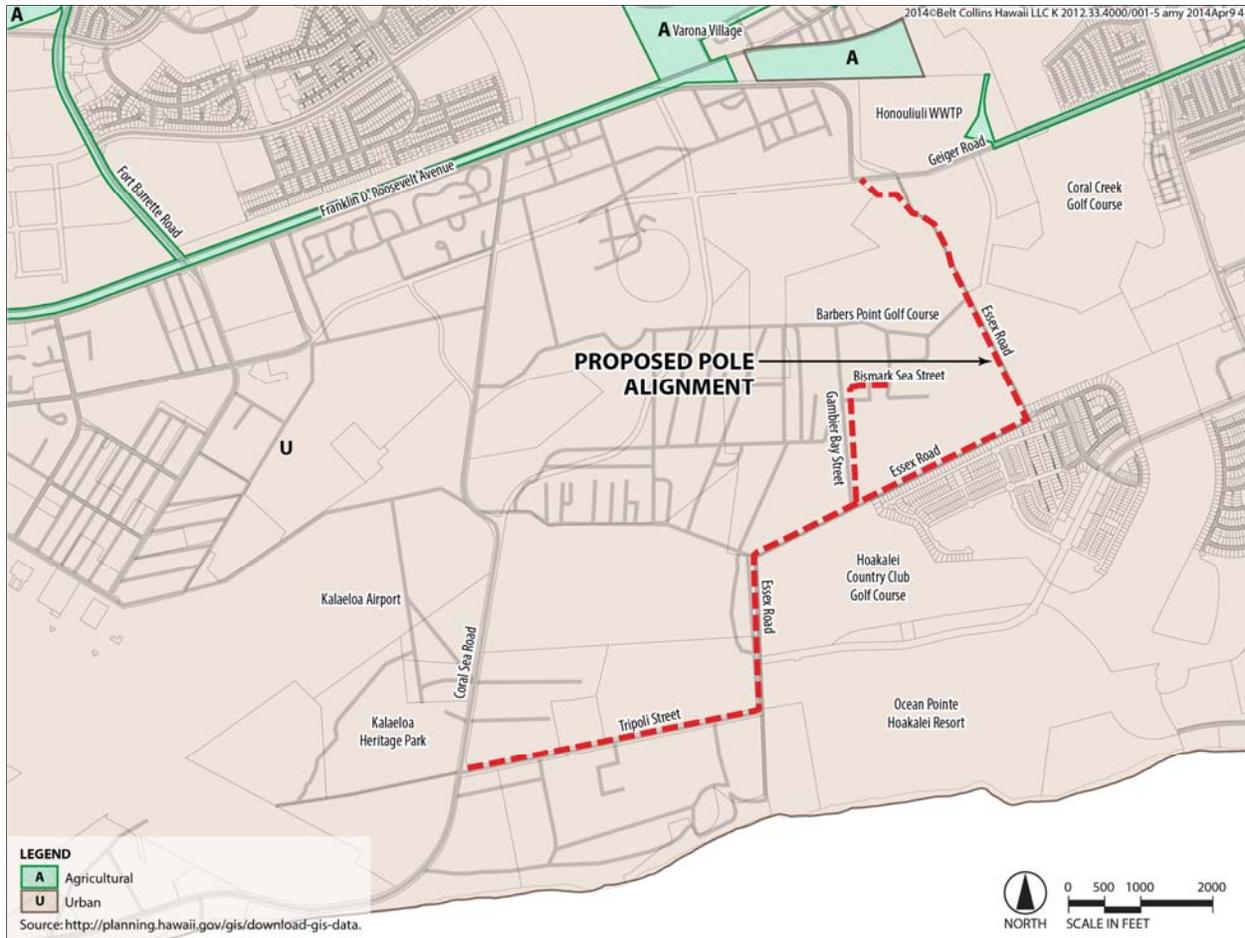


Figure 4-1. State Land Use Districts

4.2.2 STATE ENVIRONMENTAL POLICY

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

The proposed project is consistent with the following sections of the State Environmental Policy as follows:

HRS 344-3(2)(B) Enhance the quality of life by: Creating opportunities for the residents of Hawai'i to improve their quality of life through diverse economic activities which are stable and in balance with the physical and social environments.

HRS 344-4 (2)(F) Maintain an integrated system of state land use planning which coordinates the state and county general plans.

HRS 344-4 (5)(A) *Encourage industries in Hawai'i which would be in harmony with our environment.*

The proposed project calls for the installation of a new utility corridor. Such action is an improvement to the existing infrastructure that supports the development of Kalaeloa and its master planned uses. Kalaeloa is a major growth district of Leeward O'ahu and strives to promote the above-described State Environmental Policies.

4.2.3 HAWAII COASTAL ZONE MANAGEMENT PROGRAM

The Hawai'i CZM Program was promulgated in 1977 in response to the federal CZMA. The areas encompassed by the CZM are all the lands and waters of the state, including the northwestern Hawaiian Islands. The next sections assess the project in relation to the objectives and policies of the CZM Program.

4.2.3.1 Recreational Resources

The proposed project will not interfere with, nor obstruct public efforts to meet the CZM objective and policies relating to providing coastal recreation opportunities accessible to the public.

4.2.3.2 Historic Resources

Studies have been conducted to investigate and identify archaeological and cultural resources that might be impacted by the proposed project. Results of the studies found that with the mitigation measures described in Section 3.4.3 no archaeological or cultural resources impacts are anticipated.

4.2.3.3 Scenic and Open Space Resources

The proposed project is located in an existing road ROW and along roads within an existing golf course property. It would not interfere with nor obstruct public efforts to meet the CZM objective and policies relating to the protection, preservation, and restoration or improvement of the quality of coastal scenic and open space resources.

4.2.3.4 Coastal Ecosystems

The proposed project will be located inland of the shoreline and will not adversely affect valuable coastal ecosystems, including offshore reefs.

4.2.3.5 Economic Uses

The CZM objective and policies pertaining to economic uses provide for public or private facilities and improvements important to the State's economy in suitable locations. The proposed project is being installed to provide improved utility service and to support development, wherever it has been approved.

4.2.3.6 Coastal Hazards

The proposed project would not be adversely affected by coastal hazards, such as tsunami inundation, storm waves, stream flooding near the shoreline, and coastal erosion, subsidence or pollution.

4.2.3.7 Managing Development

The proposed project will not interfere with public efforts to improve the development review process, communication, and public participation in the management of coastal resources and hazards.

4.2.3.8 Public Participation

The proposed project is engaged in public participation by virtue of this EA preparation and public comment/response process. Through this State environmental review process, information and public awareness are generated on the project and its affected environment.

4.2.3.9 Beach Protection

The proposed project will not interfere with public efforts to protect beaches for public use and recreation. Operations of the new energy corridor will have no direct adverse impact on these natural resources of the state.

4.2.3.10 Marine Resources

The proposed project will not obstruct public efforts to implement the State's ocean resources management plan.

4.2.4 KALAELOA REDEVELOPMENT PLAN

In 2000, the Barbers Point Naval Air Station Redevelopment Commission (BPNASRC) prepared the Kalaeloa Redevelopment Plan to guide the transfer of the former BPNAS lands, which closed in 1999, to civilian control. The plan was accepted by the Honolulu City Council in 2001 as the Kalaeloa Special Area Plan.

4.2.5 KALAELOA MASTER PLAN

In 2002, the Hawai'i State Legislature passed legislation that transferred the redevelopment responsibility of Kalaeloa from the BPNASRC to the Hawai'i Community Development Authority (HCDA). In March 2006, HCDA prepared the Kalaeloa Master Plan to guide future redevelopment of the former BPNAS. Later in 2006, the Master Plan was approved by HCDA. The Master Plan updates the Kalaeloa Redevelopment Plan.

Within the Kalaeloa Master Plan, the project corridor crosses designated Industrial areas mauka of Franklin D. Roosevelt Avenue; crosses designated Recreation areas within the Barbers Point Golf Course (existing); crosses designated Mixed Use-High Intensity and Institutional; School/Cultural Center areas from the Barbers Point Golf Course to Tripoli Street/White Plains access road; and, finally, passes through designated Recreation/Cultural areas along Tripoli Street from the White Plains access road to Coral Sea Road. See Figure 4-2.

4.2.6 KALAELOA INFRASTRUCTURE MASTER PLAN UPDATE (2010 DRAFT)

The Kalaeloa Infrastructure Master Plan Update was prepared for HCDA and Kalaeloa Ventures, LLC in 2010. It identified steps towards conversion of most infrastructures to dedicated City facilities, and replacement of the Navy's electrical system with one that serves the entire developed area of Kalaeloa, links new renewable energy facilities with the island grid, and can be accepted by Hawaiian Electric Company. The proposed project is part of that process.

While the Kalaeloa Infrastructure Master Plan Update indicates that electrical and communication infrastructure will eventually be constructed underground, it identifies the need to construct and utilize overhead systems until the full build-out of planned roadway improvements occurs, at which time the undergrounding of utilities could be constructed in unison with roadway improvements. Sections of the proposed corridor that the plan recommends for roadway improvements include Tripoli Street and portions of Essex Road. Franklin D. Roosevelt Avenue and Coral Sea Road are also recommended for improvements.

The Kalaeloa Infrastructure Master Plan Update identifies the need for transmission lines to accommodate potential renewable energy projects. While not included in the plan, the 2012 HCDA Annual Report indicates three parcels (tax map keys [TMKs] 9-1-013:039, 9-1-013:042, and 9-1-013:067), which connect to the project corridor, are planned for photovoltaic energy production.² Notably, parcels 9-1-013:039 and 9-1-013:042 partially form the 'Ewa Plains 'Akoko Preserve and Critical Habitat Lowland Dry-Unit 11.

4.2.7 KALAELOA COMMUNITY DEVELOPMENT DISTRICT RULES

Adopted September 11, 2012, the Kalaeloa Rules establish land development regulations based on the vision and concepts of the Kalaeloa Master Plan. The Kalaeloa Rules regulate the types and intensities of development and land uses within Kalaeloa. The Kalaeloa Rules include a Thoroughfare Plan that is consistent with the roadway improvements recommended in the Kalaeloa Infrastructure Master Plan Update. The Kalaeloa Rules do not address the area's electrical system. See Figure 4-3.

4.2.8 KALAELOA AIRPORT MASTER PLAN

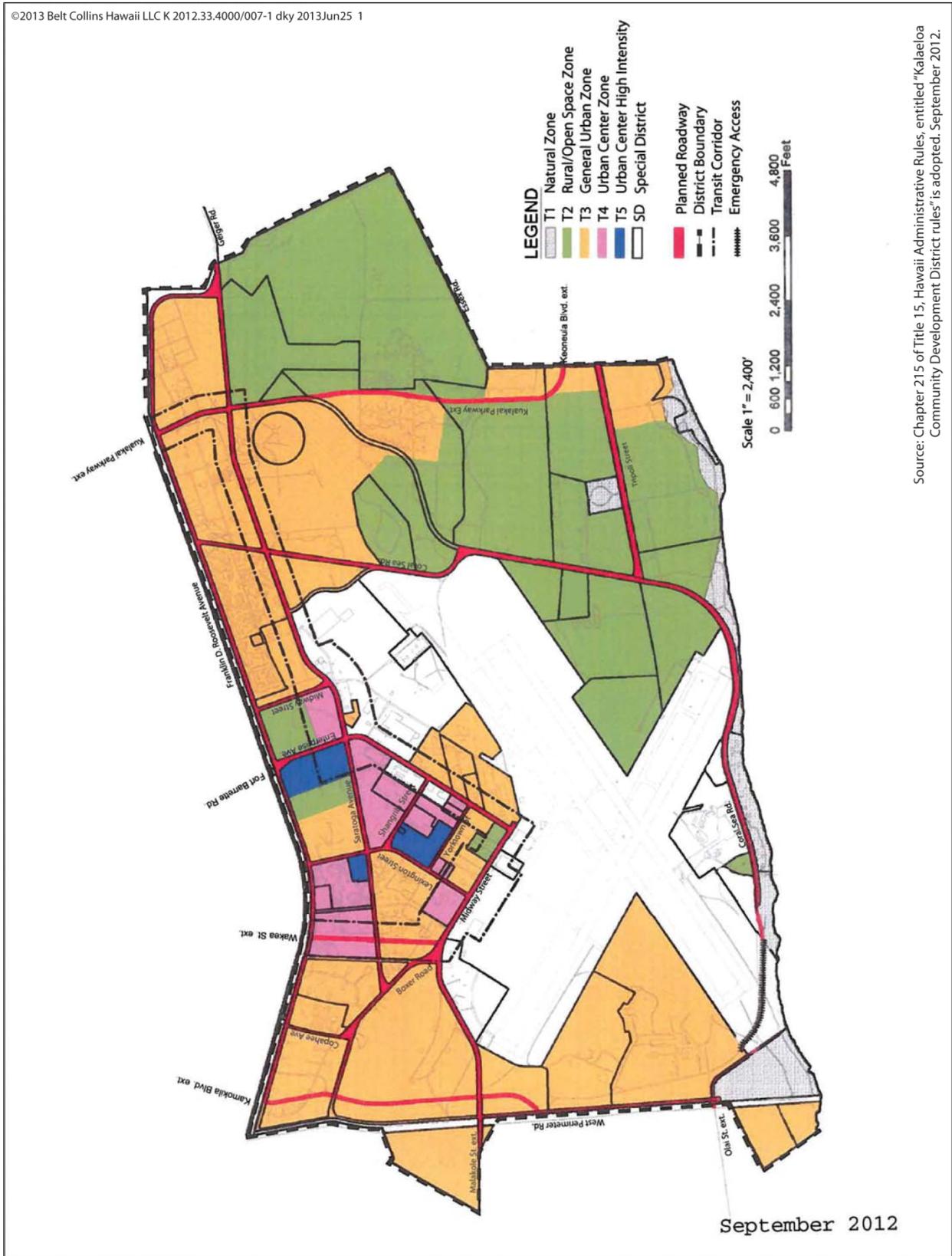
Kalaeloa Airport, which is owned by the State and operated by the Department of Transportation (DOT), Airports Division, occupies one of the largest sections (752.2 acres) of Kalaeloa. The airport is currently being used for general aviation.

The Kalaeloa Airport Master Plan was prepared by the DOT in 1998 in anticipation of the closing of BPNAS. In 1999, jurisdiction over the airport was transferred from the Navy to DOT. The Master Plan includes the transitions from existing land uses to new land uses, retention of some existing uses and facilities, and plans for facility improvements.

In 2010, the DOT prepared an EA for planned improvements to the airport.³ The improvements included the construction of eight banks of T-hangars for 144 general aviation aircraft and the development of eight lease lots and related access roads for use by lessees on about 54.4 acres within the airport grounds. Since the project lies well to the east of the airport, its impact consists of improvements to energy supply and reliability for the surroundings users, including the airport.

² State of Hawai'i, Hawai'i Community Development Authority. 2012. *2011 Annual Report*.

³ State of Hawaii Department of Transportation Airports Division. June 2010. Final Environmental Assessment/Finding of No Significant Impact, Kalaeloa Airport Development Plan Improvements.



Source: Chapter 215 of Title 15, Hawaii Administrative Rules, entitled "Kalaheo Community Development District rules" is adopted. September 2012.

Figure 4-3. Kalaheo Regulating Plan

4.2.9 HAWAII ARMY NATIONAL GUARD FACILITY IMPROVEMENTS

Hawaii Army National Guard (HIARNG) is a major occupant in Kalaeloa. It has approximately 150 acres that includes various former Navy hangers and barracks. HIARNG is continuing to make its transition to Kalaeloa, and in 2010, prepared an EA for the relocation and consolidation of its operations from around O’ahu to Kalaeloa. Part of the relocation/consolidation plan includes relocating all HIARNG aviation units from Wheeler Army Airfield to Kalaeloa, consolidation of Joint Forces Headquarters - HIARNG from Fort Ruger to Kalaeloa, consolidation of Combined Support Maintenance Shop to Kalaeloa, construction of an Army Aviation Support Facility, Brigade Readiness Center, Joint Forces Headquarters - HIARNG Readiness Center, Army Aviation Readiness Center, and various other support structures within its 150-acre site.

4.3 CITY AND COUNTY OF HONOLULU

4.3.1 GENERAL PLAN

The City’s General Plan, which was last updated on October 26, 2006, is comprised of 11 sections: Population; Economic Activity; Natural Environment; Housing; Transportation and Utilities; Energy; Physical Development and Urban Design; Public Safety; Health and Education; Culture and Recreation; and Government Operations and Fiscal Management.

The sections on Physical Development and Urban Design, and Transportation and Utilities are relevant to this EA and are presented and discussed in Table 4-1.

Table 4-1. Applicable Sections of the General Plan

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 1: Plan for the construction of new public facilities and utilities in the various parts of the Island according to the following order of priority: first, in the primary urban center; second, in the secondary urban center at Kapolei; and third, in the urban-fringe and rural areas.
COMMENT The proposed project fully supports the General Plan’s objectives and policies for physical development and urban design. The needed energy corridor will: (1) be well-designed and appropriate for the area; (2) occur in O’ahu’s second urban center; (3) supplement existing support services; and (4) will allow improved accountability of use of utility services.
TRANSPORTATION AND UTILITIES
OBJECTIVE C Maintain a high level of services for all utilities.
Policy 3 Plan for the timely and orderly expansion of utility systems.
OBJECTIVE D Maintain transportation and utility systems which will help O’ahu continue to be a desirable place to live and visit.
Policy 4 Evaluate the social, economic, and environmental impact of additions to the transportation and utility systems before they are constructed.

Table 4-1. Applicable Sections of the General Plan

COMMENT

The proposed energy corridor is intended to improve the basic infrastructure and maintain a high level of service for utilities in Kalaeloa, which is currently undergoing redevelopment and growth.

4.3.2 'EWA DEVELOPMENT PLAN

The 'Ewa Development Plan (DP) was approved by the County Council in July 2013; updating the 1997 plan and 2000 revision. The 'Ewa DP provides the City's conceptual, long-range vision and policies on land use and infrastructure development in the 'Ewa Plain (see Figure 4-4). The 'Ewa DP designates Kalaeloa as a Special Area. Its development is guided by the Kalaeloa Redevelopment Plan. This special area has its own Master Plan (see Section 4.2.5) under HCDA, which currently has jurisdiction over Kalaeloa. The plan calls for the Kalaeloa Master Plan to be submitted to the City Council for passage as a revised Special Area Plan.

The 'Ewa DP provisions related to the historic and cultural resources, natural resources, the electrical power development and the Kalaeloa Regional Park are relevant to the proposed project and are discussed in the following sections.

4.3.2.1 'Ewa Historic and Cultural Resources

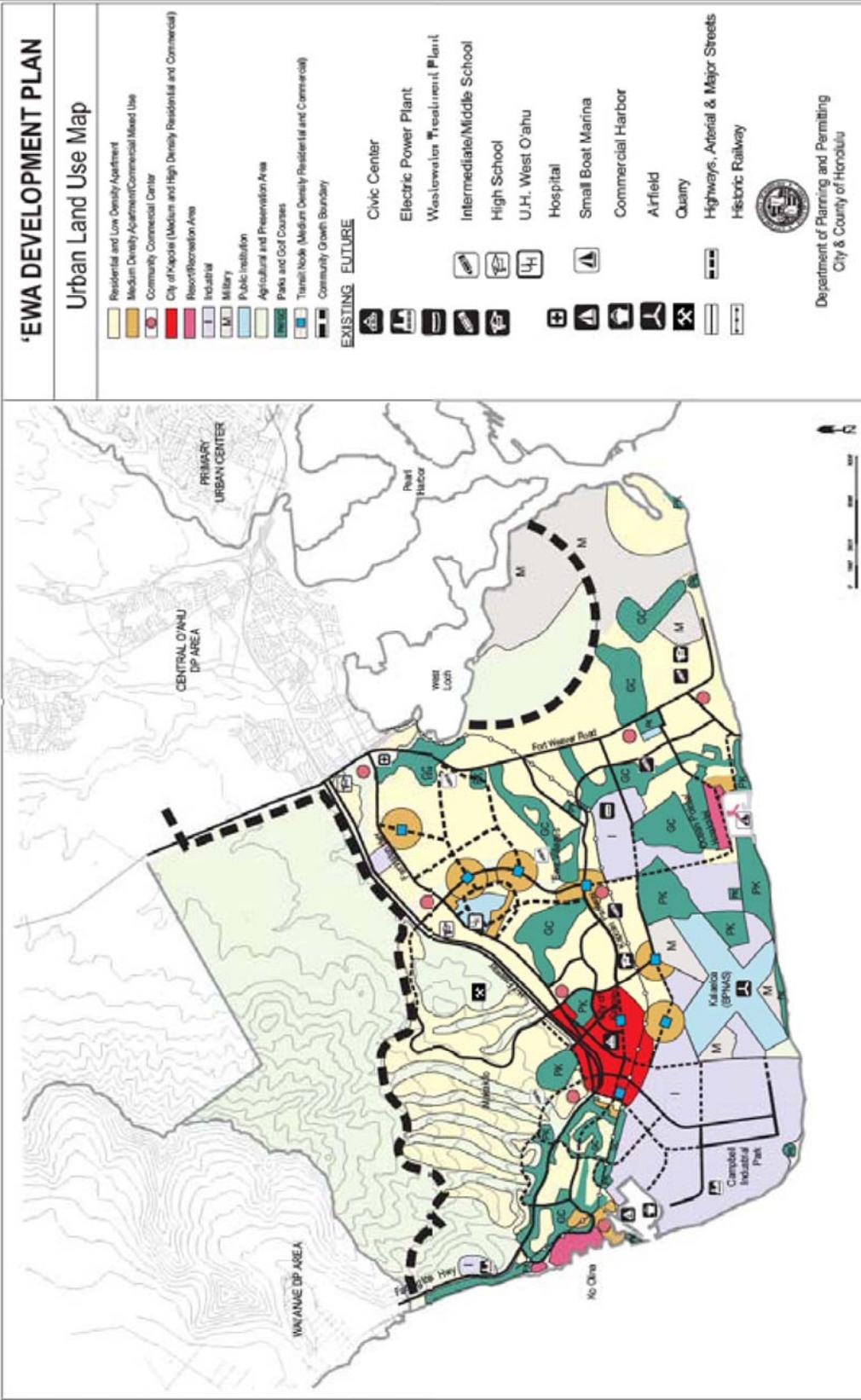
The 'Ewa DP includes general policies on preserving 'Ewa's historical and cultural roots to define the area's sense of place. These policies call for protecting visual landmarks, creating cultural landmarks, preserving historic features, and retaining significant vistas. The policies include appropriate treatment of sites, including in situ preservation, and implementation of approved mitigation measures. Guidelines for implementing the general policies are also provided.

The historic, cultural, and visual resources are discussed below.

Historic Resources: The 'Ewa DP identifies the following significant historic features and landmarks: 'Ewa Plantation Villages, 'Ewa Marine Corps Air Field, Honouliuli Internment Camp, Lanikuhonua, OR&L Historic Railway & Railway Stock, Pearl Harbor National Historic Landmark, Pu'u Makakilo, Pu'u O Kapolei/Fort Barrette. See Figure 4-5.

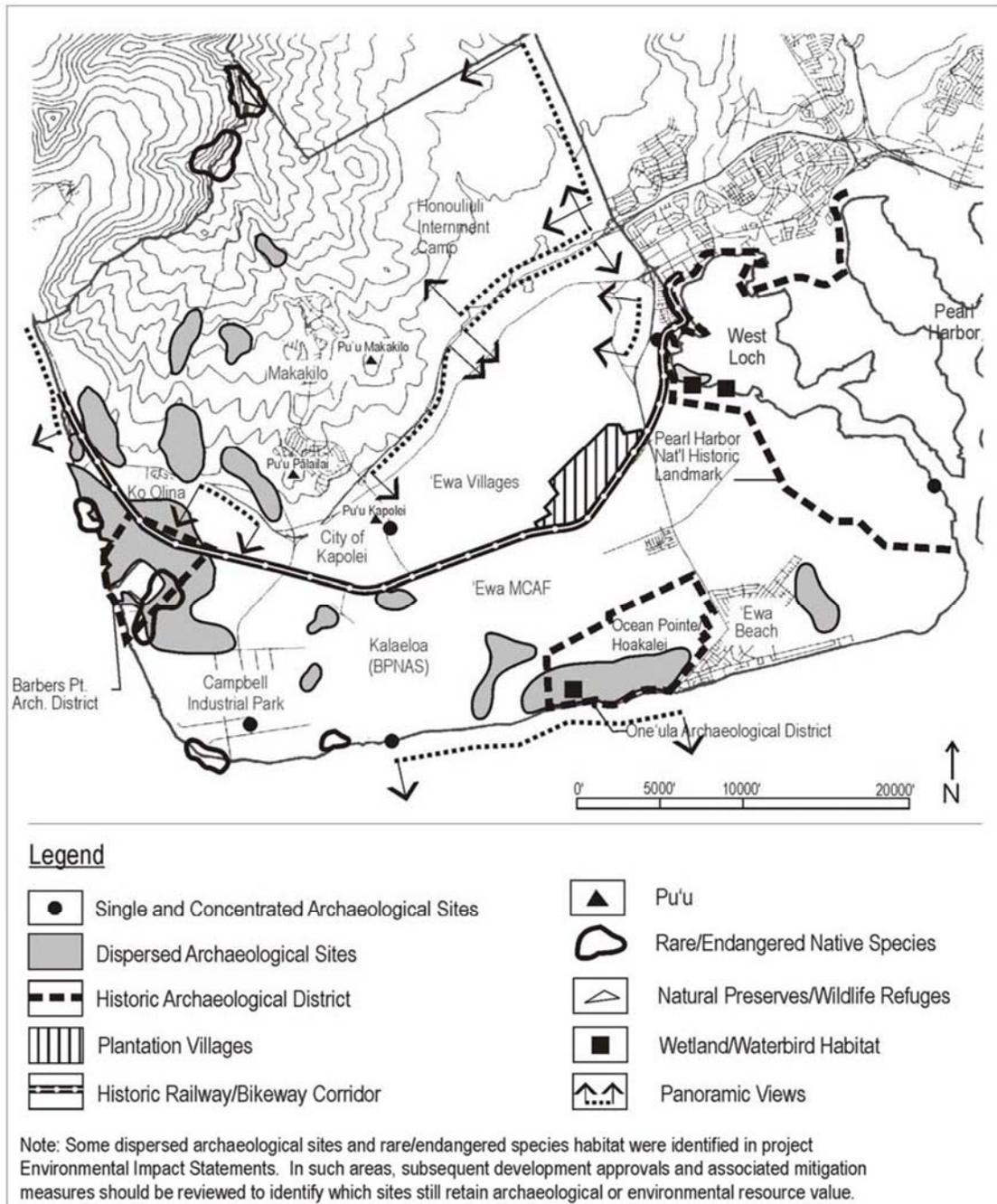
The project corridor does not affect these identified historic features and landmarks. The project corridor begins just south of the historic OR&L ROW (TMK 9-1-017:003) and runs near a portion of the 'Ewa Marine Corps Air Field parcel (TMK 9-1-013:096), but does not traverse any historic features at either site.

Cultural Resources: The 'Ewa DP also identifies the important Native Hawaiian Cultural and Archaeological Sites as follows: Barbers Point Archaeological District, 'Ewa Beach Midden Site, 'Oki'okirole Pond, and One'ula Archaeological District. See Figure 4-5. Of these sites, the project corridor along portions of Essex Road and Tripoli Street crosses a portion of the dispersed archaeological sites on the west side of the Ocean Pointe/Hoakalei development.



Source: City and County of Honolulu, 2013. "Ewa Development Plan".

Figure 4-4. 'Ewa Development Plan



Source: City and County of Honolulu. 2013. "Ewa Development Plan".

Figure 4-5. Natural, Historic and Scenic Resources in the 'Ewa DP

For Native Hawaiian Cultural and Archaeological Sites, the general guideline includes implementing an appropriate method of preservation, establishing appropriate site boundaries, setbacks, restriction and sight lines for adjacent uses; and determining appropriateness of public access.

An archaeological assessment of the project corridor indicated that through implementation of mitigation measures no archaeological sites would be adversely affected by the proposed action.⁴ See Section 3.4 for further discussion.

Visual Landmarks and Vistas: The 'Ewa DP seeks to maintain views of significant landmarks and vistas and states, "Whenever possible, relocate or place underground overhead utility lines and poles that significantly obstruct public views, under criteria specified in State law."⁵

Although overhead electrical lines are proposed, much of the work includes replacement of existing overhead electrical lines. See Section 3.12 for more discussion of visual and aesthetic resources.

4.3.2.2 'EWA NATURAL RESOURCES

The 'Ewa DP identifies the conservation of natural resources as one of the ten key elements. Natural resources are defined as including potable water, coastal water quality, and wetlands, and other wildlife habitat. The 'Ewa DP identifies eight areas for conservation action, two of which are applicable to the proposed project: protecting valuable habitat for endangered plants located within Kalaeloa; and, protecting endangered fish and invertebrates present in sink holes as Ordy Pond.

The project corridor runs adjacent the 'Ewa Plains 'Akoko Preserve and Critical Habitat Lowland Dry-Unit 11, and near Ordy Pond. All work to the proposed action is to occur within the existing road ROW. Potential impacts and mitigation measures to Ordy Pond, the 'Ewa Plains 'Akoko Preserve and Critical Habitat Lowland Dry-Unit 11 are addressed in Section 3.5.

4.3.2.3 ELECTRICAL POWER DEVELOPMENT

The 'Ewa DP includes General Policies that recognize the increased demand for electrical power and the need to provide additional power plants and transmission lines based on island-wide studies and siting evaluations. The DP policies call for location of electrical power plants in areas planned for industrial use and away from residential areas. Other facilities, e.g. sub-stations and transmission lines, are to be reviewed and approved administratively. The policies also state, "Give strong consideration to placing any new transmission lines underground where possible under criteria specified in State law."

The proposed overhead power lines and the underground alternative are discussed in Section 2.

4.3.2.4 KALAELOA REGIONAL PARK

The creation of the Kalaeloa Regional Park is identified as one of the ten key elements in the 'Ewa DP. The proposed park is envisioned as a major center of community activity and an attraction for visitors from all of O'ahu. The park is planned to be developed into mauka and makai portions on lands to be conveyed to the City Department of Parks and Recreation by the Navy. The mauka

⁴ International Archaeological Research Institute, Inc. June 2013. *Archaeological Assessment for the East Kalaeloa Energy Corridor in the Kalaeloa Community Development District, Honouliuli Ahupua'a, 'Ewa, O'ahu, Hawai'i*. Prepared for Belt Collins Hawaii LLC.

⁵ City and County of Honolulu. 2013. *'Ewa Development Plan*.

portion would incorporate a wide range of activity areas, including athletic fields, a Hawaiian cultural park, and other passive and active recreation use areas and support facilities. The makai portion would include a large shoreline park, between the Ocean Pointe/Hoakalei development and Ko Olina, with beach recreation and support facilities. The Park is also proposed to include an endangered plant preserve (presumably Critical Habitat Lowland Dry-Unit 11, though the DP does not specifically identify the parcel).

The project corridor runs adjacent to the Kalaeloa Regional Park makai portion within the Tripoli Street ROW. The placement of power poles within the Tripoli Street ROW are not anticipated to preclude other uses or planned improvements. Potential visual and aesthetic impacts to the Park from the proposed overhead lines are discussed in Section 3.12.

4.3.3 'EWA ROADWAY CONNECTIVITY STUDY

Completed in May 2009, the City's 'Ewa Roadway Connectivity Study was formulated as a complement to the 2001 'Ewa Highway Master Plan and to identify opportunities to improve connectivity among the communities and developments being built in the 'Ewa Plain. The study particularly noted the need to ensure adequate connections with the proposed University of Hawai'i West O'ahu Campus and surrounding development; proposed housing development by the Department of Hawaiian Home Lands; and development proposed within the Kalaeloa Master Plan, as well as other large development projects such as Ho'opili and Ocean Pointe. The concept plan in the study is to be used as a reference document when reviewing development proposals by the Department of Planning and Permitting, particularly with respect to future street and bikeway locations.

The study's recommended roadway plan identifies Fort Barrette Road, for the long-term, as an arterial road with a bicycle/pedestrian way extending from Farrington Highway to Saratoga Avenue. It further shows Geiger Road extending to the west and connecting with Saratoga Avenue within Kalaeloa. Beyond 2030, Saratoga Avenue is shown to be realigned to the south to connect with Malakole Street in the Campbell Industrial Park. The Kalaeloa Master Plan calls for additional road connections: a link to Keoneula Boulevard and an extension of Tripoli Street east to the boundary with Ocean Pointe/Hoakalei, where it could connect with a new road in that subdivision.

4.3.4 O'AHU BIKE PLAN

The O'ahu Bike Plan, adopted August 2012, proposes bicycle facilities to create an integrated network of bikeways across O'ahu. It covers State and City facilities and is used to guide the City Department of Transportation Services' bikeway planning. In the project area, the plan proposes bikeway improvements to Essex Road, Franklin D. Roosevelt Avenue, and Coral Sea Road. The improvements are consistent with Kalaeloa Infrastructure Master Plan Update, with the exception of the O'ahu Bike Plan not recommending improvements on Tripoli Street.

In accordance with the Kalaeloa Infrastructure Master Plan, bikeway improvements would likely occur as a component of other roadway improvements, at which time there would be an opportunity to underground the electrical system.

4.3.5 CITY LAND USE ORDINANCE

Kalaeloa is currently a state community development district. The City's Land Use Ordinance map designation of F-1, Federal and Military Reservation District, reflects the zoning for the former BPNAS. See Figure 4-6.

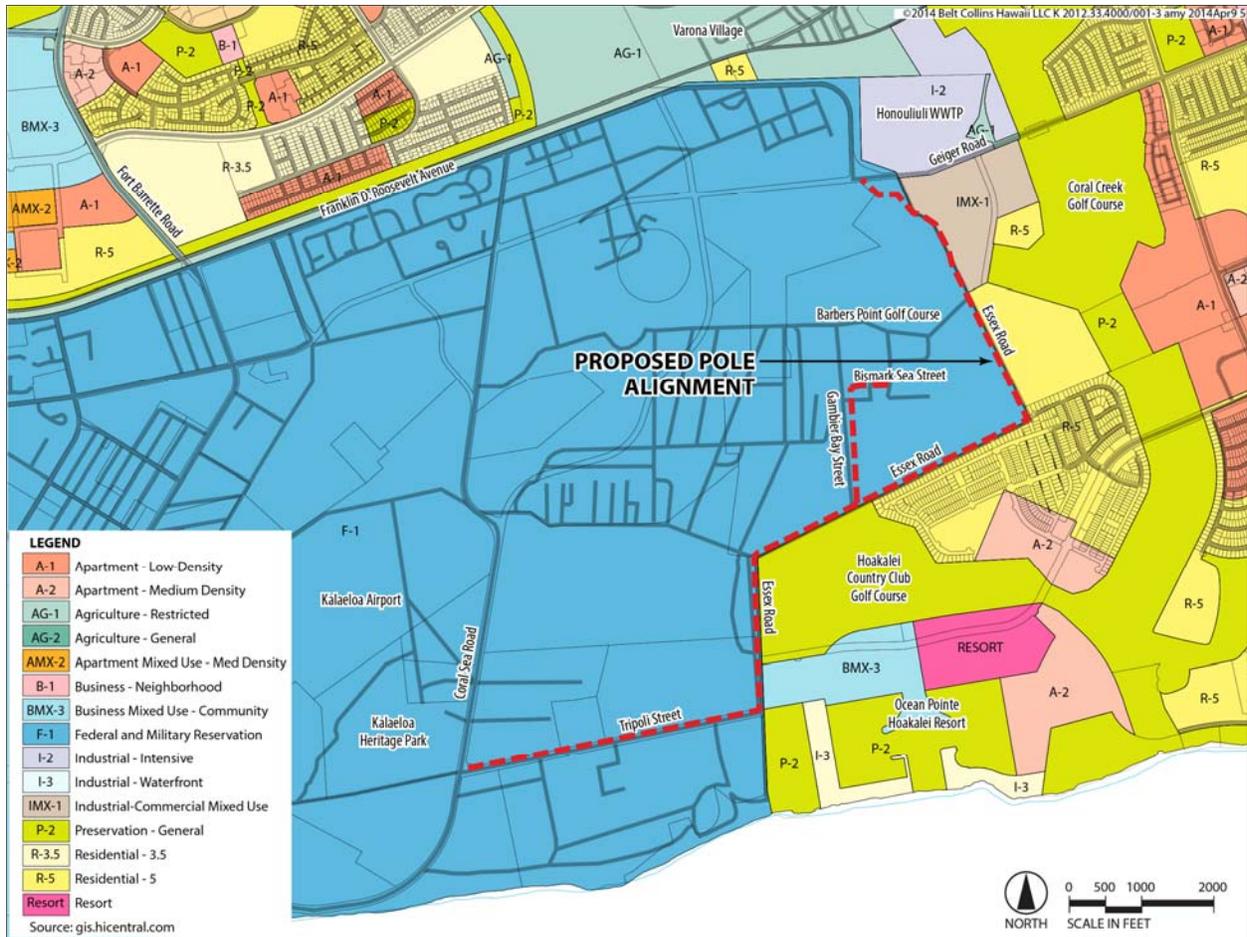


Figure 4-6. City Land Use Ordinance

4.3.6 SPECIAL MANAGEMENT AREA

The SMA on O'ahu is administered by the City. However, pursuant to Chapter 206E-8.5 of the HRS, DBEDT's Office of Planning administers the SMA within community development districts, such as the Kalaeloa Community Development District.

The SMA map shows the proposed corridor is outside of the SMA and, therefore, will not be subject to Chapter 15-150, Hawai'i Administrative Rules, governing SMAs within community development districts. See Figure 4-7.

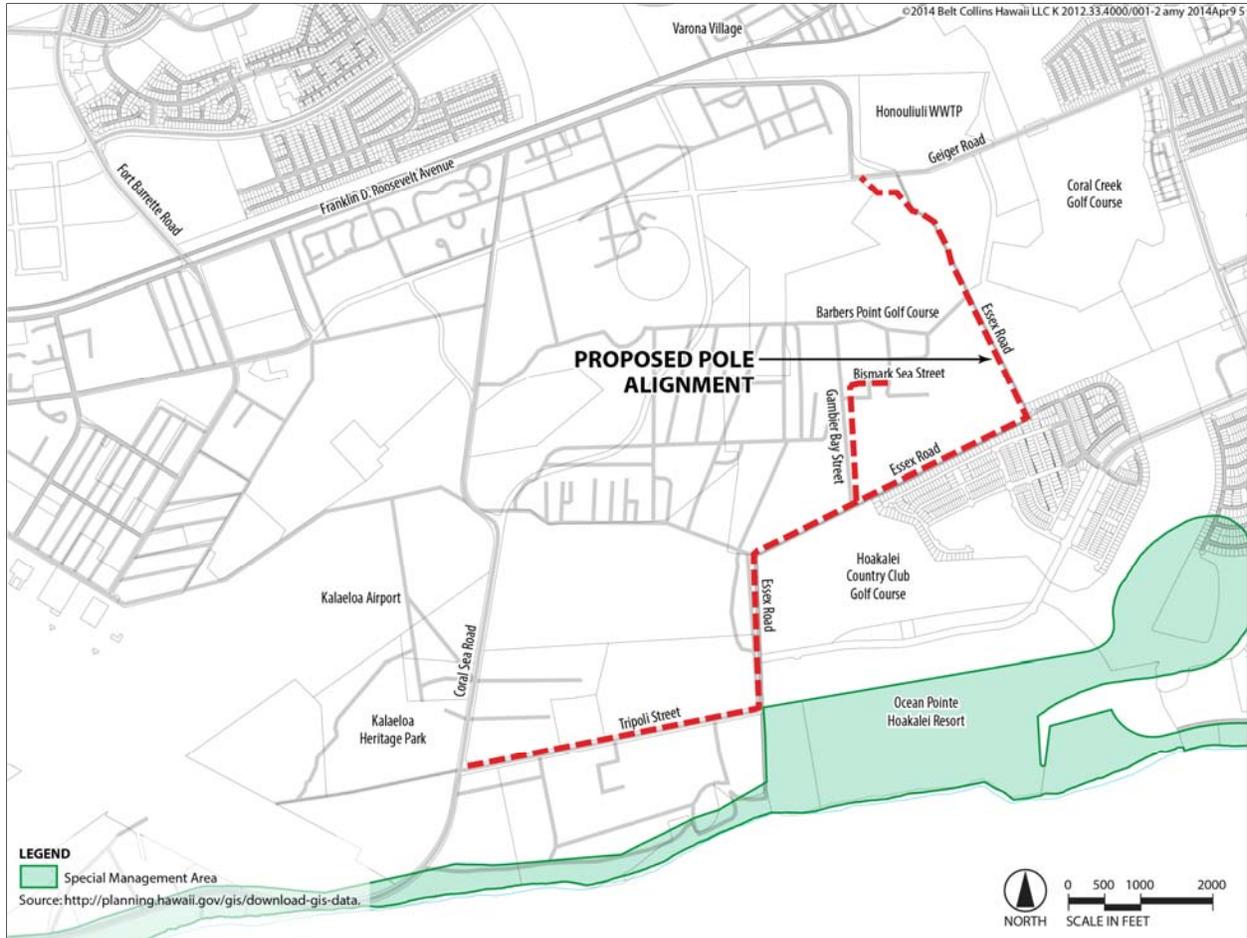


Figure 4-7. Special Management Area

4.3.7 SUMMARY OF REQUIRED PERMITS AND APPROVALS

The proposed action will require permits for the installation of new power lines and poles, and the removal and proper disposal of old power lines and poles. Table 4-2 provides a summary of required permits and approvals.

Table 4-2. Summary of Required Permits and Approvals

Construction Activity	Required Permit/ Approvals	Approving Agency
Construction work in Navy Kalaeloa Renewable Energy Park parcel (TMK 9-1-013:096)	Review and approval of construction plans. Permission to work on Navy property (Kalaeloa Ventures, LLC).	
Construction work on Essex Road, Gambier Bay Street, and Bismark Sea Street within Navy golf course parcel (TMK 9-1-013:095)	Review and approval of construction plans. Permission to work on Navy property.	
Construction work on Tripoli Street	Review and approval of construction plans	City Department of Design and Construction

Table 4-2. Summary of Required Permits and Approvals

Construction Activity	Required Permit/ Approvals	Approving Agency
Earthwork and installation of poles.	Grading permit and building permit.	City DPP
Designation of easements.	Subdivision permit.	City DPP
Construction area to be one acre or more in size.	National Pollutant Discharge Elimination System Permit	State DOH

5 ANTICIPATED DETERMINATION

This Draft Environmental Assessment demonstrates that the proposed action will have no significant adverse impact on the environment and that an Environmental Impact Statement is not warranted. A Finding of No Significant Impact is, therefore, anticipated for this proposed action.

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6 FINDINGS AND REASONS SUPPORTING ANTICIPATED DETERMINATION

The following findings and reasons indicate that the proposed action will have no significant adverse impact on the environment based on the 13 significance criteria provided in the Hawai'i Administrative Rules 11-200-12, and as a result supports the above anticipated determination.

- *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.*
Response. The flora, fauna, archaeological, and cultural impact studies conducted for this proposed action indicate that with the implementation of identified mitigation measures there would be no significant adverse impacts on natural or cultural resources.
- *Curtails the range of beneficial uses of the environment.*
Response. The proposed action involves the placement of power lines and poles within existing right-of-ways and/or within shoulders alongside existing roads. No uses are being displaced or curtailed by the proposed action.
- *Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, [Hawai'i Revised Statutes] HRS.*
Response. As demonstrated in this document, the proposed action is consistent with the State's long-term environmental policies and guidelines as expressed in Chapter 344, HRS.
- *Substantially affects the economic or social welfare of the community or state.*
Response. The proposed action is expected to sustain and improve utility service in the community, and hence contribute to the positive economic effect that a utility provides to a community. Moreover, the construction activity associated with the proposed action would mobilize labor jobs and infuse business and personal income into the local economy. No negative effects on the social welfare of the local community are anticipated.
- *Substantially affects public health.*
Response. The proposed action would not utilize hazardous materials or construction methods that would affect public health. The noise, air and water quality regulations of the Department of Health (DOH) would be followed. The proposed action would be implemented in accordance with state and public utility standards.
- *Involves substantial secondary impacts, such as population changes or effects on public facilities.*
Response. The proposed action occurs in areas that are largely identified for recreation and open space use on the master plan. No increase in residential population or public facility demands are expected by this proposed action.
- *Involves a substantial degradation of environmental quality.*
Response. The proposed action involves the installation of power poles that produce a minimal excavation of the land during construction. Once construction is complete, the areas around the installed power poles will be renaturalized. The new power poles will be

taller than the existing poles, but visually of similar diameter and material. Therefore, no substantial degradation of environmental quality is expected.

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

Response. The proposed action is being constructed under a single contract to install the 12 kilovolt (kV) power and communication distribution lines and 65-foot and 45-foot power poles. Future use of the power poles for 46kV lines are possible options, but needs to be reviewed and evaluated when future plans are available.

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

Response. The flora and fauna survey report indicates that no substantial affects are expected. During construction, employing Best Management Practices (BMPs) to minimize erosion runoff, limiting trimming of large trees, and the establishment of buffers and monitoring are expected to mitigate the potential effects on the critical habitat and protected species. After installation of the overhead power lines, there is a potential for bird strikes, but the risk of collision, according to the flora and fauna survey report, is minimal.

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

Response. During construction, the effects of dust and runoff will be mitigated by establishing and following BMPs. Construction noise will be mitigated by scheduling of work per DOH requirements to minimize the potential effects on nearby residences. Once construction is completed, no detrimental effects are expected from the power poles.

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

Response. The proposed action is situated outside of the flood plain, is at a distance from the beach and shoreline, and is on the outside edge of the tsunami evacuation zone. The presence of unseen sinkholes or karsts within the project corridor is unknown and will be mitigated during excavation of the pole holes.

- *Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.*

Response. The proposed action does not affect scenic vistas or viewplanes identified in county or state plans. The power poles in most instances will replace existing power poles.

- *Requires substantial energy consumption.*

Response. The excavation and installation of the power poles and the installation of the power and communication lines are short term uses of energy. The upgrade of the electrical system is intended to improve the delivery of electricity to the east Kalaeloa Community Development District customers.

7 COMMENTS

The agencies and interested parties contacted as part of the pre-consultation process are as follows:

Federal Agencies

- U.S. Army Corps of Engineers, Pacific Ocean Division
- U.S. Department of Commerce, National Marine Fisheries Service, Pacific Islands Regional Office
- U.S. Department of the Interior, U.S. Fish and Wildlife Service

State Legislature

- Senator Mike Gabbard, State Senate District 20
- Representative Karen Awana, State House District 43

State Agencies

- Department of Hawaiian Home Lands
- Department of Health
- Department of Land and Natural Resources (DLNR)
- Department of Transportation, Airports Division
- Department of Transportation, Highways Division
- Hawai'i Army National Guard
- Office of Hawaiian Affairs
- State Historic Preservation Division, DLNR

City Council

- Councilmember Kimberly Pine, Council District 1

City Agencies

- Department of Planning and Permitting

Other Interested Parties

- 'Ahahui Sawila o Hawai'i o Kapolei, Kapolei Hawaiian Civic Club
- Carmel Partners
- Gentry Homes, Ltd.
- Haseko Development, Inc.
- Hawai'i Aviation Preservation Society
- Hawai'i Historic Foundation

- Hunt Development
- Ka Makana Community Association

The agencies and interested parties that provided comments as part of the pre-consultation process are listed below. Copies of the comment and the response letters are included in Appendix D of this document.

- State of Hawai'i, Department of Health, Environmental Planning Office
- State of Hawai'i, Department of Land and Natural Resources, Land Division
- State of Hawai'i, Department of Land and Natural Resource, Division of Forestry and Wildlife
- State of Hawai'i, Department of Transportation, Airports Division
- State of Hawai'i, Department of Transportation, Highways Division
- City and County of Honolulu, Department of Planning and Permitting
- Ka Makana Community Association

8 REFERENCES

- Botanical Consultants. 1984. *Flora and fauna report of Naval Air Station, Barbers Point, O'ahu, Hawai'i.*
- City and County of Honolulu. 2013. *'Ewa Development Plan.*
- Federal Emergency Management Agency. 2011. *Flood Hazard Areas shapefile and metadata.* Obtained from <http://planning.hawaii.gov/gis/download-gis-data/>.
- Hawaiian Electric Company. December 28, 2006. *Investigation of 2006 Oahu Island-Wide Power Outage.* PUC Docket Number 2006-0431.
- Hawaiian Electric Company. June 2010. *Electric and Magnetic Fields (EMF) Fact Sheet.* Downloaded from HECO.com.
- ICF Jones & Stokes, Inc. and LeGrande Biological Surveys, Inc. July 2013. *Report of Findings, Terrestrial Vegetation and Wildlife Surveys, East Kalaeloa Energy Corridor, 'Ewa, O'ahu, Hawai'i.* Prepared for Belt Collins Hawaii LLC.
- Juvik, S. and J. Juvik. 1998. *Atlas of Hawaii, Third Edition.*
- Kaimipono Consulting Services. September 2013. *Cultural Impact Assessment for the East Kalaeloa Energy Corridor in the Kalaeloa Community Development District, Honouliuli Ahupua'a, 'Ewa, O'ahu, Hawai'i.* Prepared for Belt Collins Hawaii LLC.
- National Institute of Environmental Health Sciences of the National Institute of Health. June 2002. *EMF Electric and Magnetic Fields Associated with the Use of Electric Power Questions and Answers.* Prepared for NIEHS/DOE EMF RAPID Program. Downloaded from: www.niehs.nih.gov/emfrapid.
- National Cancer Institute at the National Institute of Health. April 21, 2005. *Fact Sheet, Magnetic Field Exposure and Cancer: Questions and Answers.* Downloaded at <http://www.cancer.gov/concertopics/factsheet/Risk/magnetic-fields>.
- National Grid. November 2009. *Electric and Magnetic Fields.* Downloaded at www.nationalgridus.com.
- Ron N.S. Ho and Associates, Inc. No date. Existing Electrical Distribution Map. From AutoCAD file.
- S. Keyes (Naval Facilities Engineering Command – Hawai'i), personal communication. December 9, 2013.
- Scientific Consultant Services, Inc. March 2014. *An Archaeological Inventory Survey Report for the Kalaeloa East Energy Corridor Improvements, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island, Hawai'i.* Prepared for Belt Collins Hawaii LLC.

Star-Advertiser. November 9, 2011. *Firefighters put out Ewa Villages brush fire*. Reported by Star-Advertiser staff.

Star-Advertiser. January 5, 2013. *Crews battle 50-acre brush fire in Ewa Beach*. Reported by Star-Advertiser staff.

State Commission on Water Resource Management. June 2008. *Hawaii Water Plan: Water Resource Protection Plan*.

State of Hawai'i. 1970. Hawai'i Revised Statutes, Chapter 341, Environmental Quality Control.

State of Hawai'i. 1974a. Hawai'i Revised Statutes, Chapter 343, Environmental Impact Statement.

State of Hawai'i. 1974b. Hawai'i Revised Statutes, Chapter 344. Environmental Policy Act.

State of Hawai'i. 1975. Hawai'i Revised Statutes, Chapter 205, Land Use Commission.

State of Hawai'i. 1997. *Guidelines for Assessing Cultural Impacts*. Adopted by the Environmental Council, November 11, 1997.

State of Hawai'i. 2012. Hawaii Administrative Rules Chapter 200 of Title 15.

State of Hawai'i. September 2012. Chapter 215 of Title 15, Hawai'i Administrative Rule, entitled *Kalaeloa Community Development District Rules*.

State of Hawai'i. 1997. "Guidelines for Assessing Cultural Impacts." Adopted by the Environmental Council, November 11, 1997.

State of Hawai'i, Department of Agriculture. 1977. *Agricultural Lands of Importance to the State of Hawaii (ALISH)*.

State of Hawai'i, Department of Health. July 6, 1984. *Underground Injection Control Program Quadrangle Maps*.

State of Hawai'i, Department of Health. 1992. Hawai'i Administrative Rules, Title 11, Chapter 23, Underground Injection Control. 22 September.

State of Hawai'i, Department of Health. January 19, 1994. *DOH Policy Relating to Electric and Magnetic Fields from Power-Frequency Sources*.

State of Hawai'i, Department of Health. 1996a. Hawai'i Administrative Rules, Title 11, Chapter 200. Environmental Impact Statement Rules. 31 August.

State of Hawai'i, Department of Health. 1996b. Hawai'i Administrative Rules, Title 46, Community Noise Control. 23 September.

State of Hawai'i, Department of Health. 2003. Hawai'i Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control. 14 November.

- State of Hawai'i Department of Health. *Underground Injection Control Program*. Accessed September, 12 2013. Downloaded at <http://health.hawaii.gov/sdwb/uicprogram>.
- State of Hawai'i. Department of Land and Natural Resources, Division of Forestry and Wildlife. 2007. *Communities at Risk from Wild-land fires* (gis metadata). Downloaded at <http://files.hawaii.gov/dbedt/op/gis/data/firerisk.txt>.
- State of Hawai'i, Department of Transportation, Airports Division. June 2010. *Final Environmental Assessment/Finding of No Significant Impact, Kalaeloa Airport Development Plan Improvements*. Prepared by Wilson Okamoto Corporation.
- State of Hawai'i, Department of Transportation, Airports Division. 2013. Kalaeloa Airport. Downloaded at <http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/oahu-pre-world-war-ii/kalaeloa-airport>.
- State of Hawai'i, Department of Transportation, Airports Division.. 2013. Kalaeloa Airport Air Traffic Statistics. Downloaded at <http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/oahu-pre-world-war-ii/kalaeloa-airport-air-traffic-statistics>.
- State of Hawai'i, Hawai'i Community Development Authority. 2006. *Kalaeloa Master Plan*. Prepared by Belt Collins Hawai'i LCC., et al.
- State of Hawai'i, Hawai'i Community Development Authority. October 2010. *Draft Kalaeloa Infrastructure Master Plan Update*. Prepared by Belt Collins Hawai'i LCC.
- State of Hawai'i, Hawai'i Community Development Authority. 2011. *Final Environmental Assessment – Kalaeloa Energy Corridor*. Prepared by Belt Collins Hawai'i LLC.
- State of Hawai'i, Hawai'i Community Development Authority (HCDA). May 2011. *Final Environmental Assessment, Kalaeloa Energy Corridor*. Prepared by Belt Collins Hawai'i LLC.
- State of Hawai'i, Hawai'i Community Development Authority. 2013. *2012 Annual Report*.
- Sterling, E. and C. Summers. 1978. *Sites of O'ahu*.
- U.S. Department of Agriculture. 1972. *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*.
- U.S. Fish and Wildlife Service. 2010. *Hawaiian Island Plants: Updated August 3, 2010 Listed and Candidate Species, as Designated under the U.S. Endangered Species Act*.
- U.S. Fish and Wildlife Service. 2012. *Final Rule formally designated Lowland Dry-Unit 11 as Critical Habitat under 50 CFR Part 17 for the 'Ewa Plains 'akako*. September 18, 2012 (77 FR 181, 57648).
- U.S. Navy. June 1994. *Naval Air Station Barbers Point Final Environmental Baseline Survey*.

- U.S. Navy. June 1994. *Environmental Baseline Survey for Naval Air Station Barbers Point, Oahu, Hawaii.*
- U.S. Navy. February 1999. *Final Environmental Impact Statement for the Disposal and Reuse of Naval Air Station Barbers Point, Hawaii.* Prepared by Belt Collins Hawai'i LLC.
- U.S. Navy. 2002. *Final Programmatic Agreement, Environmental Impact Statement. Ford Island Development.*
- U.S. Navy. September 2009. *Findings of Suitability to Transfer Lots 13058-D and 13058-G (Former Northern Trap and Skeet Range and Former Southern Trap and Skeet Range Property), Former Naval Air Station Barbers Point, Oahu, Hawaii.*
- U.S. Navy. August 2011. *Final Environmental Assessment, Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point.*
- U.S. Navy. November 2012. *Environmental Assessment, Kalaeloa Renewable Energy Park.* Prepared by Helber, Hastert and Fee Planners.
- Wagner, W. and D. Herbst. 1999. "Supplement to the Manual of the flowering plants of Hawaii," in *Manual of flowering plants of Hawaii, Revised Edition.* University of Hawaii Press and Bishop Museum Press, Honolulu, Hawai'i.
- Wertheimer, N. and E. Leeper. 1979. Electrical Wiring Configurations and Childhood Cancer. In *American Journal of Epidemiology*, 109: 3.
- Whistler, A. 2012. Botanical Survey for the 'Ewa Plains 'Akoko (*Chamaesyce skottsbergii* var. *kalaeloana*), Northern and Southern Trap and Skeet Range, Former Naval Air Station Barbers Point, O'ahu, Hawai'i. Prepared for Department of Navy, Naval Facilities Engineering Command Pacific & BRAC PMO West.

APPENDIX A

ARCHAEOLOGICAL INVENTORY SURVEY

**AN ARCHAEOLOGICAL INVENTORY SURVEY REPORT
FOR THE KALAELOA EAST ENERGY CORRIDOR IMPROVEMENTS,
HONOULIULI AHUPUA'A, 'EWA DISTRICT,
O'AHU ISLAND, HAWAII
[TMK: (1) 9-1-013]**

Prepared by:
Alexander Hazlett, Ph.D.,
and
Robert L. Spear, Ph.D.
April 2014
DRAFT

Prepared for:
Belt Collins HI, LLC
2153 N. King St., Suite 200
Honolulu, Hawaii 96819

SCIENTIFIC CONSULTANT SERVICES Inc.

1347 Kapiolani Blvd., Suite 408 Honolulu, Hawaii 96814

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ABSTRACT

At the request of Belt Collins HI, LLC, Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey for the Kalaeloa East Energy Corridor Improvements Project, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island, Hawaii [TMK: (1) 9-1-013]. The project will include the removal, relocation, and reinstallation of power poles in a 5,320.3-meter-long corridor along Essex Road from a point south of Roosevelt Avenue to Tripoli Street and west along Tripoli Street to Coral Sea Road, and along Gambier Bay Street up to Bismark Sea Street. The Area of Potential Effect (APE) includes the shoulder area on the side that the pole alignment is to be placed and the paved roadways. The APE did not include the other shoulder of the roadway.

The Archaeological Inventory Survey was conducted in advance of the proposed energy corridor improvements to determine the presence of historic properties (over 50 years old), and if sites are present, to document each site and gather sufficient information to evaluate the significance of the historic properties' features and to assess the function, age, and construction methods of those features in accordance with Hawaii Administrative Rules (HAR) §13-276. During the survey three new archaeological sites (State Sites 50-80-12-7572, -7573, and -7574) were identified. Site -7572 consisted of ten surface features interpreted as a military sewer waste and water system located on the east side of Gambier Bay Street. Site -7573 consisted of a single surface feature interpreted as a military structure foundation located at the intersection of Gambier Bay and Bismark Sea Streets. Site -7574 consisted of a single surface feature interpreted as a military concrete sidewalk located on the north side of the Essex Road segment oriented in a general east-west direction. Based on feature type, construction methods, and construction materials, all three sites were associated with military construction.

In addition to the pedestrian survey, SCS excavated shovel probes within the project corridor, in proximity to three previously documented sites (Sites-1731,-1734, and -5106) that lay adjacent to or within five meters of the current project corridor, to see if subsurface features reached into the project corridor. Recovered cultural material including glass, metal, basalt gravel, and plastic was collected for laboratory analysis to confirm archaeological origins. SCS verified that no previously documented sites or features were located within the project corridor either above or beneath the ground surface.

All three new sites have been evaluated for significance, as outlined in HAR §13-275-6, and found to be significant only under Criterion d, for information content. Thus, no further archaeological work is recommended for the three sites. Due to presence of previously documented sites in close proximity (5 m or less) to the project corridor, however, and the potential for discovering karst pits during project excavations, archaeological monitoring is recommended for all ground disturbance activities in the project corridor. In addition, orange construction fencing or other high-visibility flagging should be posted along the project boundary in the vicinity of previously documented sites -1731,-1734, and -5106, prior to ground disturbance activities in the project corridor, to ensure that project activities do not encroach on these sites.

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At the request of Belt Collins HI, LLC, Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey for the Kalaeloa Energy Corridor Improvements Project, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island, Hawai'i [TMK: (1) 9-1-013] (Figures 1-2).

The project will include the removal and reinstallation of power poles in a 5,320.3-meter-long (17,045-foot) corridor along Essex Road from a point south of Roosevelt Avenue to Tripoli Street and west along Tripoli Street to Coral Sea Road, and along Gambier Bay Street up to Bismark Sea Street. Associated ground disturbance will include the removal of old power poles, drilling new holes (approximately 2.74 meters [9 ft] deep, spaced approximately 61 m [200 ft.] apart in most segments of the project corridor) for the installation of new poles. Guy wire anchors will be installed where the alignment changes direction. 12 kilovolt overhead lines will be installed on the new poles. All poles will be installed in the shoulder areas next to the paved road. Construction of equipment pads will also be in the shoulder area next to the roadways.

The Area of Potential Effect (APE) includes the shoulder area on the side that the pole alignment is placed and adjacent paved roadways (Essex Road, Tripoli Street, Bismark Sea Street, Gambier Bay Street). Tripoli Street is the only public road being utilized for this project. All other roads are on Navy property. In the shoulder area, the bounds of the APE are determined by whichever of the following is nearest to the pole alignment - the edge of the public right-of-way, nearby fence, or a maximum width of 20 feet from the edge of pavement into the shoulder. The APE includes all areas where ground disturbance may occur, including all access, maneuvering, and staging areas.

Fieldwork, consisting of a pedestrian survey of the entire project corridor and the manual excavation of six shovel probes, was conducted from December 19, 2013 through January 10, 2014 by SCS archaeologist Guerin Tome, B.A., under the direction of Robert L. Spear, Ph.D., Principal Investigator. The Archaeological Inventory Survey was performed in order to identify and document archaeological sites; to gather sufficient information on the sites; to evaluate the significance of the sites, and to compile the information in accordance with Hawaii Administrative Rules (HAR) §13-276.

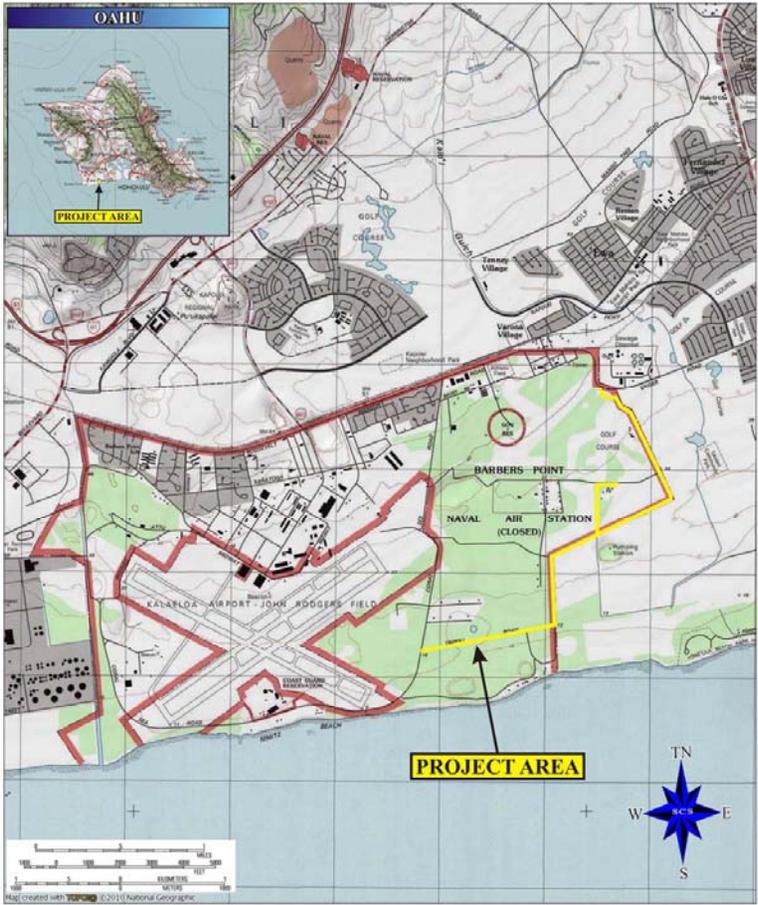


Figure 1: Portion of 1988 USGS Map (Ewa Quadrangle) Showing Location of Project Area.

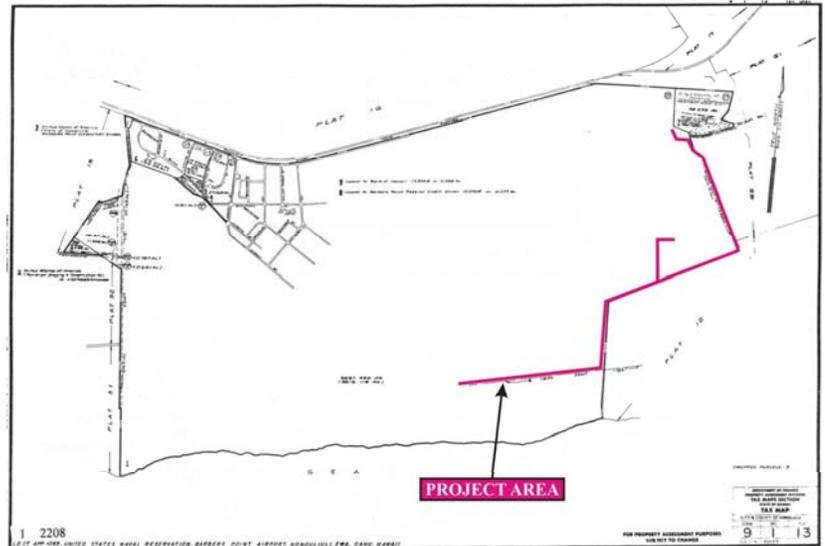


Figure 2: Tax Map Key [TMK: (1) 9-1-013] Map Showing Project Area Location.

During the survey three new archaeological sites (SCS Temporary Site TS-1 through TS-3 (State Sites 50-80-12-7572, -7573, and -7574), comprised of a total of twelve surface features, were identified. Based on feature type, construction methods, and construction materials, all three sites were associated with military construction. All cultural material identified during six shovel probes was collected for laboratory analysis; the collected material included modern bottle glass fragments, aluminum foil, an aluminum pull tab, plastic shard, and a fragment of styrofoam (based on materials found these materials date to the 20th century but without diagnostic features it is not possible to further characterize them).

ENVIRONMENTAL SETTING

The project area is located on the central portion of the 'Ewa Plain, the coastal plain that forms most of the lowlands of southwestern O'ahu. The topography in the project area is generally level or gently sloping, reaching a maximum height approximately 15.25 m (50 ft.) above mean sea level (amsl) at the northeast end of the project corridor. The project area consists of a 5,320.3-meter-long corridor along Essex Road from a point south of Roosevelt Avenue to Tripoli Street, and west along Tripoli Street to Coral Sea Road.

SOILS

The portion of the 'Ewa Plain where the project corridor is located is primarily coralline limestone overlain by calcareous marine sediments (a coral reef that formed in the mid-Pleistocene era, during the Waimanalo +25-ft. high seastand) and soils (Macdonald *et al.* 1983:279, 420-421).

According to Foote *et al.* (1972: 29-30, 93-94; Map Sheets 44-45), soils in the project corridor consist of Coral Outcrop (CR), Mamala stony silty clay loam sloping 0 to 12 percent (MnC), and Ewa silty clay loam sloping 0 to 2 percent (EmA). Coral Outcrop (CR), generally consists of coral or cemented calcareous sand, with a thin layer of friable, red soil filling cracks, crevices, and depressions; Mamala stony silty clay loam (MnC) is a shallow, well-drained soil formed on alluvium that was deposited over coralline limestone or consolidated calcareous sand; and Ewa silty clay loam (EmA) is a well-drained soil developed on alluvium derived from basic igneous rock.

CLIMATE

Temperatures in the project area can range from 65 degrees Fahrenheit (F), during the winter months, to 85 degrees in the summer (Armstrong 1980: 58). Monthly rainfall can range from 7 to 95 millimeters (0.28 to 3.74 inches) (Giambelluca *et al.* 1986:21).

VEGETATION

Vegetation observed within the study area during the Archaeological Inventory Survey primarily consisted of introduced species including *koa haole* (*Leucaena glauca*); *kiawe* (*Prosopis pallida*) and various grasses.

CULTURAL HISTORICAL CONTEXT

The island of O'ahu ranks third in size of the eight main islands in the Hawaiian Archipelago. The Wai'anae and Ko'olau Mountain ranges were formed by two volcanoes. Through the millennia the constant force of water carved fertile amphitheater-headed valleys and rugged passes eroded at lower elevations providing access from one side of the island to another (Macdonald *et al.* 1983:218).

TRADITIONAL SETTLEMENT PATTERN

Archaeological settlement pattern data suggests that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas of the main islands between A. D. 850 and 1100, with populations eventually settling in drier leeward areas during later periods (Kirch 2011:3). Although coastal settlement was dominant, Native Hawaiians began cultivating and living in the upland *kula* (plains) zones. Greater population expansion to inland areas began around the 14th century and continued through the 16th century. Large scale or intensive agriculture was implemented in association with habitation, religious, and ceremonial activities.

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua'a*. During the pre-Contact Period (pre-1778), there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinarum*) and *mai'a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *'uala* (sweet potato, *Ipomoea batatas*) were cultivated. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985).

The generally accepted paradigm of Hawaiian settlement is that the earliest settlements were located in the wet, windward regions. As population pressure increased or politics

changed, populations began to branch out into leeward, less hospitable regions of Hawai'i, adapting their cultivation strategies as they moved into dryer climates (Cordy 2002). Previous archaeological studies have documented long-term Hawaiian settlement of the 'Ewa Plain, beginning around A.D. 1000-1250 and peaking between A.D. 1400 and 1800 (Athens et al. 1999:23; Davis 1990; Davis et al. 1995; Tuggle and Tomonari-Tuggle 1997a:18, 1997b:73-88, Appendices D-F).

PAST POLITICAL BOUNDARIES

Traditionally, the division of O'ahu's land into districts (*moku*) and sub-districts (*'ili*) was said to be performed by Mā'ilikukahi, a ruling chief of O'ahu, who was chosen by the chiefs to be the *mō'īho'oponopono o ke aupuni* (administrator of the government; Kamakau 1961). It was Mā'ilikukahi who had the Island of O'ahu thoroughly surveyed, and permanently defined the boundaries between the different divisions and lands (Fornander 1969:89; Kame'elehiwa 1992:26; Beckwith 1985: 383). Cordy (2002: 23) places Mā'ilikukahi's reign over O'ahu at the beginning of the 16th century. Mā'ilikukahi created six districts and six district chiefs (*ali'i 'ai moku*). Land was considered the property of the king or *ali'i 'ai moku* (chief who rules a *moku*) (Pukui and Elbert 1986: 20), which he held in trust for the gods. The title of *ali'i 'ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka'āinana* (commoners) worked the individual plots of land. It is said that Mā'ilikukahi gave land to *maka'āinana* all over the island of O'ahu.

In general, several terms, such as *moku*, *ahupua'a*, *'ili* or *'ili'āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua'a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua'a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua'a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *'ili'āina* or *'ili* were smaller land divisions next in importance to the *ahupua'a* and were administered by the chief who controlled the *ahupua'a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo'o'āina* were narrow strips of land within an *'ili*. The land holding of a tenant or *hoa'āina* residing in an *ahupua'a* was called a *kuleana* (Lucas 1995:61).

The project area was located in 'Ewa District, in the *ahupua'a* of Honouliuli, which is translated as "blue harbor" (Sterling and Summers 1978:1), or "dark bay" (Pukui et al. 1974:51). Incorporating 46,640 acres, Honouliuli is the largest *ahupua'a* in land area on O'ahu.

Honouliuli *Ahupua'a* is bounded by Pu'uloa *Ahupua'a* and Pearl Harbor to the east and southeast, by Waikele and Ho'ae'ae *Ahupua'a* to the northeast, Nanakuli and Wai'anae *Ahupua'a* to the north and west, and by the Pacific Ocean to the south.

PLACE NAMES

The name of 'Ewa District, may derive from a legend about two Polynesian gods who conducted a survey of O'ahu:

To mark boundaries of land they [the gods] would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land ['Ewa District] lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by that name. The stone that strayed [Sterling and Summers 1978:1].

According to and Elbert (1986:42) the word 'ewa, with an initial glottal stop, means "imperfect" or "incorrect," while the early-identical word ewa, without an initial glottal stop (an 'okina), translates as "unstable" or "strayed."

The project area lies in an area of Honouliuli called Kalaeloa, "long point" (Pukui et al. 1974:72). Kalaeloa was later named Barber's (also Barbers) Point after Captain Henry Barber, whose ship was wrecked on a coral shoal offshore on October 31, 1796 (Pukui et al. 1974:16-17). The Navy base that was established in and around the project area took its name from this event; the area was renamed Kalaeloa when Naval Air Station Barber's Point was decommissioned in 1999.

HISTORICAL BACKGROUND

Prior to Western Contact, Hawaiian settlement in the 'Ewa Plain seems to have been confined to small communities scattered across a hot, dry, and unproductive land (Athens et al. 1999:20, 27-28). Agricultural produce included 'uala (sweet potato, *Ipomoea batatas*) and 'ulu (breadfruit, *Artocarpus altilis*). A variety of fish, shellfish, and seaweed were available from fisheries in Pearl Harbor and offshore (Beardsley 2001:II.6; Haun 1991:152; Tuggle and Tomonari-Tuggle 1997a:9-17, 1997b:12-15), and large colonies of seabirds were available (Athens et al. 2002; Davis 1990; Tuggle and Tomonari-Tuggle 1997a:11-12, 1997b:13).

At contact, Honouliuli was most populous ahupua'a on the island; the majority of the population was distributed in the well-watered eastern portion near on Pearl Harbor. Captain Vancouver recorded his impressions of the arid coast of Honouliuli in 1792.

...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, Vol. II:217]

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, Vol. I:167].

...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, Vol. III:361-363]

After contact,, the landscape of the 'Ewa Plain was adversely affected by the introduction of domesticated animals and new vegetation species. which were allowed to graze freely about the land for some time after they were first introduced in the 1790s.

At contact, Honouliuli was the most populous ahupua'a on the island, but the population declined precipitously following contact. A missionary census in 1832 recorded the population as 1,026, by 1836 the population was down to 870 (Schmitt 1973:19, 22). In 1835, there were eight to ten deaths for every birth (Marion Kelly, in Haun 1991:157-158). Between 1848 and 1853, there was a series of epidemics of Western diseases (measles, whooping cough, and influenza) that contributed to the decline in population. By 1853, the population of all of 'Ewa and Wai'anae together was only 2,451 people, and by 1872, it was only 1,671 (Schmitt 1968:71). By the mid-19th century, much of the inland area of 'Ewa was probably abandoned because of the continuing population decline and consolidation of the remaining people in the town of Honouliuli.

After the conquest of O'ahu in 1795, Kamehameha granted the the lands of Honouliuli to Kalanimōkū. Kalanimōkū's heir was Miriam Ke'ahikuni Kekau'ōnohi, one of Liholiho's (Kamehameha II's) wives, and after his death, she lived with her half-brother, Luau'u Kahalai'a, governor of Kaua'i (Kelly in Haun 1991:164). Subsequently, Kekau'ōnohi ran away with Queen Ka'ahumanu's stepson, Keli'iahonui, and then became the wife of Chief Levi Ha'alelea. In 1848 Kekau'ōnohi was awarded 43,250 acres in Honouliuli (Land Commission

Award 11216) (Indices of Awards 1929; Kame'eiehiwa 1992). Upon her death on June 2, 1851, all her property was passed on to her husband and his heirs In 1863, the owners of the kuleana lands deeded their lands back to Ha'alelea to pay off debts owed to him (Frierson 1972:12). In 1864, Ha'alelea died, and his second wife, Anadelia Amoe, transferred ownership of the land to her sister's husband John Coney.

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 approximately 43,000 acres of land in the ahupua'a, constructed fences, drove in some 32,000 head of cattle, and developed a prosperous ranch that included approximately 10,000 acres of agricultural land, growing *kiawe* (Mesquite, which was well suited to the dry plain) beans for cattle fodder and *kiawe* wood for charcoal (Kelly, in Haun 1991:162),. In 1879, he also had the first artesian well in the Islands drilled behind his ranch house, making irrigation possible on these arid lands for the first time. The ranch extended from Pearl Harbor to Barbers Point and as far north as Wahiawa, in the center of the island (Day 1984:17-18; Yardley 1981:81, 100-102).

Another crop well suited to the dry 'Ewa Plain was sisal, which was grown to produce fibers for rope and other material. Sisal was planted primarily on the coastal plain, just inland of Kualaka'i; the initial planting were conducted before 1898 and production continued until the 1920s (Frierson 1972:16).

In early June 1888, William R Castle introduced a bill in the Legislature to empower the Minister of the Interior to contract with B. F. (Frank) Dillingham to construct and operate on O'ahu a steam railroad or railroads to transport both passengers and freight. The bill was passed in September 1888. In late 1888, Dillingham and Mark Robinson purchased 75 acres on the Mānana peninsula (later renamed the Pearl City Peninsula) In December 1888, Dillingham purchased 2,010 acres in 'Ewa from Robinson, leased an additional 18,000 acres for 20 years, and acquired 1,000 head of cattle, 50 horses, 45,000 railroad ties, and a steamer, the Ewa (Yardley 1981:72-733, 124-127, 135-136). In 1889, Campbell leased most of Honouliuli to Dillingham, who then subleased north and east portions of Honouliuli to William Richards Castle, who established Ewa Plantation Company to cultivate sugarcane across the Ewa Plain. Castle's Ewa Plantation became Dillingham's prime tenant (Yardley 1981:170-171). Ewa Plantation continued to cultivate sugar in 'Ewa until it was sold to Oahu Sugar Company in 1970; Oahu Sugar Company continued to cultivate sugar there until 1995 (Dorrance and Morgan 2000:46,49).

In 1889, Dillingham acquired a 50-year charter for the railroad company, not only as a railroad but as a land-development company. From 1889 on, Dillingham focused on connecting Honolulu to the north shore of O’ahu by railroad. Starting west from Honolulu, the railroad reached Pearl City in 1890, Wai’anāe in 1895, Waialua Plantation in 1898, and all the way to Kahuku in 1899 (Kuykendall 1967:III, 100). The railroad line ran across the center of the ‘Ewa Plain, generally laid along the makai (seaward) boundary of the sugar cane fields. This route paralleled the modern Roosevelt Avenue, just north of the northeast end of the project area (Tuggle and Tomonari-Tuggle 1997b:Fig. 6).

Much of southern Honouliuli, including the southwestern portion that eventually became NAS Barbers Point, continued to be used as ranchland or for sisal cultivation throughout the early 20th century. In the 1930s the U.S. Navy leased 700 acres from the Campbell Estate to create a dirigible mooring mast and a 1,500' oil-surfaced emergency landing field known as the Ewa Mooring Mast Field. In 1939 after the Navy dirigible program ended the field was turned over to the U.S. Marine corps and redeveloped as Marine Corps Air Station (MCAS) Ewa. In 1940 the Navy bought 3,500 acres adjacent to the southwest corner of MCAS Ewa and established Naval Air Station (NAS) Barbers Point. All of MCAS Ewa's aircraft were destroyed during the Japanese attack on O’ahu on December 7, 1941. NAS Barbers Point and MCAS Ewa were rapidly expanded during WWII. By the start of the Korean War, however, MCAS Ewa's runways proved to be too short for the new jet aircraft fielded by the Navy and Marine Corps, so the Marines relocated their aircraft to MCAS Kaneohe and MCAS Ewa was decommissioned and incorporated into NAS Barbers Point. NAS Barbers Point continued to serve as an active military installation until it was closed in the 1990s under the Base Realignment and Closure Act.

PREVIOUS ARCHAEOLOGY

Extensive archaeological research has been conducted at Barber’s Point Naval Air Station and numerous surrounding properties near the present project area that have revealed a consistent land use pattern in the area relating to habitation and fishing and agricultural activities for *maka‘āinana* and various *Ali‘i* families in addition to being renown for it’s association with the prominent legendary figures Kamapua‘a and Hi‘iaka. The *heiau* at Pu‘u o Kapolei was reported by Thrum (1907:46). The Western portion of Honouliuli has undergone numerous studies. Due to the time constraints of this particular project, these studies will be presented in chronological order in Table 1. A brief discussion of archaeological sites follows Table 1. The

reader is referred to Tuggle and Tomonari-Tuggle 1997 for a complete synthesis of cultural resources recorded on the ‘Ewa Plain prior to 1995. Table 1 was adapted from Cordy and Hammatt’s (2003) Archaeological and Related Studies in Western Honouliuli Ahupua‘a. Figure 5 further references several locations of previous archaeological investigations conducted in nearby vicinities and neighboring upland properties of the current project area.

Prior to Tuggle and Tomonari-Tuggle’s 1997 synthesis, Davis (1990) has produced the definitive synthesis of pre-Contact human settlement in Southwestern O’ahu and this section relies heavily on that work.

Table 1: Archaeological Studies in the Vicinity of the Project Area.

REFERENCE	DESCRIPTION OF STUDY	LOCATION OF STUDY
Thrum 1907	Heiau Study	Hawaiian Islands
McAllister 1933	Island Wide Survey	O’ahu
Kikuchi 1959	Site Letter Report	Barbers Point
Lewis 1970	Reconnaissance Survey	Barbers Point Harbor Area
Frierson 1972	Geologic Change in Honouliuli	Honouliuli
Barrera 1975	Reconnaissance Survey	Barbers Point Harbor Area
Clark and Connolly 1975	Reconnaissance Survey	Barbers Point Harbor Area
Oshima 1975	Reconnaissance Survey	Barbers Point
Sinoto 1976	Cultural Resources Survey	Barbers Point Harbor Area
Bordner 1977	Reconnaissance Survey	Kalo‘i Gulch
Davis 1978	Scholarly Paper	Barbers Point Harbor Area
Davis and Griffin 1978	Archaeological Survey	Barbers Point Harbor Area
Hawai‘i Marine Research Inc.	Reconnaissance Survey 1978	Barbers Point Harbor Area
Kirch 1978	Land Snail Study	Barbers Point Harbor Area
Sinoto 1978	Archaeological and Paleontological Salvage	Barbers Point Harbor Area
Barrera 1979	Archaeological Study	West Beach
Clark 1979	Reconnaissance Survey	Barbers Point Harbor Area
Cleghorn 1979	Reconnaissance Survey	Barbers Point
Davis 1979a	Emergency Excavations	Barbers Point Harbor Area
Davis 1979b	Emergency Excavations	Barbers Point Harbor Area
Davis 1979c	Emergency Excavations	Barbers Point Harbor Area
Komori and Dye 1979	Archaeological Testing	West Beach
Sinoto 1979	Cultural Resources Inventory	Barbers Point Harbor Area
Davis 1980	Research Design	Barbers Point
Kirch and Christensen 1980	Land Snail Study	Barbers Point Harbor Area
Christensen and Clark 1981	Land Snail Study	Barbers Point Harbor Area
Hammatt and Folk 1981	Archaeological and Paleontological Investigation	Barbers Point Harbor Area

REFERENCE	DESCRIPTION OF STUDY	LOCATION OF STUDY
Davis 1982	Academic Paper	Barbers Point
McCoy et al. 1982	Proposal for Investigations	Barbers Point Harbor Area
Neller 1982	Scholarly Study	Barbers Point
Ahlo and Hommon 1983	Reconnaissance Survey	Barbers Point Harbor Area
Bordner and Silva 1983	Reconnaissance Survey	Waimānalo gulch
Ahlo and Hommon 1984	Test Excavations	Barbers Point Harbor Area
Hammatt 1984	Reconnaissance Survey	Kahe Point
Haun and Kelly 1984	Research Design	Naval Air Station
Tuggle 1984	Survey Report	Naval Air Station
Neller 1985	Review and Evaluation	West Beach
Barrera 1986	Archaeological Investigations	West Beach
Davis and Haun 1986	Intensive Survey & Test Excavations	West Beach
Davis et al. 1986 a&b	Research Design	West Beach
Haun 1986a	Reconnaissance Survey	Kapolei
Haun 1986b	Reconnaissance Survey	Kapolei
Davis and Haun 1987	Intensive Survey & Test Excavations	West Beach
Rosendahl 1987a	Reconnaissance Survey	Kapolei
Rosendahl 1987b	Survey Report	Kapolei
Welch 1987	Reconnaissance Survey	Naval Air Station
Bath 1989a	Petroglyph Study	Waimānalo gulch
Bath 1989b	Burial Documentation	Kahe
Burgett and Rosendahl 1989	Sub-Surface Archaeological Testing	S. of Farrington Hwy.OR&L, W. of Kalaeloa Blvd.
Hammatt and Shideler 1989a	Archaeological Assessment	Barbers Point Harbor Area
Hammatt and Shideler 1989b	Reconnaissance Survey	Kahe
Kawachi 1990	Burial Documentation	Campbell Industrial Park Area
Carlson and Rosendahl 1990	Inventory Survey	Kaomi Loop Subdivision
Cleghorn and Davis 1990	Archaeological and Paleontological Investigation	Barbers Point Harbor Area
Davis 1990a	Archaeological and Paleontological Investigation	Barbers Point HECO Area
Davis 1990b	Archaeological and Paleontological Investigation	Barbers Point Harbor Area
Rosendahl 1990	Letter Report	Kapolei
Kennedy 1991	Subsurface Testing	Pu'u o Kapolei
Hammatt et al. 1991	Inventory Survey	Makaiwa Hills
Hammatt and Shideler 1991	Archaeological Assessment	Barbers Point Harbor Area
Haun 1991	Survey Report	Naval Air Station

REFERENCE	DESCRIPTION OF STUDY	LOCATION OF STUDY
Burgett and Rosendahl 1992	Inventory Survey	Barbers Point Harbor Area
Charvet-Pond and Davis 1992	Data Recovery Excavations	West Beach
Hammatt and Folk 1992	Subsurface Testing	Barbers Point Harbor Area
Glidden et al. 1993	Data Recovery Excavations	Paradise Cove
Jones 1993	Fossil Coral Reef Study	Hawaiian Islands
Landrum 1993	Reconnaissance and Subsurface Testing	Naval Air Station
Miller 1993	Data Recovery	Barbers Point Harbor Area
Davis 1993	Archaeological and Paleontological Investigation	Barbers Point Harbor Area
Hammatt and Shideler 1994	Archaeological assessment	Barbers Point Harbor Area
Hammatt et al. 1994	Inventory Survey	Barbers Point Harbor Area
Erkelens 1992	Archaeological Survey	Naval Air Station
Hammatt and Shideler 1995	Data Recovery Plan	Barbers Point Harbor Area
Jourdane 1995	Burial Documentation	Paradise Cove
O'Hare et al. 1996	Intensive Survey and Testing	Naval Air Station
Tuggle 1997	Inventory Survey	Naval Air Station
Tuggle and Tomonari-Tuggle 1994, 1997a, b, c	Cultural Resource Inventory Survey	Naval Air Station
Wickler and Tuggle 1997	Cultural Resource Inventory, Inventory Survey	Naval Air Station
Athens et al. 1999	Cultural Resource Inventory, Paleoenvironmental Investigations	Ewa Plain:Naval Air Station
Hammatt and Shideler 1999	Inventory Survey	Waimānalo Gulch
McIntosh and Cleghorn 1999	Archaeological Archival Research	Honouliuli
McDermott et al. 2000	Data Recovery	Barbers Point Harbor Area
Cordy and Hammatt 2003	Archaeological Assessment	Kapolei
Monahan 2004	Archaeological Inventory Survey	Palailai Gulch Area
Tulchin <i>et al.</i> 2007	Archaeological Assessment	Campbell Industrial Park Area
Hammatt and Shideler 2010	Archaeological Field Check and Literature Review	Naval Air Station
Tome and Spear 2010	Archaeological Monitoring	Naval Air Station
McElroy and Elison 2013	Archaeological Inventory Survey	Adjacent to Naval Air Station
Pacheco and Allen 2013	Archaeological Assessment	Naval Air Station
Medrano et al. 2014	Archaeological Inventory Survey	Naval Air Station

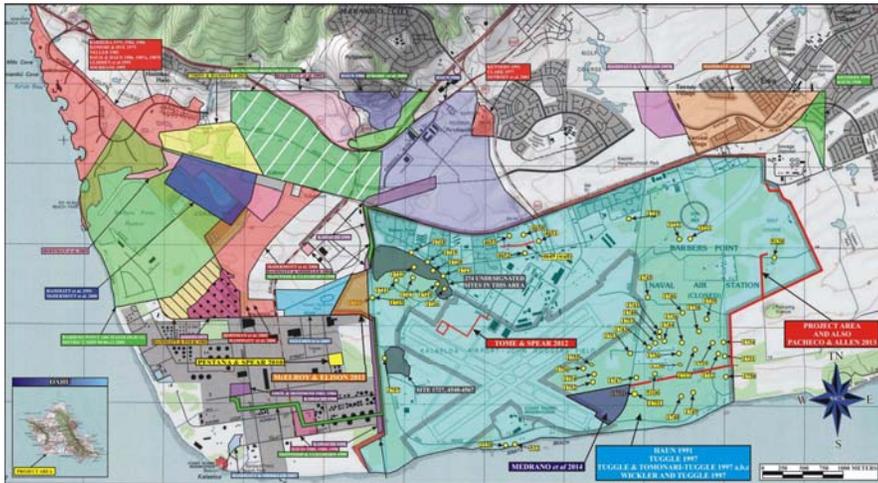


Figure 3: USGS 7.5-Minute Series Topographic Map, Ewa Quadrangle (TOPO 2002® Version 3.2.0), Showing Locations of Previous Archaeological Studies in Western Honolulu.

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PREVIOUS ARCHAEOLOGY IN THE VICINITY OF THE PROJECT AREA

Relatively few archaeological studies have been conducted in the eastern portion of the former Naval Air Station Barbers Point, and even fewer in the former Marine Corps Air Station Ewa. These studies are described below.

In 1986 Hawai'i State site number 50-80-13-2873 was assigned to the One'ula Archaeological District, under evaluation at that time for possible listing on the NRHP. The district was declared eligible on September 28, 1986, but was not fully listed at that time. Portions of the project corridor along Tripoli Road and Essex Road extend into the district, but the majority of the area covered by district, including the historically mapped settlement of One'ula, is located east, outside the current project corridor. Within the vicinity of the project corridor, the district includes sites 1730, 1731, 1734, 1750, 5103, 5108, 5109, and 5110.

Haun (1991) conducted an archaeological inventory survey of 1,310 acres at Barbers Point Naval Air Station, identifying 42 separate sites (State Site Numbers 50-80-12-1717 through 50-80-12-1758). Thirty-nine of the forty-two sites were recommended for registration in the National Register of Historic Properties. Site types identified included agricultural complexes, habitation complexes, other site complexes, walls, sinkholes, and mounds.

In 1992 and 1993, International Archaeological Research Institute, Inc. conducted an Archaeological Inventory Survey for construction projects at NAS Barbers Point (Tuggle 1997). The survey was conducted in two phases (I and II) to the west and northwest of the Naval Air Station. Phase I identified a total of 274 features, including five sites (State Sites 50-80-12-1718, -1719, -1720, -1723, and -1726) that were previously recorded by (Haun 1991). Features identified during this project were grouped into five sites (State Sites 50-80-12-4701, -4702, -1723, -1724, and -1726), three of which use previous site numbers. Features identified during Phase I included linear alignments, circular mounds, elongated mounds, modified outcrops, enclosures, sinkholes, C-, U-, and L-shaped structures, platforms, cairns, hearth and linear-stacked rock, the majority of which are related to pre-contact and early post-Contact Hawaiian occupation. Features from the 19th and 20th centuries also were recorded, including wall sections, a stone-lined irrigation ditch, concrete cistern, and a stone cattle tank. Military features include a concrete bunker and trash scatters. Phase II, was conducted in of a portion of Phase I (Area A) in order to provide detailed information on the cultural resources of the project area adequate for evaluation and management within the framework of historic preservation regulations (Tuggle 1997).

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In 1994, International Archaeological Research Institute, Inc., conducted two archaeological projects, a Reconnaissance Survey and a Phase I Inventory Survey of the entire Naval Air Station Barbers Point property. All relatively undeveloped areas of the Naval Air Station were covered by intensive survey, moderately developed areas were covered by either intensive survey or reconnaissance sweeps, and developed areas were covered by a general reconnaissance (Tuggle and Tomonari-Tuggle 1997:50). The 1994 Phase I survey covered the Haun (1991) survey areas (A through E), including four new areas (F through I) (see Figure 5; Tuggle and Tomonari-Tuggle 1997: Fig 20). Thirty-five archaeological sites, including a human burial site, were newly identified (State Sites 50-80-12-5119 through -5130), horizontal boundaries were modified for eight previously recorded archaeological sites, several areas were identified for subsurface investigation, and locations were clarified for State Sites -1727 and -4548 through -4567. During the 1994 project, State Sites 50-80-12-5119 and 50-80-12-5120 were identified in an area described as E6c, which was re-identified during the current project and are discussed below.

Phase II Part II of the 1994 Archaeological Inventory Survey (Tuggle and Tomonari-Tuggle 1997) was conducted by International Archaeological Research Institute, Inc. (Wicker and Tuggle 1997), which included mapping and testing of feature complexes at two Hawaiian sites and detailed mapping of military structures, including State Sites 50-80-12-5119 and 50-80-12-5120 (Wicker and Tuggle 1997).

Hammatt and Shideler (2010) conducted an Archaeological Field Inspection and literature Review for roadway improvements at five intersections in the eastern portion of the former Naval Air Station Barbers Point, including the intersection of Coral Sea Road and Tripoli Road (the southwest end of the current project area). Based on the heavily disturbed nature of the lands within the study areas they determined that it was likely that any surface archaeological sites were removed prior to or during the construction of the roads. No new archaeological features were observed in close proximity to the study areas, and no further archaeological work was recommended.

Tome and Spear (2010) conducted archaeological monitoring for the construction of the Kalaeloa Airport T-Hangers (c.15,094 sq. meters) and associated subsurface utility lines (c.2,200 meters total length). No archaeological cultural material or subsurface features were identified during monitoring, however, given that several vertical karstic limestone cavities were observed within the walls of several excavations and that archaeological resources had been found in

karstic limestone cavities just outside of the T-Hanger project area confines, archaeological monitoring was recommended for any future excavations within TMK (1) 9-1-013:032.

McElroy and Elison (2013) conducted an Archaeological Inventory Survey in a 43 acre parcel adjacent to the western border of the former Naval Air Station Barbers Point. Previously documented State Site 50-80-12-1725 was re-identified. Seventeen previously described features were re-located and ten new features were found. Subsurface testing of 4 features indicated that the Feature 4 c-shaped structure was likely used in the early-20th century as a military fortification, although the construction style of the structure suggested that it might have been built earlier, during traditional Hawaiian times. The other three excavated features did not yield any material to determine age or function. A WW II-era artifact found within the Feature 3 enclosure and bottle glass within the walls of the enclosures could not be correlated to the age of the structure. Data recovery was proposed for 4 of the 27 features of Site 1725, preservation was recommended for 17 features, partial preservation/partial data recovery was recommended for one feature, and no further work was recommended for five features.

Pacheco and Allen (2013) conducted an Archaeological Assessment of 34 previously documented archaeological sites in the area surrounding the current project corridor. They identified 5 of the 34 sites (State Sites 50-80-12-1734 and 5106, complexes of traditional features; and Sites 5109, 5112 and 5128, three military sites) that "...were found to contain features that either overlap the project corridor or are located within approximately 5 meters of the corridor." The project corridor and APE studied by Pacheco and Allen differs from the current project corridor, particularly in that it included the shoulder areas on the opposite of the road from the pole alignment. No new sites were identified during the assessment. They recommended archaeological monitoring during the removal of power poles and the attached soils, and during drilling for the installation of new poles, in order to mitigate fully any adverse effects of construction, and to document any cultural discoveries.

Medrano et al. (2014) conducted an Archaeological Inventory Survey in a parcel on the west side of the intersection of Coral Sea Road and Tripoli Road (the southwestern end of the project corridor), in a portion of the area previously surveyed by Wicker and Tuggle (1997). State Sites 50-80-12-5119 and 50-80-12-5120, which were originally recorded by Tuggle and Tomonari-Tuggle (1994, 1997) and again by Wicker and Tuggle (1997), were re-identified during the Archaeological Inventory Survey and new features were recorded for both sites. The 2014 survey added 20 additional limestone rock mounds, two additional karst pits, and eight other substantial features to State Site 50-80-12-5119, a Hawaiian Agricultural Complex

composed of seven rock mounds and one karst pit. State Site 50-80-12-5120 was originally recorded by Tuggle and Tomonari-Tuggle (1994) and re-identified during the International Archaeological Research Institute, Inc. survey (Tuggle and Tomonari-Tuggle (1997:169). The 2014 survey added multiple archaeological features including structural concrete pads and a karst pit to State Site 50-80-12-5120, a World War Two battery complex, bivouac, bulldozed, crash site with 10+ features.

EXPECTED FINDINGS WITHIN THE SURVEY AREA

Based on previous archaeological studies in the vicinity of the project area expected findings would include Traditional Hawaiian agricultural, habitation, and other site complexes and features, sinkholes, historic structures and features associated with agriculture or ranching, and historic sites and features associated with the former military bases (Ewa Mooring Mast Field, MCAS Ewa, and NAS Barbers Point). In particular, previous archaeology had documented archaeological features of three sites that were either adjacent to or within five meters of the current project corridor. These included Site -1731, a pre and/or early post-Contact habitation complex comprised of enclosures, cairns, and a stone-lined firepit, Site -1734, a pre and/or early post-Contact habitation and agricultural complex comprised of enclosures, C-shaped enclosures, cairns, modified sinkholes, and a paved remnant, and Site -5106, a military training site comprised of a grenade range, barbed wire, and a stacked stone military feature.

FIELD METHODS

FIELD METHODOLOGY

Multiple field tasks were completed during the current Archaeological Inventory Survey. A pedestrian survey of 100% of the project corridor was conducted from December 19, 2013 through January 10, 2014, by SCS archaeologist Guerin Tome, B.A., under the direction of Robert L. Spear, Ph.D., Principal Investigator. Transect spacing of ten to fifteen meters (32.8 to 49.2 feet) intervals was employed as ground visibility was moderate. Once surface archaeological features were identified, they were marked with biodegradable flagging tape, and the survey results were compiled on standard graphing paper as well as with digital photography. Based on spatial context (*i.e.*, proximity) surface architectural features were consolidated into sites. Each site was given an SCS temporary site designation (e.g., TS-1) and plotted on a United States Geological Survey (USGS) map with a handheld Garmin GPSMap60CSx global positioning system (GPS) unit. The datum and coordinate system used for the GPS unit was NAD83 and UTM (Universal Transverse Mercator). True north compass orientation was also employed. All measurements were recorded in metric units. Individual sites were also

documented in plan view. Site boundaries were primarily determined by spatial distance between surface feature clusters.

Limited excavation was conducted during the current Archaeological Inventory Survey; SCS excavated shovel probes within the project corridor, in proximity to the previously documented sites (Sites-1731,-1734, and -5106) that lay adjacent to or within five meters of the current project area, to see if subsurface features reached into the project corridor. All excavated materials were visually inspected for the presence of cultural materials. Equipment utilized to perform these excavations included shovel, trowel, pick ax, and whisk broom. Soil matrices were recorded using United States Department of Agriculture (USDA) Munsell (2000) soil color descriptions.

LABORATORY METHODOLOGY

All field notes and digital photographs were curated at the SCS laboratory, Honolulu. Representative plan view sketches showing location and morphology of identified sites/features/deposits were illustrated. All samples collected during the project have undergone analysis at the SCS laboratory in Honolulu. All data were clearly recorded on standard laboratory forms. No definitive archaeological food midden samples were observed within the excavations, therefore none were available for analysis. Artifact analysis data is presented in Appendix C and selected artifact photographs are presented in Appendix D.

ARCHAEOLOGICAL INVENTORY SURVEY RESULTS

The current Archaeological Inventory Survey was conducted in a 5,320.3-meter-long corridor along Essex Road from a point south of Roosevelt Avenue to Tripoli Street, and west along Tripoli Street to Coral Sea Road; including 100% pedestrian survey of the project corridor. In addition to the pedestrian survey, SCS excavated shovel probes within the project corridor, in proximity to the previously documented sites (Sites-1731,-1734, and -5106) that lay adjacent to or within five meters of the current project area, to see if subsurface features reached into the current project corridor. The field archaeologist verified that no previously documented sites or features were located within the project corridor either above or beneath the ground surface.

During the survey three new archaeological sites (SCS Temporary Site TS-1 through TS-3, which were designated State Sites 50-80-12-7572, -7573, and -7574, respectively), comprised of a total of twelve surface features, were identified (Figure 4, Figure 5). Based on feature type, construction methods, and materials, all three sites were associated with military construction.

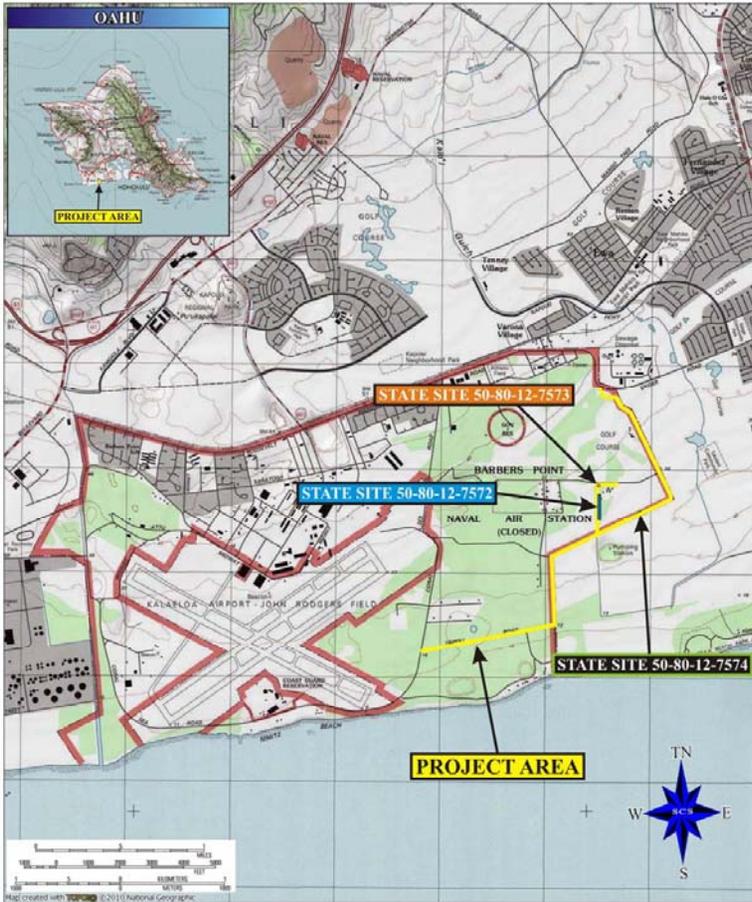


Figure 4: Portion of 1998 USGS Map (Ewa Quadrangle) Showing Site Locations.

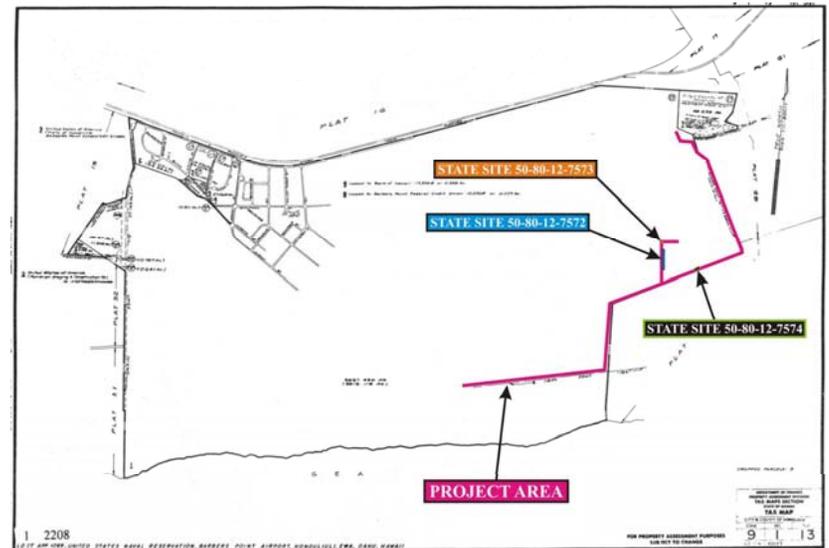


Figure 5: Portion of Tax Map Key (TMK: [1] 9-1-013) Showing Site Locations.



Figure 7: Photo of State Site 50-80-12-7572 (TS-1) , Feature 1, Concrete Manhole, View to Southeast.



Figure 8: Photo of State Site 50-80-12-7572 (TS-1) , Feature 2, Concrete Pad, View to East.



Figure 9: Photo of the interior of State Site 50-80-12-7572 (TS-1) , Feature 2, Showing the Borehole, View to East.

State Site 50-80-12-7572 (TS-1) , Feature 3

State Site 50-80-12-7572 (TS-1) , Feature 3 consisted of a circular concrete manhole, its concrete casing measured 1.05 m in diameter and its concrete lid measured 0.85 m in diameter, with two grooves containing iron handles which were broken due to corrosion (Figure 10). No cultural material was observed on around or in the feature. Although Feature 3 exhibited the effects of weathering, the feature remained in good condition.

State Site 50-80-12-7572 (TS-1) , Feature 4

State Site 50-80-12-7572 (TS-1) , Feature 4 consisted of a circular concrete manhole, its concrete casing measured 1.05 m in diameter and its concrete lid measured 0.85 m in diameter, with two grooves containing iron handles (Figure 11). No cultural material was observed on around or in the feature. Feature 4 exhibited the effects of weathering and both the casing and the manhole had been broken, the feature remained in poor to fair condition.

State Site 50-80-12-7572 (TS-1) , Feature 5

State Site 50-80-12-7572 (TS-1) , Feature 5 consisted of a rectangular concrete slab measuring 1.25 m long and 0.91 m wide with a raised lip on the northwest and northeast sides of the slab measuring 10 cm wide protruding 10 cm above the surface of the slab (Figure 12). No cultural material was observed on around or in the feature. Although Feature 5 exhibited the effects of weathering, the feature remained in good condition.

State Site 50-80-12-7572 (TS-1) , Feature 6

State Site 50-80-12-7572 (TS-1) , Feature 6 consisted of a square concrete manhole, its casing measured 2.0 m wide and its concrete lid measured 1.5 m wide with a single groove containing an iron handle (Figure 13). A steel cleanout pipe 18 cm in diameter was located approximately 75 cm southeast of the manhole casing. No cultural material was observed on around or in the feature. Although Feature 6 exhibited the effects of weathering, the feature remained in good condition.



Figure 10: Photo of State Site 50-80-12-7572 (TS-1) , Feature 3, Concrete Manhole, View to West.



Figure 11: Photo of State Site 50-80-12-7572 (TS-1) , Feature 4, Concrete Manhole, View to Northeast.



Figure 12: Photo of State Site 50-80-12-7572 (TS-1) , Feature 5, Concrete Slab, View to East.

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Figure 13: Photo of State Site 50-80-12-7572 (TS-1) , Feature 6, Concrete Manhole, View to North.

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State Site 50-80-12-7572 (TS-1) , Feature 7

State Site 50-80-12-7572 (TS-1) , Feature 7 consisted of a circular concrete manhole, its concrete casing measured 1.05 m in diameter and its concrete lid measured 0.85 m in diameter, with two grooves containing iron handles, marked "645" (Figure 14). No cultural material was observed on around or in the feature. Feature 7 exhibited the effects of weathering and both the casing and manhole were cracked and broken, the feature remained in poor condition.

State Site 50-80-12-7572 (TS-1) , Feature 8

State Site 50-80-12-7572 (TS-1) , Feature 8 consisted of a square concrete manhole with rounded edges, its casing measured 85 cm wide and its concrete lid measured 77 cm wide with two 1-cm holes for a handle (Figure 15). No cultural material was observed on around or in the feature. Although Feature 8 exhibited the effects of weathering, the feature remained in good condition.

State Site 50-80-12-7572 (TS-1) , Feature 9

State Site 50-80-12-7572 (TS-1) , Feature 9 consisted of a circular concrete manhole, its concrete casing measured 1.05 m in diameter and its concrete lid measured 0.85 m in diameter, with two grooves containing iron handles, marked "646" (Figure 16). No cultural material was observed on around or in the feature. Feature 9 exhibited the effects of weathering and both the casing and the manhole lid showed mechanical scarring, the feature remained in good condition.

State Site 50-80-12-7572 (TS-1) , Feature 10

State Site 50-80-12-7572 (TS-1) , Feature 6 consisted of a square concrete manhole with a steel lid, the casing measured 0.91 m wide and its steel lid measured 0.68 m wide with two iron handles. The western lip of the casing was marked (with yellow paint) "F F" and the northern lip of the casing was stamped (with yellow paint) " SECURED SECURED" (Figure 17). No cultural material was observed on around or in the feature. Although Feature 10 exhibited the effects of weathering, the feature remained in good condition.



Figure 14: Photo of State Site 50-80-12-7572 (TS-1) , Feature 7, Concrete Manhole, View to West.



Figure 15: Photo of State Site 50-80-12-7572 (TS-1) , Feature 8, Concrete Manhole, View to East.



Figure 16: Photo of State Site 50-80-12-7572 (TS-1) , Feature 9, Concrete Manhole, View to Southwest.



Figure 17: Photo of State Site 50-80-12-7572 (TS-1) , Feature 10, Concrete Manhole, View to North.

STATE SITE 50-80-12-7573 (TEMPORARY SITE TS-2)

State Site 50-80-12-7573 (TS-2) was comprised of a single surface feature interpreted as a military structure foundation located at the intersection of Gambier Bay and Bismark Sea Streets.

Site State Site 50-80-12-7573 (TS-2) was located inside the intersection of Gambier Bay and Bismark Sea Streets; it consisted of a concrete slab extending southeast (121°magnetic) from the concrete curb of the island in the middle of the intersection, the concrete slab was 8.0 m wide and 11.7 m long, the top of the slab was level with the asphalt pavement to the northwest and southeast of it (Figure 18).

Set into the center of the slab was an earth-filled rectangular slot measuring 5.0 m long and 1.3 m wide oriented northeast-southwest (029°magnetic), and two steel post molds (one located next to the northeast edge of the slot, the other located midway between the southwest edge of the slot and the southwest edge of the slab). Four more post molds were set into the pavement southwest of the slab, aligned with the slab and its post molds, as if a fence had been set up to divide the road into two lanes on that side of the intersection (Figure 19, Figure 20, and Figure 21).

Although Site State Site 50-80-12-7573 (TS-2) exhibited the effects of weathering and soil erosion, the feature remains in good condition. State Site 50-80-12-7573 was evaluated for significance, as outlined in Hawai'i Administrative Rules §13-275-6, and found to be significant under Criterion d, for information content, only.

STATE SITE 50-80-12-7574 (TEMPORARY SITE TS-3)

State Site 50-80-12-7574 (TS-3) consisted of a single surface feature interpreted as a military concrete sidewalk measuring 44.0 m long and 1.82 m wide located on the northern shoulder of Essex Road, oriented in a general Northeast-Southwest direction (parallel to Essex Road). The sidewalk was composed of twenty-four 1.82 m square concrete slabs. Concrete fragments were observed at the east and west ends of the sidewalk (suggesting that the sidewalk had previously extended farther east and west along Essex Road).

Based on feature type and construction materials, Site State Site 50-80-12-7574 (TS-3) was interpreted as a sidewalk remnant associated with MCAS Ewa. Although State Site 50-80-12-7574 (TS-3) exhibited the effects of weathering, the feature remains in good condition. State Site



Figure 18: Photo of State Site 50-80-12-7573 (TS-2), Concrete slab, View to Southwest.

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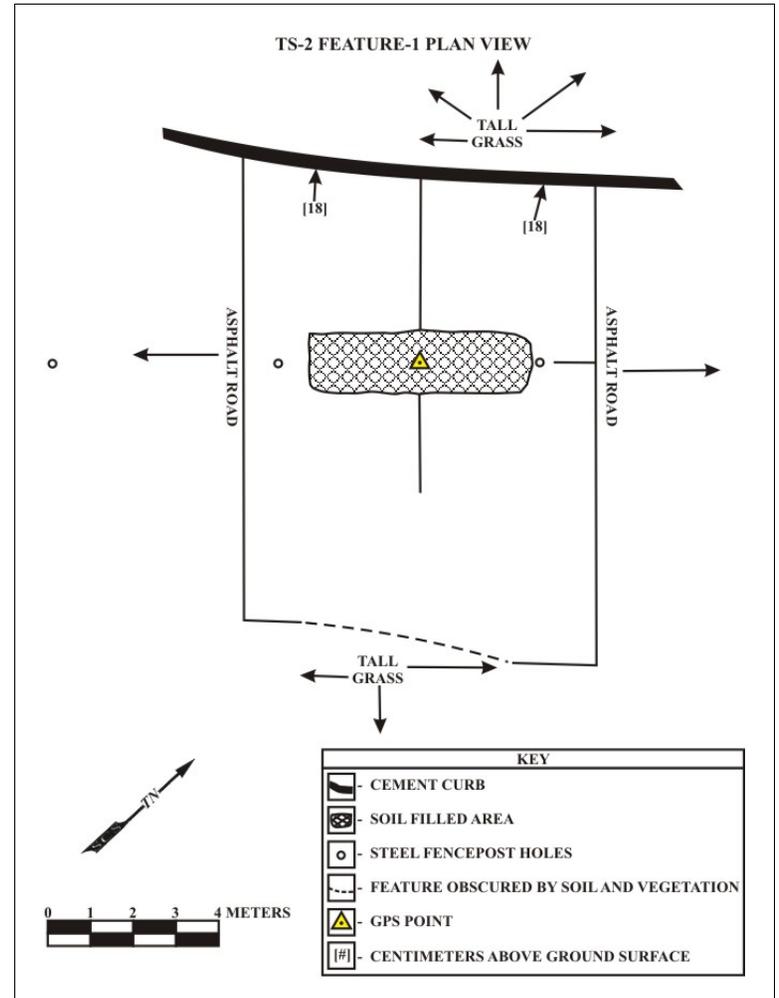


Figure 19: Plan View Map of State Site 50-80-12-7573 (TS-2), Showing the Center Slot and Post Molds.

39



Figure 20: Photo of State Site 50-80-12-7573 (TS-2) Showing the Center Slot and Post Molds, View to Southwest.



Figure 21: Photo of State Site 50-80-12-7573 (TS-2), Showing the Alignment of the Center Slot and Post Molds, View to Northeast.

50-80-12-7574 was evaluated for significance, as outlined in Hawai'i Administrative Rules §13-275-6, and found to be significant under Criterion d, for information content, only.

TESTING RESULTS

In addition to the pedestrian survey, SCS excavated shovel probes within the project corridor, in proximity to several previously documented sites (Sites-1731,-1734, and -5106) that lay adjacent to or within five meters of the current project area, to see if subsurface features reached into the current project corridor (selection of sites was restricted to those sites on the shoulder where poles would be installed, sites on the other side of the street from the proposed pole installation were not considered for testing). A description of each Shovel Probe is presented below.

All cultural material identified during six shovel probes was collected for laboratory analysis; the collected material included basalt gravel, modern bottle glass fragments, aluminum foil, an aluminum pull tab, a white plastic shard, and a fragment of styrofoam. Based on their composition these items date to the 20th century but without diagnostic features it was not possible to further characterize them).

SHOVEL PROBE 1 (SP-1)

Shovel Probe 1 (SP-1) (0.5 m diameter by 0.14-0.16 m deep) was placed on a level ground surface in the shoulder 2.5 m west of Essex Road at STA 20+70, just east of Site 1734, (Figure 23), a pre and/or early post-Contact habitation and agricultural complex comprised of enclosures, C-shaped enclosures, cairns, modified sinkholes, and a paved remnant, which measured approximately 151 m by 151 m overall. Shovel Probe 1 was surrounded by live and decomposing grasses. Shovel Probe 1 contained two stratigraphic layers which are described below (Figure 24, Figure 25, Figure 26).

Layer I

Layer I (0 to 4-6 cmbs) consisted of semi-loose dark brown (7.5YR 3/2, moist) sandy loam with grass roots. As the lower boundary was diffuse, Layer I was interpreted as a natural stratum. Cultural material collected from Layer I consisted of three clear glass sherds, one amber glass sherd, one green glass sherd, two pieces of basalt gravel, and one piece of red plastic.

Layer II

Layer II (4-6 to 14-16 cmbs) consisted of semi-loose dark greyish brown (10YR 4/2, moist) loamy sand with many limestone pebbles and a few limestone cobbles. Layer II was interpreted as a natural stratum. Layer II



Figure 22: Photo of TS-3 (State Site 50-80-12-7574), Concrete Sidewalk, View to Southwest.

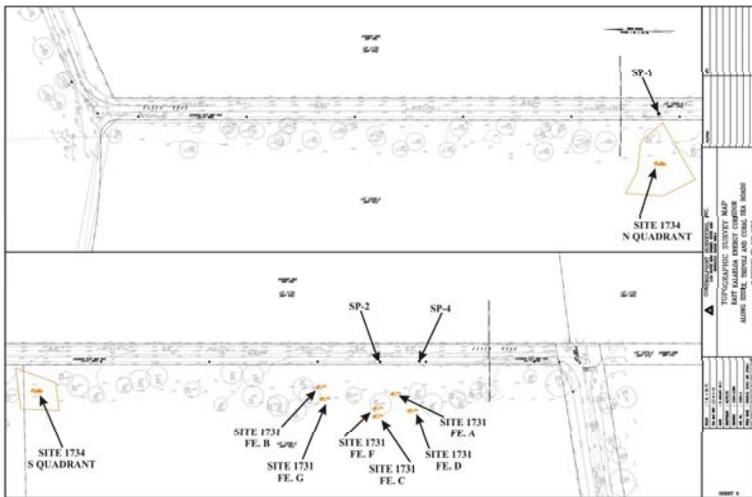


Figure 23: Client-Provided Map Showing the Location of SP-1 in Relation to Site 1734.



Figure 24: Photo of Shovel Probe 1 (SP-1) Excavation. View to South.



Figure 25: Photo of Shovel Probe 1 (SP-1) Stratigraphy, West Wall.

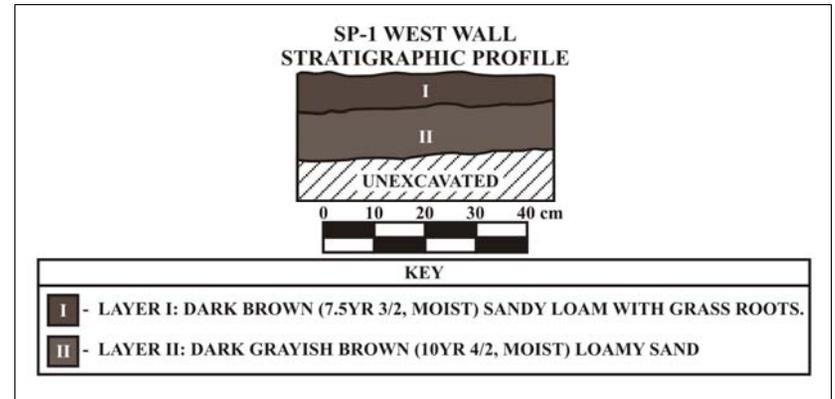


Figure 26: Stratigraphic Profile of Shovel Probe 1 (SP-1), West Wall.



Figure 28: Photo of Shovel Probe 2 (SP-2) Excavation. View to West.

50



Figure 29: Photo of Shovel Probe 2 (SP-2) Stratigraphy, South Wall.

51

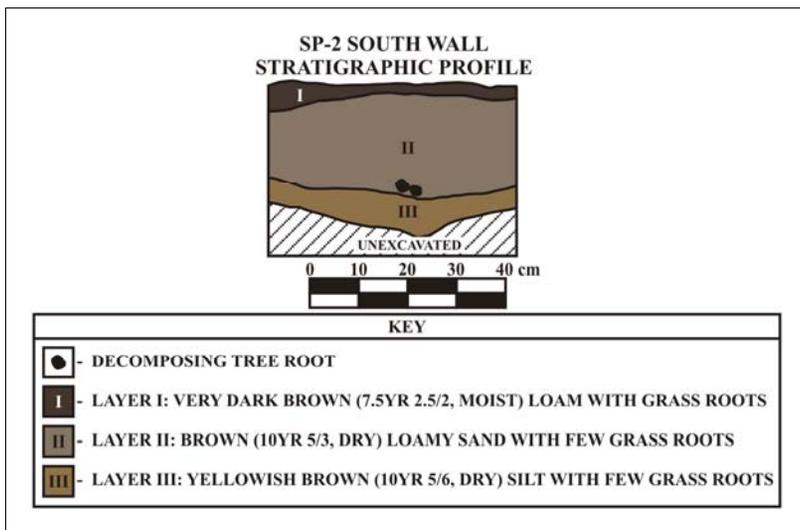


Figure 30: Stratigraphic Profile of Shovel Probe 2 (SP-2), South Wall.

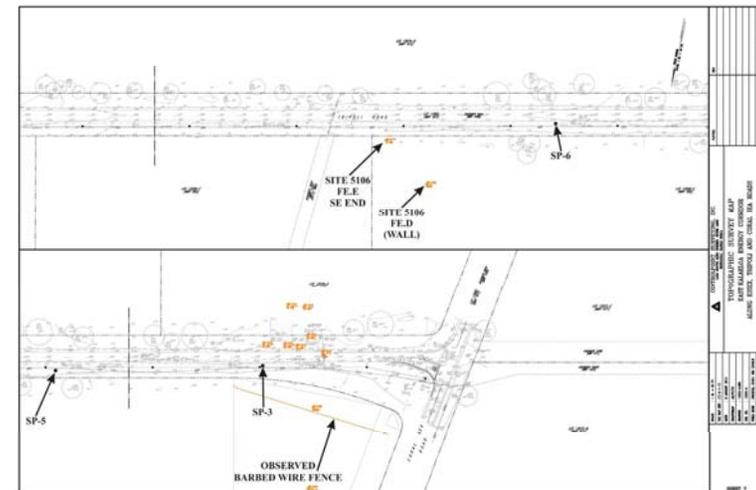


Figure 31: Client-Provided Map Showing the Location of SP-3 in Relation to Site 5106.



Figure 32: Photo of Shovel Probe 3 (SP-3) Excavation. View to East.

54



Figure 33: Photo of Shovel Probe 3 (SP-3) Stratigraphy, South Wall.

55

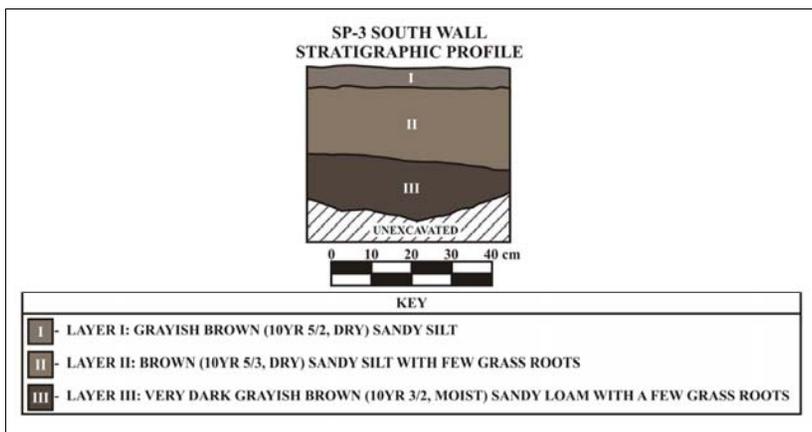


Figure 34: Stratigraphic Profile of Shovel Probe 3 (SP-3), South Wall.

56

Layer II

Layer II (5 to 25 cmbs) consisted of compact brown (10YR 5/3, dry) sandy silt with a few grass roots, many limestone pebbles and a few limestone cobbles. The lower boundary was solid and distinct; Layer II was interpreted as fill from a local source.

Layer III

Layer II (25 to 37 cmbs) consisted of compact very dark grayish brown (10YR 3/2, moist) sandy loam with a few grass roots. Layer III was culturally sterile. Excavation was halted at 37 cmbs because the excavation encountered the limestone bedrock.

SHOVEL PROBE 4 (SP-4)

Shovel Probe 4 (SP-4) (0.5 m diameter by 0.20 m deep) was placed on a level ground surface in the shoulder 2.31 m west of Essex Road at STA 15+00, to the east of Site -1731 . (Figure 35), a pre and/or early post-Contact habitation complex comprised of enclosures, cairns, and a stone-lined firepit, measuring 126 m North-South by 50 m East-West. Shovel Probe 4 was surrounded by live and decomposing grasses. Shovel Probe 4 contained three stratigraphic layers which are described below, all three layers were culturally sterile (Figure 36, Figure 37, Figure 38).

Layer I

Layer I (0 to 5 cmbs) consisted of semi-loose very dark brown (7.5YR 2.5/2, moist) loam with grass roots. Cultural material collected from Layer I comprised three amber glass sherds. As the lower boundary was diffuse, Layer I was interpreted as a natural stratum.

Layer II

Layer II (5 to 14 cmbs) consisted of semi-loose brown (10YR 5/3, dry) loamy sand with a few grass roots, 2 tree roots, many limestone pebbles and a few limestone cobbles. Layer II was interpreted as a natural stratum. Layer II was culturally sterile.

Layer III

Layer III (23 to 30 cmbs) consisted of loose yellowish brown (10YR 5/6, dry) silt with a few grass roots and limestone cobbles. Layer III was interpreted as a natural stratum. Layer II was culturally sterile. Excavation was halted at 20 cmbs because the excavation encountered the limestone bedrock.

SHOVEL PROBE 5 (SP-5)

Shovel Probe 5 (SP-5) (0.5 m diameter by 0.16-0.19 m deep) was placed on a level ground surface in the shoulder 4.0 m north of Tripoli Road at STA 13+37, south of Site -5106 (Figure 39), a military training site comprised of a grenade range, barbed wire, and a stacked stone military feature, measuring approximately 400m East-West by 180 m North-South.

57

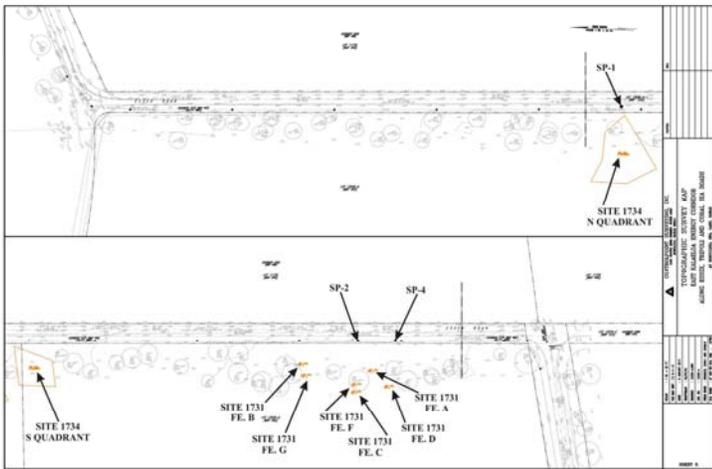


Figure 35: Client-Provided Map Showing the Location of SP-4 in Relation to Site 1731.

58



Figure 36: Photo of Shovel Probe 4 (SP-4) Excavation. View to South.

59



Figure 37: Photo of Shovel Probe 4 (SP-4) Stratigraphy, East Wall.

60

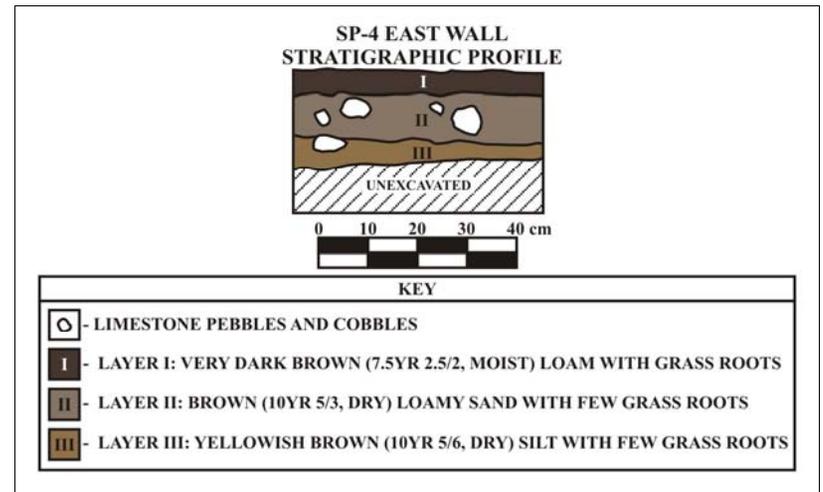


Figure 38: Stratigraphic Profile of Shovel Probe 4 (SP-4), East Wall.

61

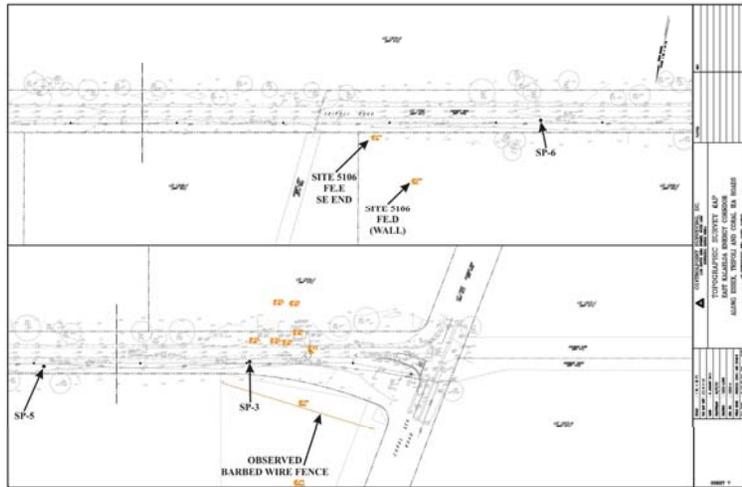


Figure 39: Client-Provided Map Showing the Location of SP-5 in Relation to Site 5106.



Figure 40: Photo of Shovel Probe 5 (SP-5) Excavation. View to South.



Figure 41: Photo of Shovel Probe 5 (SP-5) Stratigraphy, West Wall.

64

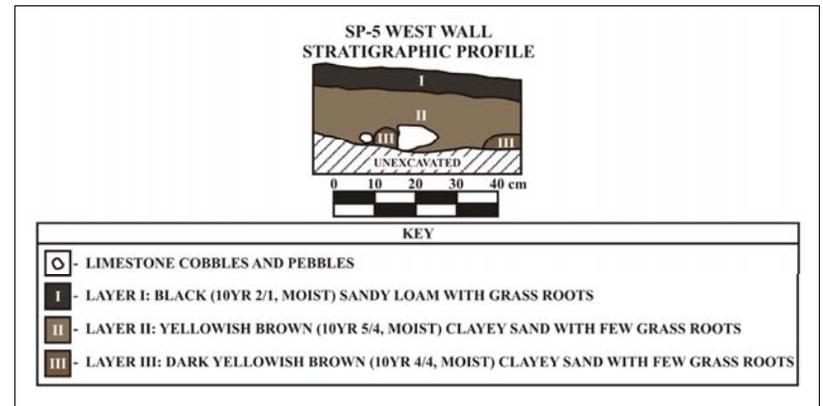


Figure 42: Stratigraphic Profile of Shovel Probe 5 (SP-5), West Wall.

65

Shovel Probe 5 was surrounded by live and decomposing grasses. Shovel Probe 5 contained three stratigraphic layers which are described below (Figure 40, Figure 41, Figure 42).

Layer I

Layer I (0 to 5 cmbs) consisted of semi-loose black 10YR 2/1, moist) sandy loam with grass roots. Cultural material collected from this layer included 3 pieces of basalt gravel and a piece of styrofoam. As the lower boundary was diffuse, Layer I was interpreted as a natural stratum.

Layer II

Layer II (5 to 19 cmbs) consisted of semi-compact yellowish brown (10YR 5/3, dry) clayey silt with grass roots and limestone pebbles and cobbles. Layer II rested on the limestone bedrock in most of the shovel probe. Layer II was interpreted as a natural stratum. Layer II was culturally sterile.

Layer III

Layer III (13 to 19 cmbs) consisted of semi-compact dark yellowish brown (10YR 4/4, moist) clayey silt with a few grass roots. Layer II was present only as small pockets of sediment between Layer II and the limestone bedrock. Layer III was interpreted as a natural stratum. Layer II was culturally sterile. Excavation was halted at 19 cmbs because the excavation encountered the limestone bedrock.

SHOVEL PROBE 6 (SP-6)

Shovel Probe 6 (SP-6) (0.5 m diameter by 0.18-0.20 m deep) was placed on a level ground surface in the shoulder 3.3 m north of Tripoli Road at STA 11+85, south of Site 5106 Feature F (Figure 43), a military training site comprised of a grenade range, barbed wire, and a stacked stone military feature, measuring approximately 400m East-West by 180 m North-South.. Shovel Probe 4 was surrounded by live and decomposing grasses. Shovel Probe 6 contained two stratigraphic layers, described below (Figure 44, Figure 45, Figure 46).

Layer I

Layer I (0 to 5 cmbs) consisted of semi-loose black 10YR 2/1, moist) sandy loam with grass roots. Cultural material collected from this layer included a ferrous metal lid, an aluminum can pull tab, aluminum foil, basalt gravel, a ferrous metal fragment, multiple glass sherds (amber, green, clear), and a single shell (*Pinctado Sp.*). As the lower boundary was diffuse, Layer I was interpreted as a natural stratum.

Layer II

Layer II (5 to 20 cmbs) consisted of semi-loose dark brown (10YR 3/3, moist) sandy clayey silt with grass roots and fist-sized fragments of concrete (some of which protruded into Layer I. Layer II terminated at the bedrock limestone. Because of the presence of concrete fragments, Layer II was interpreted as a disturbed natural stratum.

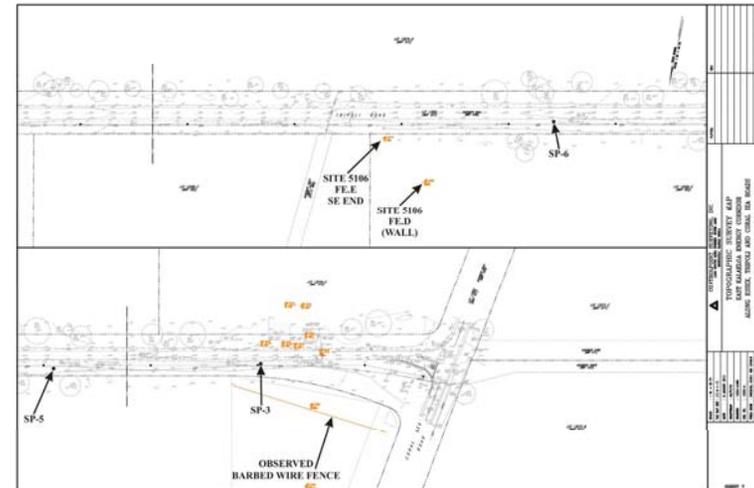


Figure 43: Client-Provided Map Showing the Location of SP-6 in Relation to Site 5106.



Figure 44: Photo of Shovel Probe 6 (SP-6) Excavation. View to SouthWEST.

68



Figure 45: Photo of Shovel Probe 6 (SP-6) Stratigraphy, Southwest Wall.

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DISCUSSION AND CONCLUSIONS

Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey of a 5,320.3-meter-long corridor along Essex Road from a point south of Roosevelt Avenue to Tripoli Street and west along Tripoli Street to Coral Sea Road, and along Gambier Bay Street up to Bismark Sea Street. The Area of Potential Effect (APE) included the shoulder area on the side that the pole alignment is to be placed and the paved roadways. In the shoulder area, the bounds of the APE were determined by whichever of the following was nearest to the pole alignment - the edge of the public right-of-way, nearby fence, or a maximum width of 20 feet from the edge of pavement into the shoulder. The APE did not include the other shoulder of the roadway.

In addition to the pedestrian survey of the entire corridor, SCS excavated six shovel probes within the project corridor in proximity to three previously documented sites (Site-1731, -1734, -and -5106) that lay adjacent to or within five meters of the current project area on the side of the road where the pole alignment will be placed, to see if subsurface features reached into the project corridor. SCS verified that no previously documented sites or features were located within the project corridor either above or beneath the ground surface.

During the survey three new archaeological sites comprised of a total of twelve surface features were identified. State Site 50-80-12-7572 (SCS Temporary Site TS-1), a military sewer waste and water system, State Site 50-80-12-7573 (TS-2), a concrete foundation slab (although SCS Temporary Site TS-2 was identified near previously-documented Site 5128, TS-2 was designated as a new site based on its distance from the clustered features of Site 5128), and State Site 50-80-12-7574 (TS-3), a concrete sidewalk. Based on feature types, construction methods, and construction materials, all three sites were associated with the former MCAS Ewa.

SIGNIFICANCE

All three newly documented sites were evaluated for significance, as outlined in Hawai'i Administrative Rules §13-275-6. These three sites were found to be significant only under Criterion d, "It must have yielded or may be likely to yield, information important in prehistory or history." Based on the findings of the survey, it seems unlikely that new information would be gleaned from additional study, and no further archaeological work is recommended for the three sites.

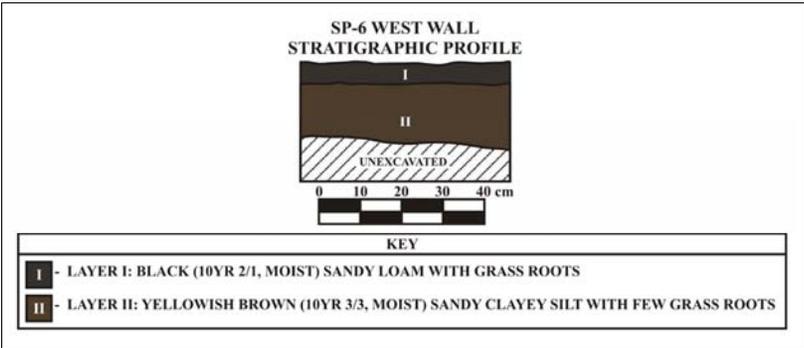


Figure 46: Stratigraphic Profile of Shovel Probe 6 (SP-6), West Wall.

RECOMMENDATIONS

Due to the presence of previously documented sites in close proximity (5 m or less) to the project corridor, however, and the potential for discovering karst pits during project excavations, archaeological monitoring is recommended for all ground disturbance activities in the project corridor. In addition, orange construction fencing or other high-visibility flagging should be posted along the project corridor boundary in the vicinity of previously documented sites -1731, -1734, and -5106, prior to ground disturbance activities in the project corridor, to ensure that project activities do not encroach on these sites.

REFERENCES

- Ahlo, Hamilton M., Jr., and Robert J. Hommon
1983 *An Archaeological Reconnaissance Survey of the Site of the Proposed Solid Waste Processing and Resource Recovery Facility, Honouliuli, 'Ewa, O'ahu.* Science Management, Inc., Honolulu.
- 1984 *Archaeological Test Excavations at the Site of the Proposed Solid Waste Processing and Resource Recovery Facility, Honouliuli, 'Ewa, O'ahu.* Science Management, Inc., Honolulu
- Armstrong, R.W. (Editor)
1980 *Atlas of Hawaii*, 2nd Edition. The University of Hawaii Press, Honolulu.
- Athens, J.S., J. Ward, H.D. Tuggle, and D. Welch
1999 *Environment, Vegetation Change, and Early Human Settlement on the 'Ewa Plain: A Cultural Resource Inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i. Part III: Paleoenvironmental Investigations.* Prepared for Department of the Navy, Pacific Division, Naval Facilities Engineering Command, Pearl Harbor, Hawai'i. International Archaeological Research Institute, Inc., Honolulu.
- Athens, J. Stephen, H. David Tuggle, Jerome V. Ward, and David J. Welch
2002 Avifaunal Extinctions, Vegetation Change, and Polynesian Impacts in Prehistoric Hawai'i. *Archaeology in Oceania* 37:57-78.
- Barrera, William M., Jr.
1975 *A Report on the Archaeological Reconnaissance Survey of the Proposed Barber's Point Harbor Area.* Prepared for: U.S. Army Corps of Engineers, Pacific Ocean Division. Bernice P. Bishop Museum, Department of Anthropology, Honolulu.
- 1979 *West Beach, Oahu: An Archaeological Survey.* Chiniago Inc., Honolulu.
- 1986 *West Beach, O'ahu Archaeological Investigations.* Chiniago Inc., Honolulu.
- Bath, Joyce
1989a *Waimānalo Gulch Petroglyphs 80-12-4110, Waimānalo Gulch, Honouliuli, 'Ewa, O'ahu. SHPD File # O-561.* Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawai'i.
- 1989b *Site File for State Site 50-80-12-4061.* Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawai'i.
- Beckwith, Martha Warren
1985 *Hawaiian Mythology.* University of Hawai'i Press, Honolulu.

- Bordner, Richard M.
1977 *Archaeological Reconnaissance of the Proposed Kalo'i Gulch Landfill Site, 'Ewa O'ahu Island*. Archaeological Research Center Hawai'i, Lāwa'i, Kaua'i, Hawai'i.
- 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.
- Burgett, Berdena D., and Paul H. Rosendahl
1989 *Subsurface Archaeological Testing Ko Olina Resort Phase II Development Site Land of Honouliuli, 'Ewa District, Island of O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
1992 *Archaeological Inventory Survey, Contaminated Soil Stockpile/ Remediation Facility*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- Carlson, Arne K., and Paul H. Rosendahl
1990 *Archaeological Inventory Survey, Campbell Industrial Park - Kami Loop Subdivision*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- Charvet-Pond, Ann, and Bertell D. Davis
1992 *Volume I: West Beach Data Recovery Program, Phase 4 - Archaeological and Paleontological Excavations (Two volumes)*. Ko Olina Resort, Land of Honouliuli, Ewa, Island of Oahu. Paul H. Rosendahl, Ph.D., Inc., Hilo, Hawai'i.
- Christensen, Carl C. and Patrick V. Kirch
1981 "Landsnails and Environmental Change at Barbers Point, Oahu, Hawaii," *Bulletin of the American Malacological Union* 1981:31. Honolulu.
- Clark, Stephan D.
1979 *Archaeological Reconnaissance Survey for Barbers Point Beach Park Improvements, Ewa, Oahu (TMK: 9-1-26:27)*. Kualoa Archaeological Research Project, Honolulu.
- Clark, Stephan D., and Robert D. Connolly, III.
1975 *Archaeological Reconnaissance Survey for Honouliuli Sewage Treatment Plant and Barbers Point Outfall*. Kualoa Archaeological Research Project, Honolulu.
- Cleghorn, Paul L.
1979 *Archaeological Reconnaissance Survey of Water Systems Improvement Area, Park I, James Campbell Industrial Park, Oahu, Hawai'i (TMK: 9-1-18)*. Bernice P. Bishop Museum, Honolulu.
- Cleghorn, Paul L., and Bertell D. Davis
1990 *Archaeological Paleontological Investigations at the Barbers Point Deep Draft Harbor, 'Ewa, O'ahu*. Applied Research Group, Bernice P. Bishop Museum, Honolulu.
- Cordy, Dominique, and Hallett H. Hammatt
2003 *Archaeological Assessment of an Approximately 100-Acre Project Area at Kapolei, Honouliuli ahupua'a, 'Ewa District, O'ahu*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- Cordy, Ross
2002 *The Ancient History of Wai'anae*. Mutual Publishing, Honolulu.
- Davis, Bertell D.
1978 "Human Settlement and Environmental Change at Barbers Point, O'ahu," pp. 87-97 in C.W. Smith (ed.) *Proceedings, Second Conference in Natural Sciences Hawaii Volcanoes National Park. Cooperative National Park Resources Study Unit*. University of Hawai'i at Mānoa and National Park Service.
1979a *Progress Report on Emergency Excavations at Barbers Point, O'ahu: First Quarter (January-March), 1979*. University of Hawai'i at Mānoa, Department of Anthropology, Honolulu.
1979b *Progress Report on Emergency Excavations at Barbers Point, O'ahu: Second Quarter (April- June) 1979*. University of Hawai'i at Mānoa, Department of Anthropology, Honolulu.
1979c *Progress Report on Emergency Excavations at Barbers Point, O'ahu: Third Quarter (July-August) 1979*. University of Hawai'i at Mānoa, Department of Anthropology, Honolulu.
1980 "A Research Design for the Study of Human Settlement and Environmental Change in Southwestern O'ahu: Re-evaluation of the Strategy Based on New Work," pp. 77-86 in C.W. Smith (ed.), *Proceedings Third Conference in Natural Sciences, Hawaii Volcanoes National Park, Cooperative National Park Resources Study Unit*. University of Hawai'i at Mānoa and National Park Service.
1982 "Horticultural Adaptation and Ecological Change in Southwestern O'ahu: Preliminary Evidence from Barbers Point," pp. 51-59 in *Proceedings, Fourth Conference in Natural Sciences, Hawaii Volcanoes National Park, Cooperative National Park Resources Study Unit, UH Manoa and National Park Resources Study Unit*. University of Hawai'i at Mānoa and National Park Service.
1988 *Report on Archaeological Investigations at the Proposed HECO Generating Station, Babers Point Hono'uli'uli, 'Ewa, O'ahu*, International Archaeological Research Institute, Inc., Honolulu, HI.

- 1989 *Report on Archaeological Investigations at the Proposed HECO Generating Station, Barbers Point Hono'uli'uli, 'Ewa, O'ahu*, International Archaeological Research Institute, Inc., Honolulu, HI.
- 1990a *Human Settlement in Pristine Insular Environments: A Hawaiian Case Study from Barbers Point, Southwestern O'ahu*. Ph.D. Dissertation, University of Hawaii, Honolulu.
- 1990b *Archaeological and Paleontological Investigations at the Proposed HECO Barbers Point Generating Station, Honouliuli, 'Ewa, O'ahu* Applied Research Group, Bernice P. Bishop Museum, Honolulu.
- 1993 *Archaeological and Paleontological Investigations at Barbers Point at the Deep Draft Harbor*. Bernice P. Bishop Museum, Honolulu.
- Davis, Bertell D., and Bion Griffin (editors)
1978 *Studies in Natural History and Human Settlement at Barbers Point, Oahu, Interim Report I*. Archaeological Research Center Hawai'i, Lāwa'i, Kaua'i, Hawai'i.
- Davis, Bertell D., and Alan E. Haun
1986 *Preliminary Report Upon Completion of Field Work: Phase 2 - Intensive Survey and Test Excavations, West Beach Data Recovery Program, West Beach Resort, Honouliuli, 'Ewa, O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- 1987a *Interim Report: Phase 2) Intensive Survey and Test Excavations West Beach Data Recovery Program, Honouliuli, Ewa, Island of O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- 1987b *Phase 2 — Intensive Survey and Test Excavations, West Beach Data Recovery Program, West Beach Resort, Honouliuli, Ewa, Island of Oahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- Davis, Bertell D., Alan E. Haun, and Paul H. Rosendahl
1986a *Phase 1 - Research Design for Intensive Survey and Test Excavations, West Beach Data Recovery Program, West Beach Resort, Honouliuli, 'Ewa, O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- 1986b *Phase 3 - Data Recovery Plan for Archaeological and Paleontological Excavations, West Beach Data Recovery Program, West Beach Resort, Honouliuli, 'Ewa, O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- Davis, Bertell D., Jane Allen, Thecla M. Bennett, Carl C. Christensen, Paul L. Cleghorn, Sara Collins, Mary F. Riford, and Jeannette A. Simons
1995 *Archaeological and Paleontological Investigations at the Barber's Point Deep Draft Harbor, 'Ewa District, Honouliuli Ahupua'a, O'ahu Island, Hawai'i*. 3 vols. Prepared for U.S. Army Pacific Ocean Division, Corps of Engineers, Fort Shafter, Hawai'i. Bishop Museum Anthropology Department, Honolulu.

- Day, A. Grove
1984 *History Makers of Hawaii: A Biographical Dictionary*. Mutual Publishing, Honolulu.
- Dorrance, William and Francis Morgon
2000 *Sugar Islands*. Mutual Publishing, Honolulu.
- Erkelens, Conrad
1992 *Interpretive Trail Development Study, Naval Air Station Barbers Point, Archaeological Survey of Site 1719*. International Archaeological Research Institute, Inc., Honolulu.
- Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Science and University of Hawai'i Agricultural Experimentation Station. Washington D.C., U.S. Govt. Printing Office.
- Fornander, Abraham
1969 *An Account of the Polynesian Race, Vol. II*. Charles E. Tuttle Company, Tokyo.
- 1919 *Hawaiian Antiquities and Folklore*. Bishop Museum Press, Honolulu.
- 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, Honolulu.
- Giambelluca, T.W., M. A. Nullet, and T. A. Schroeder
1986 *Rainfall Atlas of Hawai'i*, Report R76, Hawai'i Division of Water and Land Development, Department of Land and Natural Resources, Honolulu.
- Glidden, Catherine, Maurice Major, and Boyd Dixon
1993 *Results of Subsurface Data Recovery in Selected Areas of Paradise Cove, Honouliuli, 'Ewa, O'ahu*. Anthropology Department, Bernice P. Bishop Museum., Honolulu.
- Hammatt, Hallett H.
1984 *Archaeological Reconnaissance at HECO Kahe Point Power*. Cultural Surveys Hawaii, Kailua, Hawai'i.
- Hammatt, Hallett H., and William H. Folk
1981 *Archaeological and Paleontological Investigation at Kalaeloa (Barber's Point), Honouliuli, 'Ewa, O'ahu, Federal Study Areas 1a and 1b, and State of Hawai'i Optional Area 1*. Archaeological Research Center Hawai'i, Lawa'i, Hawai'i.

- 1992 *Archaeological Subsurface Testing of a Beach Berm within the Proposed Barber's Point Drainage Channel, TMK 9-1-14 & 15.* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- Hammatt, Hallett H., and David W. Shideler
 1989a *An Archaeological Assessment for the Proposed Kapolei Business/Industrial Park, Honouliuli, 'Ewa, O'ahu.* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- 1989b *Archaeological Reconnaissance of the Six-Acre Proposed HECO Kahe Training Facility (T.M.K. 9-1-3:27), Honouliuli, 'Ewa, O'ahu.* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- 1991 *An Archaeological Assessment for the Proposed Barbers Point Harbor Expansion, (140.4 acres), Honouliuli, 'Ewa, O'ahu.* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- 1994 *An Archaeological Assessment for the Proposed Barber's Point Harbor Expansion (84 acres), Honouliuli, 'Ewa, O'ahu.* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- 1995 *Data Recovery Plan for Archaeological Sites in the Proposed Barber's Point Expansion Area (TMK 9-1-14:2).* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- 1999 *An Archaeological Inventory Survey for the Waimānalo Gulch Sanitary Landfill Project Site, Honouliuli, 'Ewa, O'ahu (TMK: 9-2-3:40).* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- 2007 *Archaeological Inventory Survey For the Proposed Kapolei Corporation Yard, Kalaeloa Honouliuli Ahupua'a, 'Ewa District, O'ahu Island TMK: [1] 9-1-026:004 ,* Cultural Surveys Hawai'i, Kailua, HI.
- 2010 *Archaeological Field Inspection and Literature Review For the Kalaeloa Life Safety Improvements Project, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu TMK: [1] 9-1-013: (Coral Sea Road Intersections and Roosevelt Ave. at Philippine Sea Road Intersection).* Cultural Surveys Hawai'i, Kailua, HI.
- Hammatt, Hallett H., Jennifer Robins, Mark Stride, and Matthew McDermott
 1991 *An Archaeological Inventory Survey for the Makaiwa Hills Project Site, Honouliuli, 'Ewa, O'ahu.* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- Hammatt, Hallett H., David W. Shideler, Melody Heidel, and Mark Stride
 1994 *Archaeological Inventory Survey of the Proposed Barbers Point Harbor Expansion (TMK 9-1-14:02).* Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- Haun, Alan E.
 1986a *Preliminary Archaeological Reconnaissance Survey for Environmental Assessment (EA) Ewa Town Center/Secondary Urban Center Land of Honouliuli, Ewa, Island of Oahu, (TMK 9-1-15: Por. 4, 5, 17; 9-1-16:1, Por. 4, 6, 9, 16, 18, 24, 30; 9-2-19: por. 1).* PHRI report 275-111886. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- 1986b *Preliminary Archaeological Reconnaissance Survey for Environmental Assessment (EA) Ewa Town Center/Secondary Urban Center Land of Honouliuli, Ewa, Island of Oahu, (TMK 9-1-15:Por. 5, 17; 9-1-16:Por. 9).* PHRI report 320-090687. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- 1991 *An Archaeological Survey of the Naval Air Station, Barber's Point, O'ahu, Hawai'i.* With historical notes by Marion Kelly. Applied Research Group, Bishop Museum, Honolulu.
- Haun, Alan E., and Marion Kelly
 1984 *Research Design for an Archaeological Survey of Naval Communication Area Radio Transmission Facility, Lualualei; and Naval Air Station, Barbers Point, Oahu, Hawai'i.* Dept. of Anthropology, Bernice P. Bishop Museum, Honolulu.
- Hawaii Marine Research Inc.
 1978 Appendix I: "Geoarchaeological Reconnaissance of Barbers Point," in Akihiko Sinoto, *Archaeological and Paleontological Salvage at Barbers Point, O'ahu.* Prepared for: U.S. Army Engineer District by Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
- Jones, Anthony
 1993 *Elevated Fossil Coral Deposits in the Hawaiian Islands: A Measure of Island Uplift in the Quaternary.* Ph.D. dissertation, Department of Oceanography, University of Hawai'i at Mānoa, Honolulu.
- Jourdane, Muffet (Elaine)
 1995 *Inadvertent Discovery of Human Remains at Paradise Cove, Honouliuli, 'Ewa, Oahu, State Site No. 50-80-12-4968, SHPD #762.* Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawai'i.
- Kamakau, Samuel
 1961 *Ruling Chiefs of Hawaii.* The Kamehameha Schools Press, Honolulu.
- Kame'eleihiwa, Lilikalā
 1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press, Honolulu.

- Kawachi, Carol T.
1990 *Recordation of Campbell Industrial Park Burial, Honouliuli, Ewa, O'ahu State Site No. 80-12-4209 ME#90-0117*, Department of Land and Natural Resources, Honolulu, HI.
- Kennedy, Joseph
1991 *Subsurface Testing at the Proposed Kapolei Park/Fort Barrette, Pu'u Kapolei, Island of O'ahu, TMK:9-1-16:2*. Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawai'i.
- Kikuchi, William K.
1959 Standard Oil Refinery Site Letter Report. plus maps and field notes on file. Bernice P. Bishop Museum, Honolulu.
- Kirch, Patrick V.
1978 Appendix II, Report on Recent and Subfossil Land Mollusca From Barbers Point, Oahu," in Akihiko Sinoto, Archaeological and Paleontological Salvage at Barbers Point, O'ahu. Prepared for: U.S. Army Engineer District, Pacific Ocean Division. Department of Anthropology Bernice P. Bishop Museum, Honolulu.

1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawai'i Press, Honolulu.

2011 " When Did the Polynesians Settle Hawai'i? A Review of 150 Years of Scholarly Inquiry and a Tentative Answer," in *Hawaiian Archaeology*. 12 (2011) pp. 3-26.
- Kirch, Patrick V. ,and Carl C. Christensen
1980 *Nonmarine Molluscs and Paleoecology at Barbers Point, O'ahu*. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
- Kirch, Patrick V. and Marshall Sahlins
1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press, Chicago.
- Komori, Eric K., and Thomas Dye
1979 *Archaeological Testing at Lanikuhonua, West Beach, Ewa, O'ahu, Hawai'i, (TMK 9-1-13:por.10)*. Bernice P. Bishop Museum, Honolulu.
- Kuykendall, R.S.
1938 *The Hawaiian Kingdom*. Vol. 1, 2, 3. University of Hawai'i Press. Honolulu.
- Landrum, Jim
1993 *Archaeological Reconnaissance and Limited Subsurface Testing at the Proposed Family Housing Construction Area Project No. 34863, Barbers Point Naval Air Station, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island*. Ogden Environmental and Energy Services, Inc., Honolulu.
- Lewis, Ernest
1970 *The Campbell Project: A Preliminary Report*. University of Hawai'i, Honolulu.
- Lucas, Paul F. Nahoa
1995 *A Dictionary of Hawaiian Legal Land-terms*. Native Hawaiian Legal Corporation. University of Hawai'i Committee for the Preservation and Study of Hawaiian Language, Art and Culture.. University of Hawai'i Press, Honolulu.
- Lyons, C.J.
1875 *Land Matters in Hawaii. The Islander*, Vol. I. Honolulu.
- Macdonald, G. A. , A. T. Abbott, and F.L.Peterson
1983 *Volcanoes in the Sea*. Second Edition. University Press of Hawaii, Honolulu.
- McAllister, J. Gilbert
1933 *Archaeology of Oahu*. Bishop Museum, Bulletin 104. Honolulu.
- McCoy, Patrick C., Carl Christensen, and Bertell Davis
1982 *A Proposal for Archaeological and Paleontological Investigations in Stockpile Area III at Barbers Point, Southwestern O'ahu; Phase 1: Data Recovery and Preliminary Analysis, and Phase 2: Detailed Data Analysis*. Bernice P. Bishop Museum, Honolulu.
- McDermott, Matthew, David Shideler, John Winieski, and Hallett H. Hammatt
2000 *Archaeological Data Recovery Report for the Archaeological sites in the Proposed Barber's Point Harbor Expansion Area, Kalaeloa, Ahupua'a of Honouliuli, District of 'Ewa, Island of O'ahu (TMK 9-1-14:2)*. Cultural Surveys Hawaii, Kailua, Hawai'i.
- McElroy, Windy, and Mina Elison
2013 *Archaeological Inventory Survey for a Proposed Solar Farm in Kalaeloa, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu TMK: (1)9-1-013:001*. Keala Pono Archaeological Consulting, LLC, Hauula.
- McIntosh, James and Paul L. Cleghorn,
1999 *Report of Archaeological Archival Research for the Honouliuli Wastewater Treatment Plant Water Reclamation Project, Island of O'ahu*. Pacific Legacy, Inc., Kailua.
- Medrano, Stephanie, Cathleen Dagher, Michael Dega, and Robert L. Spear
2014 *Archaeological Inventory Survey For a Proposed Solar Farm in Kalaeloa, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu, Hawai'i [TMK: (1) 9-1-013:070]*. Scientific Consultant Services, Honolulu.

- Miller, Lynn
1993 *Archaeological Data Recovery of State Sites 50-80-12-2710 and 50-80-12-2711 at Barbers Point, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island*. Bernice P. Bishop Museum, Honolulu.
- Monahan, Christopher M.
2004 *Archaeological Inventory Survey of 2 Acres of Land Located in the Ahupua'a of Honouliuli, District of 'Ewa, O'ahu Island, Hawai'i [TMK: 9-1-015: Portion of 005 and TMK 9-2-03: Portion of 002]*. Scientific Consultant Services, Honolulu.
- Munsell Soil Color Charts
2000 U.S. Dept. of Agriculture Handbook. GretagMacbeth. New York.
- Neller, Earl
1982 *The Barbers Point Archaeological District, O'ahu, Hawai'i. Committee on Public Archaeology (COPA) Communications 5(3): 19021*. Society for American Archaeology.
1985 *A Preliminary Review and Evaluation of Archaeological Studies and Recommendations for the Proposed West Beach Estates at 'Ewa, O'ahu*. Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawai'i.
- O'Hare, Constance R., Thomas R. Wolforth and Paul H. Rosendahl
1996 *Phase II Intensive Survey and Testing, Naval Air Station Barbers Point*, PHRI, Inc. Hilo Hawaii.
- Oshima, Neal
1975 *Archaeological Reconnaissance Survey of Proposed Drainage Channel at the Campbell Industrial Park Complex, Ewa, Island of O'ahu*. Bernice P. Bishop Museum, Honolulu.
- Pacheco, Robert, and Jane Allen
2013 *Archaeological Assessment for the East Kalaeloa Energy Corridor in the Kalaeloa Community Development District, Honouliuli Ahupua'a, 'Ewa, O'ahu, Hawai'i, Tax Map Key (1) 9-1-013*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- Pestana, Elizabeth, and Robert L. Spear
2010 *An Archaeological Assessment of Approximately 0.9-Acres for the PHYCAL Algae Pilot Project in Campbell Industrial Park, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu [TMK (1) 9-1-032: 084 por]*. Scientific Consultant Services, Honolulu.
- Pukui, M. and S. Elbert
1986 *Hawaiian Dictionary*. University of Hawai'i Press, Honolulu.
- Pukui, Mary Kawena, Samuel Elbert, Esther Mookini
1974 *Place Names of Hawaii*. University of Hawai'i Press, Honolulu.
- Rosendahl, Paul H.
1987a *Archaeological Reconnaissance Survey for Environmental Impact Statement: Kapolei Village Master Plan Project, Honouliuli, 'Ewa District, Island of O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
1987b *Archaeological Reconnaissance Survey Ko Olina Resort Phase II Development Site, Honouliuli, Ewa, District, Island of O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
1990 *Archaeological Survey Kapolei Golf Course Addition Honouliuli, 'Ewa District Island of O'ahu*. Paul H. Rosendahl, Ph.D., Inc, Hilo, Hawai'i.
- Schmitt, Robert C.
1968 *Demographic Statistics of Hawaii: 1778-1965*. University of Hawai'i Press, Honolulu.
1973 *The Missionary Censuses of Hawaii*. Bernice P. Bishop Museum, Honolulu.
- Sinoto, Akihiko
1976 *A Report on Cultural Resources Survey at Barbers Point, Island of O'ahu*. Prepared for: U.S. Army Corps of Engineers, Pacific Ocean Division. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
1978 *Archaeological and Paleontological Salvage at Barbers Point, O'ahu*. Prepared for: U.S. Army Corps of Engineers, Pacific Ocean Division. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
1979 *Cultural Resources Survey at New Dredged Material Disposal Sites at Barbers Point, O'ahu*. Prepared for: U.S. Army Corps of Engineers, Pacific Ocean Division. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.
- State of Hawai'i Administrative Rules.
2002a *Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, Hawaii Revised Statutes: Evaluation of Significance* §13-275-6.
2002b *Rules Governing Standards for Archaeological Inventory Survey and Reports Hawaii Revised Statutes: §13-276*.
- Sterling and Summers
1978 *Sites of O'ahu*. Bishop Museum Press, Honolulu.

- Tome, Guerin, and Robert L. Spear
 2010 *Archaeological Monitoring for the Construction of the Kalaeloa Airport T-Hangers, Honouliuli Ahupua'a, Ewa District, Island of O'ahu, Hawai'i [TMK (1) 9-1-013: Portion of 032]*. Scientific Consultant Services, Inc., Honolulu.
- Tuggle, H. David
 1997 *Archaeological Inventory Survey For Construction Projects At Naval Air Station Barbers Point, O'ahu, Hawai'i, Phase I Survey for Housing Project H-208, Aviation Maintenance Training Building Project P-281, and PATSWINGPAC Project P-255 Phase II Survey for Family Housing Project H-208*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- Tuggle, H. David, and M. J. Tomonari-Tuggle
 1994 *Cultural Resources of Naval Air Station, Barbers Point: Summary, Assessment, and Inventory Research Design. Archaeological Research Services for the Proposed Cleanup, Disposal and Reuse of Naval Air Station, Barbers Point, O'ahu, Hawai'i (Task 1b)*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- 1997a *A Cultural Resource Inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i: Part I: Phase I Survey and Inventory Summary*. Prepared for Belt Collins Hawaii. International Archaeological Research Institute, Inc., Honolulu.
- 1997b *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*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- 1997c *Cultural Resources of Naval Air Station, Barbers Point: Summary, Assessment, and Inventory Research Design Task 1b: Archaeological Research Services for the Proposed Cleanup, Disposal, and Reuse of Naval Air Station, Barbers Point, O'ahu, Hawai'i*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- Thrum, Thomas
 1907 "Heiaus and Heiau Sites Throughout the Hawaiian Islands". In *Hawaiian Almanac and Annual*, pp. 36- 48. Honolulu : Press Publishing.
- Tulchin, Todd, Constance R. O'Hare, Matt McDermott
 2007 *Archaeological Assessment of the 65.8-acre former Hawai'i Raceway Park Property, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.
- Vancouver, George
 1798 *A Voyage of Discovery to the North Pacific Ocean...performed in the years 1790, 1791, 1792, 1793, 1794, and 1795, in the Discovery . . . and . . . Chatham . . Vols. 1-3*. Amsterdam, N. Israel, London.
- Welch, David J.
 1987 *Archaeological Reconnaissance of Former 'Ewa Marine Corps Air Station, Barbers Point Naval Air Station, O'ahu, Hawai'i*. International Archaeological Research Institute, Inc. Honolulu.
- Wickler, Stephen K., and H. David Tuggle
 1997 *A Cultural Resource Inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i; Part II: Phase II Inventory of Selected Sites Archaeological research Services for the Proposed Cleanup, Disposal and Reuse of Naval Air Station, Barbers Point O'ahu, Hawai'i (Task 2b)*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- Yardley, Paul T.
 1981 *Millstones and Milestones—The Career of B. F. Dillingham*. University Press of Hawaii, Honolulu.

APPENDIX B

CULTURAL IMPACT ASSESSMENT

— Draft —

**Cultural Impact Assessment for the
East Kalaeloa Energy Corridor in the
Kalaeloa Community Development District,
Honouliuli Ahupua‘a,
‘Ewa, O‘ahu, Hawai‘i**

Tax Map Key (1) 9-1-013



Prepared for:

Belt Collins Hawaii LLC
2153 North King St., Suite 200
Honolulu, HI 96819-4554

INTERNATIONAL ARCHAEOLOGICAL RESEARCH INSTITUTE, INC.
SEPTEMBER 2013

— Draft —

**CULTURAL IMPACT ASSESSMENT FOR THE
EAST KALAELOA ENERGY CORRIDOR IN THE KALAELOA
COMMUNITY DEVELOPMENT DISTRICT,
HONOULIULI AHUPUA‘A,
‘EWA, O‘AHU, HAWAI‘I
TMK (1) 9-1-013**

by

Maria E. “Kaimi” Orr, M.A.
Kaimipono Consulting Services, LLC

Prepared for

Belt Collins Hawaii LLC
2153 North King St., Suite 200
Honolulu, HI 96819-4554

International Archaeological Research Institute, Inc.

September 2013

Cover
Photo 1. Typical un-modified sinkhole.
(All photos were taken by author)

EXECUTIVE SUMMARY

This Cultural Impact Assessment (CIA) is in response to a request from *International Archaeological Research Institute, Inc.* (IARII) for East Kalaeloa Energy Corridor, 'Ewa District, O'ahu. This study is part of a larger project that includes an Archaeological Assessment (AA) conducted by IARII. The AA and CIA will be incorporated into an Environmental Assessment (EA) prepared by Belt Collins Hawaii LLC in compliance with federal and state requirements to identify and evaluate possible cultural impacts to cultural resources, cultural practices and access to resources and/or practices in advance of construction activities for the East Kalaeloa Energy Corridor project.

The project will include power-pole removal, relocation, and reinstallation as part of construction of an electrical and communication distribution system along a 5,195.4-meter-long corridor, on and around Essex Road from a point south of Geiger Road to Tripoli Street, and west along Tripoli Street to Coral Sea Road. It is designed to provide an interconnection between the Hawaiian Electric Company, Inc., and prospective photovoltaic facilities; to replace a substandard Navy electrical infrastructure with an infrastructure to be maintained by Hawaiian Electric Company; and to provide electric services to certain tenants in the District.

The project corridor crosses part of the central portion of the 'Ewa Plain, a coastal plain that forms most of the lowlands of southwestern O'ahu. The area around the corridor was once used during traditional settlement as evidenced by remaining archaeological sites. Today it is highly modified, once used by the military and currently being developed with additional housing and another golf course partially across from the established Barbers Point Naval Golf Course. Many remaining rock features including walls and enclosures, and large numbers of both modified and unmodified sinkholes across the limestone terrain of Kalaeloa (Barbers Point), represent traditional activities such as habitation and agriculture, and possibly burial. The 'Ewa Plain, especially the sinkholes, which retain water and moist soils—remained in use throughout the early post-Contact era, during the ranching period of the 19th century, and later for sugarcane and other commercial agriculture. In the mid-1900s, the areas surrounding the corridor became part of the Barbers Point Naval Air Station and used almost exclusively by the U.S. military until its closure in 1999.

This CIA is in accordance with the State of Hawaii Environmental Council *Guidelines for Assessing Cultural Impacts* [1997] and in compliance with Act 50 SLH 2000 (HB 28 H.D.1) as it amends the State of Hawai'i Environmental Impact Statement law [Chapter 343, HRS] to include "effects on the cultural practices of the community and State. [It] also amends the definition of 'significant effect' to include adverse effects on cultural practices." The *level of effort* for this CIA included ethnographic research (two oral history interviews) and analysis, a review of relevant reports provided by IARII, additional cultural literature research, and a CIA report.

There is no obvious direct impact to cultural resources, access to them, or cultural practices. However, based on the results of the CIA, it is possible that construction could affect water sources (through surface run-off and/or penetration of underground freshwater sources) or encounter previously-filled sinkholes and cave systems containing cultural remains. Therefore, in addition to the archaeological monitoring recommended by IARII, cultural monitoring is also recommended during construction. This includes the removal, relocation and reinstallation of power poles, where removal of dirt and/or drilling into sub-surface soil and coral/limestone beds will take place. This additional cultural monitoring will help to mitigate any possible adverse effects of the project.

ACKNOWLEDGEMENTS

Without the ethnographic consultants this Cultural Impact Assessment could not have been done, therefore **Mahalo Nui Loa** goes out to Uncle Shad Kane and Uncle Henry Chang Wo who are both very well-known cultural practitioners from this *'āina*, whose expertise and *mana'o* are always sought out. Big *mahalo* for the awesome site tours and lessons about the resources of land and sea.

Big *mahalo* also go transcriber Rona Ikehara-Quebral, occasional typist Se Ah Kee, computer tech Jessica Orr, and Essex Road survey driver Uncle Pat Aki.

Mahalo to IARII staff, Steve, Rona, Sue, Tim, Gail, Tom and Myra.

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INTRODUCTION

This Cultural Impact Assessment (CIA) is in response to a request from *International Archaeological Research Institute, Inc.* (IARII) for the East Kalaeloa Energy Corridor project, 'Ewa District, O'ahu. This study is part of a larger project that includes an Archaeological Assessment (AA) conducted by IARII. The AA and CIA will be incorporated into an Environmental Assessment (EA) prepared by Belt Collins Hawaii LLC in compliance with federal and state requirements to identify and evaluate possible cultural impacts to cultural resources, cultural practices and access to resources and/or practices in advance of construction activities for the East Kalaeloa Energy Corridor project. The *level of effort* for this CIA included ethnographic research (two oral history interviews) and analysis, a review of relevant reports provided by IARII, additional cultural research and a CIA report.

This CIA is in accordance with the State of Hawaii Environmental Council *Guidelines for Assessing Cultural Impacts* [1997] and in compliance with Act 50 SLH 2000 (HB 28 H.D.1) (Appendix A) as it amends the State of Hawai'i Environmental Impact Statement law [Chapter 343, HRS] to include "effects on the cultural practices of the community and State. [It] also amends the definition of 'significant effect' to include adverse effects on cultural practices." The following is from its *Introduction*:

It is the policy of the State of Hawaii under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

A Cultural Impact Assessment comprises gathering information about the project lands through interviews with knowledgeable individuals, and a study of applicable historical and cultural documents. The *Guidelines for Assessing Cultural Impacts* (Appendix B) recommend the following:

The geographical extent of the inquiry should be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An *ahupua'a* is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the *ahupua'a* and the geographical extent of the study area should take into account those cultural practices.

The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

This report is organized into five parts or chapters. Chapter 1 describes the project area in terms of location, in the context of *ahupua'a* (traditional sub-district land unit), district and island, as well as a generalized description of the natural environment (e.g., geology, flora and fauna) and built environment (e.g. any current features). Chapter 2 explains the methods and constraints of this study. Chapter 3 summarizes a review of the historical and traditional (cultural) literature in the context of the general history of Hawai'i, the island of O'ahu, the traditional district or *moku* of 'Ewa and local histories of Honouliuli Ahupua'a – especially Kapolei and Kalaeloa. Chapter 4 presents the ethnographic analysis based on the supporting raw data (oral history transcripts) as it pertains to land, water and cultural resources and use in the project area and vicinity. It also includes background data of the ethnographic consultants. Chapter 5 summarizes the findings of this cultural impact study based on supporting data from Chapters 1 through 4 and presents a cultural impact assessment and recommendations.

The CIA scope-of-work (SOW) (Appendix C) was based on the Environmental Council *Guidelines for Assessing Cultural Impacts* (1997) and focuses on three cultural resource areas (traditional, historical and ethnographic), conducted on two levels: archival research (literature/document review) and ethnographic data (oral history). The tasks of the CIA includes the following:

1. conduct historical and other culturally related documentary research;
2. identify individuals with knowledge of the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or *ahupua'a*; or with knowledge of the area potentially affected by the proposed action [e.g. past/current oral histories];
3. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
4. assess the impact of the proposed action on the cultural resources, practices and beliefs identified.

Traditional resources research entailed a review of Hawaiian *mo'olelo* (stories, legends or oral histories) of late 19th and early 20th century ethnographic works. Historic research focused on the literature compiled and included two past oral histories conducted in the 1970s. Ethnographic research focused on current interviews with individuals knowledgeable of the project area.

Construction activities associated with this Hawaii Community Development Authority project being implemented as outlined in the 2006 Kalaeloa Master Plan (HCDA Web site) and its 2010 Infrastructure Master Plan (also HCDA Web site) are as follows:

- Constructing an electrical and communication distribution system within the Kalaeloa Community Development District, on or about Essex Road from Roosevelt Avenue to Tripoli Street, and a portion of Coral Seas Road accordance with applicable public utility company specifications;
- Providing an interconnection between the Hawaiian Electric Company, Inc., and prospective photovoltaic facilities;
- Providing electric services to certain tenants in the District;
- Replacing a substandard Navy electrical infrastructure with one to be maintained by Hawaiian Electric Company.

To accomplish these tasks, new electrical poles will be installed along a 5,195.4-meter (m) electrical-pole corridor. Related construction activities will likely include regular movement of large vehicles and construction equipment—such as aerial bucket trucks, auger trucks, and pole trucks—along the project corridor, transportation of electrical poles in and out of the project corridor, exhumation of existing poles,

augering of new postholes, and installation of poles at the new locations. A substantial portion of this activity will take place in close proximity to recorded archaeological sites, including traditional Hawaiian agricultural and habitation structures and sites established for U.S. military use before and during World War II (Pacheco and Allen 2013:2).

Project Location

The East Kalaeloa Energy Corridor project is located on the island of O'ahu, in the *moku* or district of 'Ewa, in the *ahupua'a* of Honouliuli in an area now called Kalaeloa (formerly Naval Air Station-Barbers Point) (Fig. 1). Kalaeloa was formerly known as Barbers Point because Captain Henry Barber wrecked his ship on a coral shoal there on October 31, 1796. Naval Air Station (NAS) Barbers Point, was a 3,695-acre military installation along the southwestern shore of O'ahu in the central portion of the 'Ewa Plain. It was closed in 1999 and portions (2,165 acres) were transferred to the State of Hawaii. The state legislature established the Barbers Point Naval Air Station Redevelopment Commission (BPNAS-RC) in 1993 to guide the transfer and development of NAS-BP which included the John Rogers airfield. In July 2002 the Hawaii Community Development Association (HCDA) became the redevelopment authority for Kalaeloa. The former NAS-BP runways are now the Kalaeloa Airport (DBEDT-HCDA 2013).

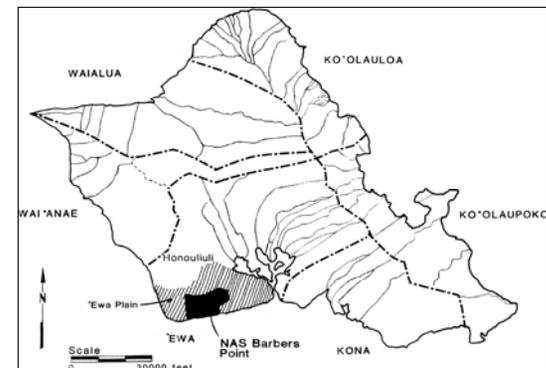


Figure 1. General project area location (from Tuggle and Tomonari-Tuggle 1997:3)

The project corridor is roughly bounded by Kalaeloa Airport (John Rodgers Field) to the west (Fig.2 and Fig. 3), Ewa Village to the north, the Ewa Gentry housing development to the northeast, Coral Creek Golf Course to the east, Ka Makana at Hoakalei housing development to the southeast, and the Pacific Ocean to the south as noted in the following from Pacheco and Allen (2013:2):

The portion of the existing electrical corridor where pole replacement is planned is a 5,195.4-m stretch of roadway that includes portions of several City and County of Honolulu roads. The corridor begins south of the Geiger Road-Essex Road junction in the northeast, and follows Essex (passing west of the Honouliuli Wastewater Treatment Plant) southwest to the northernmost roadway corner shown in, where it turns south; it continues south to the junction with Tripoli Street and follows Tripoli to the southernmost roadway corner, where it turns southwest along Tripoli to end in the southwest at Coral Sea Road. Two additional, short segments, include Gambier Bay Street north from Essex; and a short road segment east of Gambier Bay Street on Bismarck Sea Street.



Figure 2. Project Map – (from BCH 2013).

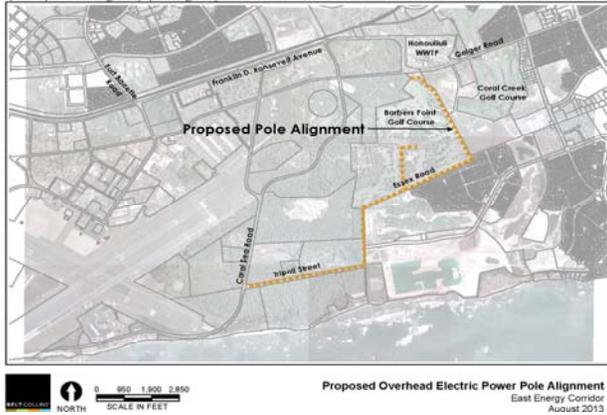


Figure 3. Electric Power Pole Route (from Pacheco & Allen 2013)

Drive-through surveys were done on three separate days following the course of the East Kalaeloa Energy Corridor route. Tripoli Street was accessed from Coral Sea Road where there was restricted access to Essex Road from there. Essex Road runs along the Barbers Point Golf Course (S/SW), but is gated just off what appears to be San Jacinto Road and therefore does not allow access to Tripoli Street.



Photo 2. Kalaeloa Airport



Photo 3. Coral Sea Road (NE)



Photo 4. Coral Sea Road (W)



Photo 5. Tripoli Street (S)



Photo 6. Essex Road-S



Photo 7. Essex Road-W



Photo 8. Essex (lf) /San Jacinto (rt)



Photo 9. Essex-sign rt rare plants



Photo 10. San Jacinto Rd.-gated



Photo 11. John F. Kennedy/S Jacinto



Photo 12. San Jacinto Rd



Photo 13. Bismark Sea/Gambier Bay

Physical Setting

The physical setting of the area is described in Tuggle and Tomonari-Tuggle (1997:9), Tuggle (1997:19), Athens (2003:3), and O'Hare and Hammatt (2003:5). The terrain is largely limestone with no topographic relief except for numerous sinkholes. Soils of Kalaeloa "fall in the classification "CR" or coral outcrop (Foote et al. 1972:29), although in some upper areas the coral has been covered by the Mamala soils that have been deposited from the erosion of the Wai'anae range.... There is no natural surface water flow through the Station and no evidence of any channels where this would have occurred in the past. Based on information from historical maps, it appears that the main runoff channel coming from the Wai'anae range into the present area of the Station drained into a large sinkhole" (Tuggle and Tomonari-Tuggle 1997:9).

Tuggle (1997:19) also observes, "Human interment has been found with some frequency on the 'Ewa Plain, commonly occurring in sinkholes. In some cases, the interments are actually buried with the sink deposit, in other cases bones have been placed in recesses of the sink." Sinkholes are natural bell-shaped cavities formed in limestone (Athens 2003:3). O'Hare and Hammatt (2003:5) provide the following summary:

Honouliuli, the westernmost *ahupua'a* of the 'Ewa District, encompasses the 'Ewa Plains and a portion of the West Loch of Pearl Harbor. The 'Ewa Plain is primarily an emerged reef that slopes upward from the ocean to an elevation of about 30 m (meters) above sea level (ASL) to the base of the Wai'anae Mountains 5-8 kilometers to the north. The 'Ewa Plain is underlain by an elevated coral reef partly covered by alluvium of the Mamala Series washed down from the Wai'anae Mountains. The lower portion of the 'Ewa Plain is a lowland limestone exposure, with little or no soil cover. Foote et al. (1972:28-29, Map Sheet 45) characterizes the soil cover in the project area as BS (Beaches) and CR (Coral Rock). The coral rock is the remnant of the reef, originally derived from coralline algae (Allen 1990:45). It is referred to as "reef limestone", since it is not entirely sedimentary. The coastline originally consisted of weathered coral rock benches, with some poorly developed and scattered calcareous sand beaches. There was little significant sand dune formation. The only topographic formations are numerous sinkholes in the reef limestone, formed by solution of the reef by water, mainly ground water (Schilz and Landrum 1996:6). The sinkholes vary from a few centimeters in width and depth to 30 m wide and 5 m deep (Tuggle and Tomonari-Tuggle 1997a:9). A fringing reef extends off of the southern end and parts of the western coast of the 'Ewa Plain.

According to Pratt and Gon III (1998:122, 127-128) the project area was once lowland dry and mesic forest and grassland. It could have included shrubs such as *'a'ali'i* (*Dodonaea viscosa*), *'ākia* (*Wikstroemia* species), *ko'oko'olau* (*Bidens* species), and *'ūlei* (*Osteomeles anthyllidifolia*). It could also have included dry or mesic forests of *'ōhia* (*Metrosideros polymorpha*), *koa* (*Acacia koa*), *lama* (*Diospyros sandwicensis*) and *wiliwili* (*Erythrina sandwicensis*). Some of the lands bordering the corridor still have native vegetation such as the *wiliwili*, *'a'ali'i* and *ko'oko'olau*, but most of the project area is primarily alien or exotic vegetation. The native fauna would have included birds such as *'elepaio* (*Chasiempis sandwicensis*), *'apapane* (*Himatione sanguinea*) and *'amakihi* (*Hemignathus virens*) and insects. The native birds are no longer in the area, however, *nēnē* (*Branta sandwicensis*) have been frequenting some nearby areas, as well as other non-native geese.

When Tuggle and Tomonari-Tuggle (1997: 9, 11) did their survey of NAS Barbers Point, they recorded the following:

One hundred seventy-three (173) plant species have been recorded on the Station (Botanical Consultants 1984). Strand vegetation includes beach *naupaka* (*Scaevola taccada*) and *'akulikuli* (*Sesuvium portulacastrum*), but is dominated by thick stands of two species of *pluchea* (*Pluchea*

indica, Indian Fleabane and *Pluchea symphytifolia*, sowbush). Vegetation in undeveloped inland areas of the Station is typical of the 'Ewa Plain: it is dominated by *kiawe* (*Prosopis pallida*) and *koa haole* (*Leucaena leucocephala*), with a variety of shrubs, grasses, and vines, including Chinese violet (*Asystasia gangetica*), Philippine violet (*Barleria cristata*), and wild basil (*Ocimum gratissimum*).

Twenty-three percent of the species are native Hawaiian plants, including *noni* (*Morinda citrifolia*), *ti* (*Cordyline fruticosa*), and *wiliwili* (*Erythrina sandwicensis*). Although *kiawe* is the dominant tree, there are stands of *wiliwili* that can be defined as mature forests invaded by *kiawe*. One large *wiliwili* stand on the Station has been noted as healthy, with the older trees bearing nuts and with many seedlings and saplings (Tuggle 1997). Several other seemingly healthy stands were noted during the 1994 survey. The presence of this remnant native dry forest has been given little attention in plant surveys; for example, it is ignored in the Station's Natural Resources Management Plan (Traverse Group 1988; e.g., A-12, E-3). This is surprising because *wiliwili* is the plant with the strongest traditional associations with the 'Ewa Plain, as discussed in the section on traditions and resources.

Two endangered plants, both endemic to O'ahu, have been identified on NAS Barbers Point: the 'Ewa Plain *'akoko* (*Euphorbia skottsbergii*) and *Achyranthes rotundata* (no common name) (Traverse Group 1988: A-12).

Tuggle and Tomonari-Tuggle (1997:11) also recorded information of various fauna on NAS Barbers Point:

Perhaps the most notable animal life in the area of NAS Barbers Point is the honey bee, which has created numerous hives of varying sizes in the sinkholes. Bee-keeping was a commercial activity in the area in the late 1800s and early 1900s. It is listed on various lease documents for Honouliuli in 1889, and is identified as one of the assets of the Ewa Plantation Company in 1920.

Other common terrestrial animals on the Station are the Indian Mongoose (*Herpestes auro-punctatus*), rats and mice (*Rattus rattus*, *Rattus exulans*, and *Mus musculus*), giant toad (*Bufo* sp.), and a variety of lizards (Traverse Group 1988).

A total of 24 species of birds has been reported from NAS Barbers Point in the last 10 years (Ogden Environmental 1994:3-13). Six species are indigenous, one species is endemic, and 17 species are introduced. The indigenous birds are water birds and migratory seabirds, including the black-crowned night heron (*Nycticorax nycticorax hoactli*), great frigate bird (*Fregata minor palmerstoni*), Pacific golden-plover (*Pluvialis fulva*), Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*), sanderling (*Calidris alba*), and ruddy turnstone (*Arenaria interpres*). In 1984, the endemic O'ahu bird *'elepaio* (*Chasiempis sandwicensis gayo*) was observed in the mangrove fringe of Ordy Pond (Botanical Consultants 1984). However, a recent review of the avian data states that this sighting "has not been confirmed... [and] it is unlikely that the Oahu 'Elepaio occurs onsite" at NAS Barbers Point (Ogden Environmental 1994:3-13).

The Hawaiian Islands had a range of resources available to the first Polynesian settlers to the islands. Tuggle and Tomonari-Tuggle (1997:12) noted the following:

Resources of the 'Ewa Plain that would have been available for Hawaiian exploitation include[d] plants, birds, marine biota, stone, soil, and water. The area of NAS Barbers Point is a large central portion of the Plain and undoubtedly most of the resources identified for the Plain in general were available in this area.

The model for the 'Ewa Plain during the early period of human occupation is one of an "open savanna-like grassland" where "trees such as Pritchardia, *wiliwili*, *noni*, and *kou*, formed small groves in favorable locations..." (Davis 1990:342). This model is based on information derived

from botanical data (Char and Balakrishan 1979:12), as well as from land snail analysis (Kirch and Christensen 1981).

Primary food plants on the 'Ewa Plain that could have been collected or cultivated include coconut palm (*Cocos nucifera*), *milo* (*Thespesia populnea*), *noni* (*Morinda citrifolia*), banana (*Musa* sp.), *ti* (*Cordyline fruticosa*), and *pōhuehue* (*Ipomoea brasilensis*), *koali'ai* (*Ipomoea cairica*), sugarcane (*Saccharum officinarum*), *pai'i'iha* (*Cyclosorus dentatus*), and *'āheahea* (*Chenopodium oahuense*) (Char and Balakrishan 1979:12; Davis 1979; Murakami 1995). A large number of other plants were available for wood, thatching, oil, and dyes (Davis 1990). Most of the cultigens would have been planted in relation to winter rains.

Regarding sweet potato and breadfruit, Tuggle and Tomonari-Tuggle (1997:17) note:

The 'Ewa Plain is described as "*o ke kaha*," a reference to sweet potato land (Formander 1916-20, II: 279).... One of the most interesting of plant references for the 'Ewa Plain is *'ulu* (breadfruit, *Autocarpus incisus*). The connections with 'Ewa concern the bringing of the first breadfruit to Hawai'i. The most commonly quoted version (Kamakau 1991:110) notes that the first breadfruit was planted at Pu'uloa, 'Ewa, brought by Mo'ikeha's grandson, Kaha'i-a-Ho'okamali'i, in a round-trip voyage that began at Kalaeloa (the southwestern tip of the 'Ewa Plain).

Tuggle and Tomonari-Tuggle (1997:12-13) describe other traditional resources as follows:

Numerous reef fish were available from coastal waters, with peak productivity from January through June, based on the seasonality model developed by Davis (1990). Archaeological remains indicate that, for inhabitants of the coast, near-shore fish were a primary food resource (Davis 1990:136; Tuggle and Tomonari-Tuggle 1997:93).

The modeling of the environment for the Plain indicates that vast numbers of bird colonies would have been exploitable, at least early in the period of human colonization (Olson and James 1982), based on the excavation of sinkhole deposits that contain bones of extinct birds. The presence of flightless species and the overlapping nesting seasons of a variety of birds would have made one or more species available at any time of year (Davis 1990:136). A large number of bird species became extinct after Hawaiian occupation, but the nature of the extinction processes, the timing of the extinctions, and the history of bird predation by Hawaiians have become primary research issues in the archaeology of the 'Ewa Plain.

Stone of high quality suitable for tool manufacture is one resource that is absent from the Plain. Basalt and volcanic glass are very rare in the archaeological sites that have been tested on the Station. Basalt cobbles occur naturally only in the upper gulches of the Plain and none have been noted on the Station. Volcanic glass is reported to be available at Pu'upalalailai (Davis 1990:79), which lies on the edge of the 'Ewa Plain about 3 km north of NAS Barbers Point. The base rock of the Plain is limestone, and this was commonly used by Hawaiians in building structures, as an element in cooking features, and as cutting tools.

Soil suitable for cultivation was not evenly distributed over the 'Ewa Plain. The better, arable soils, those used for 20th century sugarcane production, are concentrated in the upland portion of the Plain, inland of NAS Barbers Point. Hawaiian cultivation in the exposed limestone reaches of the Plain, including the area that is now NAS Barbers Point depended on the use of sinkhole deposits [hundreds of limestone sinkholes] and prepared stone mounds, rather than good soils.

Tuggle and Tomonari-Tuggle (1997:16) note the following traditional references to water on the 'Ewa Plain:

The traditions have little reference to water on the 'Ewa Plain, except for inland streams of

Honouliuli. However, there is one story that refers to a spring named "Hoaka-lei" (lei reflection) because "Hi'iaka picked *lehua* flowers here to make a *lei* and saw her reflection in the water" (Pukui et al. 1974:119). This spring was located at Kualaka'i, a well-known place on the coastline of what [was] NAS Barbers Point. Early maps show an unidentified feature at Kualaka'i, but the 1928 USGS map notes the presence of a "waterhole." People lived at Kualaka'i throughout the late 19th century and into the 20th century indicating that water remained available even after the beginning of upland well-drilling and sugarcane cultivation.

Water as a resource on the 'Ewa Plain is discussed by Tuggle and Tomonari-Tuggle (1997:13-14) as follows:

Water as a resource needs to be considered from two standpoints, rainfall and surface water availability. The annual rainfall figure of about 18 to 20 inches for the 'Ewa Plain is a misleading number. There is a substantial range of recorded annual rainfall, from a low of 8 inches to a high of 42 inches recorded at the Magnetic Station in the center of the NAS Barbers Point area from 1902 to 1933. The high end of the range can be increased to about 67 inches based on 1982 data at the Ewa Plantation gauge (Yuen and Associates, Inc. 1989:20). Hawaiian adaptation should be considered in terms of rainfall variability rather than an annual average.

In regard to surface water, the 'Ewa Plain probably had much greater water availability than is now perceived. It is uncertain if rainfall was greater in pre-contact times than now, but it is quite probable that the water table was higher. It has been estimated that the water table may have "been drained to a third of its former level" (Culliney 1988:233) as a result of artesian well drilling and the intensive water use for sugarcane irrigation. Today the water table is from 1 to 3 m below the surface up to about 500 m from the coast and thus is accessible from deeper sinkholes. With a higher water table and the hundreds of sinkholes that are found on the Station, there would have been significant water availability from these sinkholes. It is also probable that water would have been less brackish than today. Currently, all wells on the Station have water that is classified as brackish, with chlorides greater than 500 ppm (Traverse Group 1988: A-7).

Historical maps of the 'Ewa Plain show freshwater ponds, marshes, and waterholes in the inland portion of the Station. Maps by Malden (1825) and Alexander (1873) show a pond at 60 feet ASL, just inland of the present Station boundary. A 1908 USGS map shows a marsh at 30 feet ASL, an area that was quarried by the Navy and is now abandoned. The 1928 USGS map indicates three or possibly four other wetlands (two probable wetlands of reference have been filled in).... Ordy Pond is the only existing body of open water on the Station, and is brackish. The Salt Flat, to the west of Ordy Pond, is a seasonal wetland.... Hawaiian traditions also refer to a spring at Kualaka'i.

According to Magnuson and Welch (2003:5) there have been recent marine resources studies of the area.

Recent studies of marine fauna off the coast of the former NAS Barbers Point have recorded only a few microinvertebrates and a low diversity of reef fish, primarily triggerfish (*Balistidae*) and hawkfish (*Cirrhitidae*) (Odgen Environmental 1994:3-14 quoting Marine Research Consultants 1992). An aggregation of green sea turtles (*Chelonia mydas*) have also been identified off the coast.

According to Tuggle and Tomonari-Tuggle (1997:18) the 'Ewa Plains had limited early occupation, to scattered habitation as noted in the following:

In the areas of the Plain where archaeology has been carried out, radiocarbon dating suggests the possibility of early limited occupation prior to A.D. 1000, scattered habitation from A.D. 1000 to 1400, and the bulk of population growth and settlement from A.D. 1400 to 1800. Generally, the subsistence base appears to have been a mixed one involving collection of marine resources and

dryland cultivation, probably with emphasis on sweet potato.... Most of the sites appear to have been occupied for relatively brief periods of time, ranging in age from the A.D. 1400s to possibly around the time of contact.

A U.S. Department of the Navy Hydrographic Office 1880-1893 map shows three named settlements, on the south shore: Ka Laeloa [sic], at the southwest point outside of the project corridor; Kualaka'i slightly west of the project corridor; and One'ula east of the project corridor. Malden's earlier (1825) map indicated a trail (probably Hawaiian) that begins in the village of Honouliuli (near West Loch in Pearl Harbor) and branches as it nears the south shore, then following approximately the routes of the modern Coral Sea and Essex Roads, which bound the project corridor respectively on the west and east sides (see Beardsley 2001:11.8; Tuggle and Tomonari-Tuggle 1997a:22). Malden's (1825) wall and enclosures are located south outside the project corridor at the south end of Essex Road and on the shore south of Tripoli Street between Essex and Coral Sea Roads (Pacheco and Allen 2013:6-7).

METHODS

This Cultural Impact Assessment was conducted April 2013 to September 2013. The study consisted of three phases: (1) cultural and historical archival literature review; (2) ethnographic survey (oral history interviews - April), analysis of ethnographic data and (3) report writing. The personnel consisted of the principal investigator (ethnographer) who has a master's degree in Anthropology, with a graduate curriculum background in the archaeology track as well as anthropology theory, cultural resource management, ethnographic research methods, and public archaeology; an undergraduate curriculum background that included Hawaiian History, Hawaiian Language, Hawaiian Archaeology, Pacific Islands Religion, Pacific Islands Archaeology, Cultural Anthropology, as well as a core archaeology track, Geology, and Tropical Plant Botany; and ethnographic field experience that includes over 400 interviews to date.

This CIA is loosely based on *Grounded Theory*, a qualitative research approach in which "raw data" (transcripts and literature) are analyzed for concepts, categories and propositions. Categories were pre-selected as part of the overall research design. However, it is not always the case that these research categories are supported in the data. Categories were generated by forming general groupings such as "Land Resources and Use," "Water Resources and Use," "Marine Resource and Use" and "Cultural Resources and Use." Conceptual labels or codes are generated by topic indicators (i.e., sinkholes, fishing, gathering). In the *Grounded Theory* approach, theories about the social process are developed from the data analysis and interpretation process (Haig 1995; Pandit 1996). This step was not part of this cultural impact assessment as the research sample was too small.

The level of effort for this study included an archival research literature review and an ethnographic review and analysis (two formal oral histories; one email ethnographic survey). Primary source material included genealogies, oral histories and other studies and reports. Secondary source material included translations of 19th century ethnographic works, historical texts, indexes, various reports and Hawaiian language resources (i.e., proverbs, place names and dictionary) and several reports provided by International Archaeological Research Institute, Inc.

The selection of the ethnographic consultant was based on the following criteria:

- Had/has Ties to Project Location
- Known Hawaiian Cultural Resource Person
- Known Hawaiian Traditional Practitioner
- Referred By Another Cultural Practitioner

The formal interview process included a brief verbal overview of the study. Then the ethnographic consultant was provided with a consent or 'agreement to participate' form to review and sign (Appendix D). An ethnographic research instrument (see Appendix E) was designed to facilitate the interview; a semi-structured and open-ended method of questioning based on the person's response ('talk-story' style). Each interview was conducted at the convenience (date, place and time) of each consultant. The interview was conducted using a cassette tape recorder. Each interviewee was allowed to choose where he wanted to have his interview conducted. Notes were also taken, but more attention was given to listening intently to the consultant. A *makana* or gift was given to the ethnographic consultant in keeping with traditional reciprocal protocol.

Ethnographic Research Constraints included the following:

- No constraints in interviewing process; each interview included lengthy field trips to cultural areas (i.e., Kalaheo Heritage Park and 'Ewa coast *limu* picking);
- A third interview and field trip (Hoakalei Heritage Park) was planned but several issues/predicaments prevented it from happening;
- A HCDA consultant was emailed an ethnographic survey instead of conducting a formal interview; it was not returned;

In the transcribing-editing process the taped interview was transcribed by a hired transcriber and edited by the ethnographic investigator. The consultant was emailed an explanation of the transcript review process, along with the interview transcript, and a 'release of information' form. This process allows for corrections (i.e., spelling of names, places), as well as a chance to delete any part of the information if so desired or to make any stipulations if desired. The consultant was also informed of the two-week time limit for their review after which it will be assumed that the raw data can be selectively used.

The ethnographic analysis process followed a more traditional method, as a qualitative analysis software program was not necessary. The interview was manually coded for research thematic indicators or categories (i.e., personal information; land resources and uses; site information-traditional and/or historical; and anecdotal stories). For the purpose of this CIA, it was also not necessary to go beyond the first level of content and thematic analysis. However, sub-themes or sub-categories were developed from the content or threads of each interview (e.g., land resources; cultural resources).

The Summary of Findings section is based on both archival and ethnographic data: Summary of Significant People and Events (e.g., Legendary Entities, *Ali'i Nui* or high chiefs), Summary of Historic People and Events, and Significant Practices Pre-Contact and Post-Contact. This section also includes 'Environmental Council Guidelines Criteria in Relation to Project Lands' and the Cultural Impact Assessment and recommendations or mitigation if any are made.

The first interview was conducted at the Kalaheo Heritage Park off of Coral Sea Road. After the interview, Uncle Shad Kane gave me a tour of the park – the 2-3 cleared acres of 77 acres gifted by the Navy - portions of which border the East Kalaheo Energy Corridor. The second interview included a working/teaching field trip to the *limu* beds of the 'Ewa coast by Uncle Henry Chang Wo; this illustrated the *makai* or marine resources that would have been available to Pre-Contact and Post-Contact inhabitants of the 'Ewa-Kalaheo lands (see photos within report). Two additional drive-through surveys included Tripoli Street from Coral Sea and Essex Road from Roosevelt Road to San Jacinto (including Essex/Bismark Sea and Gambier).

CULTURAL AND HISTORICAL BACKGROUND REVIEW

The Cultural and Historical Background Review entailed a review of previous reports that included primary and secondary source literature. Examples of primary source material include maps, Land Court records, newspaper articles, genealogies, oral histories and other studies. Secondary source material includes translations of 19th century ethnographic works, historical texts, indexes, archaeological reports, internet research and Hawaiian language resources (i.e., proverbs, place names and Hawaiian language dictionary). A review of selected archival material is presented in this section.

The ethnographic works of the late 19th and early 20th century contribute a wealth of information that comprise the traditional literature - the *mo'olelo*, *oli*, and *mele* - as well as glimpses into snippets of time, and a part of the Hawaiian culture relatively forgotten. The genealogies handed down by oral tradition and later recorded for posterity, not only give a glimpse into the depth of the Hawaiian culture of old, they provide a permanent record of the links of notable Hawaiian family lines. The *mo'olelo* or legends allow *ka po'e kahiko*, the people of old, the *kupuna* or ancestor, to come alive, as their personalities, loves, and struggles are revealed. The *oli* (chants) and the *mele* (songs) not only give clues about the past, special people and *wahi pana* or legendary places, they substantiate the magnitude of the language skills of *na kupuna kahiko*.

Po'e ku'auhau or genealogy *kahuna* (masters) were very important people in the days of old. They not only kept the genealogical histories of chiefs "but of *kahuna*, seers, land experts, diviners, and the ancestry of commoners and slaves ...an expert genealogist was a favorite with a chief" (Kamakau 1992:242). During the time of 'Umi-a-Liloa, genealogies became *kapu* (restricted) to commoners, which is why there "were few who understood the art; but some genealogists survived to the time of Kamehameha I and even down to the arrival of the missionaries" (Kamakau 1992:242).

There are several chants from Hawai'i and other Polynesian islands referred to as migration chants that expand on the travels of ancient Polynesians and not only explain why they traveled from place to place, and where they traveled, they also give their genealogy illustrating how families are connected from one Polynesian island-nation to another. Examples are the chants and stories by Kamakau and Kepelino about Hawaii-loa a famous ancient navigator and discoverer of the islands named after him (PVS 2013).

Ruling chiefs of the various islands came from combinations of genealogies or branches. Malo (1971) wrote about the connection between the *maka'ainana* and the chiefs. "Commoners and *ali'i* were all descended from the same ancestor, Wākea and Papa" (Malo 1971:52). Surviving genealogies illustrate that the ruling families of each island were interrelated quite extensively. The chiefs of O'ahu, Kauai, Hawai'i, Maui and Moloka'i had one common ancestry. Families branched out, but conjoined several times in succeeding generations (Kamakau in McKinzie 1983:xxv). Not only were the chiefs or *ali'i* related to each other, they were also related to the commoners. In *Ruling Chiefs*, Kamakau (1992a:4) states that "there is no country person who did not have a chiefly ancestor." Genealogies were very important to the chiefs, because ranking was very important.

One could defend and/or prove their rank by knowing or having one's genealogist recite one's genealogy. "To the Hawaiians, genealogies were the indispensable proof of personal status. Chiefs traced their genealogies through the main lines of 'Ulu, Nana'ulu, and Pili, which all converged at Wākea and Papa" (Barrère 1969:24). Two well-known genealogy chants are the *Kumuhonua* and the *Kumulipo*, but other genealogy chants have survived as well.

The *Kumuhonua* first published by Fornander in 1878 in *The Polynesian Race* Vol. I was based on information from Kamakau and Kepelino. Kumuhonua, the man, was of the Nana'ulu line, and the older

brother of Olopana and Mo'ikeha (McKinzie 1986:14-15 Vol. I). Barrère (1969) explains that some of the *Kumuhonua* legends were recorded by Kamakau and Kepelino between the years 1865 and 1869, however, the 'genealogy' of the *Kumuhonua*, published by Fornander, was given to him "to provide credibility to the legends...this 'genealogy' (was) constructed from previously existing genealogies--the *Ololo (Kumuhonua)* and the *Paliku (Hulihonua)*, which are found in the *Kumulipo* chant (see Beckwith 1951:230-234) and interpolations of their own invention" (Barrère 1969:1).

Feher (1969) asked several notable Hawaiian scholars to write passages in his *Kumulipo: Hawaiian Hymn of Creation-Visual Perspectives*. In the Introduction Momi Naughton states "The *Kumulipo* belongs to a category of sacred chants known as *pule ho'ola'a ali'i*, or 'prayer to sanctify the chief,' which was recited to honor a new-born chief (Feher, 1969:1). In her passage (Feher 1969:1), Edith McKinzie states:

"The *Kumulipo* is a historical genealogical chant that was composed by the court historians of King Keaweikekahiali'iokamoku of the island of Hawai'i about 1700 AD in honor of his first born son Kalani-nui-'I-a-mamao. This important chant honors his birth and shows the genealogical descent of both the *ali'i* (chiefs) and the *maka'ainana* (commoners) from the gods, in particular Wakea."

In a passage by Roger T. Ames, he corroborates this idea and states that "what is of particular humanistic interest is the way in which the *Kumulipo* as a repository of cultural authority served Hawaiian society in transmitting its cultural legacy and organizing its community. In doing so, it combines both a linear sense of temporal development and the richness of one particular moment in time" (Feher, 1969:3).

Edith McKinzie (1983) completed the first volume of *Hawaiian Genealogies*, which were based on genealogy articles translated from Hawaiian newspapers such as *Ka Nonanona* and *Ka Nupepa Kuokoa* in the late 19th century and early 20th century. These articles were in response to a call to preserve the Hawaiian heritage. Some of the information came from Malo's (1838) *Mo'olelo Hawaii* (Hawaiian History), and in Fornander's (1880), *The Polynesian Race* (Book I) (McKinzie 1983:1).

Youngblood (1992) found that he could draw on both Fornander and Beckwith's translations of 'The *Kumulipo*' to sketch a socio-political history of Hawai'i (Youngblood 1992:34). In his re-creation he found that stemming from Wākea and Papa are two major Hawaiian genealogies: the *Nana'ulu* and the '*Ulu* [brothers]. The *Nana'ulu* was the wellspring for the *ali'i* of O'ahu and Kaua'i, while the '*Ulu* line supplied the chiefs of Maui and the Big Island.

Using thirty years to account for one generation, McKinzie determined that Wākea was born ca AD 190; Umi-a-Liloa ca 1450; Keaweikekahiali'iokamoku ca 1650, Kalanihūiukuapaikalanui Keoua ca 1710; and Kamehameha I ca 1740" (McKinzie, 1983:12). Volume One of *Hawaiian Genealogies* was published in 1983 and Volume Two of *Hawaiian Genealogies* was published in 1984 (reprinted in 1986 and 1997) with information extracted from genealogical lists published in thirteen newspapers from 1858 to 1920. It complements genealogies found in other works, such as Fornander's (1880) *An Account of the Polynesian Race* and David Malo's (1903) *Hawaiian Antiquities* (McKinzie 1986: v).

The following excerpt is from Kamakau's article in *Ka Nupepa Kuokoa* October 7, 1865, and was translated by McKinzie (1986:18-19). It illustrates some of the mid-19th century sentiment regarding genealogies:

I na maka'ainana, he mea wai wai ole, no ka mea ua papa ko lakou mau makua o hoohalikelike, a hoohanau keiki o ke kuaaina a pii aku i na li'i. Nolaila ia ao ole ia ai na keiki a na makaainana, na kahi makuakane a makuahine, a kupuna aku no.... Ia kakou i ka poe o keia wa, aole waiwai o keia mea he moaalii aole a kakou mau kuleana nui iloko. Aka, ma ko kakou noonoo iho he waiwai nui. Ua komo kakou iloko, ua waiwai na li'i na kupuna; a ua waiwai pu kakou i koo kakou ike ana. No ka mea, ua kapu i ka makaainana aole e ike i keai mea. Aka, no ka pii ana i ka nauauo a

me ke akamai o na keiki a na makaainana; nolali, ua noa na wahi kapu, ua pii waleia. O ke koeana mai o na kupuna oia kahi waiwai.

To the commoners, a genealogy was of no value because their parents forbid (sic) it lest comparisons should occur and country children be born and rise up as chiefs. Therefore, the children of the commoners were not taught beyond father, mother, and perhaps grandparents.... To us, the people of this time, there is no value of this thing of a chiefly lineage; we have no great interest in it. But in our thoughts it is of great value. We have entered into discussion of it; the chiefs valued the chiefs and ancestors; and we also value our knowledge of it. Because it was forbidden to the commoners, they were not to know this. However, due to the rise of wisdom and skill of the children of the commoners, therefore, all of the ranking privileges were no longer restricted; it was only lifted. What remains of the ancestors is something of value.

Kamakau (in McKinzie 1983: xxv) also stated the following:

In the genealogical line of *Nana'ulu*, it is believed that he is an ancestor of Tahiti and Borabora because in this genealogy down to Mo'ikeha [it is said he is from Tahiti] and married Hooipo (Hinauulua) in Kauai who bore their three children: Hookamalii, Haulanuiiaieka, and Kila. And Hookamalii became the chiefly ancestor for O'ahu, Haulanuiiaieka for Kauai, and Kila for Hawaii.

The following tables start with the genealogical line called *Kumu-Honua* which descends to the *Nanauulu* line - the ancestral chiefs of O'ahu and Kaua'i - from Nana'ulu down to Lā'ielohelohe (McKinzie 1983:13). Kamakau (1991) says that Nana'ulu to 'Olopana are the ancestors of Kahiki [Tahiti] and Nu'uhiwa [Marquesas] (Kamakau 1991:79). [Note: macrons may not be used because McKinzie did not use them.] The majority of the sources come from McKinzie (1983 and 1986); Kamakau (1991); Peleioholani (2011) and Kekoolani (2010)

Table 1a. Annotated Genealogy of O'ahu Chiefs

Kāne (male)	Wahine (Female)	Keiki (offspring)
Kumu-Honua	Haloiho	Ahukai (k)
"	"	Kane-a-Kumuhonua
"	"	Kanaloa-a-Kumuhonua
Ahukai	Holehana	Kapili
Kapili	Alonainai	Kawakupua
Kawakupua	Heleaciluna	Kawakahiko
Kawakahiko	Kahohaia	Kahikolupa
Kahikolupa	Lukaua	Kahikoleikau
Kahikoleikau	Kupomakaikaelene	Kahikoleiulu
Kahikoleiulu	Kanemakaikaelene	Kahikoleihonua
Kahikoleihonua	Haakookeau	Haakoakoalaulani
Haakoakoalaulani	Kaneiaikoakanioe	Kupo
Kupo	Lanikupo	Nahaiekieua
Nahaiekieua	Hanailuna	Keakenui
Keakenui	Laheamanu	Kahianahinakii-Akea
Kahianahinakii-Akea	Luanahinakiipapa	Koluanahinakii
Koluanahinakii	Hanahina	Limanahinakii
Limanahinakii	Onohinakii	Hikuanahina
Hikuanahina	Waluanahina	Iwahinakiieka
Iwahinakiieka	Lohanakiipapa	Welaahilaninui
Welaahilaninui	Owe	Kahiko Laumea (I) (Kahiko)
Kahiko Laumea (I) (Kahiko)	Kupulanakehau	Wākea (Nu'uanu, O'ahu)

Kukalaniehu	Kahaukauakoko	Papa (w) Nu'uanu, O'ahu
"	"	Kauakahi
"	"	Kainohiula
Wākea [lived in Waolani, Nu'uanu]	Papa (Papahanaumoku) (Haumea)	Kaalewalewa
"	"	Hoohokukalani (w)
"	"	Laukapalili
"	"	Haloa I (k) [stillborn]
Wākea	Hoohokukalani (daughter)	Haloa II (k)
Haloa II	Hinaaihooulae (Hinamanoluae)	Waia (k)
"	"	Huhune (w)
Waia (sibs)	Huhune	Hananaloa (Hinanalo) (k)
"	"	Hauiki (Haunu'u) (w)
Hananaloa/Hinanalo (sibs)	Hauiki/Haunu'u	Haulani (w)
"	"	Nanakehili (k)
Nanakehili	Haulani	Waia-loa (Wailea, Manaku) (k)
"	"	Hikawaakaunu (Hikawaopuaianea)
Waialoa (sibs)	Hikawaakaunu	Kio (k)
"	"	Kamuoleilani (Kamole) (w)
Kio (sibs)	Kamuoleilani	Ole (k)
"	"	Haihailauahea (w)
Ole (sibs)	Haihailauahea	Kahiko Luamea (II) (k)
"	"	Pupue (w)
[Wikipedia has it slightly different from McKinzie who has Pupue m Kamahale – they have Manuka (k), then Manuka m Hikohaale and they have Kahiko (k) who m Kaea and they have Luanuu...the rest is same]	[Wikipedia has another Kahiko son of Manuka & Hikohaale who m Kaea and has Lukahakona (k) who m Ko'ulamaikalani and they have Kaealuanui (Lu'anui'u) (k)]	Wikipedia's information comes from various genealogies...most prolific is from well-known genealogist S. K. Peleiolani.
Kahiko Luamea (II) (sibs)	Pupue	Kawaamaukele (w)
Kaealuanui (Lu'anui'u)	Kawaamaukele	Hinakoula (w)
"	"	Kukū (Kū) (k)
Kū (sibs)	Hinakoula	Nanau (Nana'ulu) (k) [O'ahu lines]
"	"	Ulu ('Ulu) (k) [c. 415AD]
"	"	Kapumaleolani(Kapomaleolani) w
Ulu ('Ulu)	Kapunuu	Kapulani (Kapulani-a-Ulu) (w)
"	"	Nana (k)
Ulu ('Ulu)	Kaulani I	Nanaele (Nanaie) (k) [c. 440AD]
Nanau (sibs)	Kapumaleolani (Kapomaleolani)	Kahaumokuleia (w) [c. 444AD]
Nanau	Ulukou	Nana-mea (k) [13 gen→Maweke]
Nanamea	Puia	Pehekeula (k)
Pehekeula	Uluae	Pehekenana (k)
Pehekenana	Nanahapa	Nanamua (k)
Nanamua	Nanahope	Nanakeuhaku (k)
Nanakeuhaku	Elehu	Keaoa (k)
Keaoa	Waohala	Hekumu (k)
Hekumu	Kumukoa	Umalei (k)
Umalei	Umaumanana	Kalai (k)
Kalai	Lairopa	Malelewaa (k)
Malelewaa	Pililohia	Hopoe (k)
Hopoe	Hauanania	Makalawena (k)
Makalawena	Koihouhou	Lelehooma (k)
Lelehooma	Hapuu	Kekupahaikala (k)

Kekupahaikala	Maihikea	Maweke → O'ahu /Kauai/Niihau
Maweke (Ruling Chief-O'ahu)	Naiolaukea	Mulielealii (Kona, O'ahu residence)
"	"	Keaunui ('Ewa, Waianae, Waialua)
"	"	Kalehenui (Koolau)
Mulielealii (O'ahu Ruling Chief)	Wehelani	Kumuhonua II (k) [O'ahu chiefs]
"	"	Olopana (k) (Waipio Valley)
"	"	Moikeha (k) (Kauai)
"	"	Hainakolo (w) (Kuaihelani)
	KUMUHONUA II RULING CHIEFS Term Ali'i Aimoku first used:	
Kumuhonua II - 1 st Alii Aimoku of O'ahu; 1 st cousin to Laakona of 'Ewa, Nuakea-queen consort of Molokai; Moi, kaula/Molokai; and high chiefess of Koolau, Hinakaimauliawa	unkn	Elepuukahonua (k)
"	"	Molohaia (k)
"	"	Kahakuokane (k)
"	"	Kukawaieakane (k)
Elepuukahonua (k) - 2 nd Alii Aimoku [Cousin Haulanuiakaea, Kauai king]	?	?
Hikilena	Olepuukahonua	Kahokupohakano
Kahokupohakano - 3 rd Alii Aimoku	Kumana	Nawele
Nawele - 4 th Alii Aimoku of O'ahu	Kalanimoekawaikai	Lakona ('Ewa, Wai'anae, Waialua)
Lakona - 5 th Alii Aimoku of O'ahu [Ruled 'Ewa/Waianae/Waialua moku; his cousins Maelo ruled Kona, O'ahu and Kaulaulaokalani ruled Ko'olau]	Alaikauakoko (also wf of Kanipau) [Kanipau-4 th Alii Aimoku of Hawaii Is- Pili line-usurped...he went to Molokai- his gds Kalapana later Mo'i of HI Is]	Kapae-a-Lakona (k)
Kapae-a-Lakona (6 th Alii Aimoku)	Wehina	Haka (k) (resided Lihue/Ewa)
Haka-a-Kapae -7 th Alii Aimoku [O'ahu chiefs revolted and killed Haka at his fortress near Waewae, near Lihue; they then elected Mā'ilikūkahī to rule O'ahu.]	Kapunawahine	Kapiko-a-Haka (k)
	END of Kumuhonua II Ruling Chiefs as Mā'ilikūkahī descended from Moikeha , brother of Kumuhonua II .	However... Haka's granddaughters connected the O'ahu - Kauai ohana. See below
Kapioko-a-Haka (son of Haka)	Ulakiokalani	Kaulala(w)→ Kanekapuakakuhihewa
"	"	Kauoi (w)
"	"	Kamilihonui (w) →Kaumualii
Kalaniuli (Koolau chief)	Kaulala (granddaughter of Haka)	[started Kualii line of O'ahu chiefs]
Ilihiwalani [son of Kalanikuma-13 th Alii Aimoku of Kauai and Kapoleikaula, descendant of Maweke/Kumuhonua line]	Kamilihonui (gdau of Haka) [They are ancestors of Kaumualii'i, last king of Kauai]	Kukawaieakane (k) ('Ewa/Lihue)
	MOIKEHA LINE	
Moikeha (1 st Alii Aimoku of Kauai) [Brother of Kumuhonua]	Hanaula	Hookamalii (k) Kona/'Ewa→Kahai →Mailikukahi→Kalonā
"	"	Haulaniakaea (k) [He and brothers sailed to Kahiki to fetch La'a (McKinzie 1991:15)]
"	"	Kila (k)
Hookamalii	Keahiula	Kahai (k)
Kahai (grandson of Moikeha) [He sailed to Kahiki, Wawae, Upolu and Sawaii and brought back <i>ulu</i> that was planted at Pu'uloa (McKinzie	Kehehu/Keheau	Kuolono (k)

[1991:15]		
Kuolono	Kaneakalelei	Maelo (w)
Lauli-a-Laa	Maelo	Laulihewa (k)
Laulihewa	Akepamaikalani	Kahuoi (k)
Kahuoi	Pelea	Puaakahuoi (k)
Puaakahuoi	Nononui	Kukahaiilani (k)
Kukahaiilani (This contradicts Kamakau 1991)	Kokalola	Mā'ihikūkahī (k) [8th O'ahu Alii Nui] resided in Lihū'e, O'ahu
	NEW O'AHU REIGN MOIKEHA LINE (from Kauai)	
Mā'ihikūkahī - 8 th Alii Aimoku Lihū'e, O'ahu, Born at Kūkaniloko birthstones and coronated at Kapukapuakea Heiau; from Maweke & Paumakua lines; raised at Wahiawa, Kanewai and Wa'aluā, but later made Waikīkī his permanent residence; ended human sacrifices; Hilo and Maui chiefs raided O'ahu (*Ewa) during his time & were defeated in Kipapa Gulch	Kanepukaea	Kalona-nui (k) [Lihū'e, O'ahu] [Born at Kūkaniloko]
"	"	Kalona-iki (k) [b/Kūkaniloko and considered to be a Lō-Alī'i chief, who were guardians of Kūkaniloko and lived at Lihū'e, now Schofield Barracks]
Kalona-nui	Kahalakaihuholuā/Kaiuholuā	Kalamakua [→ I ohana of Hilo; and Pi'ilani Ohana of Maui]
Kalona-iki - 9 th Alii Aimoku-O'ahu	Kikenui-a-Ewa [←Lakona←Maweke]	Kamaleamaka (w)
"	"	Piliwale (k) O'ahu Moi-Waikīkī
"	"	Lali/Lō-Lale-o-Halona [Lō-Alii] (k)
	O'AHU - MAUI LINES CONNECT	
Lōlale-o-Halona (Ali'i-Lihū'e, O'ahu)	Keleanuinohanaapiapi (Maui chiefess) Aunt of Pi'ilani, Moi of Maui	Kaholialale-o-Halona/Lihū'e
"	"	Luliwahine-a-lale-o-Halona/Lihū'e
"	"	Luli-kane (Halona/Lihū'e)
"	[Kelea is sister of Kawaokahele, Maui Mo'i - father of Pi'ilani]	[All three children were born at Kūkaniloko and were Lō-Alii]
Kalamakua (Waikīkī/Hālawā) [Son of Kalona-nui, nephew of Kalona-iki, cousin of Piliwale and LōLale. developed the extensive irrigation system that supported several hundred acres of taro fields and fishing at Waikīkī. This irrigation system changed the formerly wet-taro cultivating area of Waikīkī, Kapahulu, Mō'ili'i & Mānoa. The increase of fishing was due to the development of fishponds, which along with the taro pondfields were irrigated by water drawn from the Mānoa and Palolo Valley streams and large springs in the area. He was also known to enjoy surfing, especially at Kahaloa near the mouth of the 'Apuakeahu Stream; high chief of Hālawā]	Keleanuinohanaapiapi (niaupio) [former wife of LōLale-o-Halona, who was son of Kalona-iki. She was also noted for her surfing prowess.]	Laielohelohe (w) [wf of Pi'ilani/Maui] [Bethrothed to cousin Pi'ilani in her youth; they became the progenitors of the famous Maui line of ruling chiefs. She was half-sib of Kaholialale & Luliwahinealale keiki of Lō-Alī'i of Lihū'e, O'ahu]
		MORE O'AHU - MAUI CONNECTIONS
Kawaokahele (Maui Mo'i)	Kepalaoa (O'ahu Chiefess)	Pi'ilani
Pi'ilani (Maui Moi)	Laielohelohe (O'ahu Chiefess)	Lono-a-Piilani [Maui Moi]

"	"	Piieka [m/Umi-a-Liloa-Hawaii Moi]
"	"	Kala'aiheana [given the title of Kihawahine, mo'o goddess of Maui]
"	"	Kiha-a-Piilani [O'ahu -Maui Alii]
Piliwale - 10 th Alii Aimoku-O'ahu son of Kalona-iki of Lihū'e; brother of LōLale 1 st husband of Kelea and uncle of their children	Paakanilea	Kūkaniloko (w) b/Kūkaniloko Sister of Kohipalaoa; cousin of Kaholialale-o-Halona, Luli-kāne and Luli-wahine
"	"	Kohepalaoa/Kohipalaoa (w)
Kaholialale-o-Halona [1 st cousins] [s/Lō-Lale & Kelea of Maui]	Kohipalaoa	Kānehoalani (k) grandson of Kelea; grdf of Kākūhewa ;
Luaia [Maui chief-gs/Kaka'alaneo; son of Kahekilihumano; cousin of Pi'ilani]	Kūkaniloko - 11 th Alii Aimoku-O'ahu 1 st female Ali'i Aimoku of O'ahu; her daughter ruled after her	Kalai-Manuia (w) b/Kūkaniloko [childhood in Wahiawa mtns and youth/adult in Kalauao-res at Kukiihau & Paaia; She built many fish shrines and fish ponds of Kapaakea, Opu & Paaia; She died at 91yrs; ruled 65 yrs]
"	"	Kauwahimakawee (k)
Lupekapukeahomali	Kalai-Manuia - 12 th Alii Aimoku She ruled for a long time; built several fishponds especially in the Pearl Harbor area.	Ku-a-Manuia (k) (b/lived Waikīkī)
"	"	Kaihipapu-a-Manuia (k) (Waimanalo) [given Kalauao/Aiea/Hālawā/Moanaluā]
"	"	Ha'o (k) (lived in Waikēle'Ewa) [given 'Ewa Beach/Waianae]
"	"	Kekela (w) (lived Kalauao) [given Wai'aluā/Ko'olauloa; Napulanauhū-Mahiki (son of Ha'o) married Kekela (nephew/aunt) - they ruled Wai'anae, Wai'aluā, and Ko'olauloa]
Ku-a-Manuia - 13 th Alii Aimoku [given Kona and Koolaupoko; greed and assault got him killed]	?	?
Ha'o-killed by bro Kahikapu-a-Manuia	Kekela (aunt)	Kahaiaonuiakahuailana/Kaea-a-Kalona
Kaihipapu-a-Manuia - 14 th Alii Ai Grew up in Waimanalo/Ko'olaulopoko; built <i>loko</i> Kaihipapu & Lelepau in Ke'ehi; was jealous of bro Ha'o's wealth and killed him]	Ka'ūniakanehoalani (Ko'olau) [Grt-grd dau of Lō-Lale & Kelea; daughter of Lō-alii Kānehoalani]	Kākūhewa (k) -b Kūkaniloko [He grew up in Waipi'o, Waiawa & Mānana; royal res 'Ewa, Waikīkī & 'Alele, Kailua]
Kākūhewa * (15 th Alii Aimoku) [He was born at Kūkaniloko; taken to Ho'olonopahu by gf Kānehoalani; & 48 chiefs e.g. Makohau, Ihukolo, Kaaumakua, Pakapakauana & sacred drums Opuke & Hāwea; he grew up at Waipio, Waiawa & Mānana]	Kahaiaonuiakahuailana (Wai'anae) aka Kaea-a-Kalona [She was dau of Napulanauhūmahiki, son of Ha'o and Aunt Kekela; with this union Koolauloa united with Waianae and Waialuā]	Kanekapu-a-Kakūhewa [when his father died O'ahu was divided between the 3 eldest brothers]
"	"	Kaihipapu-a-Kakūhewa (k) [2 nd son]
"	"	Makakaililani (w)
"	Kaakaualani (dau of Laninui-a-Kaihupee, a descendant of the Kalehenui-a-Maweke branch and his wife Kauhiihūla-a-Piilani, a daughter of Pi'ilani, the King of Maui.)	Kaukahinui-a-Kakūhewa (k)
"	Koaekea (unkn)	Kalehuapaikua (k)
"	Kahamaluihi (dau of Kaiōe, a descendant of the Kumuhonua-a-Mulielealii branch of the Maweke line and Kawelo-Ehu, of the Kauai branch	Kumuhonua-a-Mulielealii

	descending from Ahukini-a-Laa, 4th Alii Aimoku of Kauai. Said to have become the wife of her stepson, Kakuhihewa's son, Kanekapu-a-Kakuhihewa)	
Kaihipu-a-Kakuhihewa Ruled Waikiki & Ewa; during this time Kauhī-a-Kama Maui Mo'i invaded Waikīki and was killed; he was offered at heiau Apuakehau	Ipuwaiahōlani [O'ahu/Hawaii] [Dau of Hoalani, brother of Kakuhihewa's wife and Kauhī-a-Kama Maui Mo'i, dau of Kohala chief]	Kauakahikuaanaauakane/kama (w)
"	Kapunawahine	Kauaupena (w)
Kawelo-kalanikala	Kaupena	Kuihewa-kauaupena (w)
Kauloaiwi	Kuihewa-kauaupena	Kuihewa-makawelo
Umi-a-Liloa	Kuihewa-makawelo	Papaikaniau (w) mother of Kekaulike
"	"	Kuimehewa
"	"	Uluehu (ancestor of Molokai and Lanai)
Iwikaukaua (O'ahu/Hawaii Chief) (son of Makakaulii (k) & Kapukamola & grdsn of Kukailani who was nephew of Keawenui Mo'i of Hawaii Island and father of Kaikilani (w) 17 th aliī Aimoku of Hawaii Island	Kauakahikuaanaauakane/kama (O'ahu Chiefess - descendant of Kakuhihewa of O'ahu)	Kaneikauaiwilani (k) Kaneikauaiwilani
"	(cousins)	Keakamahana (19 th Hawaii Mo'i)
[ancestor of Kalākāua & Lili'uokalani]		Keakealaniwahine (20 th Hawaii Mo'i)
Kaneikauaiwilani (1/2 sibs)	Keakealaniwahine (Hawaii Island Mo'i)	Kalanikauleleaiwi (w) [She married several ruling chiefs and became progenitor of several ruling families on Hawaii and Maui islands e.g. wife of Hawaii Island Mo'i and ½ sib Keaweikahāliiokamoku ; grt-grdmf of Kamehameha I; she married Kaulaheha II mo'i of Maui and had Kekuipoiwani wife of Kekaulike-Maui Mo'i;
	SEE MIXED LINES BELOW	
Kanaloakaiwilewa	Keakealaniwahine (29 th Hawaii Mo'i)	Keaweikahāliiokamoku (21 st Hawaii Mo'i; ggf of Kamehameha I)
Kaneikauaiwilani (O'ahu Alii) (½ sibs)	"	Kalanikauleleaiwi (w) (ggm of K-I)
Kaulaheanuikamoku [Maui Mo'i]	Papaikaniau	Kekaulike (k) → Maui Mo'i
Kaulaheanuikamoku [Maui Mo'i]	Kalanikauleleaiwi	Kekuipoiwani I (w) ½ sib Kekaulike → Maui Dynasty
Keawe II [21 st Hawaii Mo'i] (½ sibs) [progenitor of the House of Keawe]	"	Ke'eumoku Nui (k) (Kona ch) → grdf of Kamehameha I
"	"	Kekelaokalani (w) → Kekuipoia II, mother of Kamehameha I
Kauauanui-a-Mahi (Kohala chief)	"	Alapai-nui (k) [22 nd Hawaii Mo'i]
"	"	Haee-a-Mahi (k) (Kohala Chief)
Lonoikahaupu	"	Keawepoepoe (k) [father of royal twins Kame'eiamoku/Kamanawa]
Ke'eumoku Nui	Kamakaimoku	Keōua (k) → Kamehameha I
"	Kailakanoa	Kanekoa (k) → Kawananakoa
Haee-a-Mahi (k) (Kohala Chief) ½ sibs	Kekelaokalani	Kekuipoia II mother of Kamehameha I
	[After death of Kakuhihewa the Kingdom was divided into 3 districts and ruled by 3 eldest brothers; since Kanekapu, O'ahu Alii Aimoku ruled from Kailua, the Ewa & Waialua chiefs ruled West O'ahu]	
Kanekapu-a-Kuhihewa - 16 th Alii	Kalua-o-Hoohila (descendant of Haka's	Kahoowahaokalani (k)

Aimoku; ruled from Kailua; he is ancestor of Papaikaniau, mother of Kekaulike, Maui Mo'i]	gd)	
"	Kahamalūhi (step-mother)	NI
Kahoowahaokalani - 17 th Alii Aimoku. [Koolaupoko Chf, ruled from Kailua; mother descended from Haka of O'ahu & Ilihiwalani of Kauai; Maweke line]	Kawelolauhuki (Kauai chiefess)	Kauakahi-a-Kahoowaha (k)
Kauakahi-a-Kahoowaha - 18 th Alii Aimoku; he ruled from Kailua; introduced the <i>kapu-moe</i> to O'ahu from his ohana on Kauai from O'ahu it went to Maui-Kekaulike]	Mahulua	Kualilanipipililanoakaikunuiakalu anuokuiilikahalau (k) [born at Kalapawai, Kailua; raised in Kailua & Kualoa; sacred drums Opuku & Hawea used at birth ceremony]
Kūāli - 19 th Mo'i O'ahu; (Kauai) [Famous for his Law of Nīaupio Kolowalu; Kualii defeated ohana Waiālua army at Kalena on plains of Heleauau (Haleauau) and later defeated ohana army of Ewa at Malamanui and Paupawela uniting O'ahu again]	Kalanikahimakealii (w) (Maui) [dau of sibs Kaulaheha II & Kalaniomāheula, who connect to Kauai and O'ahu lines; father of Kekuipoiwani I and Kekaulike who were parents of Kamehamehanui, Kahekili & Kalola and gp of Kalanikapule, Kiwala ʻō, and Liliha Kekuipoiwani]	Kapiohokalani (k) (O'ahu Mo'i)
"	"aka" Kalanikahemakoalii	Peleioholani I (k) (b 1735) [He was given Kauai to rule while older brother ruled O'ahu, but later ruled O'ahu as well following death of nephew Kapio]
"	"	Kukuiaimakalani (w)
"	"	Kaionuilanilalahai (w)(Maui)(b 1733) [mother of Kahahana, last O'ahu Mo'i]
Kapiohokalani - 20 th Alii Aimoku (son/mom) [after Kekaulike's death, Kapio invaded Molokai; he was defeated and slain by Alapa'inui, uncle of Maui Mo'i Kamehamehanui and Kahekili at Kawelo]	Kalanikahimakealii (w) (Maui)	Kanahaokalani (k) (O'ahu Mo'i) [six when father died so Uncle Peleioholani took over and went to Maui to assist nephew Kauhiamokuakama, Kekaulike's oldest son who waged war on younger brother Kamehamehanui]
Kanahaokalani - 21 st Alii Aimoku aka Kahahaokalani [regent ruled - he was six years old; died at 7; he was descendant of Kaihipu-a-Manuia]	NA	NA
Peleioholani I (21st Alii) (sibs) [Kualii made him <i>alii nui</i> of Kauai; co-ruled O'ahu as regent for nephew]	Halakii (Kauai Chiefess)	Kūmahana (k)
" (Uncle of Kauhiamokuakama eldest son of Kekaulike, Mō'i of Maui)	"	Keelaniihonuaikama (w) [She was murdered on Molokai and avenged by her father who spared Kaiākea, his son-in-law of other dau]
"	"	Kaapuawai (w)
" (dau)	Kukuiaimakalani	Kalanipoo-a-Peleioholani (w)
" (sibs)	Lonokahikini	Keaamoku-a-Peleioholani (k)
"	"	Kuwalu (w) m I (Alii of Hilo) wf of I
"	"	Kapuehoanoano (w)
Kūmahana -22nd Mo'i (neph/aunt) [Just a youth as Mo'i; deposed 1773]	Lonokahikini [one version] Unknown [another version]	Kaneco-a-Peleioholani (k)
Kaiākea (Molokai Alii-Nui)	Kalanipoo-a-Peleioholani (w)	Kaakapalalaka (w)
"	"	Kuluehu (k)
"	"	Kolokoli (k)
Kaneco (O'ahu Alii)	Kamakahahei [Kauai chiefess; dau of	Lelemahaloani (w)

" [died in an insurgency]	Kaapuawai-sister of Kumuhana]	[She had four children]
Elani (*Ewa Chief; Maweke-Lakona)	Kalonuilalahai (daughter of Kualii & related to Kahekili II)	Kahahana (k) O'ahu /Molokai; b Kukaniloko [nephew of Peleioholani; cousin of Kumuhana; great-grandson of Kaulahea II; grandson of Kekaulike; nephew of Kehekili and raised in Kahekili's court]
Kahahana - 23 rd Alli Aimoku-O'ahu [15 when voted in by O'ahu Council after Kumuhana; later tricked/slain by Uncle Kahekili; he "was killed at Maunakapu, as one descends to Moanalua" - last of Kualii's line]	Kekuapo'iula (Maui) [Very beautiful] daughter of Kekaulike-Maui Moi; niece of Kehekili II; she and Kahahana were betrayed to Kahekili II by her brother Kekuamanoa, son of Kekaulike; nephew of Kahekili II]	?
END OF O'AHU -MAUI RULE		
BEGINNING OF RULE BY MAUI ALI I		
Kahekili II - 24 th Moi; 25 th Moi of Maui	Kauwahine (dau of Kekaulike)	Kalanikupule (k) Maui/O'ahu
Kaokolani (26 th Maui Moi) Kauai Moi (son of Kekaulike; 1/2 sib of Kahekili)	Kamakahahei (Queen of Kauai; granddaughter of Peleioholani)	Kaumuali'i (k) last Kauai Moi
Kalanikupule - 25 th O'ahu Moi; (27 th Maui Moi)	[Defeated/slain by Kamehameha I - possibly 1/2 sibs]	

Legends: k/kāne-male; w/wahine-female; wf/wife; dau/daughter; gd/granddaughter; gs/grandson; gf/grandfather; gm/grandmother; ggf/great-grandfather; ggd/great-granddaughter; sibs/siblings; gp/grandparents; OT/Over Thrown

*At the time Kākūhewa was the ruling chief of O'ahu, Kihapi'i and his son Kamalalawalu were chiefs of Maui; Keli'ioakoa (later killed by Kona's people), Keawenuiaumi, Kanaloakuaana (Kona, Kohala and Hamakua), and Umiokalani were ruling chiefs of Hawai'i Island (Kamakau in McKinzie 1986:13, 14). However the families from each main island were all related as the genealogy of Kawaookekahuli illustrates, as written by her husband Samuel R. Keli'ihahaimoku. "The birth of the ancestors occurred through those of Molokai, Hawaii, and of Maui. The great-great-grandparents join together with those of O'ahu nui; and the great-great-grandparents were related to Kūhīhewa" (McKinzie 1986:75). Keli'ihahaimoku continues (McKinzie 1986:75):

We have partially withdrawn through a straight line in the history of the genealogical line, unbranched; and because the history of Kawaookekahuli (w) is extensive, what the researcher has partially presented are the individual alignments and O'ahu nui's great-great-grandparents on the side of Kawaookekahuli's father. This is what we now present; that there are those from Waianae, those from Oki Kupee, those from Wahīawā, of Kūkaniloko, and those of Mokuleia. The desire of the ancient period has passed away.

Table 1b. Annotated Genealogy of O'ahu Chiefs – House of Pili

END OF RULE by MAUI ALI I		
RULE BY HAWAII-MAUI LINE		
HOUSE OF PILI (KAMEHAMEHA)		
Keoua-kalani-kupua-i-kalani-nui (bro of Kalani'opu'u Hawaii Is Moi)	Kekuiapoewa II [dau of Kekelaokalani & Haae (k); niece of Alapa'inui Hawaii Is Moi; niece of Kekaulike's 1/2 sib wife]	Kamehameha I
Kahekili (Maui Moi) [said to be biological father of K-I]	Kekuiapoewa II (Hawaii Is chiefess)	Kamehameha I
Kalei'o-u'u/Kalani'opu'u (Hawaii Is Moi; mom from O'ahu ; Brother of Keoua; uncle of Kamehameha I)	Kalola (Maui Chiefess) [dau of Kekaulike and Kekuiapoewa I; sib of Kamehamehanui and Kahekili III]	Kiwala'ō (Hawaii ruling chief) [cousin of Kamehameha I; grandson of Kekaulike; father of Keopuolani]
Keoua-kalani-kupua-i-kalani-nui	Kalola (Maui Chiefess)	Liliha Kekuiapoewa III

(bro of Kalani'opu'u; father of Kamehameha I)	[younger sister of Kamehamehanui; older sister of Kahekili and Namahana; aunt of Ka'ahumanu and grandmother of Ke'ōpuolani]	[gdau of Kekaulike; mother of Ke'ōpuolani]
Kiwala'ō (half sibs) [cousin of Kamehameha I]	Liliha Kekuiapoewa III (Maui chiefess) [1/2 sib of Kamehameha I- they shared the same father]	Kalani-kau-i-Ka'alaneo/ Ke'ōpu-o-lani
Ke'e'eaumoku Pāpa'iahiahi (Hawaii chief)	Namahana Kaleleonalani (Maui Chfs) [widow of 1/2 sib Kamehamehanui-Maui]	John Adams Kuakini (k) (Hawaii chief) Governor of Hawaii Island
"	"	Ka'ahumanu (fav wf of Kamehameha I)
"	"	George Cox Kahekili Ke'e'eaumoku II Governor of Maui
"	"	Kalākua (w) (Maui chiefess)
"	"	Lydia Namahana Pai'ia
Paiea Kamehameha (nephew/aunt) [warrior youth]	Kānekapolei (wife of Kalaniopu'u – they were parents of twins Keoua Kuahuula and Keoua Peale)	Pauli Ka'ōleikū
Pauli Ka'ōleikū [son of Kamehameha I]	Keouawahine	Kalani Pauhi ('fire out'...gunpowder explosion she narrowly escaped)
"	Kahailiopia Luahine	Laura Konia
Kala'imamalu (bro of Kamehameha I)	Kalākua Kaheheimālie (Maui chiefess; sister of Ka'ahumanu and Namahana)	Miriam Auhea Kekāluo'hi →mom of Lunalilo
Paiea Kamehameha	Kalola-a-Kumuko'a	NI
Kamehameha I (Hawaii Is chief-King of all islands except Kauai)	Ka'ahumanu (Maui/Hawaii chiefess) [favorite wife]	NI
"	Ke'ōpūolani (Maui chiefess-niaupio) descendant of Pi'ilani through mother and father who had same mother-Kalola	Liholiho (Kamehameha II)
"	" (grdau of Kekaulike-Maui Moi)	Kauikeaouli (Kamehameha III)
"	"	Nahi'ena'ena
"	Peleuli-i-Kekela [dau of Kamanawa; gm of Kekauōnohi]	Kahoanoku Kina'u (k) father of Kekauōnohi wf of Liholiho
"	Kalākua Kaheheimālie (dau of Namahana Kaleleokalani; Maui chiefess; gd of Kekaulike; descendant of Pi'ilani)	Kamāmālu (later wf of Kamehameha II) (two sons died as infants)
"	"	Elizabeth Kina'u (hanai to Peleuli; wf of Kamehameha II)
"	Lydia Namahana Pi'ia (dau of Namahana Kaleleokalani; Gov of O'ahu)	NI
"	Kahakuha'akoi Wahinepio (Maui cfs; her father was son of Kekaulike; her mother Kamakahūlani was daughter of Kauhāimokukama-eldest son of Kekaulike; sister of Kalanimoku, Boki and Manono II and cousin of Ke'ōpūolani; buried at Moku'ula)	NI
" (uncle/niece)	Miriam Auhea Kekāluo'hi (dau of Kalākua & Kala'imamalu; Kuhina Nui; wf of K-II and Charles Kana'ina; mom of Lunalilo)	NI
"	Kekipipa'a (dau of Kame'eiamoku cousin of Kiwala'o; she was mother of High Chiefess Kapiolani)	
"	Manono II (sister of Kalanimoku, Boki & Kahakuha'akoi; gd of Kekaulike; wf of Keoua Kekua-o-kalani-both died in Battle of Kuamo'o in favor of the kapu system)	NI
Liholiho (Kamehameha II) (1/2 sibs) descendant of Pi'ilani through mother	Kamāmālu (fav wife; dau of Kalākua/Kamehameha I)	NI
"	Kalani Pauhi [dau of Pauli; gd of K-I;]	NI

(uncle/niece)	mom of Princess Ruth Ke'elikōlani]	
" (1/2 sibs)	Elizabeth Kina'u (dau of Kalākua and Kamehameha I; Kuhina Nui after Ka'ahumanu; mother of two kings with another <i>kāne</i>)	NI
" (step-sister/cousin)	Miriam Auhea Kekāuluohi [dau of Kalākua; ½ sib of Kamāmalu and Kina'u; Gov of Kauai]	NI
" (cousins)	Anna/Miriam Kekau'ōnohi (dau of Kahakuha'akoi & Kahō'anokū Kīna'u - the eldest son of Kamehameha I and wife Peleuli; Boki niece; ggd of Kekaulike; ggd of Kauhiamokuakama)	NI
Charles Kana'ina (b/Napo'opo'o; descendant of Pi'ilani – Maui Mō'i; House of Nobles-Privy Council; friend of Kamehameha III)	Miriam Auhea Kekāuluohi (dau of Kalākua & brother of Kamehameha I)	William Charles Lunali(k)
Kauikeaouli (sibs)	Nāhi'ena'ena	Infant died
Kauikeaouli	Kalama (mom sister of C. Kana'ina)	Two infants died/hanai several
" descendant of Pi'ilani through mother's line	Jane Lahilahi Young Ka'eo [dau John Young; grand niece of Kamehameha I; companion of Nāhi'ena'ena]	Albert Kuka'ilimoku Kumuakea; twin Keoua died as infant; hanai by Queen Kalama
Mataio Kekūānō'a (punahale of Liholiho; Gov of O'ahu; Kuhina Nui after Kamāmalu - dau of Kalākua & Kamehameha I)	Kalehua	Pa'alua (k)
"	Kalani Pauahi (gd of Kamehameha I; wf of Liholiho)	Princess Ruth Ke'elikōlani
"	Elizabeth Kīna'u (dau of Kamehameha; wf of Liholiho; Kuhina Nui/K-III)	David Kamehameha
"	"	Moses Kūkūāiwa
"	"	Lot Kapūāiwa (Kamehameha V)
"	"	Alexander Liholiho (Kamehameha IV)
"	"	Victoria Kamāmalu (Kuhina Nui)
Abner Pāki (Molokai/Maui ali'i; gs of Kamehamehanui Ailua-Maui Moi - descendant of Pi'ilani)	Laura Konia (gd Kamehameha I)	Bernice Pauahi Bishop (named for aunt Queen Kalani Pauahi)
Alexander Liholiho (Kamehameha IV)	Emma Na'ea (dau of Fanny Young; gd of John Young; ggn of Kamehameha I; she and husband established Queen's Hospital)	Albert Edward Kauikeaouli (died at 4 years old)
Lot Kapūāiwa (Kamehameha V)	NA	NA (No heir)
William Charles Lunali [thru his father descendant of Pi'ilani & Kumunuiakapokii union]	NA	NA (No heir)
	END OF PILI/KAMEHAMEHA PI'ILANI LINE	
	HOUSE OF KALĀKAUA	
Caesar Kaluauku Kapa'akea (Hana)	Analea Keohokālole (Hana/Hawaii lines)	Moses Kapa'akea
"	"	James Kaliokalani
"	"	David La'amea Kalākaua
"	"	Lydia Kamakeha (Lili'uokalani)
"	"	Kaiminaauao
"	"	Anna Ka'iulani
"	"	Kinini
"	"	Miriam Kekāuluohi Likelike
"	"	William Pitt Leleiohoku II
David Kalākaua	Esther Kapiolani (dau of Kuhio Kalaniana'ole and Kinoiki Kekaulike - niaupio dau of King Kaumuali'i of	NI (Kapiolani later hanai sister Victoria Kekaulike's sons David Kawānanakoa and Jonah Kuhio Kalaniana'ole – heirs;

	Kauai)	she estb Kapiolani Maternity Home now Kapiolani Medical Center)
Liliu'okalani	John Owen Dominis	NI
Archibald Scott Cleghorn	Miriam Kekāuluohi Likelike	Victoria Ka'iulani Cleghorn (heir)
	GOVERNMENT OVERTHROWN 1893	

Legends: k/*kāne*-male; w/*wahine*-female; wf/wife; dau/daughter; gd/granddaughter; gs/grandson; gf/grandfather; gm/grandmother; ggf/great-grandfather; ggd/great-granddaughter; sibs/siblings; gp/grandparents; OT/Over Thrown

Table 2. Houses of Ali'i Nui of O'ahu

HOUSE	ALI'I NUI OF O'AHU
Maweke	Maweke · Mulielealii · Kumuhonua · Elepuukahonua · ? · Nawele · Lakona · Kapae · Haka (OT)
Paumakua-O'ahu	Mailikukahi · Kalonaiki · Piliwale · Kūkaniloko
Paumakua (Maui)	Kalaimanua
Lupe-Kalehenui-Maweke	Kumanuia · Kaihikapuamanuia · Kakuhihewa · Kanekapukakuhihewa · Kahoowaahaokalani · Kauakahikoowaha · Kualii · Kapihookalani · Kanahaokalani · Peleioholani · Kumahana (OT)
Laakona-Keaunui-Maweke	Kahahana (Last independent monarch)
Paumakua (Maui)	Kahekili II · Kalanikupule (sacrificed)
Pili	Kamehameha I · Kamehameha II · Kamehameha III · Kamehameha IV · Kamehameha V
Kanaina-Eia	Lunalilo
Paumakua-O'ahu	Kalākaua · Liliuokalani (OT)

Table 3. Lineage of Mikahela Kekauonohi - Ahupua'a of Honouliuli (Konohiki lands)

Kane (male)	Wahine (female)	Keiki (offspring)
Kalahaeuaniokamoku II (Maui Mō'i)	Papaikanuia II (Hawaii Chfs)	Kekaulikeokalanikuhoiokamoku
"	"	Kaleiamaoli-o-Kalani (w)
"	Kalani-kau-lele-i-a-iwi (Hawaii Chfs)	Keku'iapoiva Nui (I)
Kekaulike (cousins)	Kahawalu (sis of Peleioholani <i>ali'i nui</i> of Maui Mō'i, descendant of Pi'ilani and La'i'elohelohe - O'ahu cfs)	Kauhiamokuakama (at advise of kahuna challenged Kamehamehanui - younger brother - for ruling chief. After loss of thousands of lives on both sides a truce was called at Pu'unēnē, Maui)
"	Holau (dau of high chief Kawelo-a-Aila and chiefess Kauakahalii-a-Kaiwi, descendant of Lono-I-Kamakahiki)	Manuha'aipo (Queen of 'I'ao)
" (½ sibs)	Keku'iapoiva Nui (royal wife)	Kamehameha Nui (Ruling Chief of Maui)
"	"	Kalola Pupuka-o-Honokawailani (w) (aka Kalola I/Kalola Kekuipoiva)
"	"	Kahekilinui'ahuamanu II (Maui Mō'i)
"	"	Ku-ho'ohēihei-pahu
Kekaulike (uncle/niece)	Ha'alo'u (Hawaii/Maui - dau of Hawaii Is <i>ali'i</i> Haee-a-Mahi - son of ali'i Kauauanui-a-Mahi and Kalani Kalele-a-Iwi - and Maui chiefess Kaleiamaoli-o-Kalani, full-sibling of Kekaulike; Ha'alo'u had two half sisters – Kamakaehekuli and Kekuipoiva II – same father; Haee was the younger half-brother of Alapaiui, who was Hawaii Is king when Kamehameha I was born)	Na-mahana-i-kaleo-nalani
"	"	Kaekokulani

Kekaulike (Maui Mō'ī)	"	Ke-kua-manoha (father of Boki)
"	"	Kekuapo'iula (married Kahahana; betrayed by brother Kekuamanoha to uncle Kahekili II and killed)
"	"	Ahia
"	"	Nahulanui
"	"	Naaiakalani
"	"	Manu'ilehua
" (another genealogy has Keaweikekahialiokamoku as the father of Kumukoa)	Kane-a-Lae/Hoakalani (Molokai - last independent Ruling Chiefess of Molokai/she was also wife of King Keawe II/Keawe Nui-a-Umi of Hawaii Island; Fornander says she is from Kalona-iki family of O'ahu)	Kumuko'a (Molokai Chief) married Kahawalu, first wife and cousin of Kekaulike, ruling chief of Maui and had Kaikilani III)
Kekaulike (Fornander says Keawe was the father, not Kekaulike)	Kane-a-Lae/Hoakalani (Fornander says Kanaalae was the mother)	Ha'o (Molokai Chief)
" (Fornander says Keawe was the father, not Kekaulike)	" (Fornander says Kanaalae was the mother, not Hoakalani)	Awili (Molokai Chief)
" (Fornander says Keawe was the father, not Kekaulike)	" (Fornander says Kanaalae was the mother, not Hoakalani)	Kaliloamoku (w) (Molokai Chiefess)
" (½ sibs)	Kahilipoilani	?
"	Kaupekamoku	Kaiana (famous Maui chief-went to China, died in Battle of Nu'uuanu 1795)
"	?	Kauwahine
Kaulaheha II (Maui mō'ī, father of Kekaulike)	Kalanikauleleiaiwi	Kekuiapoiva Nui (w)
Keaweikekahialiokamoku (½ sibs)	"	Kekelaokeakeakalani (w)
"	"	Kalanikeaeumoku (Ali'i-o-Kona)
Kauauanuiamahiololi, (Kauaua-a-Mahi) (Ali'i-o-Kohala)	"	Alapainui
Kauauanuiamahiololi, (Kauaua-a-Mahi) (Ali'i-o-Kohala)	"	Haaekalani
Lonoikahaupu (Kauai mō'ī)	Kalanikauleleiaiwi	Keawepoepoe
Kauakahiakua-o-Lono (Maui)	Kekuiapoiva Nui	Kekelaokalani
Keawepoepoe	Kanoena	Kamanawa (twins-uncles of K-I; said to be ½ brothers of Kahekili and hid his bones at Kaloko after his death in 1794)
"	"	Kameeiamoku (same as above; grandson Kamanawa II was the grandfather of Kalākua and Lili'uokalani)
"	Kumaaiku	Ke'eaumoku Pāpa'iahiahi
Kamanawa (cousins) (½ cousin and uncle and step-father of Kamehameha I)	Kekelaokalani (dau of Kekuiapoiva Nui and Kauakahiakua-o-Lono of Maui; aunt of Kamanawa)	Kaahou
"	"	Noukana
"	"	Amamalua
"	"	Peleuli (w)
"	Kekuiapoiva II mom of Kamehameha I	Pi'ipi'i Kalanikaulihiwakama
Ke'eaumoku Pāpa'iahiahi (Hawaii chief; son of Keawepoepoe and Kumaaiku; younger ½ brother of famous twins Kamanawa and Kameeiamoku, uncles of Kamehameha I; killed Keoua	Namahana Kaleleonalani (Maui Chfs) [widow of ½ sib Kamehamehanui-Maui)	John Adams Kuakini (k) (Hawaii chief) Governor of Hawaii Island

Kuahuula at Kawaihae in 1791; died of plague on O'ahu in 1804)		
"	"	Ka'ahumanu (fav wf of Kamehameha I)
"	"	George Cox Kahekili Ke'eaumoku II - Governor of Maui (aka Kahekili II)
"	"	Kalākua Kabeihemaile (w)
"	"	Lydia Namahana Pai'ia
Kalaninu-I-amamao	Kamakaimoku (father from Waianae)	Kalanipouu (also said to be fathered by Peleioholani, O'ahu ruling chief)
"	"	Keaouakalanikupuapaikalaninui
Keaoua -kalani-kupua-i-kalani-nui (Kohala high chief; bro of Kalani'opu'u Hawaii Is Moi) (aka Keoua)	Kekuiapoiva II [dau of Kekelaokalani & Haec (k); niece of Alapa'inui Hawaii Is Moi; niece of Kekaulike's ½ sib wife]	Kamehameha I
"	"	Keliimaikai
Kahekili (Maui Moi) (said to be biological father of K-I)	Kekuiapoiva II (Hawaii Is chiefess)	Kamehameha I
"	Kauwahine (dau of Kekaulike)	Kalanikūpule (killed 1795 and sacrificed to Kamehameha I war god Kūkailimoku)
Kamehameha I (Hawaii ali'i)	Peleuli-i-Kekela [dau of Kamanawa; gm of Kekauōnohi]	Kahoanuku Kina'u (aka Abner) father of Kekauōnohi wf of K-I and Liholiho)
"	Ka'ahumanu (Maui/Hawaii Chiefess)	NI
"	Kalākua Kabeihemālie (dau of Namahana; Maui chiefess; gd of Kekaulike; descendant of Pi'ilani)	Elizabeth Kina'u (hanai to Peleuli; wf of Kamehameha II)
"	Keōpūolani (Maui/Hawaii Chiefess)	Liholiho
"	"	Kauikeaouli
"	"	Nahi'ena'ena
Kekuamanoha (son of Kekaulike)	?	Kahakuha'akoi Wahine-pio
Kahoanuku Kina'u	Kahakuha'akoi Wahine-pio (daughter of Kekuamanoha of Maui)	Mikahela Kekauonohi (aka Anna M. Kekauonohi and Keahikuni-i-Kekauonohi)
Hoapili (Utumahihehi; Kameeiamoku, the twin uncle was his father)	Kalākua (Maui Chiefess)	Kamamalu (fav wife of Liholiho – Kamehameha II – died in London)
Kala'imamalu	"	Miriam Auhea Kekūluohi (wife of K-I, then Liholiho-Kamehameha II and Charles Kana'ina - parents of Lunalilo)
Liholiho-Kamehameha II	Kamamalu	?
"	Kekauluohi (5 th wife; later wife of Charles Kanaina friend of K-III; mom of Lunalilo)	NI
Mataio Kekuanao'a	Kina'u	Moses Kukuaiwa
"	"	Lot Kamehameha (K-V)
"	"	Alexander Liholiho (K-IV)
"	"	Victoria Kamamalu
Alexander Liholiho (K-IV)	Emma Na'ea	Albert Edward Kauikeaouli
Lot Kamehameha (K-V)	-----	

Legends: k/kāne-male; w/wahine-female; w/wife; dau/daughter; gd/granddaughter; gs/grandson; gf/grandfather; gm/grandmother; ggf/great-grandfather; ggd/great-granddaughter; sibs/siblings; gp/grandparents; OT/Over Thrown; fav/favorite

O'ahu Chiefs and Lineages. About the 12th century, Kapawa, the son of *ali'i nui* Nanakaoko and his wife Kahioakalani, was the first high *ali'i* to be born at Kūkaniloko, located on the Waialua side of Kaukōnāhua Gulch in central O'ahu. It was one of two sacred places in Hawai'i where *kapu* chiefesses went to give birth (McAllister 1933:134-135; Handy and Handy 1978:465; see also Fornander 1969 (1880): 20; Kamakau 1991 (1869): 136; Cordy 1996:596). *Mele* or *'oli* informed about and honored the chiefs. The following *oli* from Kamakau (1991:136-137), is about Kapawa, the first child born at Kūkaniloko, the sacred birthing site of *ali'i nui* on O'ahu.

<p><i>'O Kapawa, 'ke ali'i o Wai'aluā, I hanau i Kūkaniloko; 'O Wahiawā ke kahua; 'O Līhu'e ke ēwe, 'O Ka'ala ka piko, 'O Kapukapuākea ka a'a, 'O Kaiaka i Māeaea; Ho'ule i Nukea i Wainakia. I 'A'aka Haleu, I ka la'i malino o Hauola, Ke 'li'i o Kapawa ho'i no, Ho'ino i uka ka waihona, Ho'ino i ka pali kapu o nā 'li'i... He kia'i Kalāhiki no Kaka'e.</i></p> <p><i>'O Heleipawa ke keiki a Kapawa, He keiki ali'i no Wai'aluā O'ahu....</i></p>	<p>Kapawa, the chief of Wai'aluā, Was born at Kūkaniloko; Wahiawā the site; At Līhu'e the placenta, At Ka'ala the navel cord, At Kapukapuākea [heiau] the caul, [Heiau] of Kaiaka at Māeaea He died at Nukea at Wainakia. Through [the surf of] 'A'aka at Haleu, Through the calm stillness of Hauola, The chief Kapawa was taken, Taken upland [in 'Iao] for laying away, Taken to the sacred <i>pali</i> of the chiefs... Kalāhiki is the "watchman" of [the burial Cave called Ka-pela-kapu-o] Kaka'e. Heleipawa was the son of Kapawa, A chiefly child of Wai'aluā, O'ahu...</p>
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Cordy (1998:9-10) explains the "rise of complex societies and settlement inland" that occurs in the 1300s with reference to 'Ewa:

By the 1300s, the oral histories tell of the formation of district (*moku*) sized countries (Cordy 1996:597-598). The accounts are brief, but they suggest these were much larger countries. Around A. D. 1320-1340, the sons of the chief Maweke were in charge over three noted countries on O'ahu. These were 'Ewa, Kona and Ko'olaupoko. Importantly for the history of Wai'anae, the 'Ewa country included not only 'Ewa, but also Wai'anae and Wai'aluā (Fornander 1960 (1880): 48-49, 68, 88 56). The senior line of Maweke, the Maweke-Kumuhonua line, controlled 'Ewa in these times. Some accounts suggested that Kumuhonua (Maweke's grandson) was the nominal ruler of all O'ahu about 1340-1360. This 'Ewa country included Kūkaniloko (the sacred birthing area), and Līhu'e became the country's important ruling center. Līhu'e was located on the central plateau, roughly in the Schofield Barracks area. It is vital to realize that the 'Ewa country may not have been divided into districts at that time. This might account for the fact that Kūkaniloko is in Wai'aluā today and that Līhu'e was mostly in today's Wai'anae-uka and perhaps once lapped over into parts of Wai'aluā and 'Ewa. The borders may have come later.

Another important point related to the rise of these larger countries is that more administrative levels of chiefs probably formed -- with a ruler and with local chiefs over the many communities of these district-based countries. More chiefs were present. In the Līhu'e area the early famed ruling line belonged to the Lō Ali'i chiefs. Anthropologists also believe that the political structure was still kin-based. The ruler would be the senior man in the dominant kin group of the country, and the local chiefs would be his kinsmen or the senior men in the dominant kin groups of their communities. The land-holding system is also still likely to have remained kin-based, with local groups controlling land. Countries may have had populations of 1,000-3,000 based on similar types of countries in Polynesia at European contact and other estimates.

The oral histories also show that the chiefs began to be behaviorally isolated from commoners to a greater degree in the 1300s (Cordy 1996:597-598 56). The Aha Ali'i council was established and

restricted access to chiefly status. Certain types of temple worship supposedly became more restricted, with rulers and chiefs becoming the main participants. One would expect different levels of temples to develop in these years -- with local community temples and larger temples at the ruling centers (national temples).... However, temple sizes were certainly still much smaller than the sizes seen at European contact. No temples dated to this period have yet been documented for O'ahu.... Construction of large national temples may have begun in the 1300s.

In Cordy's next period (AD 1400s-1500s) he summarizes the "Rise of the O'ahu Kingdom" in the following (Cordy 1998:10-11):

The oral histories indicate that O'ahu was unified into one kingdom during the 1400s -- the O'ahu Kingdom. La'akona, who was the ruler of 'Ewa, Wai'anae, and Wai'aluā about 1420-1440, was apparently recognized as the overall ruler of O'ahu by the other district based countries. In his line "descended the dignity of *Mō'i* of O'ahu" (Fornander 1969:89(1880); Cordy 1996:598 56). La'akona was the senior Maweke-Kumuhonua line. This line held power until the reign of Haka, 1520-1540. Haka portrayed as an evil ruler in the accounts -- "a stingy, rapacious, and ill-natured chief, who paid no regard to either his chiefs or his commoners" (Fornander 1969:88(1880); Kamakau 1991:53-54) -- was deposed by the O'ahu chiefs. He retreated to the fortress of Waevae on the Kawiwi ridge between Wahiawā and Wai'anae valleys, where he was captured and slain. Mā'ilikūhiki of the junior Maweke-Mo'ikeha line was made ruler in 1520-1540, and this line held power until the late 1700s.

Up to the time of Haka, rulers of O'ahu seem to have retained Līhu'e as their royal center, and Kūkaniloko remained an important birthing site throughout O'ahu's history. When Haka was removed, the ruling center was moved to Waikīkī in Kona district as this was the district long controlled by the Maweke-Mo'ikeha line (Fornander 1969: 89; Kamakau 1991: 54, 56). But, Mā'ilikūhiki still seems to have traveled to the Līhu'e area and perhaps periodically resided there, for he was there when raiders from Hawai'i Island arrived (Kamakau 1991: 55-56). Mā'ilikūhiki had been raised partly at Wahiawā (Kamakau 1991: 53 56). These raiders proceeded up from Pearl Harbor and were met by Mā'ilikūhiki and defeated in battles running from the gulches to Waikakalaua to Kīpapa, just below Wai'anae uka.

With island unification, at least three administrative levels of chiefs should have been formed -- the ruler, high chiefs over one or more districts (or over multiple communities), and local chiefs over one or two communities. Social stratification, thus, became more complex. Each strata of chiefs would have been set off from the commoners and amongst themselves.

The Proto-Historic Period, A. D. 1650-1795, appears to be marked with both intensification and stress. Many wars and intermittent periods of peace took place during this period between intra-island chiefdoms and inter-island kingdoms; cousins challenged cousins, nephews rebelled against uncles, fathers battled sons--all living on various islands and some losing track that they were related (see Kamakau 1992a: 66-174). In Cordy's reconstruction of O'ahu Kingdoms, this was also a time of continued population growth (Cordy 1998: 13-16).

These are the years when the O'ahu Kingdom grew to the pinnacle of its power (Cordy 1996:600-603). Population grew, fields expanded, and more houses were built. These were the times of famed O'ahu rulers: Kalai'manuā (1600-1620), Kākūhīhewa (1640-1660), Kūali'i (1720-1740), and Pelei'ōhōlani (1740-1779).... The three generations of rulers following Kākūhīhewa slowly lost power to the high chiefs of the kingdom's districts (Fornander 1969(1880): 275-278). The ruler resided mostly in Ko'olaupoko, and the high chiefs of Kona, of 'Ewa-Wai'anae, and of Wai'aluā and Ko'olauloa apparently were virtually independent within their own lands.

About 1720 Kūali'i became ruler. He re-established the ruler's power over the kingdom in a series of battles, first with the Kona chiefs and then with the 'Ewa, Wai'anae and Ko'olauloa chiefs. His first battle with the 'Ewa, Wai'anae and Ko'olauloa chiefs was at Kalena in today's Schofield

Barracks area of Wai'anae uka (Fornander 1969: 270-272; Fornander Collection 1917, 4(2): 412-416). Then while off raiding Hawai'i Island, the 'Ewa, Wai'anae and Ko'olauloa chiefs rose again. Kūali'i returned, and another battle was fought at Kalapo Stream in the Wai'anae uka area near the ridgeline of the Wai'anae mountains (Fornander Collection 1917, 4(2): 414). This ended the last resistance on O'ahu. The remainder of the long reign of Kūali'i was marked by periods of stability.... Kūali'i also gained power over parts of Kauai, evidently through inheritance. He put his junior son, Pelei'ōhōlani over those Kauai lands -- occasionally visiting them himself (Kamakau 1991: 70-75; Fornander 1969: 277-282).

Upon Kūali'i's death about 1740, his eldest son -- Kapiho'okalani -- came to power. He carried on the conquest of Molokai, but was slain there by the army of the Kingdom of Hawai'i under Alapa'inui. Alapa'inui [first cousin of Pelei'ōhōlani] led his army on to O'ahu.... The O'ahu chiefs meanwhile sent to Kaua'i for Pelei'ōhōlani to come and serve as regent for his brother's young son. Pelei'ōhōlani arrived and assumed control of the O'ahu army. A truce was reached with the high chief of Wai'anae, Na'ili (brother of Alapa'inui's wife), negotiating the truce, and the Kingdom of Hawai'i's army returned home. Pelei'ōhōlani soon became the sole ruler of O'ahu, and in later years he conquered Molokai, and brought the O'ahu Kingdom to the height of its power (Kamakau 1961:7-0-75; Fornander 1969(1880): 134-140).

Cordy (1998:15-7) explains what happened after Pele-i'ō-hōlani died on O'ahu.

Pele'i'ōhōlani's son, Kumuhana, was not a capable ruler, and he was soon removed by the O'ahu chiefs (Fornander Collection 1919, 6(2): 282-291; Kamakau 1961: 128-141). (Kumuhana returned to his family's lands on Kauai.) Kahahana was chosen to be ruler. The son of a sister of Pelei'ōhōlani (Kaionuilalahai) and of a powerful 'Ewa high chief ('Elani), Kahahana had been raised on Maui in the court of the Maui ruler, Kahekili [his uncle].... [Kahekili] tricked Kahahana into slaying his high priest, Ka'opulupulu... [who] had control of the Waimea-Pūpūkea area and the huge *heiau* of Pu'u Mahuka. He also had control over Kunaiwa Heiau at Pu'u Kahea in Wai'anae....

Kahahana, while in Wai'anae and refurbishing Kamohoali'i Heiau, called Ka'opulupulu to him. He was captured, slain at Pu'uoloa, taken to Waikīkī, and offered up on the *heiau* there. With this advisor out of the way, the Maui army [led by his uncle Kahekili] invaded in 1783. The O'ahu army was defeated at Kahe-iki in Nu'uauu, and Kahahana fled into the Ko'olaulau with his wife and an aide.

Kahahana was caught in 1785 and slain. This led to a revolt by the O'ahu chiefs with his father, 'Elani, one of the leaders. The [O'ahu] rebels were harshly subdued in battles in 'Ewa. The remainder pulled back into the Wai'anae mountains, but some were lured out and crushed again by Kahekili's forces. In subduing this revolt, Kahekili was said to have slain many of the remaining nobles of the O'ahu Kingdom.... For 10 more years, the Maui Kingdom ruled O'ahu.... Kamakau in 1865 said only one chief of Maui ever entered Kūkaniloko's birthing area (Kamakau 1991: 38).

After Kahekili died in 1794 and shortly before Kamehameha's invasion, Ka'eo'ekūlani -- Kahekili's half-brother and the ruler of Kauai was returning to Kauai from the wars with Hawaii. Reputedly to avoid a conspiracy against him, he chose to attack [his nephew] Kalanikūpule, Kahekili's son and the new Maui/O'ahu ruler. Ka'eo [father of Kauai ali'i Kaumuali'i] was "joined by the warriors of Wai'alua and Wai'anae" and they fought and won a series of battles across 'Ewa. But, at a major battle at Kalau'ao (today's Pearlridge), the Kauai army and its allies were defeated, and Ka'eo was slain. Kalanikūpule proclaimed a *kanawai*, and "the slaughtering stopped, and the lives of some of the chiefs and warriors were saved, and they were released to return to their lands on Kauai."

Maui's rule came to an end in 1795 with the final conquest of Kalanikūpule and the Maui Kingdom at Nu'uauu at the hands of Kamehameha's Hawaii Kingdom army (Kamakau 1961: 168-169; Fornander 1969: 262-266). Kalani-kū-pule hid in the underbrush for a little over a year and then was captured mauka of Waipi'o in 'Ewa and killed. His body was brought to Kamehameha and offered in sacrifice to his god, Kū-ka'ili-moku. (Kamakau 1961:173).

In 1803 Kamehameha settled in on O'ahu where he placed his chiefs over all the lands (Cordy 1998:17). He put the chiefs and their men from Hawaii to work farming the lands of O'ahu (Silverman 1987:41-42).

Mo'olelo. Legends, stories or *mo'olelo* are a great cultural resource as well as entertaining. Leib and Day (1979) state in their annotated bibliography of Hawaiian legends, that legends "are a kind of rough history." They noted Luomala's idea of the value of legend and myth in the serious study of a culture and her following quote. "To a specialist in mythology, a myth incident or episode is as objective a unit as an axe, and the differences and similarities of these units can be observed equally clearly and scientifically." Leib and Day also expressed concern about authenticity, and sometimes found it difficult to determine if a legend was a primary or secondary source. The following definitions of terminology, including the Hawaiian classification of prose tales--*mo'olelo* or *ka'ao*, come from their work (Leib and Day 1979: xii, 1):

<i>Tradition</i>	used to refer to that which is handed down orally in the way of folklore
<i>Folklore</i>	a rather inclusive term, covering the beliefs, proverbs, customs, and literature (both prose and poetry) of a people
<i>Myth</i>	a story of the doings of godlike beings
<i>Legend</i>	deals with human beings and used interchangeably with 'myth'... because the collectors and translators of the tales often failed to make the strict distinction
<i>Ka'ao</i>	"pure fiction"
<i>Mo'olelo</i>	deals with historical matters and somewhat didactic in purpose... included tales of the gods, as well as tales of historical personages... many have recurring patterns, plots, and types of characters.

The following excerpts are *mo'olelo* of chiefs and chiefesses who had connections to the 'Ewa *moku*. Kamakau (1991:53-56) provides the following:

Mo'olelo of Mā'ili-kūkahi. Pua'a-a-Kahuoi was the father and Nononui the mother of Mā'ili-kūkahi. He was born at Kūkaniloko and was named the *ali'i kapu* for the land because of his dedication by the chiefs and priests and people; he had been vowed as such before the gods and had been anointed by the *kāhuna*. Chiefs born at Kūkaniloko were the *akua* of the land and were *ali'i kapu* as well.

Mā'ili-kūkahi was raised at Wahiaiwā and at Kānewai and at Wai'alua. When he was a little over twenty years of age, he was chosen by the chiefs to be the administrator of the government, the *mō'ī ho'oponopono o ke aupuni*. Mā'ili-kūkahi did not refuse them. Haka, a descendant of Kumuhonua, was the *ali'i mō'ī* at the time.

Haka was a bad chief and a stingy one. He did not take care of the chiefs and people. Because of this, the chiefs rebelled against him and fought with him. Haka took refuge in the *pu'u kaula* Waeu, the fortified hill at Kawiwī there in Līhu'e.... The rebelling chiefs and warriors came up, crowding thickly in the stronghold. Haka was the only person killed....

[Mā'ili-kūkahi] was taken to the *heiau* of Kapukapu-ākea at Pa'ala'a-kai in Wai'alua and consecrated by the *kāhuna* to rule as *mō'ī*. At the end of this ceremony, he was taken inside the *heiau* for the ceremony of the cutting of the navel cord, just as at the birth of a chief. After that another important ceremony, that of circumcision, *ōki poepoe* was reenacted. This was to cleanse and purify him; 'Ulonokū was the prayer. When this ceremony was over, he was installed as ruler

of the island, *ke ali'i o ka moku*. This chiefly ritual pertained to high chiefs from remote time – *mai ka pō mai*. It was not performed for rebellious chiefs, however, nor for warrior chiefs who took the kingdom by force, but for “chiefs of Pōkano” [chiefs of unblemished bloodlines from remote times (MKP)]. That is the manner in which Mā'ili-kūkahi became ruler of the kingdom, and he ruled as *mō'i* over the land.

Soon after he became *mō'i* the chiefs took Mā'ili-kūkahi to Waikīkī to live; he was perhaps the first of the ruling chiefs to live there. Until then the chiefs had lived in Wai'alua and 'Ewa. When the kingdom passed to Mā'ili-kūkahi, the land divisions were in a state of confusion; the *ahupua'a*, the *kā* – [*ili kūpono*], the *'ili 'āina*, the *mo'o 'āina*, the *pauku 'āina*, and the *kīhāpai* were not clearly defined. Therefore Mā'ili-kūkahi ordered the chiefs, *ali'i*, the lesser chiefs, *kaukau ali'i*, the warrior chiefs, *pu'ali'i*, and the overseers, *luna* to divide all of O'ahu into *moku* and *ahupua'a*, *'ili kūpono*, *'ili 'āina*, and *mo'o 'āina*. There were six districts, *moku*, and six district chiefs, *ali'i nui 'ai moku*. Chiefs were assigned to the *ahupua'a* – if it was a large *ahupua'a*, a high chief, an *ali'inui*, was assigned to it. Lesser chiefs, *kaukau ali'i*, were placed over the *kūpono* lands, and warrior chiefs over *'ili 'āina*. Lands were given to the *maka 'āinana* all over O'ahu.

Mā'ili-kūkahi commanded the chiefs, *kahuna*, lesser chiefs, warrior chiefs, and people: “Cultivate the land, raise pigs and dogs and fowl, and take the produce for food. And you, chiefs of the land, do not steal from others or death will be the penalty. The chiefs are not to take from the *maka 'āinana*. To plunder is to rebel; death will be the penalty. This is my command to the chiefs, the lesser chiefs, the warrior chiefs, the warriors, and the people; all the first-born sons, the *keiki mahaīapo*, are to be mine to raise; they will be my sons, *ka'u keiki*, and mine to take care of.”

The chiefs and people agreed with pleasure. Because of his exceedingly great concern for the prosperity of the kingdom, the chiefs and people never rebelled during his reign....

In the time of Mā'ili-kūkahi, the land was full of people. From the brow, *lae*, of Kuliheho to the brow of Maunauna in 'Ewa, from the brow of Maunauna to the brow of Pu'ukua (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 Hālawā in 'Ewa the land was filled with chiefs and people. The chiefs kept themselves apart, *'oko'a*, and the commoners kept to the *makai* side of the land. From Halahape to O'ahu-nui in Wai'alua was the *kūlamakauhale* of Mā'ili-kūkahi. There he raised the first-born sons of the *maka 'āinana* and of the chiefs. The chiefs and commoners loved him for his great *aloha* for their children.... Mā'ili-kūkahi's name became famous from the skies to the earth and from Hawai'i to Kauai.

The chiefs of Hawai'i and Maui heard of Mā'ili-kūkahi and of the high state of his kingdom. Hilo, the son of Hilo-kapuhi, Hilo-a-Lu'ukapu, and Punalu'u, chiefs of Hawai'i, and Luako'a, a chief of Maui, decided to go and make war on Mā'ili-kūkahi. They sailed and landed in Waikīkī, then went to Kapua'ikāula in 'Ewa with their canoes full of men. *Mauka* of Wai-kakala-ua gulch the battle was to begin. While they were going inland, they were cut off in the rear by the foster children of Mā'ili-kūkahi. Of the chiefs of Hawai'i and Maui, Punalu'u was killed on the plain now called Punalu'u. Corpses that “paved” a gulch gave the name Kīpapa to that place. Some of the invaders reached as far as the sea at 'Ewa and Waimano – the gulches were filled with their corpses. The heads of Hilo *ma* were cut off and taken to Honouliuli to a place now called Po'o-hilo....

There was peace again on O'ahu, with fear of the kingdom of Mā'ili-kūkahi. It is said of this chief that he was a religious chief. The people all over O'ahu lived religiously and in peace. It is said of Mā'ili-kūkahi that he did not sacrifice men in the *heiau* and *luakini*. That was the way of Kūkaniloko chiefs. There were no sacrificial *heiau*, *po'okanaka*, there.

Kamakau (1881:40) gives the following explanation about the *Lō Ali'i*:

Lō Ali'i. The chiefs of Līhu'e [uplands of 'Ewa], Wahiawā, and Halemano [also Helemano] 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.

High Chief Kamakau is described by Kamakau (1991:45):

Mo'olelo of Kalamakua. Kalamakua-a-Kaipūhōlua was a good chief. He was noted for cultivating, and it was he who constructed the large pond fields Ke'okea, Kūalulua, Kāfāmanamana, and other *lo'i* of Waikīkī. He traveled about his chiefdom with his chiefs and household companions to cultivate the land and gave the produce to the commoners, the *maka 'āinana*. They loved him. Kelea-nui-noho-'ana-'api'api became his wife when he was a mature man.

There are several legends of Keleanuinoho-'ana-'api'api (Kelea), the sister of Kawaokaohele, aunt of Pi'ilani, and mother of La'ielohelohe, Pi'ilani's wife. Her story is one of intrigue, and romance, but also allegorizes the life and privileges of *ali'i nui* women. It further illustrates the interrelationships between the *ali'i nui* of the various islands. The following *mo'olelo* is extracted from Fornander's (1880:83-87, 90-91) “Story of Keleanui-Nohoanaapiapi.”

The Story of Kelea. The Story of Keleanui Nohoanaapiapi, sister of Kawaokaohele, begins in Hāna. The men of Chief LōLale of Līhu'e, O'ahu were searching for a wife for him.... They went first to Moloka'i, then to Lāna'i, then sailed for Hāna intending to go to Hawai'i. While at Hāna they heard that Kawaokaohele, the Moi of Maui was stopping with his court and his chiefs at Hamakuaapoko, regulating the affairs of the country, and enjoying the cool breezes of that district, and the pleasures of surf-bathing, and that with him was his sister Kelea, the most beautiful woman on Maui, and the most accomplished surf-swimmer.

They thought of a plan to win her confidence by going surfing with her, and challenging her to a race. On her third time out, they captured her, and took her into a waiting canoe to O'ahu. They took her to Chief LōLale of Līhu'e, O'ahu, son of O'ahu Moi Kalona-iki, and brother of heir-apparent Piliwale. “And as she did not commit suicide, it may be inferred that she became reconciled to her lot and accepted him as her husband. And as no invasion of O'ahu was ever attempted by Kawaokaohele, or vengeance exacted for the abduction of his sister, it is probable, though the legend says nothing about it, that the affair was diplomatically settled to the satisfaction of all parties.” [Lō-Lale was a Lō Ali'i, who were guardians of the sacred birthing place of Kūkaniloko; chiefs born there were given first consideration if a new chief was needed to be replaced anywhere in the islands.]

Kelea and Lō-Lale had three children: Kaholi-a-Lale, who later married Kohipalaoa [Kohēpalaoa], sister of Kūkaniloko, Mō'i of O'ahu after her father Piliwale's death; Luliwahine, and Lulikane. After several years and three children she informed Lō-Lale that she was leaving him, as was her privilege due to her high rank. He reluctantly gave his consent, but his grief was preserved in a chant. While traveling around O'ahu, Kelea met Kalamakua, chief of Hālawā [and Waikīkī], son of Kalona-nui and cousin of Lō-Lale. They marry and have a daughter La'ielohelohe, who in her youth was betrothed to her cousin Pi'ilani, son of Kelea's brother Kawaokaohele.

There are other versions of this *mo'olelo*. The following is from Kamakau (1991:45-49) and corroborates Fornander's (1880) “Story of Kelea.”

The Mo'olelo of Kelea-nui-noho-'ana-'api'api. Kelea was a beautiful chiefess with clear skin and sparkling eyes. Her hair fluttered like the wings of the *ka'upu* bird, and so she was called Kelea-nui-noho-'ana-'api'api, Great-Kelea-Who-Flutters. She was the sister of Kawaokaohele (Kawaokaohele), the *mō'i* of Maui. Surfing was her greatest pleasure. She lived at Hamakuaapoko and Kekaha and at Wailuku, surf riding with all the chiefs.

When Lō Lale was the chief of Līhu'e on O'ahu, he sent some chiefs on a search for a wife for himself. The canoe expedition in search of a wife set out from Wai'alua, circled Moloka'i without finding a wife, circled Lāna'i without finding a wife, and set out to circle Maui in search of a wife. When the chiefs reached Hāna, they heard of Kelea, the beautiful chiefess who was the sister of Kawaokaohele. She was living at Hamakuapoko because of the surf was riding there, reveling in the curling breakers of the midmorning when the sea was smooth and even. She enjoyed surfing so much she dwelt upon the morrow's surfing and awakened to the murmuring of the sea to take up her board. The early morning, too, was delightful because of its coolness, and so she might go at dawn.

When the wife seekers heard these words about Kelea, they decided to obtain her as a wife for their master and quickly got ready to leave Hāna. The *kama'āina* residents tried to make them stay a little longer, but they would not listen. When they drew close to Hamakuapoko, they saw many people ashore, and saw the chiefess surf riding. They floated out where the waves broke, and when Kelea saw them her countenance faded at being seen by these strangers, and her heart throbbed. But she heeded their voices inviting her to board the canoe and showed herself to be the unsurpassed one of east Maui. The men said, "O chiefess, ride ashore on the canoe." She agreed – perhaps because of the glance of one of them. They were all "soaring *iwa* birds," constantly moving on the shifting billows of the ocean, bronzed and reddened of cheek by the high seas. The chiefess did not know that this was a "wife-searching" canoe, *he wa'a kā'ili wahine*.

The first time, they rode a wave ashore, and the second time, they rode a wave ashore, but the third time, there was a dashing away to vanish at sea, "*ua hiki mai o Pūpūhi ma*" ("blown away" has arrived). Those who searched for them found nothing; they searched Hawai'i, O'ahu, and Kaua'i without finding a thing.

When Kelea was landed at Wai'alua, she was quickly taken up to Līhu'e and became the wife of the Lō chief of Līhu'e, Lō Lale. They had three children, Kaholi-a-Lale, Luli-wahine, and Lulikāne. They were among the ancestral chiefs of O'ahu as you shall see later. After living with her husband in the uplands of Līhu'e for ten years, Kelea asked him to let her go down to the seashore of 'Ewa to go sightseeing. He agreed to her request and said "You may go. Living on our inland land is dejecting – there is only the scent of *kupukupu* ferns and *nēnē* plants here."

Kelea went down to the plain of Ke-ahu-moa ['Ewa], to the rushing waters of Waipahu, to the "hand-holding" sands of 'Ewa-uli. Beautiful was the view of the channels of Pu'uloa. When she and her traveling companions reached Hālawa, she inquired of them, "What is the place before us like? Is it as nice as the places we have passed through in coming this far?" Her companions answered, "Yes, even more so. It is dense with *kou* and coconut trees, and it is also a place where one may watch the chiefs enjoying surfing." When Kelea heard the wording "surfing," desire rose in her, for surfing had been her favorite pastime. She said to her companions, "Let us continue our sightseeing and go to see the place you two speak of." They answered, "If it is your wish that we go, then that is what we shall do. You are the one whose sightseeing journey this is, and we two are merely to accompany you. That was the command of your husband to us."

They went along until they entered the coconut grove of Kawehewehe in Waikīkī. The *kama'āina* of the place saw this beautiful woman and welcomed her and shook down coconuts for the three to eat. They asked, "Where are you from? And where are you going?" "We have come from 'Ewa from the upland of Līhu'e because we wanted to go sightseeing. This is the most pleasant place we have seen." The *kama'āina* said. "This is a place for enjoyment. Over there is the *kou* grove of Kahaloa where one may view the surfing of the chiefs and of the *ali'i nui* Kalamakua."

Joyful at the thought of surfing, Kelea said to her companions, "Let us go on." They entered the *kou* grove of Kahaloa and watched the chiefs surfing in. Kelea inquired of the *kama'āina*, "Is it possible to obtain a surfboard for the asking?" "*Ka!* Are you skilled at surfing?" "Who would not be if one had a board?" retorted Kelea. When the *kama'āina* heard these words, they were

astonished; those of Līhu'e were accustomed to slicing *mo'okīlau* ferns and *pūpolo* stalks, but of surf riding these people knew nothing. The *kama'āina* thought that Kelea had been born at Līhu'e; they did not know she came from Maui.

The *kama'āina* said that a surfboard could readily be obtained. So she asked them for a board, and perhaps because she was so beautiful a woman, someone gave her one. When she received it, she went to the edge of the sea and rubbed off the red dirt of 'Ewa from her feet so as to look fresh. When she had finished, she dipped into the sea, then jumped upon her board and paddled off like an expert. Those who were watching saw that she managed her board like one trained, moving along easily and noiselessly without the least heeling over.

When Kelea reached the place where the surf broke, she left that place to the *kama'āina* and paddled on out to wait for a wave to rise. As she floated there, the first wave rose up but she did not take it, nor did she take the second or third wave, but when the fourth wave swelled up, she caught it and rode it to shore. As she caught the wave, she showed herself unsurpassed in skill and grace. The chiefs and people who were watching burst out in cheering – the cheering rising and falling, rising and falling.

While Kelea was surfing, the chief Kalamakua was working in his fields. When he heard those shouts he was startled and asked his men, "What is that shouting reverberating from the seashore?" "It is probably because of a skilled woman surfer." They answered. The chief remembered the chiefess of Maui, Kelea. He left off his work and went to stand on the shore to watch. As Kelea rode in on a wave, the *mō'ī* ran to the edge of the sea and stood there. When the chiefess reached the sand, he took hold of her board and asked, "Are you Kelea?" "Yes," she answered. She stood up, naked. The *mō'ī* removed his *kīhei* shoulder covering and wrapped it around her as a *pā'ū* and took her to a *kapu* place. That was the beginning of her life as the *ali'i wahine mō'ī* and she married (*ho'āo mare*) the *mō'ī* Kalamakua.

The genealogies indicate how *ali'i nui* from all the islands were related, and the *mo'olelo* also confirm this as indicated in the following story of La'ielohelohe in Kamakau (1991: 49-50).

The Mo'olelo of La'ielohelohe. Kalamakua was a good chief who cultivated large pond fields of Waikīkī. He married [Kelea] Keleanuho'ana'api'api, a beautiful chiefess and sister of Kawaokaohele [children of Kahekili I], [Pi'ilani's father, also spelled Kawaokaohele] the *ali'i nui* of Maui. She loved to surf at Hamakuapoko, Kekaha, and Wailuku.... The chiefs of O'ahu, searching for a wife for Chief Lōlale, ruling chief of Līhu'e, Oahu, when reaching Hāna heard about the beautiful Kelea, they wanted to obtain her for their chief. They tricked her at Hamakuapoko, and she proved to be an unsurpassed surfer of East Maui. They tricked her and kidnapped her to Wai'alua, O'ahu, where she was taken to Chief Lōlale at Līhu'e. They had three children: Kaholialale, Luliwahine, and Lulikane, ancestral chiefs of Oahu. After ten years she asked her husband if she could go to 'Ewa to go sightseeing and he agreed. On her travels she heard about the surfing of Waikīkī and asked her companions if she could go there and they agreed. She asked the *kama'āina* for a board and she proved to be a very skilled surfer. The people cheered and cheered her. Chief Kalamakua was working in his fields and heard the shouts. He went to check and watched her from the shore. When he saw her skill and beauty he asked if she was Kelea. She said yes. He wrapped his *kīhei* around her naked body and took her to a *kapu* place. She married Kalamakua. They had La'ielohelohe, born at Helumoa and raised in Waikīkī. She was betrothed to Pi'ilani, the son of the *ali'i nui* of Maui [Kawaokaohele]. Her *akua* grandmothers Hapu'u and Kalaiohauola took care of her. Later she voyaged to Maui to marry Pi'ilani. They lived at Halehuki and had four children: Lono-a-Pi'ilani, Pi'ikea, Kala'aiheana, and Kīhapi'ilani. La'ielohelohe returned to O'ahu for Kīhā's birth. He was born at 'Apuakehau in Waikīkī—there is a rock there to mark the place.

Kamakau (1991:50-51) shares the story of Lō Kaholi-a-Lale, son of Kelea and LōLale in the following:

Mo'olelo of Lō Kaholi-a-Lale. Lō Lale was the father and Kelea-nui-noho-'ana-'api'api [sister of Kawaoakohele, Pi'ilani's father] was the mother of Lō Kaholi-a-Lale. He was born in the uplands of Līhu'e and raised there until manhood. This youth was an exceedingly handsome man with features like his mother's. Lō Kaholi-a-Lale was taught club wielding, *ke ka'ala'au*, and spear throwing, *ka lono-maka-ihe*, and he became highly skilled in striking, thrusting, and parrying. In striking, no creeping or flying thing did he miss.

The main occupation of the Līhu'e chiefs in olden times was to learn the art of spear throwing, and from there came the most skilled teachers. Spear throwing was also the main occupation of Piliwale, the *mō'ī* of 'Ewa. He belonged to the chiefly family, '*ohana ali'i*', of Kumuhonua [Nana'ula genealogy according to editors notes] of Kūkaniloko, and he had two daughters, Kūkaniloko, the older, and Kohe-palaoa, the younger. The older was betrothed to the son of the *mō'ī* of Maui; Luaia was the name of this youth.

Piliwale said that if a man were found who was skillful in hurling spears and whose skill was as great as that of his own teacher the reward would be his daughter Kohe-palaoa. The name of the chief's teacher of spear throwing was 'Awa. We could grasp ten spears in his right hand and ten in his left. He was a "triple threat" in throwing; he could throw ten spears from the shoulder, two backwards, and two directly to the navel....

There were two days of sham battles on the plain of Pueohulunui, but no one challenged 'Awa. However, Lō Kaholi-a-Lale studied the stances and thrusts of this teacher who was so skilled in *kākā lā'au*, the striking, thrusting, and parrying with the spear-club *lā'au pālau*. He himself already knew the thrusts and the stances of his own teacher, whose name was Ake-pao-a-nā-ihe. On the third day, the sham battles were resumed to seaward at Hālaulani. From there word came to the chief Piliwale that a young chief from upland Līhu'e had challenged 'Awa-hūna-la'au-nui in *kākā lā'au*. Here the youth exerted himself to the limit and was beyond compare in wielding the spear-club. The strokes by which he won were the *pāne oluna* and the *hū'alepo*.... This incident gave names to places that remain to this day: Kūpahu, "to hurl," and Hanapouli, "make dark." These places are in Waipi'o in 'Ewa.

Kohe-palaoa became the wife of Lō Kaholi-a-Lale. That was the beginning of the combining of the *lō* and the *wohi*, the ranks of Kaholi-a-Lale. As for Kohe-palaoa, her rank was that of a Kumuhonua chief of Kūkaniloko; she was a *nī'au'pi'o*. They had a son named Kānehōalani who became the *ali'i* of Ko'olau.

There are no *mo'olelo* or stories of Piliwale (of 'Ewa) a ruling chief of O'ahu or his eldest daughter Kūkaniloko in Kamakau (1991); however there are several references to them in the other *mo'olelo* of this section. Piliwale was the 10th Ali'i Aiomoku of O'ahu and the son of Kalona-iki, who was a son of Mā'ili-kūkahi. Like his father and grandfather before him and his two daughters, Piliwale was born at the royal birthing site of Kūkaniloko. His eldest daughter Kūkaniloko was the first female ruling chiefess of O'ahu and the 11th Ali'i Aiomoku. Her daughter, Kalani-Manuia was also born at Kūkaniloko and followed her mother as ruling chiefess of O'ahu and was the 12th Ali'i Aiomoku of O'ahu. Kamakau (1991: 57-61) shares the following in the Mo'olelo of Kalani-Manuia.

Luaia was the father and Kūkaniloko, the daughter of Piliwale, the mother of Kalani-manuia (Kalai-manuia). Luaia was an *ali'i kapu* of Maui; his father was Ka'ihiwālu and his mother was Kaulua; Ka-lei-iki-o-Kaka'e was his grandfather. Malena was the place where Luaia's navel cord was cut; at Olopio the placenta (as deposited); at Kaukūloa, the caul.

Kalani-manuia was a famous chiefess, an *ali'i kapu*; she lived *mauka* of Wahiawā, Kalani-manuia was born at Kūkaniloko, at Kapu'ahu'awa, in A.D. 1100, and at Ho'olono-pahu *hetau* her naval was cut. When this chiefess was a grown woman, she was taken to Kalauao ['Ewa]; her home as at Kūki'iahu, with a second residence at Pā'aiau. She remained in Kalauao when she became ruler of the kingdom. She was a good chiefess, and the chiefs and commoners lived in comfort all over the

land. No taxes were laid upon the chiefs and their men, *kānaka*, and no war was known in her kingdom. She ordered the chiefs and commoners to erect *hetau* to the gods, and also *mua*, men's "chapels," a places for the chiefs and their men to pray to the gods. She had Pā'aiau, Opu, and Kapa'akea fishponds made for herself. The island of O'ahu was made productive through cultivation.

Kalai-manuia married (*ho'ao*) Lupe-kapu-ke-aho-makali'i, an *ali'i kapu* and an *ali'i pi'ō*. He was the son of Kalaniuli. Kalaniuli was the father (and Kalaniuli's full sister) Nalu-e-hilo-i-ke-aho-makali'i, the mother. It is said of Lupe that he was skilled and wise and did many things. His main occupation was fishing. Because of his skills in handling fine fishlines and the smells of tiny fishhooks, and all other tiny things, his men called him Lupe-kapu-ke-aho-makali'i, Sacred Lupe of fine fishlines. He was a chief benevolent toward the commoners. However, the kingdom belonged to his wife Kalani-manuia, and he acted as the administrator for their government.

Kalai-manuia and Lupe had four children: Kū-a-Manuia first, Ka'ihikapu-a-Manuia second, Ha'o third, and Kekela, a female, fourth. Kū-a-Manuia was raised in Waikī to be the overlord, *haku ali'i*, there; Ka'ihikapu-a-Manuia was raised at Wai-mānalo in Honouliuli, 'Ewa, to be the chief there, and Ha'o at Waikele ['Ewa] to be the chief there. The daughter Kekela was raised at Mauna-ku'aha; her bathing place was Kahuawai in Kalauao. She was raised by her mother and father. The main occupation of Kekela during the time she lived with her mother were playing *kōnane* 'and drinking 'awa. Her *kōnane* board and her 'awa straining bowl still exist.

The reign of Kalai-Manuia and her husband Lupe lasted a long time.... The chief Lupe became a parent to the children of the commoners, as in the days of Mā'ili-kūkahi. He was beloved by commoners. His occupations as he traveled about O'ahu were cultivation and fishing, the main one being fishing with long lines....

Shortly before she died at her residence at Kūki'iahu in Kalauao ['Ewa], Kalai-manuia gave her commands her children. She ordered that her first-born, Kū-a-Manuia, be at the head of the kingdom; Ka'ihikapu-a-Manuia was given charge of her gods Kūkalani and Kū-ho'one'e-nu'u. To Ha'o she gave charge of 'Ewa and Wai'anae under his older brother Kū-a-Manuia. To the sister Kekela were given the lands of Wai'alua and Ko'olauloa; to Kū-a-Manuia were given Ko'olauloko and Kona. All the chiefs and commoners were to be under him. The lands given to Ka'ihikapu-a-Manuia were Kalauao, Aiea, Hālawā, and Moanalua, under his older brother. Also the gods. After she had given these orders, Kalai-manuia did in the ninety-first year of her life and sixty-fifth of her reign.

The following *mo'olelo* from Kamakau (1991: 61-67) are about the three sons of Kalani-Manuia:

Kū-a-Manuia became the ruler, *noho ali'i*, in the fortieth year of his life. He was a chief who disregarded the commands of his parents; he was greedy and covetous of honors. He wanted to take the lands of his younger brothers, as well as everything else left by the parents, and take them for himself alone. He did evil to the chiefs, *kāhuna*, and the commoners, *maka'ānana*. The *kāhuna* and the *maka'ānana* supported Ka'ihikapu-a-Manuia.

Ka'ihikapu-a-Manuia was constructing the fishponds of Ka'ihikapu and Lelepau at Ke'ehi. Ka'ihikapu was finished and Lelepau was almost finished when Kū-a-Manuia came to do battle with his younger brother. Because so many people supported Ka'ihikapu-a-Manuia, Ha'o did so too. Kū-a-Manuia was killed. A memorial stone to his death, *pōhaku ho'omana'o*, remains to this day. He had reigned for six years.

Ka'ihikapu-a-Manuia became the ruler in the forty-first year of his life. Ka'ū-nui-a-Kānehōalani was his wife. She was a threefold chiefess: she was a Kumuhonua, a *wohi*, and a *lō*. She was the daughter of Kānehōalani and Kualoa-ka-la'ila'i, both high chiefs and *kapu* chiefs, *ali'i nui a ali'i kapu*....

Ka'ihikapu-a-Manuia was a Kumuhonua chief, a *nī'auipi'o*, and *pi'o*. When he married Ka'ū-nui-a-Kānehoalani, they had a son, Kākuhihewa. Ka'ihikapu-a-Manuia was a good chief, benevolent toward the *ali'i* and the *maka'āinana*. He restored the *heiau* and the houses of the gods all over O'ahu, and his administration of the land was peaceful. During the reign of Kū-a-Manuia, the chiefs of Ko'olaupoko, Ko'olauloa, Wai'ālua and Wai'ānae had rebelled because of his misrule and had put an end to his reign. However when the chiefdom became Ka'ihikapu-a-Manuia's, the chiefs were pleased. He made circuits, *ka'apuni*, around the island to build god-houses for Lono, Kāne, and Kanaloa....

On one of Ka'ihikapu-a-Manuia's circuits of the island, he came to Waikele in 'Ewa where his younger brother Ha'o was living. Cultivating and raising animals were the main occupations of Ha'o's people, and from Honouliuli as far as Wai-pi'o, the land was full of his men. Ka'ihikapu-a-Manuia noted the many men that swarmed about the land. He was afraid he might lose the chiefdom to Ha'o and became very anxious about it.

When the procession returned to Waikīki, Ka'ihikapu raised up a house for the gods, a Hale Kumuka'āha. He imposed the *kapu 'awa-ko'o* of his mother Kalai-Manuia and freed it, performed the 'aha ritual of Maluakoa and freed it, imposed the *kapu* of Kūmalohia and freed it. Then he said to the *kahuna mui* Laumea, "Perhaps I should go and war against my *kaikaina*. If he lives until I die, he will rebel against the *apuni* of my son. Then my descendants will not be rulers in this world, but the descendants of my younger brother will be rulers."

The *kahuna* Luamea said not to kill his brother in war, instead to shower him with gifts of pigs, taro, bananas, sugarcane and fish. So for five years Ka'ihikapu did this, but with hypocrisy because he still wanted the death of his brother. So he planned on a unique way to kill his brother. He went shark fishing and snared a nine and a half meter long shark which took two days and nights to die. They towed the shark to Waikīki. When the *kahuna* heard of this and learned that Ka'ihikapu still felt his brother was raising up an army to defeat him, he had a plan. Ka'ihikapu was told to send someone to tell his brother Ha'o that Ka'ihikapu had a shark offering for him for the *kapu Kū* coming up.

Laumea then told Ka'ihikapu to remove the flesh from the shark and fill it with spears for he and his men who would be hiding inside the shark. Ha'o was told that Ka'ihikapu would not be coming when the shark was delivered so they were relaxed. The shark was delivered to Ha'o in Waikele, 'Ewa accompanied by "countless" men and placed on the *lele*. When Ha'o was about to offer his prayer and 'amama for this *kapu* ritual, Ka'ihikapu opened the mouth of the shark and said "You are bitten by the mouth of the shark!"

The story of the sons of Kalani-Manuia by Kamakau (1991: 61-67) continues with the death of Ha'o:

With the death of Ha'o, his *kahuna*, and his chiefs, the slaughter stopped. Their bodies were put inside the shark, and Ha'o, the *kahuna*, the shark, and the chiefs were offered at one time. Nā-pū-lānahu-mahiki-a-Ha'o, the son of Ha'o, escaped and became the *ali'i* of Wai'ānae. He was strong in battle. There in Waikele was the place of this slaughter, at Paumakua.

When Ha'o died and Nā-pū-lānahu-mahiki became *ali'i* of Wai'ānae, he became an enemy of Ka'ihikapu-a-Manuia. He was a strong chief, and in the warring, the kingdom of O'ahu was divided into two parts. Wai'ālua, Wai'ānae, and Ko'olauloa became one part and 'Ewa, Kona, and Ko'olaupoko became the other. Ka'ihikapu-a-Manuia ruled the latter section. The chiefs supported the two rulers equally.

Kamakau (1991:68-70) tells the story of Kākuhihewa, son of Ka'ihikapu-a-Manuia and grandson of Kalani-Manuia in the following:

When Ka'ihikapu-a-Manuia died Kākuhihewa inherited his kingdom. He was thirty-nine years old when he became the ruler, the *noho ali'i*, and he ruled for fifty years. Kākuhihewa was the son of Ka'ihikapu-a-Manuia and Ka'ū-nui-a-Kānehoalani. The parents were *ali'i kapu*, *ali'i nī'auipi'o*, and *pi'o* chief, so the *kapu* of Kākuhihewa were multitudinous – *kapu a mano a lehu*.

In the birthing of Kākuhihewa at Kūkaniloko, the Līloa *kapu* of the supports and the removal of the child were observed. Kānehoalani, his maternal grandfather, was the one who took him into Ho'olono-pahu *heiau*. Forty-eight chiefs, including Mākō-kā'au, Ihu-kolu, Kā'aumaku'a, and Pakapaka-kūāua, observed the cutting of his navel cord, and the two drums, 'Opuku and Hāwea were sounded to announce the birth of Kākuhihewa. When the *kahuna* had finished the rites of purification – the *huikala*, *ka'iole*, *lele uli*, and *lele wai* rites – all defilements were cleared away.

Kākuhihewa was taken to 'Ewa to be raised by his *kahu* at Waipi'o, Waiawa, and Mānana on the fat *awa* fish of Kuhia and the sweet mullet of Pauhala. 'Ewa was a land much loved by Kākuhihewa. The warmth of Wai'ānae and Wai'ālua; the thickness of the *poi* of Wai'ānae; the sweetness of the *poi* of Kamaile; the soft mullet of Lualualei; the two calm places of Wai'ālua, 'Uko'aa and Loko Ea, the centers for choice fish; the delicious *poi* of Ke-awāwa-ihe – all these were loved by the chief.

Kākuhihewa had many teachers and learned the many arts of warfare, including spear throwing, club wielding, slingstones, but his favorite pastime was the shooting with bows and arrows; Kamakau (1991:68-70) continues:

The shooting of rats and mice, *pana 'iole*, was one of Kākuhihewa's principal pastimes during his reign. From the open country of Hālawā to Līhu'e, he would go with food and fish and his household and his wives, and babies would be born in the open country. The bones of birds or human beings were used for the points of the arrows. This was one of the worthless occupations of the chiefs in olden times....

During the reign of Kākuhihewa, O'ahu became known for its productivity; its smell reached Kaua'i there was so much cultivation. Kākuhihewa maintained residences in 'Ewa, at Waikīki, and at Kailua in Ko'olaupoko. At 'Alele in Kailua he built his "government house," *Hale Apuni*.... Kākuhihewa became a famous chief from Hawai'i to Kaua'i. In the *mele* of the chiefs of Hawai'i, Maui and Kaua'i, Kākuhihewa and the chiefs of O'ahu are included. Because of the benevolence of this ruler and because of his many works, O'ahu was called "the sands of Kākuhihewa," *ke one o Kākuhihewa*. He was a chief without anger or resentment....

Lānahu-'imi-haku, an elderly *kahuna* and advisor to Lono-i-ka-makahiki of Hawai'i, came to O'ahu to live with Kākuhihewa, and many chiefs of Hawai'i and Maui came to live on O'ahu because of the abundance of food and fish and fresh water and the productivity of the land. Through the graciousness and kindness of the chiefs of O'ahu, those of Maui, Moloka'i, and Hawai'i became relatives (through intermarriage). This is one of the things that bound the chiefs together in ancient times....

Kākuhihewa treated the old people, the children of the *maka'āinana*, and the destitute like favorites. His name has been famous down to our times, and people nowadays frequently call O'ahu "O'ahu-a- Kākuhihewa." Here is one reason for his fame: he was an ancestral chief for the chiefs of Hawai'i, Maui, and Kaua'i.

The following is a list of additional *mo'olelo* sources from the *Hawaiian Legends Index* Vol I & II by the Hawaii State Public Library System (HSPLS) (1989) that mention 'Ewa, Honouliuli, Kalaeloa or Kapolei. Since there are several stories they will not be summarized or included in this report.

'Ewa

'Kaihi-kapu or the attack of the king shark.' [In](#) Armitage, *Ghost Dog and other Hawaiian Legends* Pp 148-151

Pele and Hi'iaka Emerson, Nathaniel Bright

'Story of Lonoikamakahiki' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 1 pp 256-363

'History of Kualii' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 1 pp 364-434

'Legend of Kelelealuaka and Keinohoomanawanui' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 1 pp 464-471

'Legend of Kewalo' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 2-71

'Legend of Palila' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2pp 136-153

'Legend of Opelelemoemoe' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 168-171

'Legend of Kahalaopuna' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 188-193

'Legend of Halemano' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 228-263

'Legend of Maikoha' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 270-273

'Legend of Namakaokapaoo' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 274-283

'Tradition of Kamapuaa' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 314-363

'Story of Palila' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 372-375

'Brief stories of ghosts and cunning' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 418-435

'Famous men in early days' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 486-503

'A story of Makahi' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 564-569

'History of the awa' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2 pp 606-611

'The kukui tree' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 2pp 670-677

'The slandered priest of Oahu' [In](#) Gowen, *Hawaiian Idylls of Love and Death* pp 34-42

'The city of refuge: A tale of Oahu' [In](#) Gowen, *Hawaiian Idylls of Love and Death* pp 59-66

'The triple marriage of Laamaikahiki' [In](#) Kalakaua, *The Legends and Myths of Hawaii* pp 117-135

'The apotheosis of Pele' [In](#) Kalakaua, *The Legends and Myths of Hawaii* pp 139-154

'Hua, king of Hana' [In](#) Kalakaua, *The Legends and Myths of Hawaii* pp 157-173

'The sacred spear-point' [In](#) Kalakaua, *The Legends and Myths of Hawaii* pp 209-225

'Kelea, the surf-rider of Maui' [In](#) Kalakaua, *The Legends and Myths of Hawaii* pp 229-246

'The adventures of Iwikauikaua' [In](#) Kalakaua, *The Legends and Myths of Hawaii* pp 335-349

'The modest warrior' [In](#) Knudsen, *Teller of Hawaiian Tales* pp 125-128

'Lai'e i ka wai' *The Hawaiian Romance of Lai'eikawai*

'Why the mullet swim around Oahu' [In](#) Pukui, *Tales of the Menehune* pp 51-54

'Oahunui' [In](#) Thrum, *Hawaiian Folk Tales* pp 139-146

'The ivory of Oahu' [In](#) Westervelt, *Hawaiian Historical Legends* pp 114-124

'The legend of the breadfruit tree' [In](#) Westervelt, *Legends of Old Honolulu* pp 23-31

'Kalelea and his wish' [In](#) Wheeler, *Hawaiian Wonder Tales* pp 143-163

Honouliuli

'Lepe the bird-maiden...' [In](#) Colum, *The Bright Islands* pp 187-196

'Lepeamoa' [In](#) Thrum, *More Hawaiian Folk Tales* pp 164-184

Kalaeloa/Barbers Point

'Aiai, son of Kuula' [In](#) Thrum, *Hawaiian Folk Tales* pp 230-249

Kapolei

'History of Kualii' [In](#) Fornander, *Fornander Collection of Hawaiian Antiquities and Folk-lore*, v 1 pp 364-434

'*Ōlelo no 'eau* (Pukui 1983) or proverbial/traditional sayings usually had several layers of meanings. They reflected the wisdom, observations, poetry and humor of old Hawai'i. Some of them referenced people, events and/or places. The following '*olelo no 'eau* that make references to 'Ewa were compiled by

Mary Kawena Pukui between 1910 and 1960 with both translations and an explanation of their meaning, which are often more *kaona* (hidden or double meaning) than obvious. Only references to ‘Ewa were found; none for Honouliuli or Kalaeloa.

‘ <i>Ōlelo no’eau</i> Translation: Meaning:	‘ <i>Āina koi ‘ula i ka lepo.</i> Land reddened by the rising dust. Said of ‘Ewa, O‘ahu (p 11 #80)
‘ <i>Ōlelo no’eau</i> Translation: Meaning:	<i>Anu o ‘Ewa i ka i‘a hāmau leo e. E hāmau!</i> ‘Ewa is made cold by the fish that silences the voice. Hush! A warning to keep still First uttered by Hi‘iaka to her friend Wahine‘oma‘o to warn her not to speak to Lohi‘au while they were in a canoe near ‘Ewa (p 16 #123).
‘ <i>Ōlelo no’eau</i> Translation: Meaning:	‘ <i>Ewa kai lumaluma‘i.</i> ‘Ewa of the drowning sea. An epithet applied to ‘Ewa, where <i>kaunwā</i> were drowned prior to offering their bodies in sacrifice (p 47 #385)
‘ <i>Ōlelo no’eau</i> Translation: Meaning:	‘ <i>Ewa nui a La‘akona.</i> Great ‘Ewa of La‘akona. La‘akona was a chief of ‘Ewa, which was prosperous in his day (p 47 #386)
‘ <i>Ōlelo no’eau</i> Translation: Meaning:	<i>He kai puhi nehu, puhi lala ke kai o ‘Ewa.</i> A sea that blows up <i>nehu</i> fish, blows up a quantity of them, is the sea of ‘Ewa. [No meaning provided] (p 75 #661)
‘ <i>Ōlelo no’eau</i> Translation: Meaning:	<i>Ku a‘e ‘Ewa; noho iho ‘Ewa</i> Stand up ‘Ewa; Sit down ‘Ewa. The names of two stones, now destroyed, that once marked the boundary between the chiefs’ land (<i>Kua‘e ‘Ewa, O‘ahu</i> (p 200 #1855)
‘ <i>Ōlelo no’eau</i> Translation: Meaning:	<i>O ‘Ewa, ‘āina kai ‘ula i ka lepo.</i> ‘Ewa, land of the sea reddened by earth [dirt]. ‘Ewa was once noted for being dusty, and its sea was reddened by mud in time of rain (p 257 #2357)
‘ <i>Ōlelo no’eau</i> Translation:	<i>Ua ‘ai i ke kāi-koi o ‘Ewa.</i> <i>Kāi</i> is O‘ahu’s best eating taro; one who has eaten it will always like it. Said of the youth or a maiden of ‘Ewa, who, like the <i>kāi</i> taro, is not easily forgotten (p 306 #2770)

Place Names. Hawaiians of old generally named everything; from winds and mountains, to rocks, canoes, taro patches, fishing stations, and “the tiniest spots where miraculous or interesting events are believed to have taken place” (Williamson et al. in Pukui 1983: x). They all represented a story; some known only locally, while others became legendary. Unfortunately, the stories and meanings of many of the traditional place names today have been forgotten. This section also includes modern names in Kalaeloa and vicinity.

Table 4. Place Names and *Mo‘olelo* in Kalaeloa and Vicinity

Name	Location/Description/Reference
Barbers Point	Quadrangle, southwest tip of O‘ahu; surfing place (Finney 1979:108), beach park, golf course, naval air station and oil refinery all named for Captain Henry Barber who was wrecked there on a coral shoal on October 31, 1796 (Howay 39); formerly Kalaeloa (Pukui et al. 1974:16-17).
‘Ewa	District, plantation, quadrangle, west of Pearl Harbor, O‘ahu. <i>Lit.</i> ‘crooked.’ The gods Kāne and Kalanaloa threw a stone to determine the district boundaries. The stone was lost but later found at Pili-o-Kahe. Beach between Pu‘uloa and One‘ula beaches (Pukui et al. 1974:28).
Hoaka-lei	Spring in Kualaka‘i. <i>Lit.</i> ‘lei reflection’ because Hi‘iaka picked <i>lehua</i> [‘ōhia] flowers here to make a <i>lei</i> and saw her reflection in the water (Pukui et al. 1974:47, 119).
Honouliuli	<i>Ahupua‘a</i> or land division, village, forest reserve and gulch. Waipahu quad, O‘ahu. <i>Lit.</i> ‘dark bay’ (Pukui et al. 1974:51); location of project area.
Kalaeloa	<i>Lit.</i> ‘the long point’ – old name for Barbers Point where Captain Henry Barber ran aground in 1796 (Pukui et al. 1974:72).
Kanehili	Lower ‘Ewa Plain, possibly a trail (Emerson) (Tuggle and Tomonari-Tuggle 1997:19).
Kapolei	Cinder cone (166 feet) on the southeast slope of the Wai‘anae range, ‘Ewa quad., <i>Lit.</i> ‘beloved Kapo’ (a sister of Pele) (Pukui et al. 1974:89); Fort Barrette, hill north of NAS Barbers Point’s main gate (Ii 1959:27) (Tuggle and Tomonari-Tuggle 1997:19).
Kaupe‘a	Plain. ‘Ewa Plain, including all of NAS Barbers Point; ‘crisscross, interwoven’ Kamakau (1964:47) (Tuggle and Tomonari-Tuggle 1997:19).
Kualaka‘i	Area near Barber’s Point. <i>Lit.</i> <i>Tethys</i> (a sea creature) (Pukui et al. 1974:119); Nimitz Beach (Tuggle and Tomonari-Tuggle 1997:19).
Nimitz Beach	See above... Kualaka‘i, west end of NAS Barbers Point (Tuggle and Tomonari-Tuggle 1997:19).
One‘ula	Beach park, ‘Ewa quad. <i>Lit.</i> red sand (Pukui et al. 1974:171).
Ordy Pond	Pond, north of Tripoli and Anzio streets (Tuggle and Tomonari-Tuggle 1997:19).
Pe‘e-Kaua	Variation of Kaupe‘a or ‘Ewa Plain (Emerson 1978:167) (Tuggle and Tomonari-Tuggle 1997:19).
Pu‘uloa	<i>‘Ii</i> or land section, camp, salt works, village, beach park, area east of Pearl Harbor, and old name for Pearl Harbor; it is said that breadfruit were brought there from Samoa; <i>Lit.</i> ‘long hill’ (Pukui et al. 1974:20).
Pu‘u-o-Kapolei	One of the most important of the <i>wahi pana</i> (special places), important cultural locales of the ‘Ewa Plain (Tuggle and Tomonari-Tuggle 1997:20).
Salt Flat	Eastern end of runway cross (Tuggle and Tomonari-Tuggle 1997:19).
White Plains Beach	East end of NAS Barbers, near One‘ula (Tuggle and Tomonari-Tuggle 1997:19).

Early Historic References. By and large “Historic References” pertain to notable historic events and overviews of important places and land tenure within the project area and district. One of the most significant practices in the history of the Hawaiian people was their concept of the stewardship of the land. However, over time, these practices were replaced by more western methods of land tenure and use, as the lands of ‘Ewa, Honouliuli and Kalaehoa went from the domain of the *ali‘i nui* to the monarchy, to various individuals and entities. The history of land use in this area went from traditional *ahupua‘a* land management and use (sweet potato) to sugarcane and ranching related activities to military and multi-uses today.

It was during the time of Kahaukapu of Hawai‘i and Kaka‘alaneo of Maui (also said to be the time the Spanish first came with Ku-kanaloa (Kamakau 1991:324) that the division of lands is said to have taken place under a *kahuna* named Kalaihaohi‘a. He portioned out the lands into districts, sub-districts, and smaller divisions, each ruled over by an agent appointed by the landlord of the next larger division, and the whole under control of the ruling chief over the whole island or whatever part of it was his to govern (Handy and Handy 1978:491; Beckwith 1970:383). Each island was divided into *moku* or districts that were controlled by an *ali‘i ‘ai moku*. Within each of the *moku* on each island, the land was further divided into *ahupua‘a* and controlled by land managers or *konohiki*. The boundaries of the *ahupua‘a* were delineated by natural features such as shoreline, ridges, streams and peaks, usually from the mountain to the sea, and ranged in size from less than ten acres to 180,000 acres (Moffat and Kirkpatrick 1995:24-29, see also Chinen 1958:3). According to Kamakau (1991) it was during the time of Mā‘ili-kūkahi that O‘ahu was divided.

Each *ahupua‘a* was often divided and sub-divided several times over (i.e., ‘*ili*, *kuleana*, *mo‘o*, *pauka*, *kōele*, *kiha pai*), answerable to *ali‘i* where the lesser division was located. However the ‘*ili kūpono* or the *ili kū* was “completely independent of the *ahupua‘a* in which it was situated...tributes were paid directly to the king himself” (Chinen 1958:4). Rights to lands were mutable or revocable; a ruling chief or any “distributor” of lands could change these rights if displeased, or as favors-usually after a victorious battle, and after the death of the *ali‘i nui* or ruling chief (Chinen 1958:5).

‘Ewa is one of the largest districts in O‘ahu. The northern boundary begins from the top of Ka‘ala mountain and runs towards the Ko‘olau mountain range, passing Wahiaua and Halemano, along the mountain to Moanalua, to Ke‘ehi Lagoon, passing Kapukaki (Red Hill). From the west of Honolulu Airport near Kapuaikaula (Fort Kamehameha), to Barbers Point, to Piliokahe, along the Wai‘anae mountain range. It comprises the following *ahupua‘a*: Hālawā, ‘Āiea, Kalauao, Waimalu, Waiau, Waimano, Manana, Waiaua, Waikele (Waipahu was a spring in Waikele), Hoaeae, Honouliuli and including Waikakalaua, Lihu‘e, Wahiaua, and Halemano (Sterling and Summers 1978:1). The following *mo‘olelo* explains how the ‘Ewa boundaries were created (Sterling and Summers 1978:1):

When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by that name. The stone that strayed. Eventually the stone was found at Pili o Kahe. This is a spot where two small hills of the Waianae range come parallel on the boundary between Honouliuli and Nanakuli.

‘Ewa is as diverse as it is large. One the one hand it was well-known for its famous taro lands, countless springs, streams and river, as well as hundreds of fishponds. On the other hand, ‘Ewa was also referred to as hot and arid. The hot and arid plains of ‘Ewa were most likely referring to Honouliuli, its westernmost *ahupua‘a* as described in the following excerpt (Magnuson and Welch 2003:1).

The ‘Ewa Plain is a dry, hot, low-lying, and relatively flat expanse of emerged reef limestone with the northern part being partly covered by alluvium from the Wai‘anae Mountains. Geologists have long suggested that most of the emerged reef formed during the plus-7.6 m (25 ft) Waimanalo sea stand (Macdonald and Abbott 1970:355), and recent radioactive isotope dating confirms an interglacial age of about 114,000 to 131,000 years ago (Szabo et al. 1994). At elevations above 12.2 m (40 ft) above sea level (asl), there may be an older reef, as indicated by the presence of a fossil soil (Fletcher, pers. comm., 1996 in Athens et al. 1999:3).

Based on the previous *mo‘olelo*, ‘Ewa was significant in the ancient socio-political world where ruling chiefs lived and/or set up court in the lands of ‘Ewa from Kalauao to Waikele. Also according to the *mo‘olelo* and history, many of the ruling chiefs and their families were killed by Kahekili, ruling chief of Maui, who was likely related to most of them. By the time Kamehameha I defeated the Maui chiefs and warriors in the battle of Nu‘uanu in 1795, ‘Ewa had lost its political power, but not its appeal. Unfortunately, it was ravaged during the sandalwood era (Kamehameha I – III), then changed as sugar cane became the dominant industry in the islands. However, several *ali‘i nui* still frequented its lands during the monarchy period, such as Kamehameha III and Queen Lili‘uokalani. But, the ‘Ewa lands continued to change radically with the Overthrow of the Kingdom government to the military occupation of its lands from Pearl Harbor to Fort Shafter, to Schofield, Halemano and Wheeler; to its modern developments from Hālawā to Honouliuli.

During the period 1839 to 1855, several legislative acts transformed the centuries-old Hawaiian traditions of *ali‘i nui* land stewardship to the western practice of private land ownership. In the first stage, King Kamehameha III (Kauikeaouli) divided up his lands among the highest-ranking *ali‘i* (chiefs), *konohiki* (land managers), and favored *haole* (foreigners) (Chinen 1958:7-14; Moffat and Fitzpatrick 1995:11, 17). This historic land transformation process was an evolution of concepts brought about by fear, growing concerns of takeovers, and western influence regarding land possession. Kamehameha III, in his mid-thirties, was persuaded by his *kuhina nui* and other advisors to take a course that would assure individual personal rights to land.

One-third of all lands in the kingdom would be retained by the king; another one-third would go to *ali‘i* or chiefs as designated by the king. In 1846 he appointed a Board of Commissioners, commonly known as the Land Commissioners, to confirm or reject all claims to land arising previously to the 10th day of December, A.D. 1845. Notices were frequently posted in *The Polynesian* (Moffat and Kirkpatrick 1995). However, the legislature did not acknowledge this act until June 7, 1848 (Chinen 1958:16; Moffat and Kirkpatrick 1995:48-49), known today as *The Great Mahele*. The *mahele* did not actually convey title to the *ali‘i* and *konohiki*, but it essentially gave them the right to claim the lands assigned to them. These lands became known as the *konohiki* lands. The *konohiki* chiefs were required to present formal claims to the Land Commission and pay a commutation fee, which could be accomplished by surrendering a portion of their land to the government. The government could later sell these lands to the public in the form of Grants. Upon payment of the commutation fee, the Minister of Interior issued a Royal Patent to the chief or *konohiki*. The last one-third was originally designated to the *maka‘ainana*, but not acted on - instead it was set aside to the government, “subject always to the rights of the tenants” (Moffat and Kirkpatrick 1995:41-43; see also Chinen 1958:15-21).

‘*Ili kūpono* were the only ‘*ili* (parcel) recognized in this process, all the ‘*ili* and lesser divisions were absorbed into the *ahupua‘a* claim (Chinen 1958:20). In 1892 the legislature authorized the Minister of Interior to issue Royal Patents to all *konohiki* or to their heirs or assignees where the *konohiki* had failed to receive awards for their lands from the Land Commission. The Act further stipulated “that these Royal Patents were to be issued on surveys approved by the Surveyor General of the kingdom” (Chinen 1958:24; Moffat and Fitzpatrick 1995:41-43). Kamehameha III formalized the division of lands among himself (one-third) and 245 of the highest-ranking *ali‘i* and *konohiki* (one-third) between January 27 to

March 7, 1848. He acknowledged the rights of these individuals to various land divisions in what came to be known as the *Buke Mahele* ('sharing book') or *The Great Mahele*. According to Baker and Baker (1989) the *ahupua'a* of Honouliuli was given to Mikahela Kekauonohi as *konohiki* lands during the time of the Great Mahele.

Mikahela Kekauonohi also known as Anna M. Kekauonohi and Keahikini-i-Kekauonohi comes from a very long line of intermixed royal families from all the main Hawaiian Islands. She was born in Lahaina, Maui in 1805 and died in Honolulu, O'ahu in 1851. She was the only daughter of Kahoanuku Kinau and Kahakuha'akoi Wahinie-pio, daughter of Maui chief Kekuamanoha, younger son of Maui ruling chief Kekaulike, and brother of many older siblings including Kamehamehanui, Kalola, Kahekili and Kaekoolani. On Kekauonohi's father's side, Kahoanuku Kinau was the son of Kamehameha I and Peleuli, daughter of Kamanawa, one of the famous twin uncles of Kamehameha I.

Kekauonohi was married to Kamehameha II (Liholiho), her half-brother, but when he died she married Kaua'i *ali'i* Abner Keli'ihanouli (1832). Keli'ihanouli was once married to Deborah Kapule, former wife of Kaumuali'i, the last king of Kaua'i, and Ka'ahumanu. Keli'ihanouli died in 1849 and was buried in Pu'uloa. Kekauonohi then married Levi Ha'alelea in 1850. She was the Governess of Kaua'i from 1842-1844 (Kekoolani 2010). Since she died in 1851 her lands may have passed on to others during the processing of the Mahele claims (1848-1855).

To complicate matters there are Native and Foreign Testimony regarding land claims in Lahaina, Maui (various claims in *UluKau.org* 2013 translated by Kepā Maly) that involve Kekauonohi and Keli'ihanouli [spelled Keliiahonui below] and husband Levi (Appendix F). While these testimonies are not about lands on O'ahu, they give a glimpse of the status and connections of Kekauonohi. During this period in history (ca 1820-1850) the *ali'i* of Lahaina, especially around the lands of Kaua'ula and vicinity are all royal families and/or directly related to them, such as Auwae, Keawe'iwi, Ruth Keelikolani, Hoapilikane, Ka'ahumanu, Kekahuna, Kaheheimaile, Kekauloahi, Kekauai, M. Kekauonohi, M. Kekuaiwa, I. Kaeo, M. Kekuanaoa, Kaheananui, A. Keohokalole, I. Kaiama, Keopuolani, Kaikioewa, Kuakiniopio, S. Laahili, Kalanimoku Liukua, Wm. Lunailo, Kalua, A. Moku, V. Kamamalu, Moo, Kamanawa, Muli, Naea, Kamehameha II, Nahienaena, Kamehameha III, Nalehu, L. Namaau, A. Paki, Pane (Fanny Young), Kapelaumoku, Kapu, Puhī, Ulumaheihēi wahine and others.

There were 96 LCA Claims made including that of Mikahela Kekauonohi (#11216*O) in Honouliuli; 73 were awarded. There were 73 Royal Patents awarded in Honouliuli including one to M. Kekauonohi (RP# 6971) for TMK 1-9-1 (Waihona 'Āina 2013). [See Appendix G for Waihona lists of awardees]

Post-Mahele Historic Land Use. Along the northern edge of the installation and inland, the limestone is capped by Mamala soils eroded from the Wai'anae Mountains. These alluvial soils were once used for sisal and sugarcane cultivation, then ranching in the mid to late 1800s and early 1900s. From 1939 to 1999, the project area was utilized by the military; much of that land was turned over to the State and other agencies. The Barber's Point Golf Course is still under military jurisdiction.

In 1877 James Campbell purchased approximately 17,401.5 hectares; (ha; 43,000 ac.) of land in the Honouliuli *ahupua'a* for \$95,000. Campbell constructed fences, drove in about 32,000 head of cattle, and developed a prosperous cattle ranch with pastureland and approximately 4,047 ha (10,000 ac.) of agricultural land. In 1879, he also had the first artesian well in the Islands drilled behind his ranch house. The ranch incorporated 'Ewa lands from Pearl Harbor to Barbers and Kahe Points west and north to Wahiawa (Day 1984:17-18; Yardley 1981:81, 100-102 referenced in Pacheco and Allen 2013:7).

In 1888 Benjamin. F. Dillingham was contracted to construct and operate a railroad that would transport both passengers and freight. Dillingham's main focus was connecting Honolulu with the north shore of

O'ahu by railroad, an enterprise that was expected to require the acquisition of at least 2,428 ha (6,000 ac.) of agricultural land across the 'Ewa Plain (Day 1984). The actual acquisitions totaled much more. Dillingham and Mark Robinson bought 30.4 ha (75 ac.) on the Mānana peninsula, which was renamed Pearl City Peninsula. Dillingham later purchased 81.3 ha (2,010 ac.) of land in 'Ewa from Robinson and leased an additional 7,284.3 ha (18,000 ac.) for 20 years, and acquired 1,000 head of cattle, 50 horses, 45,000 railroad ties, and a steamer, the Ewa (Yardley 1981:72-733, 124-127, 135-136 referenced in Pacheco and Allen 2013:7).

Pacheco and Allen (2013:7-8) provide the following summary:

In 1889, Dillingham acquired a 50-year charter for the railroad company, not only as a railroad but as a land-development company. In the same year, Campbell leased most of Honouliuli to Dillingham, who continued to buy additional land parcels and built his OR and L (Oahu Railroad and Land Company) railway across 'Ewa throughout the 1890s, with many difficulties but eventually with huge successes as well. Dillingham subleased north and east portions of Honouliuli to William Richards Castle, who established Ewa Plantation Company in the early 1890s, to cultivate sugarcane across the 'Ewa Plain. Ewa Plantation was now Dillingham's prime tenant, and by 1894, its increasing financial difficulties and decreasing sugar tonnage were a serious financial handicap for Dillingham's railroad (Yardley 1981:170-171....

In 1899, the newly opened Oahu Sugar Company, in Waipahu, was making a large profit for the railroad, which had been extended to the mill site in Waipahu before the sugar company even opened (Yardley 1981:137-138; 188, 191-194, 199).

The slightly older Ewa Plantation Company continued to operate until Oahu Sugar Company assumed control of the 'Ewa sugarcane lands in 1970. Sugarcane cultivation on the 'Ewa Plain continued until the closure of Oahu Sugar Company in 1995. The railway remained open between West Loch and Lualualei, on the leeward side of O'ahu, until 1968 (O'Hare et al. 2007:27), following nearly the same route as the modern Roosevelt Avenue, a short distance north of the northeast end of the East Kalaeloa Energy Corridor (Tuggle and Tomonari-Tuggle 1997b).

The area formerly known as the Barbers Point Naval Air Station was first developed by the U.S. Navy in 1939 as a mooring station for airships. This was followed by development of a U.S. Marine air station, then the naval air station, which was completed in 1942. During World War II, both 'Ewa Marine Corps Air Station and Barbers Point NAS operated from the 3,709 acres. It is also the home of the Barbers Point Coast Guard Station. In 1996, the three runways handled about 46,000 air operations. It was closed in 1999 (HA-KA 2013; HG-HA 2013; Magnuson 2003:1-2). Magnuson and Welch (2003:1) describe NAS Barbers Point as follows:

The former NAS Barbers Point covers an area of about 1,480 ha (3,656 acres). It is located on the landform known as the 'Ewa Plain, an emerged reef that forms the lowland of southwestern O'ahu from Pearl Harbor to the western side of the Wai'anae range. The terrain of former NAS Barbers Point slopes gradually away from the coast, reaching an elevation of 15 m (49 ft) asl at about 2,400 m (7,872 ft) inland. The coastline is a mix of weathered coral rock benches and calcareous sand beaches. Just inland from the coast and including all but the northern boundary of the installation, the terrain consists mostly of exposed limestone with no topographic relief except for numerous sinkholes (Magnuson and Welch 2003:1).

Magnuson and Welch (2003:2) also note that "a number of areas on the installations were left relatively undisturbed by construction and, although used for training and other activities, they contain numerous Hawaiian archaeological remains, as well as two wetlands and hundreds of limestone sinkholes."



NAS-BP was also referred to as the John Rodgers Field-BP (the name was formerly used for what is now Honolulu International Airport). It is now called the Kalaeloa Airport (Fig.4) and is a joint civil-military regional airport of the State of Hawai'i established on July 1, 1999 to replace the Ford Island NALF facilities which closed on June 30, 1999 (HA-KA 2013).

Figure 4. Former NAS-BP, now Kalaeloa Airport and vicinity (HA-KA 2013).

The U.S. Navy had named the airfield after Commander John Rodgers who made the first attempt to fly from San Francisco to Hawai'i in 1925; the Hawaii Department of Transportation chose to continue this tradition with the designator JRF (John Rodgers Field). Kalaeloa Airport is owned and operated by the Oahu District of the State Airports System as a general aviation reliever airport for Honolulu International Airport and has air traffic control functions daily with full fire fighting capability. The airport is primarily used by the U.S. Coast Guard (providing a launch site for search and rescue operations), Hawaii Community College Flight Program, Hawaii National Guard and the general aviation community (training base). Improvements to the facilities have included a new airfield lighting system, partial runway paving, emergency power systems, and fire fighting and communication equipment. It also serves as an alternate landing site for airlines and the military, and extension of the capacity of HNL (HG-HA 2013).

The following information is from the Kalaeloa Master Plan (2006) on the HCDA website.

The Kalaeloa Airport, located on a 752-acre parcel in the center of Kalaeloa, has been conveyed to the State Department of Transportation (DOT) under a public benefit conveyance. The airport has two parallel runways (4R-22L and 4L-22R) and a crosswind runway (11-29). Runway 4R-22L is 8,000 feet; Runway 4L-22R is 4,500 feet; and Runway 11-29 is 6,000 feet. Retention of the crosswind runway benefits the local community by maximizing takeoffs and landings over water, thus reducing noise impacts. In addition, Runway 11-29 provides backup capability during periods when Runway 4R-22L is closed for maintenance. Kalaeloa Airport also includes a 100-acre ramp area that houses the air-traffic control tower and attached administration building, two large hangars (one is currently owned by the University of Hawai'i), and two large aircraft parking aprons for use as tie-down space, future hangar expansion, and lease lots.



Photos 14 and 15. Kalaeloa Airport from east Coral Sea Road



Photos 16 and 17. Kalaeloa Airport from east Coral Sea Road



Photo 18. Overhead near White Sands - Touch and Go Landings

The following information comes from www.Hawaii.Gov website regarding the Kalaeloa Airport Master Plan.

A Kalaeloa Airport Master Plan was published by the HDOT in November 1998. The master plan was completed with the assistance of the Redevelopment Commission to determine the combination of airport facilities that would best balance the needs of aviation users with other potential uses of the surplus land. The master plan recommended:

- Obtaining approximately 757 acres of land for an airport that included adequate land for an airfield with two parallel runways and a crosswind runway.
- Retaining Runway 4R-22L at a length of 8,000 feet.
- Shortening Runway 4L-22R to 4,500 feet.
- Retaining Runway 11-29, shortened to 6,000 feet to provide operational and land use compatibility benefits to the local community in maximizing takeoffs and landings over water. Providing a backup capability when Runway 4R-22L was closed for maintenance or other reasons.
- Preserving airfield capacity with parallel Runways 4L-22R and 4R-22L to meet forecast demand beyond the year 2020, which also reduces aircraft delay costs.
- Including navigational and landing aids and providing for an instrument approach capability and approach lighting system.
- Retaining approximately 115 acres for aviation and airport support facilities, including Hangar 110 and also two large aircraft parking aprons for future use as tie downs, hangars and lease lots.
- Including an air traffic control tower, aircraft rescue and firefighting facilities, weather reporting, HDOT administration building and maintenance areas, fuel storage, fencing and utilities.
- Utilizing existing airport access roads and vehicular parking facilities.

In addition, the Hawaii National Guard would have airfield access from its 160-acre reservation at the north end of the airport and the U.S. Coast Guard would continue to have airfield access from its 48-acre complex at the south end of the airport. Hangar 111 and about two acres of paved parking were transferred to the University of Hawaii, for aviation training.

Hawaii Community Development Authority (HCDA). The following information is from the HCDA website in the Kalaeloa Master Plan and provides a history of the NAS-BP lands and transition. In the years following this report, several transition changes and land modifications have likely taken place.

CDP. On October 8, 1996, the NAS Barbers Point Reuse Commission adopted a Community Redevelopment Plan that identified State and City agencies interested in receiving lands and designated proposed uses of the surplus land. The Community Redevelopment Plan further served as the principal guiding document to coordinate the conveyance of surplus lands and in the preparation of an Environmental Impact Statement (EIS) for the disposal and reuse of the surplus land. Since its adoption, the Community Redevelopment Plan was amended five times between 1997 and 2001 to respond to new site conditions and changes in interest of government agencies designated to receive surplus land (2-1).

HCDA. In July 2002, Act 184 of the 2002 Hawai'i State Legislature (SB 2702, SD2, HD2, CD1) transferred redevelopment responsibility for Kalaeloa from the NAS Barbers Point Redevelopment Commission to the HCDA. The State Legislature created the HCDA in 1976 to supplement traditional community development methods and revitalize economically depressed or blighted urban areas in the State. HCDA assumed responsibility for redevelopment of Kalaeloa, overseeing remaining conveyances, contract administration, promulgation of administrative rules, and other tasks relating to the Redevelopment Commission (2-1).

Kalaeloa is situated within the 'Ewa region of the City and is bounded by residential development to the north and east, and by Campbell Industrial Park to the west. Communities in the region, consisting of predominantly single-family residences, include Kapolei, Makakilo, Honokai Hale, 'Ewa Beach, 'Ewa by Gentry, 'Ewa Villages, Ocean Pointe, and others. Commercial areas, schools, and parks support these residential neighborhoods. The northeastern corner of Kalaeloa is adjacent to the City's Honouliuli Wastewater Treatment Plant. The State's Kalaeloa Deep Draft Harbor and Ko'olina Resort are located west of Campbell Industrial Park. The University of Hawai'i is planning to construct a new West Oahu campus north of Kalaeloa in east Kapolei (2-2)

KCDD. Act 184 of the 2002 Hawai'i State Legislature not only transferred redevelopment responsibility to the HCDA, it also redefined the boundaries of the Kalaeloa Community Development District to include the entirety of the former NAS Barbers Point. As such, the Kalaeloa Community Development District includes the lands retained by the U.S. Navy, the excess lands conveyed to other federal agencies, and the surplus lands designated for disposal (2-4).

Kalaeloa Conveyance. The conveyance and ownership of land in Kalaeloa has evolved over the course of the BRAC process and will continue to evolve. Government interest in land has fluctuated, with certain agencies withdrawing interest and others expressing interest. New federal legislation has emerged allowing the Navy to sell or lease portions of its retained lands in support of redevelopment at Ford Island in Pearl Harbor. Land transferred pursuant to this legislation has since been sold to private entities. Furthermore, within the past three years, pending conveyances to government agencies have been suspended until a decision is made regarding the possible homeporting of an aircraft carrier strike group.... At present, 25 percent (929 acres) of Kalaeloa is being retained by the U.S. Navy; 44 percent (1,621 acres) has been transferred or conveyed to other government and private parties; and 31 percent (1,146 acres) is pending conveyance to government agencies or unallocated (2-4).

Navy Retained Lands. When the U.S. government designated NAS Barbers Point for closure, the U.S. Navy retained approximately 1,055 acres for housing, recreation, operational and community support services. In April 2000, the U.S. Navy announced plans to fund development of its lands at Ford Island in Pearl Harbor. Special federal legislation (10 United States Code 2814) authorized the sale or lease of approximately 675 acres of Navy retained land in Kalaeloa. These so called, "brokered lands" included the majority of land along Roosevelt Road and in select parcels throughout the downtown area. Navy retained lands that are not part of the Ford Island development include the Barbers Point Golf Course and adjacent horse stables, White Plains Beach, Nimitz Beach, Landfill, Public Works Center, and Defense Reutilization and Marketing Office facilities (2-4).

Fish & Wildlife Refuge. The U.S. Fish and Wildlife Service received 37 acres in southwestern portion of Kalaeloa for incorporation into the Pearl Harbor National Wildlife Refuge. This undeveloped parcel is situated between the end of the airport runway, the ocean, and the Campbell Industrial Park drainage channel and contains the endangered plant species — *Achyranthes splendens* var. *rotundata* (2-6).

DHHL Lands. Fourteen parcels totaling approximately 555 acres were designated for conveyance to the Department of Hawaiian Home Lands (DHHL). These parcels, ranging in size from 1 acre to 130 acres, are located in three distinct areas: west of the airport, downtown, and east of the airport runways. Lands designated for transfer to DHHL were part of a settlement agreement under the Hawaiian Home Lands Recovery Act (P.L. 1-4-42). To date, approximately 50 percent of the 555 acres have been conveyed to the DHHL. DHHL is currently leasing portions of these lands and appurtenant facilities to approximately 20 tenants for various commercial and industrial purposes (2-7).

Unallocated Lands and Archaeological Sites. During the BRAC process, several government agencies withdrew their interest in receiving lands in Kalaeloa. The U.S. Fish and Wildlife Service withdrew interest in 3 of the 4 parcels it was designated to receive. These parcels totaling approximately 200 acres are relatively undeveloped and contain wetlands and habitat for endangered plant and bird species and archaeological sites. The State DOT-Airports and the University of Hawai'i have since expressed interest in each receiving a parcel, leaving the third and largest parcel (about 146 acres) unallocated. Similar undeveloped parcels in the eastern portion of Kalaeloa, totaling 135 acres were previously designated for public benefit conveyance to the State Department Land and Natural Resources to be used as a heritage park. However, the State later withdrew interest. Two of the parcels were previously used by the U.S. Navy as skeet and trap ranges. As a result, the surface soils were heavily contaminated with lead and were subsequently removed and encapsulated in the Navy's landfill parcel in the western portion of Kalaeloa. These parcels also contain numerous archaeological sites and features (2-9).

Road Transfers. The following roads have been transferred to designated transportation agencies (2-10):

DOT-HD. Roads that were transferred to the State DOT include Franklin D. Roosevelt Road, West Perimeter Road, Enterprise Road, Coral Sea Road, and a right-of-way for a future connection with the North-South Road.

C-DOT. The roads transferred to the City Department of Transportation Services include: Saratoga Road, Independence Road, Tripoli Road, Yorktown Road, Shangri-La Road, Midway Road, Lexington Road, Hornet Road, Copahoe Road, Boxer Road, and several right-of-ways for road extensions.

Kalaeloa Water. The water distribution system in Kalaeloa is currently owned and operated by the U.S. Navy and currently serves all existing facilities at Kalaeloa. Anecdotally, the Navy water supply system is in a relatively poor state of repair and has been subject to significant water losses. Within Kalaeloa, the capacity of the Navy water infrastructure is not adequate to support the

planned development. Additionally, the Navy has indicated that it will not increase its current water usage at Kalaeloa, due to aquifer draft limitations at the Navy's Halawa Shaft. The Navy's responsibility is provision of water to federal agencies. New development by non-federal entities will require installation of new water infrastructure that meets current BWS standards. Mauka of the northern boundary, the BWS's East Kapolei 215-foot elevation water system is being constructed; portions of the system will be constructed and/or funded by the DHHL (2-11).

Electrical System. The existing electrical distribution system in Kalaeloa is currently owned and operated by the U.S. Navy. The Hawaiian Electric Company, Inc. (HECO) has, thus, expressed an unwillingness to accept the existing on-site Navy system due to concerns regarding the condition and compliance of the infrastructure and potential environmental liability associated with the electrical system. Since HECO is the primary electrical utility provider on O'ahu, any future electrical system at Kalaeloa will likely be an extension of HECO's generation, transmission, and distribution grid (2-12).

Topography and Soil. Kalaeloa is relatively flat, with an average slope across the site of about 0.5 percent. The ground surfaces slopes gently southward from a maximum elevation of approximately 65 feet above mean sea level at the northern boundary to mean sea level at the shoreline. Soil cover across nearly the entire site consists of a thin layer of friable, red material present in cracks and crevices on coral outcrop. Mamala stony silty clay loam is found along the northern, western, and eastern boundaries. This soil type is moderately permeable, with slight to modern erosion potential. Beach sand is found along the south shore, and the airfields are situated on filled land (2-13).

Climate. The climate of the region is constant and relatively dry. Long-term climatic data at Kalaeloa indicate mean daily maximum and minimum temperatures of 81 and 69 degree Fahrenheit, respectively; mean annual rainfall of 20.3 inches on the 'Ewa Plain with slightly higher figures for the upland area; and prevailing winds from the northeast at 9 knots. Also, solar insulation data for Kalaeloa shows that the area produces approximately 1,800 BTUs per square foot or 5.8 peak sun hours, making it among the highest in the state for solar potential (2-13).

Groundwater. The groundwater under Barbers Point is within aquifers that are part of the 'Ewa aquifer system of the Pearl Harbor aquifer sector. A confined aquifer in a deep layer of basalt, as well as a shallow unconfined aquifer in the overlying caprock, is present under Kalaeloa. This groundwater in the confined aquifer is brackish with a chloride content ranging from 250 to 1,000 milligrams per liter and considered too deep to be contaminated from the surface. According to the Federal Safe Drinking Water Act, this aquifer qualifies as a source of drinking water. The State, however, has a more stringent standard for salinity and does not consider this aquifer a source for potable water use. The shallow aquifer at Kalaeloa is brackish with chloride content ranging from 1,000 to 5,000 milligrams per liter; the water is not suitable for consumption or irrigation without desalination. This aquifer is at approximately 50 feet below ground surface along the northern boundary and at sea level along the shoreline. The aquifer is susceptible to contamination and no production wells have been developed (2-13).

Protected Species and Habitat. Two federally listed endangered plant species exist at Kalaeloa. The endemic 'akoko shrub (*Chamaesyce skottsbergii* var. *skottsbergii*) occurs in at least three separate locations, including the area east of the airfield. A single colony of endemic round-leaved chaff-flower shrubs (*Achyranthes splendens* var. *rotundata*) is found at the southwest corner of Kalaeloa. In addition, pua pilo (*Capparis sandwichiana* var. *zoharyi*), an endemic shrub federally listed as a species of concern, is known to exist in the same area as the *Achyranthes splendens* var. *rotundata* (2-13).

Ordy Pond, an anchialine pond east of the airfield, the coastal salt flats between Runway 4R-22L and Taxiway K, and also the western boundary of Kalaeloa are frequented by the federally listed endangered Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*) and migratory bird

species. The state-listed endangered Hawaiian short-eared owl (*Asio flammeus sandwichensis*), federally listed as a species of concern, may occur or range over Kalaeloa (2-14).

Green Sea Turtle. The threatened green sea turtle (*Chelonia mydas*) is known to frequent the area immediately offshore of Kalaeloa (2-14).

Archaeological Sites. A complete inventory of archaeological sites was previously conducted at Kalaeloa, the former NAS Barbers Point. A total of twenty-four (24) Historic Site Resource Areas were delineated. They contain sixty-two (62) archaeological sites and sixty-four (64) historic structures eligible for listing on the National Register of Historic Places. The identified archaeological sites contain at least 746 features including habitation complexes, agricultural complexes, sink hole complexes, and historic structures. Fifty-two (52) of the archaeological sites are considered to be significant or potentially significant. The remaining ten (10) sites are so thoroughly disturbed that very little of their original components and qualities remain intact. Each of the significant sites retains sufficient data, informational value, and research potential to address questions of local and regional prehistory and history (2-16 - 17).

A re-location survey and assessment was conducted by IARII staff in July 2013 to relocate sites and to obtain geographical coordinates for archaeological sites/features within 50m of the project corridor (Pacheco and Allen 2013).

Thirty-four archaeological properties - 32 sites assigned permanent site numbers, one site assigned a temporary number (NL-64), and an Archaeological District - had been previously recorded in or near the project corridor. These sites are a mixture of traditional Hawaiian sites including agricultural, habitation, and other sites; post-Contact ranching and other features; and military features primarily associated with WWII. No portion of either Site 1731 or Site 5103 are visible today near the corridor but five sites, Sites 1734, 5106, 5109, 5112, and 5128, do contain features located within 5 m of the corridor (Pacheco and Allen 2013:11).

All the archaeological sites lie within the former boundaries of the Honouliuli (Campbell) Ranch, later NAS Barbers Point. Several archaeological surveys have been conducted east of the project area - on lands where sugarcane was cultivated for more than 100 years. All traditional Hawaiian sites east of Essex Road have likely been destroyed during grading and construction associated with both sugarcane cultivation and modern development (Pacheco and Allen 2013:11). [See Pacheco and Allen (2013) for detailed site information]. The sites mentioned below are within 50 m or less from the project corridor (Pacheco and Allen 2013:16-19):

- Sites 50-80-12-1730 to -1744 and 50-80-12-1746 are located in a cluster within a 1,050- by 730-m area north of Tripoli Street, between Site 5104 (Ordy Pond) and Essex Road (Haun 1991; also see later discussions, Beardsley 2001:IV.82, 182-183 and Tuggle and Tomonari-Tuggle 1997:104).... Most of these sites are long distances from the corridor and are not considered further here. Sites 1731 and 1734 are singled out here for further description; Site 1731 includes features located within approximately 50 m of the corridor, and Site 1734, one of the sites relocated during the field check, includes features 1-5 m from the corridor.
- Site 50-80-12-1731 is a complex of habitation and possible burial features located on emerged reefrock (limestone) on the west side of the north-south segment of Essex Road. Five features recorded by Haun (1991:57) included a rectangular enclosure (Feature 1), a C-shaped enclosure (Feature B), a collapsed cairn (Feature C), a standing cairn (Feature D), and a rock-lined pit interpreted as a firepit (Feature E). Beardsley (2001:IV.89-IV.92) relocated all but the firepit and documented a new discovery, Feature F, a roughly square habitation enclosure. Three test units were excavated in the enclosures and the Feature C cairn; a calibrated (cal.) A.D. 1460-1640 radiocarbon date was returned on charred material from Layer II.

- Site 50-80-12-1734, a short distance north of Site 1731 on the west side of Essex Road, is an extensive complex described by Haun (1991:67-74) as containing 43 traditional habitation and agricultural features. Beardsley (2001:IV.107-IV.129) located 77 features and feature complexes but was not able to correlate these with the specific site components described earlier. The features include rock walls, one alignment, enclosures, a platform, a cairn, mounds and groups of mounds, modified outcrops, and modified sinkholes. The team excavated 21 test units, recovering midden and traditional artifacts; a ca. A.D. 1220-1450 radiocarbon date was obtained on charred material in Layer I.
- Site 50-80-12-1747, on the north side of Essex Road near Coral Sea Road, contains three features: modified and damaged sinkholes and a possibly military C-shaped enclosure (Haun 1991:95-96). It was revisited by Beardsley (2001:IV.187-188), who interprets one of the sinkholes in the area as a possibly promising paleontological site. The site is located between Sites 1506 (see below) and 1507.
- Site 50-80-12-5104 is a wetland known as Ordy Pond, an abbreviation of “Ordnance Pond,” which refers to its use as an unexploded ordnance and scrap metal dump by the military from the 1940s through the 1970s (Haun 1991; see also Beardsley 2001:IV.184.). While use of the pond during the pre-Contact era is unclear, the wetland may have functioned as a fishpond that served the nearby settlement cluster represented by Sites 1730 to 1744 and 1746. During the ranching period in the early 20th century, the pond was fenced for use as a watering hole for livestock. During the buildup of NAS Barbers Point during WWII, Hawaiian and ranching structures adjacent to the pond were bulldozed to construct a road. Sediment cores taken from Ordy Pond during paleoenvironmental field investigations in the mid-1990s have produced very precise records of environmental conditions on the ‘Ewa Plain before and after Polynesian settlement of the Hawaiian Islands (Athens et al. 1999:iii-iv). Site 5104 is north of Tripoli Street, approximately 485 m northeast of the Coral Sea Road-Tripoli Street intersection.
- Site 50-80-12-5106 is a complex of rock structures probably used for agriculture and habitation activities during the pre-Contact period, then later altered for ranching and military use in the 20th century. During WWII, this area served as a military training facility, and contained a grenade range, barbed wire, and roads (Beardsley 2001:IV.187-193; Tuggle and Tomonari-Tuggle 1997:107). The site is north of Tripoli Street, and is bounded roughly by the Coral Sea Road-Tripoli Street intersection to the west, and Site 5105 (an early 20th-century homestead) to the east. During site relocation, IARII determined that the ends of two barbed wire fences (Features E and F) remaining from a WWII defensive barbed wire system (Wickler and Tuggle 1997:340) are within 5 m of the project corridor.
- Site 50-80-12-5108 is a complex of more than 185 sinkholes, of which several have been modified for pre-Contact agricultural, habitation, and possibly burial usage. Signs of historic ranching and military activity within the complex are also present. As indicated by the presence of dense deposits containing high amounts of fossil bird bones, the sinkholes potentially contain significant paleoenvironmental information (Beardsley 2001:IV.205-211; Tuggle and Tomonari-Tuggle 1997a:100, 107). The site is south of Tripoli Street, southwest of the Tripoli Street-Essex Road intersection.
- Site 50-80-12-5109 is a WWII training complex that contains the remnants of a machine-gun target range and an associated recreational area (Tuggle and Tomonari-Tuggle 1997:100, 107). It is southeast of the Tripoli Street-Essex Road intersection, and partially overlaps Site 5108 (sinkhole complex). During site relocation, IARII determined that the north end of a WWII-era limestone footpath running through the complex (Feature I) is adjacent to the project corridor.
- Site 50-80-12-5111 is a WWII bivouac area containing several rock walls laid without mortar (Tuggle and Tomonari-Tuggle 1997:100, 107). It is 45 m south of Tripoli Street (Wickler and Tuggle 1997:58), and approximately 100 m southeast of Site 5104 (Ordy Pond).

- Site 50-80-12-5112 is a WWII training area that, like Site 5109*, contains a large moving-target range for machine gun fire, a firing area, and a nearby recreational area (Tuggle and Tomonari-Tuggle 1997:100, 107). The site extends about 425 m south of Tripoli Street, and encompasses a substantial portion of the approximately 500 m gap between the Coral Sea Road-Tripoli Street intersection and Site 5110 (small arms firing range). During site relocation, IARII determined that a pipeline and a set of concrete pads (Features I and J)—remnants of a WWII Drone Hangar—are within 0-5 m of the project corridor.
- Site 50-80-12-5119 is a complex of rock structures and modified sinkholes that were likely used for agricultural activities in the pre-Contact era (Beardsley 2001:IV.222-223; Tuggle and Tomonari Tuggle 1997:101, 108). The site is southwest of the Coral Sea Road-Tripoli Street intersection.
- Site 50-80-12-5128 is a complex of shallow building foundations and street curbs that are remnants of barracks and shops associated with MCAS Ewa, which closed in 1952 (Tuggle and Tomonari-Tuggle 1997:101, 108). It is located along a stretch of Bismark Sea Street east of the Bismark Sea/Gambier Bay Street intersection. During project relocation, IARII determined that the remnants of a possibly historical concrete sidewalk are adjacent to the project corridor, and that an inactive concrete manhole and a standing concrete column—both possibly historical—are within approximately 5 m of the project corridor.
- Site NL-64 is an area where a fragment of an early 20th-century gravestone was discovered during the 1980s (Tuggle and Tomonari-Tuggle 1997:92, citing Hommon 1989). The fragment was not in situ, and had likely been displaced from its original location during construction of the nearby Barbers Point Golf Course in 1961 (Tuggle and Tomonari-Tuggle 1997:41, 92, 101). The current location of the fragment is unknown.
- Site 50-80-13-2873 is the Hawai‘i State site number that was assigned in the 1980s to a district, One‘ula Archaeological District, under evaluation at that time for possible listing on the NRHP. The district was declared eligible on September 28, 1986, but was not fully listed at that time. It is still considered eligible and the nomination may eventually be completed by Hawai‘i SHPD. Until the decision is made, the file is restricted (August 8, 2013, e-mail from Jeff Joeckel, Archivist, NRHP).

The majority of the area covered by One‘ula Archaeological District is located east, outside the Energy Corridor. Within areas near the corridor, it includes only sites already considered above. Those sites, which are located either entirely or partially with the District, include Sites 1730, 1734, 1750, 5103, 5108, 5109, and 5110. The historically mapped settlement of One‘ula, mentioned earlier, is located within the eastern part of the District, the part outside the current corridor.

The following are recommendations made by IARII for the East Kalaeloa Energy Corridor project (Pacheco and Allen 2013:21):

Many traditional Hawaiian and post-Contact archaeological sites, including some of the best-preserved traditional agricultural and habitation sites on the ‘Ewa Plain, are located near portions of the project corridor. On July 17, 2013, as part of the current project, IARII archaeologists relocated and acquired precise GPS locations for all archaeological features within 50 m of the project corridor, and identified five site areas (Sites 1734, 5106, 5109, 5112, and 5128) that contain features located either within or up to 5 m outside the corridor. Additionally, Site 2873, One‘ula Archaeological District, which includes the southeast area of the corridor, also incorporates part of Site 1734.

Although construction activities related to electrical pole replacement in the Energy Corridor are not expected to affect any site features, heavy equipment operation and ground-modifying activities conducted near these sites during the project might inadvertently damage nearby features. In order to ensure proper mitigation of any adverse effects of the project to significant cultural properties, IARII recommends that archaeological monitoring be conducted during all ground-modifying activities, including posthole auguring and pole removal and replacement.

As part of archaeological monitoring, IARII recommends that a 5-m-wide buffer zone be flagged by the archaeological monitor around each archaeological site or feature within 5 m of the corridor. Flagging will be completed before ground-modifying activities begin. The sites requiring buffer zones are expected to include Sites 1734, 5106, 5109, 5112, and 5128, all located within 5 m of the corridor. These archaeological mitigation measures should ensure that the project will have no adverse effect on any significant archaeological properties near the project corridor

ETHNOGRAPHIC DATA AND ANALYSIS

The Ethnographic Survey (oral history interview) is an essential part of the Cultural Impact Assessment (CIA) because the ethnographic data helps in the process of determining if an undertaking or development project will have an adverse impact on cultural properties and practices or access to cultural properties and practices. The following are initial selection criteria:

- ❖ Had/has Ties to Project Location(s)
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Known Hawaiian Traditional Practitioner
- ❖ Referred By Other People

The consultant for this Cultural Impact Assessment was selected because he met the following criteria: (1) consultant grew up, lives or lived in Honouliuli Ahupua'a, 'Ewa and vicinity (Kalaehoa, Kapolei, Makakilo, 'Ewa Beach); (2) consultant is familiar with the history and *mo'olelo* of 'Ewa and vicinity; and (3) consultant is a cultural practitioner of the area. Copies of signed "Consent" forms are provided in (Appendix H).

In order to comply with the scope of work for this cultural impact assessment (CIA), the ethnographic survey was designed so that information from the ethnographic consultant would facilitate in determining if any cultural resources or practices or access to them would be impacted by the implementation of the East Kalaehoa Energy Corridor project. To this end the following basic research categories or themes were incorporated into the ethnographic instrument: Consultant Background, Land Resources and Use, Water Resources and Use, Cultural Resources and Use; Anecdotal Stories and Project Concerns. Except for the 'Consultant Background' category, all the other research categories have sub-categories or sub-themes that were developed based on the ethnographic raw data (oral histories) or responses of the ethnographic consultants. These responses or clusters of information then become supporting evidence for any determinations made regarding impacts on cultural resources and/or practices including access.

Each person interviewed is asked to talk about their background; where they were born and raised, where they went to school and worked, and a little about their parents and grandparents. This category helps to establish their connection to the project area, their area and extent of expertise, and how they acquired their proficiency. In other words, how they meet the selection criteria. Ethnographic consultants either have family or personal ties to the project vicinity and/or are familiar with the history of the area.

Two cultural practitioners from the area were formerly interviewed; both of them also included a cultural tour. One person suggested by HCDA staff was emailed an ethnographic survey; it was not returned. Both ethnographic consultants are part-Hawaiian.

There is always a danger of not allowing the consultant's "voice" to be heard; of making interpretations that are not theirs; and of asking leading questions. To remedy this, the "talk story" method is used and allows for a dialogue to take place, thereby allowing the consultant to talk about a general topic in their own specific way, with their own specific words. All of the excerpts used are in the exact words of each consultant or paraphrased to insert words that are "understood" or to link sentences that were brought up as connected afterthoughts or related additions spoken elsewhere in the interview. The following "Consultant Background" provides an overview of the consultant, as well as information about their families.

Shad Kane. My name is Shad Kane. I was born on the island of O'ahu at Pearl City Peninsula. This was prior to the Navy having bought out the residents subsequent to December 7, 1941. So at that time the Navy wanted to increase their buffer around Pearl Harbor, so they were re-thinking a lot of that with respect to the events that took place on December 7, 1941. I was born on [REDACTED] 1945. Subsequent to that, when my parents had to sell their Pearl City Peninsula house, we moved to Wahiawā Heights on Carson Drive. I spent most of my early childhood years up in Wahiawā Heights, Wahiawā, in and around that particular area, and we lived there up until elementary school, because I was around five at that time. My parents stayed in Wahiawā however, my mom wanted me to go to a Catholic school, so I ended moving in with my grandfather in Kalihi and went to school at Saint Anthony's Elementary School. My seventh and eighth grade we moved to Chicago and spent two years living in Chicago where my dad went to school. We came back and I went to Kamehameha School and graduated from Kamehameha in 1964. Subsequent to that, I spent two years at Utah State University, then spent four years in the Navy, and then went back to school and graduated from University of Hawai'i in 1976, and got a Master's degree subsequent to 1976 from Central Michigan University. At that time, I was in the Police Department, and in order to get promoted into administrative positions, you're in a better position if you had more than of course a high school [diploma] and more than a college [degree] at that time. I think I just made sergeant at that time, so I found out that Central Michigan had an extension program, where you can work and also get a Master's degree. So I got a Master's degree in Public Administration. I became a policeman in 1971. I think it was October 1, 1971 - for 34 years - I got actually three years credit for my military service - I spent four years in the Navy. So actual years spent [in police force] was 31 years. I retired as a lieutenant in November, 2000.



Currently, I represent the 'Ewa Moku on the O'ahu Island Burial Council. I represent the 'Ewa Moku on the State of Hawai'i's Aha Moku Council for the island of O'ahu. I also sit on the City Council's Clean Water and Natural Lands Commission. I represent the O'ahu Council Hawaiian Civic Club as a Native Hawaiian organization on the Navy's Historic Preservation Partners and we participate and comment on all Navy construction projects on Navy lands, to include Pearl Harbor, Hickam, some parcels in Kalaeloa, all Navy regions property, Barking Sands Missile Range, Luualualei, and Iroquois Point. Also, I'm the Chair of O'ahu Council of Hawaiian Civic Club's committee on the preservation of historic sites; Cultural Properties, Cultural Resources Chair of Kapolei Hawaiian Civic Club. And I'm a board member and facilities manager for the Kalaeloa Heritage and Legacy Foundation over the last several years.

My mom was Hattie Pavao Kane Gushikuma. My stepdad's name is Henry Gushikuma. My father's name is Tazoni Crowningburg Kane. My mom actually grew up in Honolulu, island of O'ahu. However, she spent time in Hālawā Valley, where her mother was from. My grandmother on my mom's side was from Hālawā Valley, Moloka'i. But she grew up in Honolulu. My dad's parents and my father grew up in Kohala, in the area of Hāwī. My dad's parents were sugar workers for the sugar industry of Kohala. My dad and his parents moved to Honolulu during his high school years, where they lived in Kalihi and he graduated from Farrington High School. That's my stepdad. My father Tazoni is also from Honolulu, the island of O'ahu. He grew up for the most part at a place called Waiale'e. Waiale'e is between Sunset Beach and Kahuku. His father, Albert Kane was a school teacher at the Boys' Industrial School. And remnants of that building is still there at Waiale'e. Most people are not aware of Waiale'e by name. I think most people refer to that as Vellzyland, because it's right on the beach. It's a surfing spot, the ancient Hawaiian name for where my father grew up, right on the beach. They had a house right there and there's burials right there on the beach in the sand dunes. It's actually called Waiale'e. Tazoni Kane's father Albert Kane worked at the Boy's Home, but it's referred to as the Waiale'e Boys' Industrial School. And so his early years were spent there, subsequent to that, they moved to town, Honolulu and spent many years working at the Pearl Harbor Naval Shipyard. However, in the 1950s, my father and my mother Hattie got a divorce and my father moved to the mainland. We still kept in touch, but it was kind of long distance. On occasions we would go visit him.

All my life, my mom did not share a lot about Hawaiian culture with me. My mom was a strong Catholic, she taught catechism. And she taught me and my two brothers to be very devout Catholics. Her mom spoke only Hawaiian. But my mom saw the struggles of being a Hawaiian person. So my mom kind of kept us apart from Hawaiian culture. So everything to do with Hawaiian in our house was bad. Speaking Hawaiian was bad, chanting was the devil's work. All that stuff. We grew up like that. So by the time I became an adult and actually graduated from high school, I did not see myself as being a Hawaiian. I saw myself as a German. I'm half Hawaiian, a quarter

German, a quarter Portuguese. So I never talked about Hawaiian. I always talked about my German background. And it comes from the Crowningburg family, my father was a Crowningburg, so we talked often about the Crowningburgs. That's how I saw myself, so I couldn't see myself as a Hawaiian. So I've always kind of wondered about that. And I've always had questions. When I graduated from Kamehameha, I knew very little about Hawaiian culture. The only thing I knew about, there was this guy by the name of Kamehameha that conquered the islands. I knew about *aloha* spirit, I knew about Diamond Head. That was the extent of it. I learned of other cultures, other histories, another language - French. So when I graduated, and as I got older, I really didn't see myself as Hawaiian.

And to make this long story short, let me just share it this way. My interests actually, when I graduated, it was easy for me to adopt another culture because there was a void there. So it was easy for me to adopt it. I grew up watching cowboy shows, probably just like you, Maria, watching all these old westerns. So I identified with Indians for some strange reason, Native Americans. That's important to understand because I was identifying with the Indians and I saw them as Native Americans. And I got involved in the Indian culture - I was going to the Pow-Wows at Thomas Square. I made myself Indian war bonnets - I was wearing feathers and all this kind of stuff. I even studied the Plains Indians because I had an interest in horses, so I learned about the Blackfoot, Arapaho, the Cheyenne, and the Crows. I learned about all the battles between the Seventh Cavalry and the Native Americans.

My wife and I, one year, went on a trip to visit all these places where the Native American Plains Indians struggled with the Seventh Cavalry. We flew to Seattle, rented a car, drove to Spokane, drove across the panhandle of Idaho, which is Coeur d'Alene, and the reason for that is because the Coeur d'Alene Indians lived in that area. So I wanted to visit the places that they had lived, where Chief Joseph of the Nez Perce tribe made his exit right through that area up into Canada to flee the Seventh Cavalry. Here's the guy that said I will fight no more. So we went across the panhandle of Idaho, into Bozeman, Montana. I'm really going to try to summarize all of this because it's so much. But all these are all the places where historically there were battles between Seventh Cavalry and the Native Americans. So we went to Bozeman down to Billings, we went to the Big Horn Memorial Cemetery where Custer died. We went down to Sheridan, Wyoming - we drove all the way across to the east end of Wyoming. And we ended up in Rapid City, at the Black Hills. The reason why I wanted to go all the way to the Black Hills is because the Black Hills is considered the most sacred place in the Indian culture. So I wanted to get a sense of that. What I wanted to do, because I was making Indian crafts, I wanted to go buy some Native American crafts. I found out that there was a store in Rapid City called Prairie's Edge. My wife and I went there and saw all these Indian crafts made by the Lakota who live on Pine Ridge Reservation. There are two major Indian reservations in South Dakota, one is Pine Ridge - the other one is Rosebud. While shopping at Prairie's Edge, I accidentally bumped into a guy, both of us backed up into each other. When I turned around and I saw this guy, in my mind he looked like the typical Indian elder. And I was blown away by the way this guy looked. He had sun-dried parched skin with a lot of wrinkles on him, long white hair flowing down over his shoulders, and I was simply just blown away by this guy's look. That's how this guy looked, without even saying one word to me. We both excused each other, because we weren't paying attention to each other, we bumped into each other. But that day was very interesting because I had the most interesting conversation that I can think of with anybody that I ever had. We started talking about the Indian Culture, we started talking about all the things I read about, about the struggles between the Lakota, which is his tribe, and the Seventh Cavalry. I mentioned all the Chiefs, all the battles to him. I mentioned all the places, Snake River, all the different places where these battles were in. And it came to this defining moment. This is what became a turning point for me, in my life. He asked me what tribe I belonged to. And I told him, "Hawaiian." I think I must have said that thousands of times after that. And for some reason, this day, I actually heard myself say that. And this is what he said: "You know more about my culture than my sons, my grandsons, everyone I know. You come from so far away. And you know so much." And I heard the guy say that. But what I also heard him say, he was actually talking about me. I know so little about Hawaiian culture and I saw myself as one Indian. But I heard myself that day say I was Hawaiian. That day, when I went home, I set aside all the Indian stuff I did. I never made another Indian war bonnet, I never made another choker, I never made another breastplate which I made out of bones - I have all that in my house. That day is when I started researching our Hawaiian culture.

So, I'm not a person who had the benefit of *kūpuna* sharing stuff with me. My parents, my grandparents never felt that was the right thing. My parents wanted me to assimilate into the western world. And I think I did that. But that day I suddenly realized I have so little time to learn about our ancestors. From that day on, that was the start of this journey - that was start of researching all these cultural places. I had horses at a Barbers Point Stable; I moved them up to Pōhākea. I was leasing ten acres of land from a guy named Sam Delgado. The main reason for that is I heard about the history of about this place, but never knew that much about it. Started riding my horses up in the

mountains, found rock walls, found *ahus*, found a whole bunch of things. So it started with all of that. And it continued - the Kapolei Hawaiian Civic Club was established with the shutting down of the agricultural lands by Campbell and Base closure. Civic Clubs realized that it was partnership between federal agencies, Department of Defense and business interests that brought about the transition of a cultural landscape to one of military bases and agricultural lands in 'Ewa. So the Civic Club took on the *kuleana* of working in partnership with the State, the City, and developers of this new city of Kapolei and Base closure, working with the Barbers Point Redevelopment Commission, identifying all the cultural landscapes within Kalaeloa, establishing a relationship with archaeological people such as Dave Tuggle, Rubellite Johnson, Alan Ziegler, Aki Sinoto, to learn about the landscape of Kalaeloa and work in partnership with the growth of this region and the preservation of the cultural landscape. And it brought us to today, you and me, sitting at this table in the *kauhale*.

It was 1996 [when I went to the Lakota's]. I had already joined the Civic Club. The Civic Club was chartered in 1993 in Las Vegas. In 1993 I was an Indian. I joined the Civic Club because I started to see a relationship between Native American Indians and Hawaiians. So I saw something there. So I joined the Civic Club. And in 1995, by this time I had already read everything I knew about Indians. So 1995 I made a trip because when I came back one of the first assignments I was given in 1995, I was asked by our club to represent the Kapolei Hawaiian Civic Club on the Barbers Point Redevelopment Commission. I served on the committee, the Parks and Recreation Public Facilities task force which discussed and looked at the future land use issues with respect to Parks' properties. And it was from this meeting where I came to meet Dave Tuggle. I got to meet all these different archaeologists because we're working with them in defining future land use, levels of land use, those that would have restrictions on them, those that would have liabilities in the conveyance. When I say level of re-use, some properties in Kalaeloa had segments of past history. So the effort was to save them, but work with developers to define the footprints of those projects. All in an effort to preserve the cultural landscape of Kalaeloa. I hope I'm not giving you too much. Is this okay?



Photo 20. Hale of the Kalaeloa Heritage Park

Henry Chang Wo. My name is Henry Chang Wo. I was born in town. I grew up in Hālawā. My family were lease people, and they were all taro people. My father came from Hanalei, Kaua'i. We're half Hawaiian, half Chinese. My mother came from Kahakuloa, Maui. Man that was in the boonies. That's a nice place. It's a beautiful place. They had the taro patch. You know, they mountain, ocean. They were close to the ocean. And I guess their life was a hard life at that time. My mom was three-quarters Hawaiian, one-fourth Chinese. On my mother's side my grandfather was pure Hawaiian. And my grandmother was three-quarters Hawaiian. On my father's side, being half and half, my grandfather was pure Chinese and my grandmother was pure Hawaiian. From what I heard, I didn't meet her, but she only talked Hawaiian. She didn't know English, she only talked Hawaiian. My father grew up talking both languages. Photo 21. Uncle Henry.



Grandmother and them came over to take me back to Maui with them. On the day they were supposed to leave, December 7th, that's when the war started. So they never went to Maui. I grew up in Hālawā, that time that area had open spaces. We knew Pearl Harbor as kids, we picked clams, oysters, had a lot of fishponds, and my family did a lot of camping. My uncle, when he went camping, the whole family went and our beach was at 'Ewa Beach. And you know where you and I were at the marina, you know I told you that trail, that point we had our own name for that area. We called that Kekona's Place. The whole family, that's where we went all the time. And we walked. My mother had seven girls and one boy, and all the sisters, when it came vacation time we stayed two weeks on the beach. Everybody took their vacation the same time.

I went to Kamehameha - I went during my sophomore year. [Before] Aiea Elementary and Intermediate. It went up to the ninth grade. I really wanted to go Farrington. I didn't want to go to Kamehameha but my parents says I going to Kamehameha or they'll send me to Lahainaluna in Maui. Oh man, I cannot leave. And Kamehameha is a very good school. [Then] I joined the service. I joined the Army. I got out when Vietnam started. I said ah-ah, I'm not John Wayne and then I didn't re-D. It actually started in 1962, to me. I don't know when it really started, I don't go back into it. I thought that war was really... I came from Kamehameha, my parents never sent me to be dumb. I volunteered. We had six kids [in the family], I couldn't wait to get out of the house so while in high school I volunteered to join the Army. I graduated in May and went into the Army in July. We were the fifth all Hawai'i company. And it was good. We got away from the islands, seen something different. I ended up in Japan. I went to school up in New Jersey, on the east coast. You know to be 18, all the way from home, it was a good experience. I got married too young. We didn't know any better. We look back at it, not knowing any better. I got divorced. It never lasted more than 5 years. But I don't regret nothing. I had a good understanding. We're good friends. Two boys. I have seven grandchildren and four great-grandchildren. I'm too young for that. I just thank God, I'm kind of blessed. I still work. I enjoy what I do. It's when you have to get up it gets tiring.

I went overseas. I went _____, I stayed there for quite a while. And I came home, I worked for Hawaiian Electric. And I went Maui, and then I worked for Maui Electric. Then I quit Maui Electric because I went farming on the *lo'i*. My grandfather came up and then when he died I came back home. When I came back from overseas, I stayed up there for a while [Kahakuloa], when I was working at nights. They got all these stories. When you're young, you don't care. When you're young, you like to listen to all the stories. Man, I ain't going up there, it's in the boonies. But as you get older, you change. The fishing was great. It's a beautiful place.

I applied for a job with the State and I got into the State. That's where I'm at right now. I'm a maintenance mechanic. At the Honolulu International Airport. That more or less sums it up. I used to do a [*limu*] class every second Saturday, for the longest of time. But then I was getting burnt out. Me and my partner really getting burnt out because we started in 1998. In 2010 we kind of stopped. And all we do now is a show-and-tell. We go down and tell you what we have. We're kind of low key too. But we know our stuff.

Photo 22. Uncle Henry giving *limu* education



Land Resources and Use. Land resources and use changes over time. Evidence of these changes is often documented in archival records. Cultural remains are also often evident on the landscape and/or beneath the surface and provide information regarding land resources and use. However, oral histories can give personal glimpses of how the land was utilized over time and where the resources are or may have been. The specific place names are often forgotten over time or in this case can get lumped into one name as in 'Ewa, which the district but sometimes used as a reference to the project's general area. Honouliuli, which is the name of the *ahupua'a* in the district of 'Ewa, where the project is located. Or Kalaeloa, which is a new name given to the lands where the former NAS-BP was located. Both cultural consultants know the places names of the project area vicinity from the *mo'olelo*; they are also familiar with the natural resources and cultural land uses of the project area and vicinity.

The proposed project area, the EKE corridor, will follow the Coral Sea Road and Tripoli Street. The Coral Sea Road runs east-west and northeast-southwest and is the southeastern boundary of the Kalaeloa Heritage Park. Tripoli Street runs north-south, perpendicular to Coral Sea Road and is the western boundary of lands where Ordy Pond is located. The Kalaeloa Heritage and Legacy Foundation members also *malama* (care for) Ordy Pond and vicinity.

Kalaeloa and Kanehili. Well, with respect to Base closure I was involved in land use issues in the cultural landscape of Kalaeloa. However, much of the broader discussion within the commission itself - the committee I sat on was specific to land use issues - it also comes under Navy region. So Navy region is not just Kalaeloa. Navy region is Iroquois Point, at that time it was Waikele Naval Magazine, Lualualei and elsewhere, but my involvement at that time through the Civic Clubs was really specific to this region here [Kalaeloa]...so Kapolei Hawaiian Civic Club's *kuleana* is specific to this geographical region.... So, with respect to the Base closure, clearly Kalaeloa, the Barbers Point Naval Air Station is within our *kuleana*, Kapolei (Uncle Shad).

The name Kalaeloa actually identifies the shoreline structure, so, much like Ka'ena Point. Kalaeloa really wasn't a community of people living in that particular area. It just defined the shape of the shoreline - was 'Kalaeloa,' the long point. The traditional name of Barbers Point Naval Air Station, the geographical area occupied by the former Barbers Point Naval Air Station, is Kanehili. The biggest challenge in Honouliuli and much of 'Ewa is that all the boundary markers that were here had been destroyed by the nature of agriculture. With agriculture coming in, they bulldozed, pushed stones all around. So we can only get a sense of the geographical area with respect to Hawaiian names in terms of *'ili* by traditional cultural stories. The association of the name Kanehili, whether it's an *'ili* or something else, I cannot say with any kind of certainty. My best guess is it was (Uncle Shad). [See more of Kanehili in the Cultural section 4.4.0]

Kalaeloa Heritage and Legacy Foundation. The Kalaeloa Heritage and Legacy Foundation applied for a grant from Kaupapa o Kakuhihewa, an organization that grew out of community benefits for Kapolei and Wai'anae with respect to five power plants that were being planned for construction seven years ago. The foundation, a 501(c) (3), a non-profit, was able to secure a grant to build a traditional *kauhale* to serve as an interim visitor center. This piece of property, this 77-acre parcel, was identified as a heritage park back in the 1990s as a result of base closure. It was identified as a heritage park simply because of the amount of archaeological and cultural sites on this property. This parcel, this Kalaeloa Heritage Park parcel was conveyed to State by the Navy a year and a half, two years ago. And when the State got conveyance of it, they approached the Kapolei Hawaiian Civic Club and they asked the Kapolei Hawaiian Civic Club if they would consider working with the State to build this heritage park. The reason why they asked is because of the history of the Kapolei Hawaiian Civic Club's involvement in that whole base closure process and establishing relationships with the archaeological firms. The only thing is that the heritage park needed to be a broad-based community effort. It could not be a Hawaiian-only project. It had to be something that would benefit the entire community. The club had established a 501(c) (3) private, non-profit organization. And we just received our 501(c) (3) non-profit designation only about several months ago. And part of that is because of the amount of

volunteer hours, we want to be able to take credit of their in-kind service to assist us in acquiring grants for construction such as the *kauhale* (Uncle Shad).

Kalaeloa Heritage Park Biological Resources. Part of this whole effort is not to just restore and preserve the cultural resources. Site 1753, which is a site where we've actually cleaned up, is two to three acres. We will not be going into the other portions of the 77-acres until our non-profit can secure the assistance of an archaeologist to help us extract data before we walk in the other areas. So part of this whole effort is not just to restore culture resources but also to restore the biological resources.... We're trying to restore the native vegetation, so what we're doing is that. We don't want to buy plants from the nursery and plant them here. So what we've been doing is identifying plants that's growing here and gathering seeds and trying to get them propagated in our own respective backyards. That's the stuff that all our *Na Koa* are helping out with it. We want to get rid of all the *kiawe* and restore the *wilwili* because it appears that the *wilwili* was a dominant tree. That was it, everything else was low brush. 'Ewa *hinahina* is one, so we've actually got some growing. *Maiapilo* is another plant that's been here historically and it's still alive. A whole bunch of other plants. The plants that we're all planting and trying to propagate are plants that don't require water. So the whole idea is to get them off water completely (Uncle Shad).



Photo 23. 'Ewa *hinahina*



Photo 24. *Maiapilo* thrives here.



Photo 25. Plant in sinkhole.



Photo 26. Native Plant



Photo 27. Ti here since 1950s.



Photo 28. Experimental area.



Photos 29-32 Various native plants thriving in Kalaeloa Heritage Park.



Photo 33. A native plant growing on alien tree.



Photo 34. *Kiawe* is typical alien tree in this area.



Native *Wiliwili* Trees. As a matter of fact, there's one *wiliwili*, see it sitting right there on the ground? So we've been gathering all of them and trying to get as many as we can propagated. This is another example of a very healthy *wiliwili* tree. There's another *wiliwili* tree that's healthy. We actually have established partnerships with developers so we have a guy who's going to loan us what they call a genie, which is a mobile cart where they actually can raise the platform to reach higher trees. Some of these trees are actually sitting on the *wiliwili*. We want to cut them from the top and come down. A good example is this one, so we have to cut the top. So we're going to remove all these trees but that tree we have to cut it from the top first and come down (Uncle Shad).

Photo 35. *Wiliwili* tree overshadowed by alien *kiawe* tree.

Historic Plane Crashes and the Kualaka'i Trail. The crash happened on September 17, 1948. It was a TBM 3Q which is a torpedo bomber. It had three: the pilot, a guy that operated the body mechanism, and a machine gunner. Apparently four planes were taking off on September 17, 1948, from the airport, and this plane, which they refer to as an avenger, was the fourth plane. And what happened was, it got caught in the wake of the three planes in front of him, so he lost power at a low elevation and could not recover. So he hit the ground and all three people died. We're going to try to gather as much information we can about this plane crash. We have most of it, but we also want the support of the family members, to put up a memorial for the three guys that died here. But we want to do it with their permission - we just don't want to go do it. When I took a look at the photos of the plane crash, this plane went scatter all over here. So I am even surprised that's still here (Uncle Shad).



Photo 36. Site of TBM 3Q bomber crash.



Photo 37. Part of crash scatter swath.



Photo 38. Part of midden scatter at crash site.



Photo 39. Trail obliterated by crash.

You can tell from the trail, that portion of the trail, about almost 50 yards is gone. So it destroyed the trail for about 50 yards, then it continues further down. This whole place burned. Somebody came in here without permission and removed some parts, but you can tell they also did some screening. There's one screen soil. There's a big pile of screened soil over there. It looks screened to me... That's a lot of plane trash over there. But there's really more in the bushes. If you walk around these bushes, there are big parts of the plane all over in there. So eventually we're going to try to spend time and walk in there and try to pick them all up and bring them out here. (Uncle Shad).



Photo 40. Part of area just beyond crash site.

We're surprised, we're glad they left the engine. There are actually two plane crashes. There's this one here and an F-4 Phantom on the other end of the Heritage Park. The Phantom actually went down in 1971. Two pilots ejected, but they ejected too low, so they hit the ground before the chutes completely opened up... Yes [it destroyed ancient sites]. It came off this runway behind us - it was headed in the Honolulu direction. So he had to have hit trees. According to the article, it looked like he exploded before he hit the ground. So it threw material all over. They took an aerial photo of the burnt area, and this thing burned a big chunk of that area. So most of the damage is actually in a line from here - scattered in that direction [west]. So everything is saved on both sides, on the ocean and *mauka* sides. But that segment of the trail, I would say about 30 to 40 yards, is all gone. And then it picks up again, beyond that. But everybody's impressed with that trail. We never moved a single stone, that's exactly how it was (Uncle Shad).



Photo 41. Remnant of TBM 3Q engine.

Historic Burials in Sandalwood Era. This identifies an *ahu* turned into a burial. Interesting thing about these two burials is, it's our opinion that they would've been probably buried along the beach rather than in here, especially in the sinkhole. That sinkhole would have been water. So we suspect that these are modern. When I say modern, I mean subsequent to contact, probably in the 1800s when these people started harvesting *'iliahi* in the mountains for China. Most of the people that were harvesting *'iliahi* were actually from this geographical region. It was a period in our history when their health became eroded because their subsistence was changing, so they were not eating in the same manner. So they became susceptible to invasive diseases like smallpox. The nature of smallpox is so horrific that they probably just buried them wherever they fell (Uncle Shad).



Photo 42. Possible Ahu turned into historic burial.

East Kalaehoa Energy Corridor-Essex. [More in the next section 4.4.0]. That's the golf course #59. Most all of the golf course had been disturbed. Let's see, I'm trying to get my bearings. 'Ewa Marine Corps Air Field it looks like it might be #59 and #21A. That's the former 'Ewa Marine Corps Air Field. That was actually built before the Navy base was built. So the first base was actually right here. Actually, these are not the exact borders, but it's that approximate location. [Coral Sea runs between #19A and #19.] That's the main energy corridor. The reason why this one is going to happen first. Because it's identified as the energy corridor right here. And, based on what I know, this perhaps will be first one that's going to move. All these others, not going to happen right away. The reason why I say that, it's been discussed at meetings I've been participating in. The first one is going to be this one. Right now, a PV company Sunetric that's going to build a PV plant right here. The reason why, it's going to connect...it's mostly only going over state property. So there's no problems going over the state land. As far as I know, it's going to be right on the roadway. It's going to be on the shoulder. So it's going to follow the shoulder of the roadway. According to what I'm aware of. And it's going to connect to the high voltage lines right in here. If you go back out and drive out, you take a look at all these power lines. It runs right along here and it runs *mauka* along North-South Road and Kualaka'i Parkway. That actually defines the former base boundary - that's Roosevelt Road. Now the problems they are having with all these other corridors is to connect with Hawaiian Electric. With respect to those corridors going out in this direction, the problem with this one, to connect with the high voltage power line, they got to cross over private lands. So the problem is going to be complicated by getting rights to all of that. This one here, all they're dealing with is the State of Hawai'i. So it will be the easiest one to work on right away. That's why they're saying the East Corridor there. There only one I've been in discussion with is this here because of the cultural stuffs. I have not been involved in any of this on this side. All this right here. Here, there's actually two ways out. What they gotta do is, they gotta connect to Hawaiian Electric's lines to get into the grid. What is difficult is if you got a lot of land owners, you gotta cross over and get permission; that makes it difficult. So my understanding is this is going to be the easiest one and the quickest one. That's why we got Sunetric thinking of building here. We got the Southern Trap and Skeet Range being considered, we got the Northern Trap and Skeet Range. They're all going to be connected to this corridor (Uncle Shad).

Northern and Southern Trap and Skeet Ranges. The plan is, that still belongs to the Navy. So we had the meeting yesterday, so the Navy is considering conveying those two parcels (#26 and #23). Number 24 belongs to Hawaiian Home Lands. Number 25 belongs to the Navy; they're going to convey it to the State soon. Number 26 Navy, Southern Trap, the Navy wants to convey it to the State. Number 23 Navy, Northern Trap, at the meeting yesterday; they want to convey it to the State. All of that (Uncle Shad). (See Fig. 2 for references to sites)

Cultural Resources and Use. This category represents traditional Hawaiian cultural resources and practices and other ethnic resources and practices. The traditional Hawaiian cultural resources and practices, includes the pre-Contact era, as well as cultural practices after Contact. Cultural Resources can be the traditional *wahi pana* or sacred places, any cultural gathering place, or the tangible remains of the ancient past. One of the most significant traditional Hawaiian cultural resource is the *heiau* or place of worship. Other places of great significance for all cultures are the burial places of loved ones.

Kanehili. The name Kanehili, its relationship with the former Naval Air Station, comes out of several traditions, but the one that most of us are familiar with has to do with the travels of Hi'iaka. Hi'iaka was commissioned by Pele to seek Lohi'au on the island of Kaua'i, to bring him back to her on Hawai'i island. So in the story, she's coming back with him, they landed at Pōka'i Bay, she tells Wahine'oma'o and Lohi'au to continue in the canoe to Kou (in Honolulu), and she will lead them there. So Hi'iaka gets off the canoe and she walks to Wai'anae, she walks to Pōhākea, she shares the bit about the landscape in the stories, she walks to Keahumoa (the area of Village Park today), she meets people, she ends up at Pu'u O Kapolei, a place some of us think of as Fort Barrette. And at Pu'u O Kapolei she meets several women making *lei*. And when she leaves, in the traditions it says she leaves Pu'u O Kapolei, she passes through Ka'opea, she passes through Kanehili, to get to Kualaka'i, where she admires her reflection in a pond that in the traditions they refer to as the spring of Ho'akalei. So what we do know is that if you walk a straight line from Pu'u O Kapolei to Kualaka'i, which today is Nimitz Beach, you would walk first of all through a geographical area known as Ka'opea, which today is the area of Kapolei. Whether that's an *'ili* or not, I cannot say with certainty. But my *mana'o* is, that would be the *'ili* of Ka'opea. After she leaves Ka'opea, she enters a geographical area known as Kanehili. In my opinion, that is also an *'ili* before she reaches Kualaka'i. So that's where the geographical relation is. We cannot say with certainty the actual size, the north-south boundaries. This actually comes also from Rubellite Johnson. [IARII] hired Rubellite Johnson to provide the cultural interpretation and an understanding of the evolution of languages to understand place names. So she's the one that assisted Dave Tuggle in the inventory of previous archaeological surveys, not just within the geographical area of Kalaehoa, but throughout all of Honouliuli, to include 'Ewa Beach and Iroquois Point (Uncle Shad).

EKEC Project Area. It passes right through this traditional cultural landscape that we're talking about. It passes right in front of the Kalaehoa Heritage Park on Coral Sea Road. It's important to understand that although this 77-acre parcel is identified as a heritage park, that doesn't minimize the cultural significance of all the surrounding cultural properties. So it actually passes right through all of the cultural landscape (Uncle Shad).

Regional Cultural Significances: Sun, Water and Coral (Uncle Shad). There are several aspects of this region that's important to keep in mind and it's repeated in the oral traditions and stories associated with traditional cultural area:

Sun. First of all, one is sun. The other is the manner in which water supported and how it shaped a subsistence lifestyle; which is totally unique to this geographical region. The sun is repeated and shared often in the cultural traditions with respect to this region. In some stories, the sun appears, much as in Greek mythology, where the sun was seen as Zeus, being pulled by seven white steeds, that rises in the east and he passes and settles in the west. But the sun in Greek mythology is viewed as Zeus traveling in the skies. Likewise, in this region, in the oral traditions, the sun is shared in the same manner...the presence of the sun in this region, and the role that it played in history, in Hawaiian culture, how it shaped the manner in which people lived... The sun beats down on us every day here in Kapolei. So, I'm sharing that to give you an understanding, how the sun shaped a subsistence lifestyle, how it shaped the cultural landscape, and the manner which all aspects of these people's lives, the construction of their house sites, the manner which they set up, the areas where they set up their habitation sites, their temporary house sites, their permanent house sites, and all aspects of their life. What is the sun, with respect to this cultural landscape that we're situated in within the Kalaehoa Heritage Park (Uncle Shad)?

Water. When people migrate from one place to another, generally they're looking for fresh water. That's where you find early settlement, whether you're talking about Hawai'i, whether you're talking about Mesopotamia, whether you're talking about the United States, or anywhere else in the world. When you're aboard a ship, and you travel on the ocean for maybe weeks and weeks, you're looking for one thing. You're looking for fresh water and to provide provisions. You're not going to settle in a place barren of fresh water. You take a look around here, I see absolutely no river. So it comes with what I just shared, with respect to the manner in which water traveled through here and where they made their present sinkholes. So these people, such as the Kalaeloa Heritage Park, those people who resided here, the archaeological sites within this Heritage Park, it's obvious that these people realized that water was in sinkholes, and they settled. They established a lifestyle, they built their *hale*, they built the structures they needed to live a subsistence lifestyle around water, sinkholes, and agricultural mounds. So the water shaped the manner in which these people lived their subsistence lifestyle, which is totally different from anywhere else (Uncle Shad).

Coral. The third thing of significance to understand about this geographical region, with respect to the project, is the unique architecture of all the structures within this geographical region. Nowhere else in the Hawaiian Islands are you going to find cultural structures built of coral. On Hawai'i Island, on Kaua'i, on Moloka'i, most of the Heritage Parks or other places that have been preserved, are built of basalt. They're built of lava stones. This is the only place where you're going to find substantial numbers of cultural structures built of coral (Uncle Shad).

Kalaeloa Heritage Park. Within the 77-acre parcel identified as the Kalaeloa Heritage Park, which the line is going to pass directly in front of, there are more than 200 archaeological and cultural features. The only area we have cleaned is only this two- or three-acre parcel that we're actually sitting in. It's the location of Site 1753 as identified by Dave Tuggle's *Synthesis*, as part of the base closure process. Within this two- or three-acre parcel, Site 1753, there are actually eleven documented sites and seven undocumented sites that were discovered recently as a result of the cleanup. They are all being afforded the same level of preservation, whether documented or undocumented, until we can bring in an archaeologist who is willing to work in partnership with us. There're roughly seven house sites. There're two agricultural sinkholes. There's one water sinkhole. There's a burial sinkhole. There's a confirmed burial mound, confirmed burial sinkhole. A storage shed. There's a structure that's identified as a religious structure by Rubellite Johnson. All within just this one two to three acres. The significance of the architecture is that it is not "Hawaiian." After having talked to traditional Hawaiian rock-wall and *hale* builders, there's a clear distinction between Hawaiian dry stacking, which is you take flat stones and you lay them flat on top of each other and you simply interlock them at the corners. The other style of dry stacking is the Tahitian style, which is you take tall upright stones and you stand them up on the outside, leaning inwards, wide at the bottom, and it's filled with cobble stones, smaller stones on the inside. That's Tahitian. Most of the structures within the Kalaeloa Heritage Park are built in a Tahitian fashion (Uncle Shad).



Photo 43. Sinkhole in KHP. Photo 44. Ruins of Enclosure. Photo 45. Walled sinkhole.



Photos 46 - 51. Various cultural features on cleared KHP lands.

KHP Undocumented Features. This is an undocumented structure. You see this right here, that's remnants of an enclosure, but it's undocumented. So that's why we have the cone there, because we want to preserve that. With that cone there, there's an obvious alignment. So if you take a look at them, there's like five stones embedded, standing upright. We're preserving that. Undocumented (Uncle Shad).

Religious Structure. This is the structure that I wanted to show you. Rubellite Johnson identifies this as a religious structure. But this is the one that somebody went in the hole and did an excavation and tried to hide it. But it's identified as a walled sinkhole, defined as religious. There are several reasons why. Rubellite, the *mana'o* behind that interpretation, the reason why is that she says there are two *kia'i*, two guardians. She refers to that one as a *kia'i*, that's an upright boulder. It would have been standing up as a *kia'i* to this entrance. So the question is, what was he guarding? The second one is actually behind that area. Take a closer look. I'll show you where somebody went in. This hole is huge. You can actually go down and walk around it. You can walk throughout this whole area. So it's huge. Okay, this was actually shaped, it was actually standing up. This notch was fitted right in that *puka* right there, standing up, now it's down. She referred to that as one *kia'i*. She refers to this as one *kia'i*. So two basic guardians. She referred to this as one elevated platform. So it's not a chiefly place it's a religious place for people who may have lived here. For some reason they gave this area some kind of spiritual significance (Uncle Shad).



Photos 52 & 53. Documented religious structure



Photos 54-61. Large religious structure with several features including sinkhole/cave.

Religious Structure -Cave System. There are no recorded burials. But this hole is huge. You can go down there and stand upright and walk into a whole series of caves. They all go in different directions, like one huge *he'e*, octopus. But see, this hole was concealed. We opened it up. Let's see if you can see. What the guy did is, you can see the hole. Watch it now. Come over here. Look straight down. You can see what he did. What they did is this. You couldn't really get in here. What we saw when we got here was one big *kiawe* tree coming out of this hole. Was a huge one. So you could not go in. So we always thought the *kiawe* tree was growing in there. So when we went down to try to take it out, because we wanted to be able to allow someone to go in there and study it. When we took out the *kiawe* log, which we thought was growing in there, we found out somebody went cut it with a chainsaw and it was an old cut. It looks like they purposely put it in there so you could not get in. I don't know if you can see it. And it's actually one square. You know how an archaeologist squares it off, it's a perfect square. And it's right there. And he put the log right on top of that. So he had it straight down. So somebody went in there and felt a need to hide whatever he was doing in there. We're hoping he did not take anything out of here, that's what we're hoping. Because of the size of this in here, we want to be able to do more work, because there are numerous caves going in many different directions. We were just afraid to go in it right now. We're going to see if we can get some help with the archaeologist (Uncle Shad).

Religious Structure *Kia'i*. Soon, with the help of heavy equipment, this guy we're going to stand back up. And that over there, we're going to stand back up. And our thinking, it's going to look very impressive with this guy standing up. We just gotta make sure we stand him up in a way that make it secure so it doesn't topple over on top of somebody. It's not going to be any day soon, we want to be able to do a lot of research before we do that. Just before we do the restoration. That's one of the first things we're going to do. Stand this guy up. We have a feeling it's going to be impressive looking at this from a distance (Uncle Shad).



Photo 62. Large religious structure

Burials. That's identified as a burial *ahu*. But in the survey it says that it's actually one altar. But subsequent to its use as an altar, it was a burial. This is the second structure that they said they did an excavation. In the report, they showed excavation there and they showed an excavation here. Both of them turned out to be burials, a full set of human remains, it was all crushed. But what they did, rather than putting all the stones back, they only put back one level. So this is identified as a burial. And I will show you the third one, which is really interesting. And somebody did go in there and exposed it (Uncle Shad).

Sinkhole Burials. There're three sinkholes here. One, two three. Before we cleaned this up, all these sinkholes were concealed by this tree. This tree had four low logs that were going right along the ground. These four would actually cover. So when we cut these logs, we found a whole set of human remains in the third hole. Skull and everything in there. And it was exposed. You couldn't see it, because it was covered, but as soon as the log was gone. It looked like it was a young boy, like it might have been a teenager or one very short guy. He's still there. I'll share this with you. There're two documented burials, but we actually found three more.... So all we did was, we simply got sand and simply covered them. So they're there, they're all in that hole. There's one there and there's actually two in sinkholes. They're all sinkhole burials. We found two sinkholes with bones inside. But the amount of bones in here is incredible. (Uncle Shad).



Photo 63. Three sinkhole burials near here.



Photos 64 & 65. Sinkhole burials.

'Iwi Kupuna Crypt. It was so bad, we had to go and build one crypt. You know that? There are 21 in there. The reason why we were asked to make it that large is because the Heritage Park is 77-acres and if we found as many *iwi* in three acres, the likelihood of finding *iwi* in subsequent areas of the Heritage Park is great. So the plan was, in our discussions with SHPO, we want to be able to, if we had to move them, we wanted it done in a respectful way and that we would have to have a crypt over here. We get a bank vault in there. We got a bank vault from American Securities Bank when they broke down the bank. So we were able to secure that with the help of some people. And then we just built the wall around them in a similar Tahitian fashion. Let me show you the *kia'i* over here. When we were building this vault, I had a bunch of bones from SHPO. By the time we were building this crypt, because I was given all these bones by SHPO, because I'm the 'Ewa Moku cultural descendant for this region. There's a whole bunch of bones that come up in different military construction projects and so they had to be re-interred. So I got a whole bunch of *iwi* to re-inter but I had them at my house. My wife wanted me to hurry up and get them buried. So we're building this crypt for those (Uncle Shad).



Photos 66 & 67. The Crypt for 'Iwi Kupuna of KHP and vicinity (related story in section 4.7.0).

Kualaka'i Trail System. One of the structures I forgot to mention is a trail. The trail is built in a Tahitian fashion. It's a paved trail with upright stones every eight to ten feet. The trail is approximately two hundred yards long. We've only cleaned up about 30 to 40 feet of it. In addition to these structures being built in a Tahitian manner, there's also Hawaiian structures built onto a Tahitian structure. So it appears that the people who were here - this was a period of transition, when they may have seen themselves as other than Tahitians (Uncle Shad).



Photos 68 - 71. Small section of Kualaka'i Trail [E-W] and close-ups of upright trail stones.

That's the Kualaka'i Trail. That's the trail of upright stones. So it actually continues, you can see some stones standing up. Over here, you get a better sense of what the trail looks like. This is the trail that's identified by Lieutenant Malden. On his map, the trail starts at Kualaka'i, the shoreline, and goes four miles all the way to West Loch. The upright stones portion goes another two hundred yards into the bushes. We only cleaned this and we don't want to compromise the integrity of the rest of the trail so we're going to wait until we have an archaeologist working with us. Because our sense is, because this supports large numbers of people walking through here, there's a likelihood that we can find some midden and artifacts with respect and proximity to the trail. So ultimately, we're going to try and screen things along the trail, presuming people would toss things as they were walking along the trail (Uncle Shad).



Photo 72. Section of Kualaka'i Trail - E.

The Trail and Preservation. When we talk about preservation we're talking about ultimately to share it with people - that's what it's all about. Establishing a venue where we can share the ancient history and not just be able to share it, but they can see things about the past. That's what it's all about. But also to get people to see beyond the *kiawe*. Malden's map of 1825 basically tells us, on his map, wherever he saw people living, he would draw in one *hale*. We don't know how many *hale* he would represent, whether it represents 10 or 50, but he would actually draw in one *hale*. Where he saw a wall, he drew a wall on his map. Where he saw a trail, he drew a trail. That's why we are aware that this trail here was a trail that actually went from here all the way to Kalo'i Gulch, all the way to West Loch. What we did was we overlaid his map over a modern map and we saw that it went to Kalo'i Gulch and it went to Honouliuli. Which, in our thinking, because of where they live, it was probably because they needed *kalo*, which was a staple in the diet. So in addition to eating fish, crab, and lobster, they needed *poi* and that's the reason why

when you look at the trail they took an enormous amount of effort to do this trail. It would have taken hundreds of people to build, if not a thousand. So it took a lot (Uncle Shad).

You know, I showed you the picture of that trail [Kualaka'i], where the men were. I remember me and my grandmother walking down and she telling us stories, we had some night marchers - you gotta do this, you gotta do that. And we're walking down the trail at 11 o'clock at night, getting off of work (Uncle Henry).

Temporary Shelters. These three structures here, one, two and three, they're identified as temporary house sites. More specifically, in the report it refers to it as L-shaped and C-shaped structures, but they're identified as temporary house sites. The *mana'o* behind this is because these people lived the subsistence lifestyle and probably lived off ocean resources, there's probably other foods that they had preferred. So they would establish relationships with people from other areas who wanted fish. So they allowed them to live with them for a period of time. So there were relationships, and really the relationship was really more of a *mauka-makai* relationship. Not so much a relationship with people with similar access to resources. But access to people who have different resources. So these are the relationships (Uncle Shad).

Tahitian Influence? An interesting aspect, the question that always comes up, with respect to this Tahitian influence, the structures, and carbon ¹⁴ dates. One carbon ¹⁴ date within this immediate location is one that identifies these structures having been built in a period around 1400...interesting 1400. Because most of us think of the Tahitian influence occurring roughly around 400 A.D. and roughly around 900 A.D. Here we have a carbon ¹⁴ date in close proximity to the structures in Kalaeloa Heritage Park, as identifying the time that these structures may have been built as around 1400, given plus or minus. 1400 is really an average, plus or minus maybe around 150 years. So you're talking about maybe 1250, 1300 all the way up to 1500, 1550. But it raises an interesting question with regards to the architecture of the structure. If it's this period, there's a possibility that these people still had a relationship or association or still saw themselves as having a relationship with the southern latitudes. The question that always comes when we have groups of people that come for a site tour, because most people think of Tahitians having been here much earlier, not 1400, 1500 or even 1600, this is too recent. The question always comes up is: How long does it take a migrating people to see themselves as other than their place of origin? How long does it take? Every one of us here in Hawai'i, even the Polynesians, they're all migrants. Every one of us came from somewhere else. How long does it take a people to see themselves as other than where you come from (Uncle Shad)?

Honouliuli Blue Poi and the Lō Chiefs of 'Ewa. There's an interesting story. It's the story about this Tahitian chief and he's identified in the traditions as a big Tahitian. Interesting thing is, he was born in Hawai'i. He was fifth generation, born in Hawai'i. His name was Kaha'ia Ho'okamali'i. He was the son Ho'okamali'i. Kaha'ia was also the grandson of Moikeha. Most all of us are familiar with the name Moikeha and the chants associated with him. And Moikeha was the grandson of Maweke. In the traditions, Maweke is the Tahitian chief who is credited for going to South America and retrieving the sweet potato, the *uala*. He brought it here and established sweet potato in Honouliuli. In the traditions, Honouliuli is known is for its blue *poi*. The blue *poi* that they're referring to of Honouliuli is not *kalo*, it's sweet potato. It's supported by the numerous agricultural mounds within this geographical region where *kalo* would not be able to thrive. So within the area of the Heritage Park and an area identified as the Southern Trap and Skeet Range, and the Northern Trap and Skeet Range, previous archaeological surveys identified small mounds as sweet potato mounds, which is consistent with the traditions associated with Maweke. All the chiefs I mentioned are referred to the family known as the Lō chiefs of 'Ewa. These Lō chiefs of 'Ewa moved from Honouliuli, which is their initial settlement of the area of the West Loch Golf Course and Kaihuopala'ai, the lower reaches of Waipahu. They migrated in several directions. They migrated along the shoreline of Wai'anae, inland along what we refer to as Farrington Highway, and easterly along through Waipahu up to Kukiiahu, Hālawā, and that particular area. These people were referred to the Lō Chiefs of 'Ewa, sometimes even referred to as cannibals. They brought with them the traditions associated with the purity of the bloodline of

the chiefs. These same people that I'm sharing with you moved *mauka* along the approximate area of where Kunia Road is up until Līhu'e, and they established the birth site at Kūkaniloko. These are the people that we're making reference to at this region we're speaking of regarding the Tahitian association with respect to 'Ewa (Uncle Shad).

[Dave Tuggle shared the agricultural mounds with me, sweet potato, and also Tom Dye shared information on the sweet potato mounds in the Southern Trap and Skeet Range (Uncle Shad).]

East Kalaeloa Energy Corridor Cultural Landscape. I think what they're trying to say here is the significance of the cultural landscape upon which East Kalaeloa Energy Corridor is situated. [Looking at the Map below] (Fig. 5 and Fig. 6). This is Coral Sea Road. 18B, we're right here. This is the Heritage Park. This whole area, #18 and #18B, is the Heritage Park. We had to form a private, non-profit group to qualify - 77 acres. [The salt ponds] It's right here in #17, right in the middle. So that provided the salt for the people living in this region. Ordy Pond is right here, #25. The Southern Trap is #26. #23 is the Northern Trap [NE of KHP]. Numerous cultural structures in #26. Numerous in #23. And also in #27. All of #27 actually. Number 27 on the Wai'anae side of Coral Sea Road, and #27 on the Honolulu side of Coral Sea Road. All the areas identified as park properties of cultural resources. Actually, you could always say the green area, pretty much in the green area.



Figure 5. Kalaeloa Cultural Resources Map (from BCH 2013/Ford Island Venture LLC)

- Blue Cross Hatch = Sites recommended for Data Recovery
- Brown Cross Hatch = Sites for which no further action is required
- Blue Star = WWII Coastal Pill Boxes - Preservation
- Purple Bubble = Sites recommended for preservation

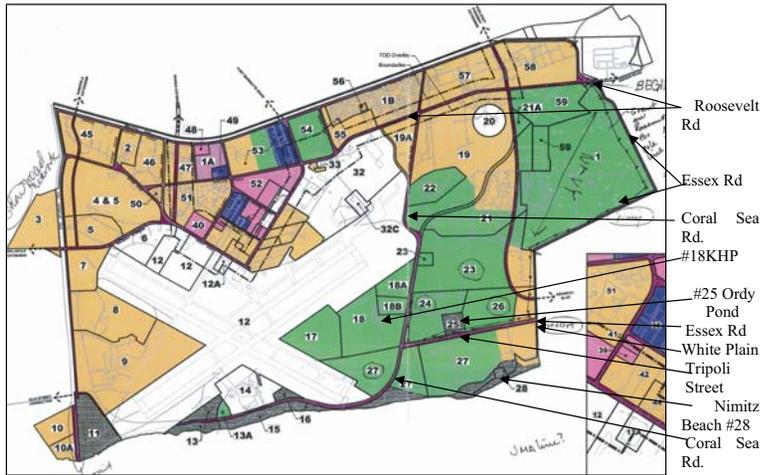


Figure 6. Draft Kalaeloa Transect Plan (adapted from BCH 2013)

Water Resources and Use. The Hawaiian word for fresh water is *wai*; the Hawaiian word for wealth is *wai wai*. This is because of the value the ancient Hawaiians placed on fresh water, which was crucial for growing taro, the staple of the Hawaiian people using the *‘auwai* or irrigation system. Fresh water was also crucial in the lifecycle of stream inhabitants such as the *‘o‘opu* and *‘opae*, as well as some of the marine life that depended on the benefits of brackish water areas. Fresh water was valuable in other ways such as natural springs or ponds. According to Uncle Shad, the *mo‘olelo* of Hi‘iaka mentions one of the springs in the vicinity.

Tripoli Street runs north-south, perpendicular to Coral Sea Road and is the western boundary of lands where Ordy Pond is located. The Kalaeloa Heritage and Legacy Foundation members also *malama* (care for) Ordy Pond and vicinity. Public access to Barbers Point Beach is off of Tripoli Beach. The Hoakalei Heritage Park is at the end of Tripoli Street just slightly northwest of unfinished marina.



Photo 73. Tripoli & Coral Seas-W.



Photo 74. Tripoli & Coral Seas-E.



Photo 75. Tripoli St. – view south.



Photo 76. Ordy Pond off Tripoli St. East side.



Photo 77. Hoakalei-W, end of Tripoli St. and Essex St.



Photo 78. Hoakalei-E, end of Tripoli St. and Essex St.



Photo 79. Tripoli St & White Plains



Photo 80. White Plains Beach



Photo 81. White Plains Pavilion

Kualaka‘i, Hoakalei and Ordy Pond. Hoakalei was in a map that was drafted by a Lieutenant Malden in the 1790s. It’s referred to as the Map of 1825. Malden was a mapmaker on board the ship commanded by British Officer George Vancouver. George Vancouver was commissioned by the British to map these islands. He called it the Sandwich Isles. So in that map, although it’s referred to as the Map of 1825, the data was actually gathered in the 1790s when Kalanikūpule was *mō‘ī* of the island of O‘ahu. Kamehameha was not here yet. And when he mapped this coastline of Honouliuli and ‘Ewa, he identifies a number of significant cultural sites. Today we use his map as a resource for information. But he also identifies, on his map, four water features, which in our interpretations would have been sinkholes with water. He identified four water features, making observations from offshore. He identified one large water feature right next to a place name Kualaka‘i. Kualaka‘i is Nimitz Beach [off Tripoli St]. Hoakalei is where the Coast Guard Station is. So the Navy filled in Hoakalei with surrounding sand berms from Kualaka‘i. That’s the first one. The second water feature was the Kualaka‘i salt ponds, which is just adjacent to where we are sitting today [at Kalaeloa Heritage Park]. It’s at the intersection of the runway. It was referred to in the traditions at a salt resource for ancient Hawaiians. That’s where they would gather their salt from. So in the area where we are sitting right now, the people who needed to salt their fish would have gotten it from the salt pond about two hundred yards away from where we are sitting right now. That’s the second water feature identified by Malden. The third water feature is what we refer to as Ordy Pond, which is just a short distance east of where we are sitting right now. The fourth water feature was quite a distance inland. It was just on the ocean side of Pu‘u O Kapolei. So there would have been a spring at a water sinkhole large enough for Malden and George Vancouver to see from half a mile offshore. So these water features support the amount of fresh water that would have been in this region, although no rivers were seen. They could not see any river, but they saw water, which made that observation interesting on this map.



Photo 82. Ordy Pond located off Tripoli St.

Ordy Pond. In discussions that I've had, of trying to kind of look at Ordy Pond from more of a scientific perspective, rather than traditional, really trying to understand. For example, from the recent cleanup, which was done just about two months ago, to remove all the mangrove from Ordy Pond, they hired Dan's Dive Shop divers, to go in the pond and try to go down to the bottom and determine the level of whatever contamination might be in there, whatever the level of the organic matter. But it's so difficult to see that they couldn't really get any sense of how that water is actually entering and how that water is actually exiting Ordy Pond. So, my answer is, I'm not sure [where the water comes from]. There's no sign that the water level varies with the tide. So although you may have tidal variations, it has no effect on that pond. So today there doesn't seem to be any way for that water to exit. Again, there's no sign of how the water entered. The thinking is this, and this is a result of discussions that I had with University of Hawai'i many, many years ago when they were looking at it. Because of the level of organic material, it's like if you have a filter and you are running water through a filter. Eventually, that filter is going to be plugged up from debris and whatever organic matter. It's going to stop the flow of air that's running through that - whatever that filter is meant to filter out. So the thinking is, from the people I talked to, is that that pond may have been fed by a system within the karst and would have exited into the ocean. But because of years of organic material and military occupation, all that has been plugged up. So that water today does not move anymore (Uncle Shad).

Ordy Pond Fauna. The interesting thing about it is that there's fish in there. The water is clean. There's got to be some kind of movement that they cannot see. But there's actually movement in there to support mosquito fish and guppies. But since they cleaned it up about a month ago, the native *ae'o*, the Hawaiian stilt, has been frequenting that pond, feeding. And we've also seen ducks in there. One day we saw 15 ducks. So it's amazing that they're feeding in there, because you can see them ducking their heads down and feeding on stuff. So the water, even if it is somewhat confined, I would suspect the water or the level, if there's level of organic materials in there, I would think that there's probably layers. So if there is organic material, it's probably at the lower level within the pond. And because there's a lot of movement on the surface, I would think the surface water is a public area where you are finding all the fish, that's what the birds are feeding on, the surface fish on the pond. So we're kind of hoping that someone will take on the responsibility of making it a preserve (Uncle Shad).

One day we had a whole flock of them. They seem to love that tree. They always land on that tree. What I think it is, they don't have claws, they have webbed feet, so he can actually balance on that. With the *kiawe*, he has to grab. So that he can actually balance on them. You know when we started seeing them? When they finished cleaning Ordy Pond. All of a sudden we see them all. They're right just beyond us. So from here, you watch, he's going to fly in that direction. He's going to go to the pond. That's where he's going. He's on the way there. So he probably came from either the ponds at the Kapolei Golf Course, the ponds at the Ko'olina Golf Course, or the ponds at the Chevron refinery (Uncle Shad). Photo 83. One type of duck that goes to Ordy Pond.



Ordy Pond Water Quality. I had a meeting there one day, two weeks ago, with several people. I got a call to meet with them. One guy from Navy Environmental and one guy from Naval Facilities, NAVFAC. And they were there to just check on the water. They didn't discuss details on researching water quality, but I suspect they were there to do just that (Uncle Shad).

Karst Water Systems. I read some of their stuff of the trip by Malden and George Vancouver. They were actually looking for rivers. Of course they refer to that area as Pearl River - Pearl Harbor was a river.... But between Wai Momi [Pearl Harbor] and Wai'anae, there was actually nothing, they said. But on the map they saw water. So at that time, they had no idea where the water was coming from. Today, we know that because of the karst system and the abundance of springs, at the mid-elevation levels, we today know through the works done by Alan Ziegler, by Aki Sinoto, and a number of other people that studied the karst system, we today know there was water. In a traditional water system the water travels from higher elevations to lower elevations, accelerating down the mountainside, bringing with it all the nutrients, topsoil; organic stuff. As the water hits the flatland on the traditional river, it deposits all the nutrients. That becomes your agricultural lands, before the water exits into the ocean. It travels along a surface depression. In this area, water travels in the same manner. When water passes over limestone, which is coral, it dissolves the coral. So it creates a depression underground within the karst. So same situation as a traditional river. In 'Ewa, the water travels from the higher elevation to the lower elevation within a karst. It travels in a depression, so the water is not all over. So you just got to imagine one traditional river underground. The water is not all over, the water is only traveling in a defined depression and as the water travels within this karst, it brings with it all its nutrients. And as that river within the karst hits the flatland, it deposits all the nutrients. That becomes your agricultural sinkholes (Uncle Shad).

Karst and Underground Rivers. So what you have here is, you have a river you cannot see, which basically means you don't know how wide or how narrow it is. What the significance of that is, at the center of the river is going to be your drinking water. At the center of the river the water is going to be clean, the water is going to be *ma'ema'e*. The banks of that river, which defines the width, would be your agricultural lands. The agricultural lands would be within sinkholes, so that defines the agricultural sinkholes. So if you find an agricultural sinkhole with plants growing in them, with organic matter inside the soils, you're looking at the river banks. So if you move either, in our particular case, our alignment basically here in the Heritage Park, is kind of a north-south alignment. So the river in this area is kind of running from slightly southwest to a slightly south direction. What it helps us understand is that your drinking water, your clean water, is where you're going to find your water sinkholes. As you move either to the left or the right to that, I think I can safely say, if you move either in the Honolulu direction or the Wai'anae direction of that, and if you find sinkholes with organic material in it, that defines the banks of that river. So it gives you a sense in that region, the width of the river passing through that geographical area. Okay, with respect to Malden's map, in identifying water features, for us today, he gave us a sense of where the water was located. Right here, in the Heritage Park, for example, we're right within that area where this water would have passed through (Uncle Shad).



Photos 84 & 85. KHP Sinkholes that may have been part of underground water system.

Marine Resources and Uses. The sea can be a great resource to people with access to its bounty. Honouliuli Ahupua'a was part of a coastal environment settlement, the former inhabitants fished and gathered there, but they were also connected to the *mauka* lands. It was also a place of recreation and continues to be, with the many beach parks in the area. 'Ewa was well-known for its abundance of *limu* (seaweed). Uncle Henry is an expert in *limu*; he not only knows all their names, and where they can be found and how to prepare them, he knows the ecosystem that they thrive in. Uncle Henry explains this ecosystem of rain, water, healthy reef and sunlight and how they all affect *limu* in this section. The majority of this information was shared while he was checking on the *limu* beds and picking samples along various shoreline beaches from 'Ewa Beach to Nimitz Beach.

'Ewa – House of *Limu*. We're very familiar with every point in the 'Ewa area. And 'Ewa was known at that time as being the house of the *limu*. If you were born in the '60s, '70s, '80s, you knew about 'Ewa, you'd see a lot of *limu* on the beach. But in the late 1900s the *limu* started to disappear. A lot of people had their own reason of why the *limu* was disappearing. And the first thing people will say is overharvest. That's not really true. What people really don't understand is that *limu* is a plant, another vegetable that needs the sunlight to go through shallow water, and it depends on the water quality. Everybody takes it for granted - *limu* is in the ocean. All they think is, ocean is salt water. *Limu* cannot grow in just strictly salt water. The salinity [level is important]. And in 'Ewa we had practically every *limu* of all the islands, in 'Ewa had all that different types. If you look at 'Ewa geographically, the ground, we had like a planting ground. It was like land - only thing, our 'land' was in the water. And then we had all the fresh water, brackish water, going into the ocean. And how we knew that was on the shoreline, when you looked at the different types of *limu*, they would tell you that had fresh water going into the ocean. A good example would be the *limu`ele`ele* and the *pālahalaha*. *Pālahalaha* is the green sea lettuce. That is a good indicator when you look at the beach, you can tell if the beach is healthy. It tells you that I got a steady stream of fresh water coming into the ocean. Photo 86. Uncle Henry with sea lettuce.



Ecosystem. When I tell my kids I'm down the beach, it's almost like in the middle of the mouth of Pearl Harbor and Kalaheo, the Point. I turn around, look at the mountain. And I tell them, "You see the clouds up there?" They go, "Yeah." "You see the raindrops? You see the two raindrops?" They look at me, like I going crazy, looking at that two raindrops. Then I explain how important the rain is. It forms the river, your watershed, feed the farmers, the *lo'i*, and then down to the beach. And from there you get all the *limu* and everything. Because if you didn't have that, then you wouldn't have nothing in the ocean. So you got to relate it to what we're doing so they can see what is that. If you look at any picture that depicts the waterfalls and everything, it all ends up in the ocean, the fishpond. The rain, waterfall, the river, the watershed, feeding the farmers. And then from there, it ends up in the fishpond. And that water is so important to the ocean because the ocean needs to drink. People don't understand that. The ocean needs to drink because when

mauka and *makai* meet, that's when the ocean *hanaus*, that's when the ocean gives birth (Uncle Henry).

Water is so important. One thing, with any place is, everybody go on the beachfront first. Then after that, everybody go on the mountain. And after that, go in between. That's how important water is. Water is the staff of life. Water is important to the *limu*. It's all water quality.

Underground Rivers. You can tell, if you're an ocean person. You see that *pālahalaha*, that green sea lettuce, you could have spot that from maybe 50 yards. As you approach it, you could have seen the *limu*. And that *limu* would tell you that I have fresh water coming out. But the whole beach used to be like that. You used to see them [underground water] coming underneath, you could see them out 75 yards, you could feel them coming out.

Well Water and Development. Here's something. You know how important the water is. If you didn't have water, you wouldn't have development. 'Ewa was only top dry. 'Ewa had a lot of wells. Because here, I'm a painter, you're a plumber, the other guy's an electrician. You and I go on strike, the other [cement] guy still has a job. The cement go on strike, nobody has a job. Because how you going to build the foundations for all this development. So where did they get the water to make cement? They bought the wells. They had to buy the wells from the City.

Rain. This is what I'm talking about. This is the Kalaheo Gulch. This is when I have the hundred year rain, the rain's going to come from Makakilo. It's going to come all on the natural path and then it ends up right here [at the beach].



Photo 87. Mauka Makakilo-Wai'anae Range.

Mauka Water. With everything, with plants on the land and even the dirt itself and the water we drink, they go by what they call the pH. Me myself, I no understand what the pH is, but I looked it up, it's something like the power of hydrogen. So it goes from zero to 14. Anything below four will kill you, anything above nine would kill you too, and everything in between is supposed to be drinkable and would be good soil. So you know, the medium. I not too good in that stuff. It's the same with every plant. So when I look at it this way, the *limu* in the ocean needs fresh water. The ocean needs to drink. And that's why *mauka* and *makai* is so important. One thing, *mauka* on the clouds to the first raindrop, that becomes your river, it becomes your watershed, it becomes your drinking water. It's water that feeds taro farmers, and from there if you ever look at a picture, see the waterfalls, see how the water turns into a river. It waters all your *kalo*, your plants, and then it ends up in the ocean. And the people never dirtied that water. They never made that water *kāpulu*. It was always clean water. And if you looked at it, there was a fishpond where the water ends down there. We look at it this way, *mauka-makai* and when they meet in the *momo wai*, that is land the ocean *hanaus*. That is when the ocean gives birth. So your food chain starts, you end towards all the small fishes. It's a kindergarten now, the ocean. That's where everything begins. That's the way we look at it. And from there, then you go into the seasons. The wet season, the dry season. And *limu* too, *limu* is a vegetable, they all got certain seasons. They all grow certain

times. But the *limu* we're looking for today is just starting grow. Like any vegetable, it grows, it comes old, and it fades on, and grows again. No more *limu*, no more fish. Let's put it that way.



Photos 88-91. Close-ups of various *limu*



Photo 92 - 94. Various *limu* – prized *limu kohu* on right.

'Ewa – Its Coral and Water. Look at it this way. 'Ewa, the land is all coral, it's porous. If you went from the mouth of Pearl Harbor to Kalaeloa, the Point, you get about 20-something miles. If you sit on the beach and you stay by the Harbor, more or less like in the center, and if you turned around and looked *mauka* at the mountains, it's about ten miles from the beach. 'Ewa, that whole area, was all coral. And then 'Ewa had a lot of *kiawe* bushes. But 'Ewa was only top-dry. Because 'Ewa had a lot of wells, 'Ewa had a lot of water. And our water was coming from the Ko'olaus and the Wai'anae range. Look at it. The *mokewa* of 'Ewa starts from Moanalua Valley, the dividing line, it goes all the way up to the Ko'olaus, then it goes west towards the Wai'anae range. Nanakuli side, just past the power plant, on the left hand side (on the ocean side), there's a little park called Mookua at the 'Ewa end. And from that area, it goes straight up to the Wai'anae range, and it goes east. So you see how wide of an area there.

Fish and *Limu*. The fishes, for some reason, they all head up the river. There's all the nutrients on the mountain that's coming down. Even the *uluu* was going up the river. That's what we call the sneak water, the water that comes from the mountain, going straight into the ocean, carrying all that good nutrients with them. We had all that fresh water and brackish water running into the ocean. And you can tell by the type of *limu* you have on the beach. You know, fishes, they're not stupid up to now. Because thirty years ago they brought in the gorilla *limu* and this is the one that they're trying to get rid of, or trying find a good recipe, or trying to get somebody to get rid of that *limu*. You find one good recipe on that, then let me know would sell. It was brought in by the scientists. Where you think we get all our invasion *limu* from? And our fishes are not stupid, they're not eating that *limu*, from thirty years ago they're not eating that *limu*. If they were eating that *limu* then we wouldn't have to pick up that *limu*. The only thing that *limu* is good for is for fertilizer right now. Because our fish, they don't eat any kind *limu*. *Manini*, they only going to eat a certain type of *limu* because its stomach is soft. So is the *limu kohu*, you know the one I just went pick up.... They not going tell you the secret, when you pick up *mamo* or they hook *manini*.

Fish and *Limu* Lessons. We teach them the season of the fish, what comes in. Just by telling what kind *limu* is floating in the water, you can tell what fish is in.

Limu Scarcity. You know, because our place is accessible, the *limu* also doesn't have a chance to grow because people would pick it up. As soon as they see it, they pick it up. So that's one of the reasons that we're not seeing what we're having because we're not giving that plant a chance to grow. And people don't know how to pick up *limu* too. What they do is, they pull the whole tree off.

You know because this was all covered with *kiawe* at one time. In the old days too, because of all the bushes, we never really went too far inland. But my side was mostly on that side [*makai*], on the shoreline, you knew the area all the way down [to #28/Nimitz Beach]. This area had a lot of *limu*, a lot of *limu*.

Invasive *Limu*. And we try to teach them what they never going see again. And our main purpose was to make people aware of what is happening. Because when we started, 'Ewa was a good example of what could happen if you didn't take care of the 'aina. While we had the *limu* and each year since we started, every year after that we could see certain places disappearing, until finally, it's the way how it is right now. You're not going to find 'em on the beach, you're not even going to find the 'opala *limu* on the beach. You're going to have a lot of people say that there's no 'opala *limu*, but there's a lot of invasive *limu* that wasn't here. And I look at it this way. If I cannot eat it, it's 'opala.

Reefs and *Limu*. The *mo'olelo* of the leeward coast from Ka'ena Point, Mākaha, it's all deep water, right? That's where the *ahi* and everything runs. As you come up towards Mā'ili you going see shore, it's still deep water. And you have all the different types of fish. When you came around Kalaeloa Point then you went to all the reefs. And it's all shallow. Because I told you I've got three reefs and it's shallow. And we had *limu*, it's another vegetable that needs the sunlight. It needs that water quality and *limu* also needs shallow water. The only one that there's a difference, you know I showed you the *pālalahala*, the green sea lettuce. And the opposite of that is the red sea lettuce, and that grows in deeper water, like about 12, 20 feet. So in deep sea it's different, no sunlight, so that *limu* is red, we call it *līpe'epe'e nokamoa*, because it looks like the coxcomb of the rooster.

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Reefs of 'Ewa



Photo 95. Facing Diamond Head



Photo 96. Outer reef seen in distance



Photo 97. Evidence of fresh water



Photo 98. Facing Nimitz Beach.

'Ewa Reef System and Development. From the mouth of Pearl Harbor, to Kalaclao Point, going west we have three reefs. And our reefs are under water and it's shallow. And we're the only island that had these three reefs. Now, look at the land itself, geographically, and look how shallow the reefs are. Watershed. So much water all going into the ocean, not going into the ocean anymore because now they had cut out my natural resources. I don't know where the water is going now. Plus, the wells, you sucking up the wells to build your development. And the next thing, you going to have to worry about would be ejection well. That thing sucks the well so you cannot suck the soil dry, you gotta put something back inside.

Golf Courses and Flood Control. That's the golf course. Why do you think golf courses are made? Golf courses are made to sell homes. Plus you need a golf course for flood control. And you know, the thing is, if I had the hundred-year rain, it doesn't matter, it affects the whole island. Remember we had rain for 45 days, it flooded right here. Sure, because it used to be flat but they buried us in. But it never went into the ocean because the berm held that water in. We never had all dirty water going into the ocean. Now, they're telling me, "Oh, the ten-year rain!" It's worse! 'Ewa rains hard. You get the 10-year rain, all the *ōpala* from up there, it's going to end up right over here, it's going to end up right on the beach. Now, it's not only affecting my *limu* and all the crustaceans and whatever, now it becomes a health factor.

Reef Sea Life



Photo 99. Sea Cucumber related to *ho'okala*.



Photo 100. Sea Urchin



Photo 101. Rare edible *ho'okala*.



Photo 102. Rare *ho'okala* underside



Photo 103. Sea Urchin colony in Coral



Photo 104. Multi-colony species in reef

Springs, Moi & Mullet Migration and 'Ewa Rest-stop. Okay, we had *limu* running all along the beaches, and when they started to do development up here, we lost it. I don't know, because you got three springs up here, I don't know what happened because we had no access to the area at that time. But when they started doing whatever they were doing, the water wasn't coming out. Because you could feel it at one time. And you know what...the migration of the *moi* and the mullet, when they used to go around the island, that's where they rested. From Kalaeloa to Pearl Harbor, they rested to get fat on the *limu* before they went again. This place was known for the *moi* going on and everything, everything we had in here. Ask the old timers, they'll tell you what we had. Now, and it's not only that too, the fish when they migrate, especially that mullet, they need that fresh water. It kills the parasites on the fish. It's kind of like the cleansing place. And this is from the old timers. I mean you could see the schools here. So I say whatever happens on the 'aina, it's [affecting the ocean]. We're dumping too much crap into the ocean. Here's what happened. If you were from 'Ewa and then we were seeing our *limu* disappearing.

Development Runoff and Reef Health. You know, in the olden times, you probably could see from *makai* to *mauka* because we never had all that different *kiawe*. We never had all those invasive plants..... Things change when the old folks are gone. And I'm worried right now because we're going to court on a contested case and what that does is, it concerns the runoff. We're not worried about the hundred year runoff. We're more worried about a ten-year runoff. Kalo'i Gulch, to me, is kind of channelized because all of Kapolei comes in, all those houses coming in. And they're going to have 41,000 homes coming in. I took you down the beach, if they should cut that berm down and do what they want to do, it's going to be right in the middle of the beach. It's not only I'm concerned about my *limu* and crustacean, it's going to be a health hazard. It's coming right in the middle of the beach. And that would be the most unfortunate, because the health factor now. It took all away the cultural things by doing this, sending all the insecticide. Kapolei, Hawaiian Homestead land, University of Hawai'i West - it's all going to come down right on that beach, right in the middle of my beach, our beach. They never been down the beach, you don't know the place, going up and down the shoreline. And it's hard for us....

Malama 'Aina. Now, when we didn't have all this subdivision, when it rained, the water went back to the earth. And then it filtered down to the ocean. Now, you build a house, you build a foundation, you wash your car, the rain comes down, hits your roof, goes on your car, wash all that soap down and all whatever it has, and then it goes on the concrete and then it runs off on the road./ And where does it end up? It ends up in the ocean. Until recently, your golf courses were throwing all this pesticide and insecticide and all this stuff, and it was all going into the ocean. But we didn't realize it until later. Oh wow, what's happening? It's one of the reasons that *limu* is not growing. And of course, when you do subdivision you cut off the natural resources that the ocean needs. And that is the fresh water and nutrients.... It's hard to stop progress.... So we really not going to know what's going to happen until all development is settled.

Sand Movements. Here's the shoreline. It goes like that. We know where the sand is at and where it is open all the time, because of the dirty reef. If you go like Wai'anae, during the winter time, they move like quicksand, where the thing goes. Ours, it hits the reef, it comes back, so it's like a parking lot. The sand going pile up all over here and then when it moves, it covers this [reef] up, open there. Right now, the sand moves. You see how much sand we got up here? We got a lot of invasion now. But then, when you come, here's what happens. On every island, during the winter months, the sand moves. It moves towards the east. And then about December, when you come down here, all the sand is gone. This continues up to there but the sand is covering it, because it's right near the part where the sand is going to be at summer time, so it's moist. This is all the mud. But it's so easy to come out. Winter time, this is going to be all gone. And the sand going be gone. Winter time only it all opens up. And then the tide goes down. But summer time the tide goes back. Usually it covers that rock. But we've been having so much of a climatic change here.

Way of Life. You're a farmer, right? Eat the *kalo*, banana. It's kind of a bland diet. You gotta come down the beach to get that flavor, like the mixture. And *limu*, there's so many purpose for

the *limu*. Not only for its vitamin and protein, but for medicinal use and religious ceremonies. I come from the ocean, so it becomes a way of life. You acquire a taste. You look at people, you can go any place in the world, in New York, and you talk to one guy about fishing, that's the only people connect with. Fishermen, we connect with everybody, talk about fishing. I looked at it, fisherman, they connect. I don't know the city, if you love the ocean, you love the ocean. And then when you see what is happening on the land, it's also affecting what's happening on the ocean. And it's hard for the average guy, the common guy; that stays on the beach, sees what is happening, and cannot do nothing about it because he doesn't know who to see when stuff is going wrong. And to me, the beach is the cheapest recreation. You can have a whole big family, all you gotta do is buy the canned tuna, get that loaf bread, bring them a loaf, tubes, and you can go down the beach. Catch your own fish. You know, it's the cheapest recreation for a family. That's the way we grew up. We also grew up, just bring rice and shoyu. And you catch your own fish. But we're not going see it any more, because of progress. Yeah, progress comes in.

'Ewa *Limu* Beach Project and *Limu*-picking Moratorium. If you went to DLNR, 60-70, and I said, you know, they're supposed to have a chart, whatever *limu* you sold, an indication of what *limu* was being picked up. I really wanted to follow Maui, because Maui was one pound per person per family, and no commercial picking. In Honolulu, commercially it was 10 pounds if you had a license. With the population over here, I really wanted to take the 10 pounds out. So we were looking at our *limu* disappearing, so we're going try re-plant. We wanted to re-plant, we seen DLNR, then we waited with them, and the thing didn't pan out. So we went to the legislature, we put in a bill, and it passed all the committees. At one time we wanted to ban any picking of *manauea*, see how the thing goes. But our friend says, Eh Henry, you cannot put what you want to do and the way you want to do it because if this goes through, then picking the *manauea* all over the islands would become a law. Oh, okay, we're just going to do it in our area, do a sanctuary in our area. It's not going to cost the state any money. So we did it. I think it was 60-70, Sunshined in 2011. But it gave you a medium of what can grow and what cannot grow and why it's not growing. And we had a lot of kids in a lot schools, technically this one reef that they grafted the whole area, they pulled the invasive species out, and then you could see a difference. But without the fresh water, the *limu* is not going to grow. Your heartier *limu* might. You see it all comes down to water quality to any plant. Of course, any time we do something, you the developer would go get your own botanist. It's like the Wai'ahole. How many times they called this one scientist. The law said that you gotta get an archaeologist or you got to get a chemist or whatever for water quality. If you look at the Wai'ahole-Waikane case, you going get this one professor that says no adverse impact, it's secluded. At that time we were looking at 85 different developments, they had the same professor that says no adverse impact. Same like us, they came down here. My friend's a school teacher and he had a lot of kids that said, we'd rather come here than listen to these professors, because they're only here for one day and then they're gone. But with us, they stay with the *kūpuna*, we show them what happens, we're there all the time. That's the only thing we can do, is do what I doing. So we had 'Ewa *limu* beach project, started in 1998. We had a bill that became an act, was no picking the *limu* in this one area, it Sunshined in 2011. But our main objective too was to go out to the outside islands and let them know what was happening, if you don't take care of your 'aina, this is what's going to happen. At the same time when we're doing this, we're looking at 'Ewa, we're looking at development. They were coming down here and we're doing classes down here. And from 1998 to 2000 you could see the difference, you really could see the difference in the ocean, what we had and what we were losing. As soon as you did a subdivision above the ocean, this is what happened, to the point where it is right now, we no more nothing. Of course, you not really going to lose it, but you're not going to see it unless you know where it is or what type of *limu* you're looking for. Plenty guys, they going disagree with me, but that's the way it is.

The Limu Dance. Also in 'Ewa, you know I told you about the *limu* dance. I was with my grandmother and she was 84. And she was picking up *limu*, feeling with her feet. And here's what's so funny about it. At that time, our parents, their shorts was all *ahina* pants. We go look for *limu*. And kind of *holomona*, *monamona*, *namona* too. Oh, you get bag? Ah, no more bag. How I going put my *limu*? But he picked up the *limu* and he stuffed the *limu* inside his pockets.

His shorts was short pants, *ahina* pants. And then you looked at him, you laughed because what he did. Then when they come back, Oh I had plenty *limu*. And they take them out of their pocket. But you know where they had it, they had it all in their bra. But funny thing about it, I was with her, she was 84 years old, feeling *limu* with her feet. And then when my mother made 84, we didn't have the *limu* over here. I took her to Kihei, Maui. I took my mom to Lipoa Street and then my mother did the same thing. It was so funny, when we first took her up there, she seen the *limu 'ele'ele*. You know, that's a nice place, the beach. I was picking up the *manauea* and putting it in my plastic bag. And then, we were just about finished, when we met this girl coming down, her and the son. She had her bag. People had already picked up the best. So I told her, Hey, let me see your bag. And my mother was right next to me, and I said "Here, take this!" Mine was filled up. Here, take this! My mother looked at me, side-eyed. Oh boy, what you doing? Because I was giving away the *limu*. What you doing? Mom, don't worry about it, I'll go in the water. What you mean? And then I see her doing the same thing, and it's almost like a dance, right? Feeling with your feet. That's what I call the *limu* dance.

Anecdotal Stories. Consultants usually have many stories to share. Some of these stories are not always germane to the research categories. However, they are too precious not to share as they give a broader view of the life in 'Ewa.

South America Connection (Uncle Shad). With respect to Maweke, let me share this with you, really interesting story, at least I find it interesting. I don't know, I'm saying it's Maweke only because of the time and what I shared with you with respect to me regarding Maweke being in that particular location in South America. Several years ago, under the Bush administration...I sat on this Commission, we met quarterly in Washington, D.C., at the old post office building on Pennsylvania Avenue, the Office of the Advisory Council on Historic Preservation. Fred Cachola was the first representative. So it was the Native American Advisory Group and it actually grew, it was established during the Clinton administration. It was the result of Clinton getting together with some local guy, can't remember his name, he was on the Advisory Council of Historic Preservation Board, he was the chairman. Raynard Soon! Raynard Soon met Clinton, and Raynard Soon talked to him about Hawaiians as Native Americans. So Raynard Soon got Clinton to appoint Raynard Soon to go sit on ACHP. When he got on the ACHP, he managed to get them to establish the Native American Advisory Group. The Native American Advisory Group (NAAG) was made up I think of 15 members. Thirteen of them came from different Bureau of Indian Affairs regions. There was one seat for Native Alaskan and one seat for the Native Hawaiian. Fred Cachola was the first Native Hawaiian NAAG member. When Fred Cachola's term expired, I took over. It was an awesome experience. Was awesome. So anyway, I took over for Fred, although he still participated. We participated jointly, subsequent to his term expiring and me participating. Interesting thing, basically what we discussed is preservation matters of concern to Native Americans. That's what we did. The policy level stuffs. The really interesting thing I found was when we were out of the meeting, when we were eating lunch. We would talk about different stories. Because theirs is an oral story too, oral traditions that we shared. And I shared all the stories. This is a story the chairman, Arden Kucate, shared with me. There are five Southwest Indian tribes that he represented: Navajo, Apache, Hopi, Pueblo, and Zuni. He was a Navajo. He told me these are Southwest Indians in Texas, Mexico, Arizona, that region.

This is the story he shared with me. It blew me away. Keep in mind now this is not one Hawaiian story. This is one Indian story. In their tribe's thinking, this story was so significant as to how they identified themselves. Today, he told me, there's a monument at the State Capitol in Phoenix Arizona that acknowledges this event that took place. He said, that during this period when the Spanish was in Central America, there was this battles going on for many, many years between the explorer Cortez' people, the Spaniards, and Montezuma, the Aztecs. He said that these battles were going on a long, long time. What it was is that the Aztecs would never venture too far away without their battle equipment. They always had their spears; they were always armed because of the threat of the Spaniards. He said, at a point in the battle, in this story, the Spaniards had the high ground. Cortez had the high ground; they're along the Pacific Coast. Cortez had the higher ground and Montezuma and his Aztecs were along the shoreline. The type of battle it was, they

would fight, they would take a break, they would fight, go have lunch, eat. It was that kind of lifestyle, because they got so accustomed to fighting all the time that they would take breaks in between, them and the Spaniards. But at one point in the battle, something interesting happened. Montezuma's people were along the shoreline and Cortez's people were up *mauka*. And at one point in the battle, the way Arden explained it, they saw one armada of ships on the horizon. In his story, he says Cortez thought it was his people, Montezuma thought that was their people. As the ships got closer, they realized it was canoes. The defining moment was when only one canoe came ashore. All the other canoes stayed offshore. Nobody came in, only one. In the story, what was strange about these people was the fact that they all never have clothes on. He says all they had was a loin cloth, even the women. Nobody had clothes. And he said they were speaking in one strange tongue and he said that they would not come ashore. They could see that they were close together, they were speaking, but they stayed in the white water. In the traditions, Montezuma had to approach them, and he approached them in a manner to greet them, in an Indian manner. I'm not sure how that was. Arden says to greet them in the manner consistent with the Aztecs. At that point, one person stepped forward and came up to the person leading the Aztecs and he bent at the waist, came right up to the guy, and went bump him in the head.

He referred to the story of bumping heads. So I thought it was interesting when he said bumping heads. Because when I think of bumping heads I think about the *honi*. So he says, the defining moment, the Indian had to approach him, they would not come out of the water, they stayed in the water. Make sense. You stay there until you get permission. So he says, these guys would not come out. So the Indians had to go into the water and then when they saw this guy approaching them, one person comes up and rather than greeting them in the manner, whatever the manner was, they didn't do that. He bent at the waist and he came right up to his face and bumped the guy's head. Remember now, I'm listening to an Indian story, not Hawaiian. I'm just listening to Arden. The reason why it played a big part of their history, the Southwest Indians, it's because this is a period of warfare. In the story, Arden says these strange people, he referred to as *people from the sea*, they stayed with the Indians, the Aztecs, and they fought with them, side by side, against the Spaniards. It doesn't say how long, but it must have been for a while because they went fight the Spaniards. To the Aztecs, that was incredible, that people that they never knew, show up and fight with them. At some point, they left. And what happened was, because they established a relationship with these people, numbers of them stayed behind and intermarried into the tribes that were there. And a number of the Aztecs got into the canoe and left with these people. So after I heard this whole thing, I told Arden, you know, what you just told me was very interesting. You know what, this story you're telling me, it's not just a story of you folks, it's a story of us. Now I don't know, I just heard what he said and to me bumping heads is Hawaiian, Polynesian. I can't imagine any other people doing that. So this story, in my opinion, I told Arden, this is a Hawaiian story. His people were so impressed with what happened there, because not just these people went land there, but these guys who they don't even know fought with them. And then intermarried. So the blood of these people are in the Navajo, Apache, and the Zuni. So I told him, eh braddah, you Hawaiian. And there's probably Hawaiians here who get Aztec or South Aztec blood. Interesting.

I listened to Arden and to me that was an awesome story. And it really defines us if this is the true story. It defines who we are, to do something like that. What makes this story even more interesting, it gives us the date. When you talk about migration, it gives you one date. Okay, the Spaniards were in that area in the 1500s, so if there was double-hulled canoes in that area in 1500, that's recent. That's not ancient times - that's getting pretty close to recent times. When I took a look at that, and I took a look at the fact that this was in during the Spaniard's period of occupation there, that was incredible. Now, in my mind, I can see people who have a Tahitian association, I can see these people being here in the 1500s, still connected to the southern latitudes. Not seeing themselves as one Hawaiian, we became Hawaiian when Kamehameha conquered the island of O'ahu. He called us people from Hawai'i. So there's an issue of when these people saw themselves as other than Tahitians. Could be really recent, could be as close as maybe the 1600s, 1700s. So it could be the families that resided here were the ones that brought the sweet potato. Not those that actually migrated to the Big Island. It could have been here, the

sweet potato went from O'ahu to Kaua'i, and went to the Big Island. It's just that the traditions and the stories associated with the sweet potato is right here in 'Ewa.

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Pālehua Connection (Uncle Shad). Pōmai. Incredible guy, I don't think he's even Hawaiian, but he speaks fluent Hawaiian and he's very *ma'a* to a lot of Hawaiian cultural stuff. Anyway, he called me up out of the blue - I didn't even know who this guy was. He called me up and I was kind of cautious because of some of the stuffs he was talking about. He said he got a phone call from another guy that said he got a stone that he wanted to get rid of, have it returned. So he asked the guy why, what's the story behind it. He said he got the stone from one of three guys that found the stone up in Pālehua, at a *heiau* up in Pālehua. The guy said several months after the three guys took the stone, the first guy died. Then they gave it to another guy. The next guy died within one year. So it ended up going to this third guy and the third guy didn't want anything to do with it so he gave the stone to the guy who called Pōmai. So when Pōmai saw the stone, he was familiar with its characteristics. And he was familiar with the *kuleana* of accepting a stone. So he took it with the intent of trying to get it back to where it came from. So he had an idea, he just didn't know exactly where. So he took the stone and he placed the stone on his balcony, because he knows the cultural significance of it. He lives in a condominium in Waikīkī overlooking the Ala Wai Canal. He had Hawaiian plants in pots on his balcony. So he placed the stone in the middle of the Hawaiian plants. Within one week, they all died. And he says he waters them. And not only they died, they all turned black. So, at the same time he was having dreams, the stone was talking to him, and basically in his mind, when he woke up, the stone was saying I want to go home, I want to go home. He tried to figure out where this place is at Pālehua. So talking to Civic Club people, might have been [REDACTED]. The Civic Club people said to go talk to Shad Kane, so that's how I got in touch with him. I thought I need to see the stone. So he comes over with a bowling bag and he opened the bag and he showed me this stone right here. Take a good look at it. A face on it. Big bulging eyes, the big broad nose, and the big lips. I'm familiar with *kia'i*. I know Bishop Museum has several. They're not identical but what they have that's consistent is the big eyes, big nose, and big lips. So I found out, when I checked around, in ancient times, when there was something of importance to this person and he's not around all the time to watch it, for example burials, he would shape one and he would assert *kapu* over them, and actually wishing ill-will over anybody who trespasses or fooled around. So that's what I found out about this. So about that time, we were building this crypt and I was told by SHPO there needed to be one entrance, in case there were more bones, we gotta be able to put them here. So there's a door right there. I tried to get in touch with the new landowners, which is Gary Gill and Ben Olson. So I told them what I heard, but they didn't want anything to do with it. I was making the crypt, so I thought it was the perfect time, so I put all the bones that I had at home around him because I had him in the patio when I was working on the crypt. And I was kind of just watching what happens in my life, everything was okay. I just felt comfortable, the bones were alright. So when we put the bones in there, we put him right at the door. So in order to go in there, you gotta handle him before you can go in. So we felt comfortable leaving it. He is facing in that direction [Pālehua, Makakilo]. Sending him that way. So there's a lot of symbolism in what we did, only because we tried to be as traditional as we could. So it worked out nice. We were thinking about where we should put him, but we thought the best way is looking in the direction of the setting sun.



Photo 105. Pālehua *Kia'i* in 'Iwi Crypt.

Project Recommendations/Comments. This special section is included when ethnographic consultants make any recommendation and/or comments about the project in general.

No Impacts. think I can safely say and speak for everybody, no. My understanding is, the corridor is going to be along Coral Sea Road. It would be a problem if they went right across the park, but I doubt that would ever happen. It would be costly to go over the heritage parks. It would be cheaper and much easier following what I think they have. It shows it here. The purple line is the corridor, that's exactly what it is. That's exactly what I've been hearing at all the meetings (Uncle Shad).

Uncle Henry is a well-known *limu* expert and his stomping grounds are 'Ewa. He is very concerned about what the extensive development is doing and will continue to do to the marine resources here.

Cultural Resources, Protection Processes and Development Procedures. You and I, we can see that they do it right. It's interesting, I don't know if you like put this down, but say you and I, we go down the beach all the time. And we see something wrong. Who do we see about it? You see your neighborhood association, then the next one you go to is your neighborhood board, but it stops there, it doesn't go any further. I cannot go to one neighborhood board meeting all the time because me and my wife gotta work to pay our mortgage, plus we got kids. But then, who do we really see if something's wrong and it's still going on? What can we do? It's hard for the average guy because the only time something like that happens is because the developer comes in, he's going to do something, he's going to have to put all this hearings or whatever it is for the public to read, to see, and to attend, but if you no more time for that kind stuff. And all we know is they put in a canal and they're doing this. And then it's too late for us to do anything. But the system itself sucks. And I blame the legislature. How do you give out permits? Is there three ways to give a permit - a, b, or c? I watched when they came down here early part in 'Ewa and they did the survey, and then they went with the...archaeologist...because I'm the developer and I got to hire you right? And you going with the State. And then the next permit, it says okay. I mean, when you guys do the survey, you gotta dig down. But don't dig two-and-a-half feet because if you do two-and-a-half feet, you might run into something. And the third one is, you gotta do it right, you gotta do this. That's why I look at it, how come you get the guys the permit? You get three different choices. I give you three different choices and then you come back to the State and say, "Oh we did what you said." That part, I really don't know, but that's what we see. Hey brah, they only do like that? And we don't know about this kind, Section 106. We just kind of learning after they found out. You know, you remember all the stones inside there, the thing is all gone. Oh, what happened? We don't know that. And then you also tell me, oh you know the stone over there, go put them up, they don't know any different. I had a bill that became an act, Sunshined. But let's say the average guy, the grassroots are lost all the way in, but I kept persisting. It started like this. It started with me and you talking. And then you promise you not going to do this, so I agree. And then I find out wow, they're doing it anyway. So we go to the next hearing and then when you go to a hearing, you only get one minute. And then you know, usually at the hearing, you know who is the last person? The Board of Health. And then one of them accepts it, and we went. Eh, this guy, they never even do that survey, they took the word of the developer. Then we go to another hearing. You know, it's so frustrating, and then there comes a time when you going need money...that was another trick. I mean it's going to cost money because now the *palapala* is in the westernized way. And the way that we had to go get our money wasn't funny. We went the hard way, right? We got rubber stamped, we got lied to, we still persisted.... The developers were looking at us like this. You come to a certain point in a hearing, you going give up, because now you don't have the money to pursue the State. As a developer, I go okay, I got the money, I got the time, and I been through this. They been through a lot of this type of cases. But then, for me, the average guy, I going hit one certain point, I gotta give up, I don't have the funding. And even if I took it all the way and I represented myself, I would still lose because I don't know the laws. They would strip me naked up there. So anyway, we had Hawai'i Legal Council come in and they represented us and we won the case. That's the one I was telling you about, the canal. Now we got another contested case coming out and it's about the Kalo'i Gulch....

CIA SUMMARIES and ASSESSMENT

This cultural impact assessment (CIA) is based on two guiding documents: Act 50 and Environmental Council Guidelines (1997) [see Appendices A & C]. H.B. NO. 2895 H.D.1 was passed by the 20th Legislature and approved by the Governor on April 26, 2000 as *Act 50*. The following excerpts illustrate the intent and mandates of this Act:

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the “aloha spirit” in Hawai‘i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of “significant effect” to include adverse effects on cultural practices.

Summary of Findings. The following summaries are based on the information presented in the previous sections: the traditional (cultural) and historical literature background review and the ethnographic data and analyses. References are not cited unless it is new information and not already cited in the text above. These summaries condense the information above, but also serve to focus on a few significant individuals and events in history in relation to the project lands in the *ahupua‘a* of Honouliuli, ‘Ewa District, O‘ahu Island, as well as give a broad overview of land, water and cultural resources and uses in the general area, as they reflect cultural resources (properties) and practices and access to them.

Summary of Significant People and Events. According to traditional and historical material, most of the land in Hawai‘i has gone through land modifications over time, including the lands of Honouliuli Ahupua‘a, and have witnessed the comings and goings of many significant people. Some of these people may have contributed substantially not only to the history of this area, but of O‘ahu Island and the rest of the Hawaiian Islands as well. There were several people and events noted in the oral histories. Some of these significant entities traversed these lands or vicinity.

Legendary Entities. There are several *mo‘olelo* about legendary entities connected to the ‘Ewa district. One of the earliest *mo‘olelo* is about the gods Kāne and Kanaloa throwing a stone to mark the boundaries of the ‘Ewa district. Another *mo‘olelo* is about Hi‘iaka, sister of volcano goddess Pele who while traveling with her companions through ‘Ewa, stopped at the spring Hoakalei to pick *lehua* flowers to make a *lei* and saw her reflection in the water. Other stories involve another sister of Pele, Kapo, whom Pu‘u Kapolei is named after. In another *mo‘olelo* the hill at Ft. Barrett is connected to the deity Kamapua‘a.

Pre-Contact *Ali‘i Nui*. The *ali‘i nui* or *ali‘i ‘ai moku* would have jurisdiction over all of O‘ahu’s lands, assigning lesser chiefs or *konohiki* to oversee each *moku* or *ahupua‘a*. Most of the O‘ahu chiefs are descendants of the Nana‘ulu line. Nana‘ulu married his sacred sister Kapumaleolani and they had a daughter named *Kahaomokuleia*. But it was through his union with another wife Ulukou that the line was passed down through their son Nanamea, to fourteen generations later to Maweke who became a

ruling chief of O‘ahu. His great-grandson Mulielealii who with his wife Wehelani had three famous sons: Kumuhonua II (who became the 1st *Ali‘i Aimoku* of O‘ahu), Olopana and Moikeha, and a daughter Hainakolo. Mulielealii’s brother Keaunui was a chief of ‘Ewa, Wai‘anae and Wai‘alua. Two of Kalai-Manuia’s (12th *Ali‘i Ai Moku*) sons were raised in west ‘Ewa; Kaihikapu-a-Manuia (14th *Ali‘i Ai Moku*) in Waimanalo, the western end of Honouliuli and Ha‘o lived in Waipi‘o, but his followers lived in Honouliuli to Waipi‘o. Kākūhewa (15th *Ali‘i Ai Moku*), son of Kaihikapu-a-Manuia was a very famous and well-loved ruling chief of O‘ahu; one of his royal residences was in ‘Ewa.

O‘ahu *Ali‘i Ai Moku*:

- 1st Kumuhonua II
- 2nd Eleluukahonua
- 3rd Kahokupohakano
- 4th Nawele
- 5th Lakona (ruled ‘Ewa/Waianaewa/Waialua; his cousins Maelo ruled Kona, O‘ahu and Kaulaulaokalani ruled Ko‘olau; Lakona’s wife Alaikauakoko was once the wife of Kanipau 4th Alii Ai Moku of Hawaii Island who was usurped by the Pili line – Kanipau exiled himself to Molokai, but his grandson Kalapana later became a Mō‘ī of Hawaii Island)
- 6th Kapae-a-Lakona
- 7th Haka-a-Kapae (O‘ahu chiefs revolted and killed Haka at his fortress near Waewae, Lihū‘e, then ‘elected’ Mā‘ilikūhahi who was a descendant of Moikeha - 1st Alii Ai Moku of Kauai and brother of Kumuhonua II; Moikeha’s grandson Kaha‘i was a famous voyager who sailed to Kahiki, Wawae, Upolu and Savaii and brought back *ulu* that was planted at Pu‘ūloa, ‘Ewa; Haka’s granddaughter would later start the Kuali‘i line of O‘ahu chiefs)
- 8th Mā‘ilikūhahi (11 generations from Moikeha, brother of Kumuhonua II; born at Kūkaniloko birthstones and ‘coronated’ at Kapukapukea Heiau in Waialua; from Maweke & Paumakua lines; raised at Wahiawa, Kanewai and Waialua, but later made Waikīki his permanent residence; ended human sacrifices; Hilo and Maui chiefs raided O‘ahu (‘Ewa) during his time & were defeated in Kipapa Gulch)
- 9th Kalona-iki (born at Kūkaniloko; second son of Lōlae-o-Halona married Keleanuinohoanaapii - sister of Kawaokauhele, father of Pi‘ilani – their children were all born at Kūkaniloko; his brother Kalona-nui was the father of Kalamakua who also married Keleanuinohoanaapii and had La‘ielohelohe who was betrothed to Pi‘ilani – together they were progenitors of the very famous Pi‘ilani line of Maui ruling chiefs)
- 10th Piliwale (oldest son of Kalona-iki; his daughter and granddaughter became 1st and 2nd female ruling chiefs of O‘ahu – all were born at Kūkaniloko; another daughter Kohepalaoa married her famous spear-throwing cousin Kaholialale, son of Piliwale’s brother Lō-Lale and Keleanuinohoanaapii of Maui)
- 11th Kūkaniloko (w) (1st female ruling chief of O‘ahu; born at Kūkaniloko and carried the sacred name; married Luaia, grandson of Maui co-ruling chief Kaka‘alaneo - with brother Kakaie; and cousin of Pi‘ilani, Maui Ruling Chief)
- 12th Kalai-Manuia (w) (born at Kūkaniloko – daughter of Kūkaniloko, ruled for 65 years, famous for building fishponds at what is now Pearl Harbor and various ahupua‘a surrounding those waters; her son Kaihikapu was also famous for building fish ponds)
- 13th Ku-a-Manuia (given lands of Kona and Ko‘olaupoko, greed got him killed)
- 14th Kaihikapu-a-Manuia (grew up in Waimanalo/Ko‘olaupoko; married Kaunuiakanehoalani, chiefess of Ko‘olau, great granddaughter of LōLae and Kelea and daughter of Kanehoalani; their son Kākūhewa grew up in Waipi‘o, Waiawa, Manana, and royal residences in ‘Ewa, Waikiki and Kailua - a very famous O‘ahu ruling chief.)
- 15th Kākūhewa (born at Kūkaniloko; taken to Ho‘olonopahu by grandfather Kanehoalani; 48 chiefs present at birth - e.g. Makohau, Ihukolo, Kaaumakua, Pakapakaunana; sacred drums Opuku & Hawea sounded at his birth; he married Kahaiaoniakahuailana or Kaea-a-Kalona, daughter of Napulanahumahiki, son of Hao and Aunt Kekela - with this union

- Ko'olauloa united with Waianae and Waialua; he had several other very well connected wives of the various O'ahu, Maui and Kauai branches; when Kākūihewa died O'ahu was divided between his three eldest sons: Kanekapu-a-Kuhihewa (ruled from Kailua); Kaihikapu-a-Kakuihewa (2nd son ruled Waikīkī and 'Ewa); and Kauakahiniui-a-Kakuihewa.
- 16th Kanekapu-a-Kuhihewa (set up court and ruled from Kailua; he is the ancestor of Papaikaniau, mother of Maui Mo'i Kekaulike; his wife Kalua-o-Hoohila was a descendant of Haka's granddaughter)
- 17th Kahoowahaokalani (Ko'olaupoko chief, Maweke line; ruled from Kailua; his mother descended from Haka of O'ahu & Ilihiwalani of Kauai; he married Kawelolauhuki a Kauai chiefess)
- 18th Kauakahi-a-Kahoowaha (he also ruled from Kailua; introduced the *kapu-moe* to O'ahu from his *ohana* on Kauai, from O'ahu it went to Maui to Kekaulike; he married Mahulua and they had Kualilaniipililanoakaiakealuanuuokuialiikahalau - Kual'i)
- 19th Kual'i (born in Kailua - raised in Kailua and Kualoa, the sacred drums Opuku and Hawea were sounded at his birth; famous for his *Law of Niauipio Kolowalu*; Kualii defeated ohana Waialua army at Kalena on plains of Heleauau [Hale'au'au, Līhu'e] and later defeated ohana army of 'Ewa at Malamanui and Paupauwela uniting O'ahu again; he was one of O'ahu's most famous rulers; he was married to Maui chiefess Kalanikahimakeialii, daughter of siblings Kaulaheha II and Kalaniomaiheula - Kaulaheha II was also the father of Maui *ali'i nui* sibs Kekaulike and Kekuiapoianui I who were parents of Kamehamehanui, Kahekili & Kalola and grandparents of cousins Kalanikūpule, Kiwala'o and Liliha Kekuiapoianui; half-sibs Kiwala'o and Liliha Kekuiapoianui were parents of Ke'ōpūlani, sacred wife of Kamehameha I; the sons of Kual'i and Kalanikahimakeialii - Kapioho'okalani and Peleioholani – were cousins of both Maui and Hawaii Island ruling chiefs, as well as Kauai Island *ali'i nui*)
- 20th Kapihookalani (after Kekaulike's death, Kapihookalani invaded Molokai; he was defeated and slain by Alapa'inui [half sib of Kekuiapoianui I and uncle of Maui Mō'ī Kamehamehanui and Kahekili] at Kawelo)
- 21st Kanahaokalani (was six years old when his father was slain at Kawelo, so his uncle Peleiohōlani, who was ruling Kauai at the time, was brought back to be regent ruler of O'ahu; Kanahaokalani died the following year at seven years old)
- 22nd Peleioholani I (several battles were avoided because he was first cousin of Alapa'inui, ruling chief of Hawaii'i Island; however when half-sibling brothers Kauhaimokuakama and Kamehameha nui went into battle with each other over the domain of Maui after the death of their father Kekaulike, they asked their uncles Peleiohōlani and Alapa'inui to help them with warriors and weapons, the first cousin uncles went into battle from Honolua Bay to Pu'unēnē where they once again called a truce, but this time after tens of thousands of their warriors died. This was Maui's biggest civil war)
- 23rd Kumahana (he was just a youth when he became ruling chief and was deposed in 1773)
- 24th Kahahana (born at Kūkaniloko to 'Ewa chief Elani and Kaionuilalahai daughter of Kual'i, making him grandson of Kual'i, nephew of Peleioholani, cousin of Kumahana and great-grandson of Kaulaheha II; grandson of Kekaulike; and nephew of Kahekili II and raised in Kahekili's Maui court; Kahahana was voted to be ruling chief by the O'ahu Council of Chiefs; he was later tricked by his uncle Kahekili and when he did not give Kahekili control of Kualoa; he was later killed at Maunakapu, near Moanalua – he was the last of the Kual'i ruling line)
- Contact/Post-Contact/Historic *Ali'i nui*
- [The next two *Ali'i Ai Moku* were not O'ahu-born chiefs although they were related many times over; this was also in a period referred to as Contact (1778)/Post-Contact and Historic when O'ahu was conquered by Maui.]
- 25th Kahekili II (also 25th Maui Mō'ī; son of Kekaulike, ruling chief of Maui; fanatical warrior and well-known athlete; said to be the biological father of Kamehameha I; with half-sister Kauwahine they had Kalanikūpule)

- 26th Kalanikūpule (also 27th Maui Mō'ī, after killing his uncle Ka'eokūlani who was half-brother of his father Kahekili II and father of Kauai ruling chief Kaumuali'i, last king of Kauai; Kalanikūpule was later slain by Kamehameha I who was possibly his half-brother)

Kingdom of Hawaii'i Era

Kamehameha I conquered O'ahu in 1795. In 1803 he settled on O'ahu where he placed his chiefs over all the lands and put the chiefs and their men from Hawaii Island to work farming the lands of O'ahu. Kamehameha I essentially became the king of all the islands except for Kaua'i. When Kamehameha I died, his successor was his son Liholiho (Kamehameha II) with Ka'ahumanu as the Kuhina Nui or regent. They successfully "kidnapped" their cousin Kaumuali'i who under duress turned Kaua'i over to the Kamehameha rulers.

Kamehameha II was the eldest son of Kamehameha I and Keōpūlani; he had a place in Pu'uuloa, 'Ewa.

Kamehameha III was known to visit and carouse in 'Ewa; he was involved with the sandalwood trade in 'Ewa.

Two sons of Kina'u, daughter of Kamehameha I became kings after the death of Kamehameha III - Alexander Liholiho or Kamehameha IV and Lot Kapuāiwa Kamehameha V; they were followed by William Charles Lunailo, nephew of Kamehameha I and descendant of Pi'ilani through both of his parents – he was the last of the royal Kamehameha line.

David La'amea Kalākaua and later his sister Lydia Kamakeha/Lili'uokalani descendants of Maui and Hawaii Island chiefly lines were the last rulers of the Kingdom of Hawaii'i.

Historic People and Events. The *ahupua'a* of Honouliuli was awarded to Mikahela Kekauonohi also known as Anna M. Kekauonohi and Keahikini-i-Kekauonohi. She comes from a very long line of intermixed royal families from all the main Hawaiian Islands. She was born in Lahaina, Maui in 1805 and died in Honolulu, O'ahu in 1851. She was the only daughter of Kahoanuku Kinau and Kahakuha'akoi Wahinie-pio. Her father Kahoanuku Kinau was the son of Kamehameha I and Peleuli, daughter of Kamanawa, half-brother of Kahekili and one of the famous twin uncles of Kamehameha I. Her mother Kahakuha'akoi Wahinie-pio was the daughter of Maui chief Kekuamanoha, younger son of Maui ruling chief Kekaulike, and brother of many older siblings including Kamehamehanui, Kalola, Kahekili and Kaeokulani. This union made Kekauonohi the granddaughter of both Kamehameha I and Kekaulike. Kekauonohi was married to Kamehameha II (Liholiho), her uncle, but when he died she married Kaula'i *ali'i* Abner Keli'ihanou (1832) and was the Governess of Kaua'i from 1842-1844. Keli'ihanou was once married to Deborah Kapule, former wife of Kaumuali'i, the last king of Kaua'i, and Ka'ahumanu. Keli'ihanou died in 1849 and was buried in Pu'uuloa, 'Ewa. Kekauonohi then married Levi Ha'alealea in 1850.

Another significant historic person of 'Ewa and specially Honouliuli, was James Campbell (originally from Ireland) who purchased the lands and had a ranch, a sisal plantation and a sugar plantation. He was married (he was 51, she was 19) to Abigail Kuaihelani Maipinepine Campbell (born in Lahaina, Maui; daughter of Mary Kamai Hanaie and John Maipinepine Bright) who was a staunch friend of Queen Lili'uokalani. He leased and sold lands to Benjamin F. Dillingham who was contracted to build a railroad that went from Honolulu through 'Ewa to Kahuku.

Significant Practices Pre-Contact and Post-Contact. Honouliuli, the westernmost *ahupua'a* of the 'Ewa District, encompasses the 'Ewa Plains and a portion of the West Loch of Pearl Harbor. The 'Ewa Plain is primarily an emerged reef that slopes upward from the ocean to an elevation of about

30 m (meters) above sea level (asl) to the base of the Wai'anae Mountains 5-8 kilometers to the north. The 'Ewa Plain is underlain by an elevated coral reef partly covered by alluvium of the Mamala Series washed down from the Wai'anae Mountains. The lower portion of the 'Ewa Plain is a lowland limestone exposure, with little or no soil cover. The soil cover in the project area is characterized as beaches and coral Rock. The coral rock is the remnant of the reef, originally derived from coralline algae and is referred to as "reef limestone," since it is not entirely sedimentary. The coastline originally consisted of weathered coral rock benches, with some poorly developed and scattered calcareous sand beaches. There was little significant sand dune formation. The only topographic formations are numerous sinkholes in the reef limestone, formed by solution of the reef by water, mainly ground water. The sinkholes vary from a few centimeters in width and depth to 30 m wide and 5 m deep. A fringing reef extends off of the southern end and parts of the western coast of the 'Ewa Plain.

It was these numerous sinkholes and coral limestone that the early people of the district utilized to create a way of life. The sinkholes and their various systems provided places to grow food, collect water, bury their dead and build their shelters and sacred shrines and temples. The coral stones were also used to create a unique trail path with sections still well preserved today.

Prior to and after the first people came to O'ahu, the lands of the Honouliuli would have been lowland dry and mesic forest, woodland and shrubland to sandy beaches. Native birds populated the mesic forests; they would have included 'elepaio (*Chasiempis sandwichensis*), 'apapane (*Himatione sanguine*), 'amakahi (*Hemignathus virens*) and the pueo or Hawaiian owl (*Asio flammeus sandwichensis*) - a subspecies of short-eared owl that is endemic to Hawai'i. The pueo continues today to be an 'aumakua or family guardian for several Hawaiian families. The fossil bones found in sinkholes indicate that many species once lived here; they may have still been here when the earliest people settled and would have been another resource.

Various plant resources would have been available on the 'Ewa Plain during the early occupation of the first settlers. Trees would have included small groves of wiliwili, *milo*, and *kou*. Primary food plants on that could have been collected or cultivated include coconut palm, *noni*, banana, *ti*, *pōhuehue*, *koali'ai*, sugarcane, *pai'i'iha*, and *'āheahea*. The 'Ewa Plain is described as "*o ke kaha*," a reference to sweet potato land there. The 'ulu or breadfruit of 'Ewa is famous in *mo'olelo* noting that it was planted in Pu'uloa, 'Ewa after being brought there by Mo'ikcha's grandson, Kaha'i-a- Ho'okamali'i, in a round-trip voyage that began at Kalaeloa (the southwestern tip of the 'Ewa Plain). A large number of other plants were available for wood, thatching, oil, and dyes.

If one were to hang out in the *hale* located at the nearby Kalaeloa Heritage Park, one would quickly understand that it could be very pleasant living in this area. The bountiful marine resources could easily sustain them, but with the various plant resources of the plains, uplands and gulches it is easy to see why the *ali'i* from very ancient to historic times liked being here in 'Ewa and Honouliuli.

Cultural Impact Assessment

According to the Environmental Council Guidelines, the types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, religious and spiritual customs. The following actions were taken to meet the EC Guidelines Criteria for conducting this cultural impact assessment based on the SOW:

- 1) conduct historical and other culturally related documentary research;

Documentary research, particularly on identifying traditional and cultural uses of the area, was completed. Much of what is known about the traditional and cultural uses of the area comes from written records that tell of its prehistory (e.g., *mo'olelo*; 19th century ethnographic works); the stories associated with early coastal and upland area uses by early Hawaiians; and scientific studies (i.e., archaeological, botanical, geological, biological).

- 2) identify individuals with knowledge of the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or *ahupua'a*; or with knowledge of the area potentially affected by the proposed action (e.g., past/current oral histories);

While the project lands have been in restricted use from the 1930s to 1999, it was well documented prior to this restriction and various studies have been done since. Two individuals who have expertise concerning the types of cultural resources, practices and beliefs found within the vicinity of the Project Site were identified. Both were formally interviewed and their *mana'o* has been incorporated into this report.

- 3) identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and

Archival research in Chapter 3 (Cultural and Historical Background Review) and ethnographic research in Chapter 4 (Ethnographic Data Review and Analysis) identified potential cultural resources, practices and beliefs within the project lands.

- 4) assess the impact of the proposed action on the cultural resources, practices and beliefs identified.

In regard to the undertaking there is "Qualified Impact" on cultural resources, practices or beliefs in the immediate area of the proposed project as identified by the ethnographic consultants, research and archaeological studies. While there is no obvious direct impact on cultural resources, practices or beliefs in the immediate area of the proposed project, there is probability for impact because of proximity to documented sites and/or the indirect result of activities such as digging, trenching, auguring, grading or trucking.

- Excavating may expose ancient sub-surface features, artifacts lost or forgotten by their previous owners while on daily activities such as gathering practices, planting, fishing or even from the occasional battle across the Plain;
- The likelihood of ancient burials are low to moderate in that former undocumented, filled sinkholes and/or caves used as burials may be exposed during project activities mentioned above. The Kalaeloa Heritage Park has already discovered previously undocumented burials in sinkholes therefore more can be expected. The lack of sand berms in the area made sinkholes an alternative

burial place. The ancient practice of *make pau* (buried where you die) should be kept in mind as people out gathering or fighting wars were buried where they fell unless they were *ali'i nui*;

- The archaeologists have recommended archaeological monitoring during construction activities mentioned above; in addition, cultural monitoring is also recommended during the construction activities of the electrical and communication distribution system along the Corridor. This includes the removal, relocation and reinstallation of power poles, where removal of dirt and/or drilling into sub-surface soil and coral/limestone beds may take place. This additional cultural monitoring will help to mitigate any possible adverse effects of this project.

This report has met the goals and objectives set forth for this CIA study. The project site is an area that has been heavily modified by historic military activities spanning over 50 years and currently is in use by military and civilian entities.

REFERENCES CITED

- Ames, Roger T.
1969 *In Hawaii: A Pictorial History*. (Feher 1969) Bishop Museum Special Publication No. 58. Bishop Museum Press, Honolulu (pg 3).
- Athens, J. Stephen
2003 'Final Summary Letter Report of Trip to Former NAS Barbers Point: Results of Sinkhole Inspection at Northern Trap and Skeet Range' To: Joanna Victorino, EarthTech; From IARII, Honolulu.
- Athens, J. Stephen, Jerome V. Ward, H. David Tuggle, and David J. Welch
1999 *Environment, Vegetation Change, and Early Human Settlement on the 'Ewa Plain: A Cultural Resource Inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i. Part III: Paleoenvironmental Investigations*. Prepared for U.S. Department of the Navy, Pacific Division, Naval Facilities Engineering Command. International Archaeological Research Institute, Inc., Honolulu, Hawai'i.
- Baker, Kekaulike and Haunani Baker
1989 'The Great Mahele 1849.' *Ke'opi'o O Puna*, Pahoā.
- Barrère, Dorothy B.
1969 *The Kumuhoua Legends: A Study of late 19th Century Hawaiian Stories of Creation and Origins*. Pacific Anthropological Records No. 3, Bishop Museum. [First published in 1878 by Abraham Fornander in *The Polynesian Race*] [Barrère original 1969]
- Beardsley, Felicia
2001 *Phase II—Intensive Survey and Testing, Naval Air Station Barbers Point*. Prepared for U.S. Department of the Navy, Commander Pacific Division, Naval Facilities Engineering Command. Paul H. Rosendahl, Ph.D., Inc., Hilo, Hawai'i.
- Beckwith, Martha Warren
1951 *The Kumulipo: A Hawaiian Creation Chant*. University of Hawaii Press, Honolulu. [Original 1951, University of Chicago Press, Chicago].

1970 *Hawaiian Mythology*. University of Hawaii Press, Honolulu. [Original 1940 Yale University Press]
- Belt Collins Hawaii (BCH)
2013a Proposed Overhead Electric Power Pole Line, East Energy Corridor, Revised Plan, August 2013. Bar scale. Plan provided by Belt Collins Hawaii, Honolulu.

2013b East Kalaeloa Energy Corridor, Construction Sheets 1-8, dated June 3, 2013. Construction plans. Bar scales. Provided by Belt Collins Hawaii, Honolulu.
- Chinen, Jon J.
1958 *The Great Mahele: Hawaii's Land Division of 1848*. University of Hawaii Press, Honolulu.

- Cordy, Ross
 1996 "The Rise and Fall of the O'ahu Kingdom: A Brief Overview of O'ahu's History". In J.M. Davidson, G. Irwin, B.F. leach, A. Pawley, and D. Brown (eds), *Oceania Culture History: Essays in Honor of Roger Green*, pp. 591-6113. New Zealand Journal of Archaeology Special Publication.
- 1998 "Ka Moku O Wai'anae: He Mo'olelo O Kahiko." MS, State Historic Preservation Division, Department of Land and Natural Resources [SHPD-DLNR]
- Davis, Bertell D.
 1990 Human Settlement in Pristine Insular Environments: A Hawaiian Case Study from Barbers Point, Southwestern O'ahu. Unpublished doctoral dissertation. University of Hawai'i - Mānoa Anthropology Department, Honolulu.
- Day, A. Grove
 1984 *History Makers of Hawaii: A Biographical Dictionary*. Mutual Publishing of Honolulu, Honolulu.
- DBET-HCDA
 2013 'The Kalaeloa District.' <http://dbedt.hawaii.gov/hcda/discover-kalaeloa/about-kalaeloa/>
- Emerson, Nathaniel B.
 1978 "Long Voyages of the Hawaiians." Krauss Reprint Co., Millwood [Original 1893, Paper of the *Hawaiian Historical Society* No. 5, pg 22, in Stokes 1928]
- Feyer, Joseph [Compiled by Edward Joesting (Part I) and O.A. Bushnell (Part II)]
 1969 *Hawaii: A Pictorial History*. Bishop Museum Special Publication No. 58. Bishop Museum Press, Honolulu.
- Finney, Ben
 1979 *Hokule'ea: The Way to Tahiti*. New York; Dodd, Mead.
- Foote, D. E., E. L. Hill, S. Nakamura, and F. Stephens
 1972 *Soil Survey of the Islands of Kauai, O'ahu, Maui, Molokai, and Lanai*. Soil Conservation Service, U.S. Department of Agriculture. U.S. Government Printing Office, Washington, D.C.
- Fornander, Abraham
 1918 *Fornander Collection of Hawaiian Antiquities and Folklore* [Notes by Thomas G. Thrum] [Volumes 4, 5, 6]
- 1969 *An Account of the Polynesian Race: Its Origins and Migrations and the Ancient History of the Hawaiian People to the Times of Kamehameha I. (v. II)* Truber and Company, Ludgate Hill. [Original 1880]
- Haig, Brian D.
 1995 Grounded Theory as Scientific Method. *Philosophy of Education Society* [1996-2001], University of Cambridge. http://www.ed.uiuc.edu/EPS/PES-Yearbook/95_docs/haig.html
- Handy, E.S. Craighill and Handy, Elizabeth Green [Mary Kawena Pukui collaborator]
 1978 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bernice P. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu. [1972] [Original 1940 *The Hawaiian Planter*]
- Haun, Alan E.
 1991 *An Archaeological Survey of the Naval Air Station, Barber's Point, O'ahu, Hawai'i*. With historical notes by Marion Kelly. Applied Research Group, Bishop Museum, Honolulu.
- Hawaii Aviation-Kalaeloa Airport (HA-KA)
 2005-2013 Kalaeloa Airport. <http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/oahu-pre-world-war-ii/kalaeloa-airport>
- Hawaii Gov-HNL Airport (HG-HA)
 2013 Kalaeloa Airport. <http://hawaii.gov/hnl/airport-information/airlines-at-hnl> (airoahu@hawaii.gov)
- Hawaii State Library System (HSPLS)
 1989 *Hawaiian Legends Index* Vol II & III. Published by Hawaii State Library System, Honolulu.
- Ii'i, John Papa
 1989 *Fragments of Hawaiian History*. Honolulu: Bishop Museum
- Kamakau, Samuel Manaikalani [Translated by Mary Kawena Pukui, Edited by Dorothy B. Barrère]
 1992a *Ruling Chiefs of Hawai'i* [Revised Edition] The Kamehameha Schools Press, Honolulu.
- 1964 *Ka Po'e Kahiko: The People of Old*. Bishop Museum Press, Honolulu.
- 1992b *The Works of the People of Old: Na hana a ka po'e kahiko*. Bishop Museum Press, Honolulu.
- 1992 *Na Mo'olelo a ka Po'e Kahiko*. Bishop Museum Press, Honolulu.[translated from Newspapers *Ka Nupepa Kuokoa* and *Ke Au Okoa* by Mary Kawena Pukui and edited by Dorothy B. Barrere]
- Kekoolani, Dean
 2010 Kekoolani Genealogy of Ruling Chiefs-Name Index. [http://www.kekoolani.org/Pages/Kekoolani%20Genealogy%20Database%20\(PAF\)/index3.htm](http://www.kekoolani.org/Pages/Kekoolani%20Genealogy%20Database%20(PAF)/index3.htm)
- Lieb, Amos P. and A. Grove Day
 1979 *Hawaiian Legends in English: An Annotated Bibliography*. Second Edition. The University Press of Hawaii, Honolulu.
- Malo, David
 1971 *Hawaiian Antiquities* [Translated by Nathaniel B. Emerson, 1898] Bishop Museum Press, Honolulu [Original 1838/First Published 1903].
- McAllister, J. Gilbert
 1933 *Archaeology of O'ahu*. Bernice P. Bishop Museum, Honolulu [1976 Krauss Reprint Co., Millwood.]

- Magnuson, Coral M. and David J. Welch
 2003 *Archaeological Survey and Testing at the Northern Trap and Skeet Range, Former Naval Air Station Barbers Point, O'ahu, Hawai'i*. Prepared for Department of the Navy, Naval Facilities Engineering Command, Pearl Harbor. International Archaeological Research Institute, Inc., Honolulu.
- McKinzie, Edith Kawelohea [edited by Ishmael W. Stagner, II]
 1983 *Hawaiian Genealogies: Volume 1*. University of Hawaii Press, Honolulu.
 1986 *Hawaiian Genealogies: Volume 2*. University of Hawaii Press, Honolulu.
- Moffat, Riley M. and Gary L. Fitzpatrick
 1995 *Surveying the Mahele*. Editions Limited, Honolulu.
- O'Hare, Constance and Hallett Hammatt
 2003 *Archaeological Monitoring Plan For The Kalaeloa Campsite Bathhouse Area, Hono'uli'uli Ahupua'a 'Ewa District, Island Of O'ahu (TMK: 9-1-13:72)*. Prepared for Engineering Solutions, Inc. CSH, Kailua.
- Olson, Storrs L. and Helen F. James
 1982 Fossil Birds from the Hawaiian Islands: Evidence for Wholesale Extinction by Man Before Western Contact. *Science* Vol. 217.
- Pacheco, Robert, and Jane Allen
 2013 *Archaeological Assessment for the East Kalaeloa Energy Corridor in the Kalaeloa Community Development District, Honouliuli Ahupua'a, 'Ewa, O'ahu, Hawai'i. TMK (1) 9-1-013*. Prepared for Belt Collins Hawaii LLC. International Archaeological Research Institute, Inc., Honolulu.
- Pandit, Naresh R.
 1996 The Creation of Theory: A Recent Application of the Grounded Theory Method. *The Qualitative Report* 2(4), December. <http://www.nova.edu/ssss/QT/QR2-4/pandit.html>
- Peleioholani
 2011 S. K. Peleioholani genealogy. www.skpeleioholani.com
- Pratt, Linda, and Sam Gon III
 1998 "Terrestrial Ecosystems." In *Atlas of Hawaii* edited by Sonia P. Juvik and James O. Juvik, 3rd edition, pp 121-129.
- Pukui, Mary Kawena
 1928 *Hoku o Hawaii* March 12, 1928. In *Sites of O'ahu* by Elspeth P. Sterling and Catherine C. Summers, 1978, p 88.
 1983 *'Ōlelo No'eau: Hawaiian Proverbs & Poetical Sayings*. Bernice P. Bishop Museum Special Publication No. 71. Bishop Museum Press, Honolulu.
 1995 *Na Mele Welo: Songs of Our Heritage*. [Selections from The Roberts Mele Collection] Bishop Museum Special Publication 88. Bishop Museum, Honolulu.
- Pukui, Mary Kawena, Samuel H. Elbert and Esther T. Mookini
 1974 *Place Names of Hawaii*. University of Hawaii Press, Honolulu. [Revised Edition]
- Polynesian Voyaging Society (PVS)
 2013 "Voyaging: 1976-2003." (<http://pvs.hawaii.org/>)
- Silverman, Jane
 1987 *Kaahumanu, Molder of Change*. Friends of the Judiciary History Center, Honolulu.
- Sterling, Elspeth P. and Summers, Catherine C.
 1978 *Sites of O'ahu*. Bishop Museum Press. Honolulu. [Revised/Reprinted] Original 1962; Reprinted 1978.
- Tuggle, H. David
 1997 *Archaeological Inventory Survey for Construction Projects at Naval Air Station Barbers Point, O'ahu, Hawai'i, Phase I Survey for Housing Project H-208, Aviation Maintenance Training Building Project P-281, and PATSWINGPAC Project P-255, Phase II Survey for Family Housing Project H-208*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- Tuggle, H. David and M.J. Tomonari-Tuggle
 1997a *A Cultural Resource Inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i: Part I: Phase I Survey and Inventory Summary*. Prepared for Belt Collins Hawaii. International Archaeological Research Institute, Inc., Honolulu.
 1997b *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*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.
- Tuggle, H. David, and M.J. Tomonari-Tuggle; with contributions by D. Colt Denfeld and Ann Yoklavich
 1997 *A Cultural Resource Inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i; Part I: Phase I Survey and Inventory Summary*. Prepared for Belt Collins Hawaii. International Archaeological Research Institute, Inc., Honolulu.
- U.S. Department of the Navy Hydrographic Office
 1880-1893 North Pacific Ocean, Sandwich Islands, Southside [sic] of Oahu. Map. Latitude-longitude grid. Published 1880, Hydrographic Office, Washington, D.C., corrected through 1893. Hawaiian Survey Registered Map 0884. Available, <<http://ags.hawaii.gov/survey/map-search/>>, last accessed June 7, 2013.
- Waihona Aina Corporation
 2013 Mahele Database. www.waihona.com.
- Westervelt, William D.
 1976 *Hawaiian legends of old Honolulu*. Charles E. Tuttle Company, Japan [Original 1915] <http://www.sacred-texts.com/pac/hloh/index.htm>

Wickler, Stephen K., and H. David Tuggle
 1997 *A Cultural Resource Inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i; Part II: Phase II Inventory of Selected Sites Archaeological research Services for the Proposed Cleanup, Disposal and Reuse of Naval Air Station, Barbers Point O'ahu, Hawai'i (Task 2b)*. Prepared for Belt Collins Hawaii, Honolulu. International Archaeological Research Institute, Inc., Honolulu.

Wiki-Kalaeloa
 2013 Kalaeloa. http://en.wikipedia.org/wiki/Kalaeloa,_Hawaii

Wiki-Kalaeloa Airport
 2013 Kalaeloa Airport. http://en.wikipedia.org/wiki/Kalaeloa_Airport

Williamson, Eleanor et al.
 1983 "Preface" In *'Olelo No'eau* by M.K. Pukui. Bishop Museum Publication No. 71. Bishop Museum Press, Honolulu.

Wu, Nina
 2008 'Kalaeloa owner has plans.' *Star Bulletin* Vol. 13, Issue 78. March 18. <http://archives.starbulletin.com/2008/03/18/business/story02.html>

Yardley, Paul T.
 1981 *Millstones and Milestones—The Career of B. F. Dillingham*. University Press of Hawaii, Honolulu.

Youngblood, Ron
 1992 *On the Hana Coast*. Emphasis International Inc. and Carl Lindquist, Hong Kong [Original 1983]

APPENDIX A

Act 50 — 2000

A BILL FOR AN ACT RELATING TO
 ENVIRONMENTAL IMPACT STATEMENTS
 [UNOFFICIAL VERSION]

HOUSE OF REPRESENTATIVES H.B. NO, 2895 H.D.1
 TWENTIETH LEGISLATURE, 2000
 STATE OF HAWAII

A BILL FOR AN ACT
 RELATING TO ENVIRONMENTAL IMPACT STATEMENTS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawai'i's culture, and traditional and customary rights.

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit" in Hawai'i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

SECTION 2. Section 343-2, Hawai'i Revised Statutes, is amended by amending the definitions of "environmental impact statement" or "statement"

and “significant effect”, to read as follows:

““Environmental impact statement” or “statement” means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic [and] welfare, social welfare, and cultural practices of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects.

The initial statement filed for public review shall be referred to as the draft statement and shall be distinguished from the final statement which is the document that has incorporated the public’s comments and the responses to those comments. The final statement is the document that shall be evaluated for acceptability by the respective accepting authority.

“Significant effect” means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State’s environmental policies or long-term environmental goals as established by law, or adversely affect the economic [or] welfare, social welfare [., or cultural practices of the community and State.”

SECTION 3. Statutory material to be repealed is bracketed. New statutory material is underscored.

SECTION 4. This Act shall take effect upon its approval.

Approved by the Governor as Act 50 on April 26, 2000

APPENDIX B
Guidelines for Assessing Cultural Impacts
Adopted by the Environmental Council, State of Hawai‘i

November 19, 1997

INTRODUCTION

It is the policy of the State of Hawai‘i under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

II. CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants [consultants], including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupua‘a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua‘a and the geographical extent of the study area should take into account those cultural practices.

The types of cultural resources the historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua'a;
2. identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials is likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant [consultant] may provide information only on the condition that it remains in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

III. CULTURAL IMPACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

1. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have

affected the quality of the information obtained.

2. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.
3. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.
4. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.
5. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.
6. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.
7. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.
8. An explanation of confidential information that has been withheld from public disclosure in the assessment.
9. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.
10. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.
11. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

APPENDIX C
Scope of Work (SOW)

Cultural Impact Assessment [in accordance with OEQC Guidelines]

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua'a;
2. identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Methods

The specific tasks listed below expand on the above scope of work:

- ◆ Conduct historical and cultural background research (i.e., business records, land records; archival documents, literature, reports, letters, photographs, journals, or newspaper files) to locate material that will provide broad patterns of the history of the project area such as subsistence, religious, recreational, and commercial uses of the land; as well as settlement and residential patterns of the area and region; major family groups that inhabited, used or controlled lands within the project area and region; documented legends, myths, or traditional histories associated with the area; and descriptions of traditional practices, customs and beliefs associated with identified traditional cultural practices;
- ◆ Prepare a semi-structured ethnographic research instrument that will include questions that will generate general biographical information, association with and knowledge of the project area, its history and use;
- ◆ Prepare a consent form to be used as written agreement with any individual interviewed concerning the review of content and use of information recorded during the interview
- ◆ Identify individuals knowledgeable with the project area.
- ◆ Conduct and record ethnographic interviews with knowledgeable individuals. If feasible individuals shall participate in field inspections (Makana to be given)
- ◆ Transcribe recorded interviews (Approximate time, 6-8 hrs/per hr of recording)
- ◆ Prepare a report that will include an overview of the archival material, and an analysis of the ethnographic data.

APPENDIX D
Agreement to Participate in Ethnographic Survey

Project Title: East Kalaeloa Energy Corridor CIA
Ewa District, O'ahu

Interviewer: Maria "Kaimi" Orr, M.A.
Kaimipono Consulting Services, LLC
(808) 375-3317 kaimi@lava.net

You are being asked to participate in an ethnographic survey conducted by an independent interviewer from *Kaimipono Consulting Services* LLC (KCS) contracted by *International Archaeological Research Institute, Inc.* (IARII) to prepare a Cultural Impact Assessment (CIA) as part of an environmental compliance document prepared by *Belt Collins Hawaii* (BCH). The interviewer will explain the purpose of this survey/CIA project, the procedures to be used, the potential benefits and possible risks of participating. You may ask the interviewer any question(s) in order to help you to understand the process. If you then decide to participate, please sign on the second page of this form. You will be given a copy of this form.

I. Nature and Purpose of the Study

The purpose of this ethnographic survey is to gather information about the project lands through interviews with individuals who are knowledgeable about the area and/or about the history of these lands. The objective of this survey is to provide ethnographic data for the CIA report.

II. Explanation of Procedures

After you have voluntarily agreed to participate and have signed the consent page, the interviewer will tape record your interview and have it transcribed later. The interviewer may also need to take notes and/or ask you to spell or clarify terms or names that are unclear.

III. Discomforts and Risks

Foreseeable discomforts and/or risks may include, but are not limited to the following: having to talk loudly for the recorder and video; being recorded and/or interviewed; providing information that may be used in a report; knowing that the information you give may conflict with information from others; your uncompensated dedication of time; possible miscommunication or misunderstanding in the transcribing of information; loss of privacy; and worry that your comment(s) may not be understood in the same way you understand them. It is not possible to identify all potential risks.

IV. Benefits

This survey will give you the opportunity to express your thoughts/knowledge (*mana'o*), which will be listened to and shared; your knowledge may be instrumental in the preservation of significant historic information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected **if you so desire**. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the interviewer of your desires. The interviewer will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the interviewer for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, _____, understand that Maria "Kaimi" Orr, an independent interviewer contracted by *International Archaeological Research Institute, Inc.* will be conducting oral history interviews with individuals knowledgeable about the project lands in Kalaeloa. The oral history interviews are being conducted in order to collect information of the area.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. **I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the CIA report. I also understand that I will still have the opportunity to make revisions during the draft review process.**

_____ I am willing to participate.

_____	_____
Signature	Date
_____	_____
Print Name	Phone
_____	_____
Address	ZipCode

Email Address	

MAHALO NUI LOA!

Part II: Personal Release of Interview Records

I, _____, have been interviewed by Maria "Kaimi" Orr of Kaimipono Consulting Services LLC, an independent interviewer contracted by International Archaeological Research Institute, *Inc.* I have reviewed the transcripts of tape recordings of the interview and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS" below.

CLARIFICATION OR CORRECTIONS:

I further agree that KCS, IARII and/or Belt Collins Hawaii may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report to be made public, subject to my specific objections, to release as set forth below:

SPECIFIC CONDITIONS TO RELEASE OF INTERVIEW TRANSCRIPT:

_____	_____
Signature	Date
_____	_____
Print Name	Phone

Address	

	Zipcode

Email address	

MAHALO NUI LOA!

APPENDIX E
Ethnographic Survey

Basic Research Instrument for Oral History Interviews

This research instrument includes basic information as well as research categories which will be asked in the form of open primary questions which allow the individual interviewed (Ethnographic Consultant) to answer in the manner he/she is most comfortable. Secondary or follow-up questions are asked based on what the Consultant has said and/or to clarify what was said. The idea is to have an interview based on a “talk-story” form of sharing information. Questions will NOT be asked in an interrogation style/method, NOR will they necessarily be asked in the order presented below. This research instrument is merely a *guide* for the interviewer and simply reflects general categories of information sought in a semi-structured format. Questions will be asked more directly when necessary.

The Consultants were selected because they met one or more of the following criteria:

- ❖ Had/has Ties to Project Area/Vicinity
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Referred By Other Cultural Resource People
- ❖ Referred By Other People

[NOTE: Introduction of East Kalaheo Energy Corridor CIA Project is done before the Ethnographic Consultant signs the Consent Form, usually during the initial phone call to make interview appointments.]

[NOTE: This part of the interview, #1-4 is mutual sharing and rapport building. Most of the information for research categories “Consultant Background” and “Consultant Demographics” come from this section, but not exclusively.]

1. *To start please tell me about yourself...Name? Where/When you were born?*

[This information can be addressed in a couple of ways. After the interviewer first turns on the tape recorder, the following information will be recorded: Day/Date/Time/Place of Interview; Name of Consultant (if authorized by Consultant); Name of Interviewer; Initial Questions: Have you read the Agreement to Participate? Do you have any questions before we begin? Will you please sign the Consent Form? The interviewer will explain again the purpose of the interview.

The interviewer will then ask the Consultant to “Please tell me about yourself—when/where were you born? Where did you grow up? Where did you go to school?” This general compound question allows the Consultant to share as much or as little as he/she wants without any pressure. Some of the information for #1 may already be known to the interviewer.]

2. *History: Your ‘ohana/family background; Hawaiian connection (if any)?*

[Much of the information for questions #2, 3, and 4 usually comes from the “monologue” answer to Question #1. If it does not, then these questions will be asked. The answers in this section usually establish how the Consultant meets the criteria; how the Consultant developed his/her information base, etc.]

3. *Youth: Where lived? Grew up?* [This may have been answered in #1]

4. *Schooling? Where? When?* [This may have been answered in #1]

[NOTE: The next part of the interview, #5-7 reflects information sought for the following research categories: Land, Water, Marine, Cultural Resources and Use as well as Significant People and Events. The questions are open-ended so as NOT to “put words in the mouths” of the Consultants. The answers will help in assessing if any cultural properties or practices (or access to them) will be impacted by the proposed project.]

5. *Please tell me what you know about the lands of the Project Area?*

[NOTE: Generally when people share information about a specific topic/place, they usually state where their information came from. If it isn’t volunteered, it is asked as a follow-up question(s). A map of the project area should be available to confirm that interviewer and consultant are talking about the same place. Photos would also help if a field trip is not possible. The best scenario would be to be “on-site” at some part of the interview...although this is not always practical.]

6. *What are your recollections and/or personal experiences of this area?*

7. *Do you know any stories/legends/songs/chants associated with these areas?*

[NOTE: Possible follow-up questions if information not in their answers:

- How are you or your family connected to the Project lands?
- What year(s) were you and/or your family associated with these lands?
- What was this place called when you were growing up or working here?
- Can you describe what the area looked like—natural and/or man made things?
- To your knowledge what kind of activities took place in this location?
- Do you know of any traditional gathering of plants, etc in the area?
- Please describe any other land/water use? Resources?
- What was the historic land use? Sugar? Pineapple? Ranching? Agriculture?
- [Have map ready for marking.]
- Do you know about any burials in the project area? [last resort question]
- Do you know of any cultural sites in the project area or vicinity? [last resort question]

8. *Is there anyone you know who can also tell me about the project area?*

[NOTE: Usually in the course of the interview, Consultants suggest other people to interview.]

9. *As soon as the tape of this interview is transcribed I will send you two sets. Please review your transcript and make any corrections and/or additions, then sign both copies of the Release Forms thereby allowing the information to be used by the interviewer, and other Project Partners. Then mail one set back in the enclosed stamped-addressed envelope (or email corrected version).*

10. *If your revised transcript is not returned within two weeks of date of receipt, it will be assumed that you are in concurrence with the transcript material and your information will then be incorporated into any draft reports. However, you can still make changes during the draft review process.*

MAHALO NUI LOA

APPENDIX F
Mahele Testimonies-Kekauonohi

The testimonies are presented in the order from *Ulukau*: MaKaua111a (060107)

- *Helu* 1853/11216 (Native Register vol 3:277), M. Kekauonohi (w) appears to be challenging land claims in 1849 (house lots in Lahaina).
- *Helu* 4316 (Foreign Testimony vol 7:16-17), the 'ili lands of Pua'a in question with have the following description of house lots: "Lahainalalo Olowalu side of Dr. Baldwin's Meeting house, *makai* Kekauonohi's, Kaanapali of Kuakamauna. Clt.[Claimant-Keohokaua] had this house lot from Kahuni an Elder Brother who had it from Kuakamauna in 1839, and Clt. Has held it undisputed with the exception of a Cl. [claim] made by Kalua for Kekauonohi."
- *Helu* 84 (Foreign Register vol 1:93) from Thomas Phillips regarding the lands of Kamani in Lahaina: "I beg leave to lay before you my claim to a land situated in Lahaina Maui, known by the name of Kamani; it was given me by Kekauonohi in the year 1829 for services rendered her, and was taken away from me by Kaahumanu in 1831."
- *Ma Kaua* 111a (060107) #4. I know his house lot at Puako, Lahaina. Kalua has always lived there since 1843. It was divided in 1848. On the 8th of February 1848, Kekauonohi gave the *makai* half of this lot to Kalua and his heirs forever. Here are the boundaries. *Mauka*, Kekauonohi ½. Olowalu, lot of Davida [Malo]. *Makai*, Government Road. Kaanapali, Kaleleiki. Here are the witnesses, myself, Kuakamauna, Momona and Kaeo.
- *Helu* 82 & 86 – Thomas Phillips – Kamani: "Arbiters. Did you see Keliiahonui give some lands in Lahaina to Phillips, from Kekauonohi?" "A. Keliiahonui Sworn on the word of God. I do not know. I did hear that some land was given to Keaki. But I do not know for certain. We spoke with Phillips in Hilo, he came and lived as a carpenter, and did not talk about land payment. He did not pay for living with us. It was not regular work, just certain times, when there was work to be had. We did not agree to giving him land in Hilo. It was not spoken of at that time in the year that he resided with us. We provided the food and he did also, sometimes."
- (Same doc as above): Mahina Sworn on the word of God. I know that Phillips has Kamani, he built a house there, though it was not finished in the year 1829 or 1830 perhaps. I do not know why it was not finished. I do not know who gave him the land, though I heard it was Kekauonohi. I do not know who took the land away. At the time that Hoapili gave me a *loi*, a certain person said that the *loi* was Phillips, so I did not take it. Therefore he pointed out the portion of land that is for me, above that *loi*. It was moved that it would be set aside and heard by *Levi* folks..."
- *Helu* 82 & 86 (Native Testimony vol 1:116-118, 1846) Re: Thomas Phillips and lands of Kamani. "Witness, Keaki sworn on the word God. Phillips obtained this land and got a wooden house, that was not completed. The land was taken and the lumber as well. He purchased the wooden house from a man of Kekauonohi's. The land was Kekauonohi's. I do not know who took the land away at this time. I have seen Kaniau living there below Namahoe, in the year 1831.
- *Helu* 1853 (Foreign Testimony vol 3:210, 1849). Re: M. Kekauonohi – Halekamani and other Lahaina lands:
No.1. Kaeo sworn. "I know this land, it is Halekamani in Lahaina Maui. A house lot of 7 houses of Clt. [Claimant] & fenced, having a fish pond. *Mauka* is the main Road. Olowalu Lahili & A. Kaeo. *Makai* Sea. Kaanapali Kanaina and Holulo. Claim't had this from Kam. I, and has held it undisputed ever since.
No.2. Pahamanama. House lot in Lahaina, having 7 Houses principally built by Foreigners who hold on short leases. *Mauka* by Main Road. Olowalu Kanaina. *Makai* Sea. Kaanapali, King. Derived with No. 1 in the same way, and never disputed.
3. House lot Makaulia, Lahaina. Two houses fenced. *Mauka* by Ohihee. Olowalu School house. *Makai*, Road. Kaanapali, Baldwin's lot. Claimant had this from Nahienaena and has held it undisputed.
4. Kahikona. Lahaina. 2 houses fenced. *Mauka*, King. Olowalu, Kuakoa & Road. *Makai*, Kalua. Kaanapali, Kaleleiki. Clt. had this from Kam. I, undisputed.

- 5. Kuakoa lives in charge. 1 house unfenced. *Mauka*, Olowalu and *Makai*, Claim'ts land. Kaanapali is Kahikona. Kuakoa is *luna*.
- 6. Kaluapelapela is *Konohiki* of this lot. 2 houses fenced. *Mauka*. Kahikona. Olowalu, Road. *Makai* Keawa. Kaanapali, Kaleleiki. Clt. had this as the others and is undisputed.
- 7. This lot is in Kuakamauna's hands, and not claimed by Kekauonohi. Partly disputed by Mapu.
- 9. Puaa, cultivated lot fenced. *Mauka*, Kuakamauna. Olowalu, same. *Makai*, Peahi and Manono. Kaanapali, Peahi. Derived from her Ancestors far back, undisputed.
Kaaui Sw. I know the testimony just given is true in the main. No. 1 is clear. No. 2 was Clt's. but she has allowed several persons to occupy part of this lot who have sent in Claims to L. Comm'r. Mahoe, Pupuka, Kalua W. are their names. They have lived there 25 or 30 years. They have their fences around their lots. All the rest is Claimants."
- *Helu* 4878M (Foreign Testimony vol 7:32, 1849). "Kaaui Sw. I know the lands of the Clt. They are in Kauaula, and a House lot in "Puehuehu." They consist of three distinct pieces. Clt. obtained his lands in "Kauaula" from Kekauonohi in 1836, and his House lot in Halama at the same time. He has been in undisturbed possession ever since."
- *Helu* 6851 (Foreign Testimony vol 7:62 – Kahula, Puaanui lands). "Naiiili Sw. I know the lands of the Clt. They are in "Puaanui," Lahaina, they consist of 6 lois in one piece. The Clt. recd. this land from Kapeleaumoku the *konohiki* of the land at the time John Young was Governor of Maui, about 1840, and he has enjoyed them without disturbance. Kekauonohi is the great Lord of this land."
- *Helu* 4878K (Foreign Testimony vol 7:31 – Piapia, Kauaula & Makila lands). "Kaiaholokai, Sw. I know the lands of the Clt. They are in Kauaula, Lahaina and consist of 40 lois in one piece, and one piece of *kula*. He has also a house in the yard of Ohai in "Makila", but no house lot. Clt. recd. these lands from Keliiahonui, the husband of Kekauonohi, who is the Lord of this land. He obtained them in 1835 and he has held possession of them ever since without disturbance."
- *Helu* 364 (Foreign Register vol 2:1 – John White, Polaiki 1846). "I wish to present the following claim to your attention. In the year 1829 after Lord Russell's visit to these Islands; through I by intercession by Mr. Richards; Kahumanu (Kaahumanu) gave me land through Kekauonohi; situate in the south part of the Town of Lahaina, called Polaiki. This land was owned by the mother of his Majesty, the present King [Kamehameha III]. And I have to the present time continued to hold it."
- *MaKaua111a* (060107) Recorded in *Buke Mahele*. "Kauaula Relinquished by Mikahela Kekauonohi to Kamehameha III (pp. 26-27, Jan. 28, 1848)
- *Helu* 82 & 86) (Native Testimony vol 1:107-108 – Thomas Phillips, Kamani 1846). "He came on this day, but the work was left to Tuesday. For the King is one of the witnesses. Keoni A. asked him if it was true, about Thomas Phillips' house lot claim in Lahaina. Kalaimoku, M. Kekauonohi and A. Keliiahonui are also witnesses for his claims. "
- *Helu* 364 (Native Testimony vol 3:220 – John White, Polaiki 1848). "Kekauonohi Sworn and States. I know the land of J. White in Lahaina, Maui. It is not exactly as given by the previous witnesses. It was not in the time of Kamehameha I that he got it. I gave him his land in the time of Kamehameha III, that is the time that J. White resided there. When I moved, I gave him his land. It is the land that Kalaipaihala has opposed for J. White. This land became White's, because I gave it to him in the year 1831."
- *Helu* 364 (Foreign Testimony vol 2:443, pg 430 – John White, Polaiki 1848). "Kekauonohi sworn. I gave this land to the Claimant in time of Kamehameha 3. I gave it through Mr. Richards about 1826, two or three years after he came to the islands. It was not given to be his forever, but given as land is always given by the Chiefs to foreigners; that is as long as they behave well and live uprightly."

**APPENDIX G
LCA & Royal Patent Claims
Waihona 2013**

HONOULIULI

	LCA	Claimant	Island	District	Ahupuaa	Ili	Awarded
Preview 1	0000003	Poina	Oahu	Ewa	Honouliuli		1
Preview 2	00745!	Mahina	Oahu	Ewa	Honouliuli		x
Preview 3	00746	Naholowaa	Oahu	Kona, Ewa	Honolulu, Honouliuli		0
Preview 4	00747	Nakai	Oahu	Ewa	Honouliuli	Kailikahi, Nukee	0
Preview 5	00748	Kalauhala	Oahu	Ewa	Honouliuli	Panahaha, Kaaumakua	1
Preview 6	00749	Mahina	Oahu	Ewa	Honouliuli	Kaulaula	1
Preview 7	00751	Kalauli	Oahu	Ewa	Honouliuli	Kamoku, Polapola, Kalihikahi	1
Preview 8	00752	Haee	Oahu	Ewa	Honouliuli	Kailikahi, Kailihai	1
Preview 9	00753	Manuwa	Oahu	Ewa	Honouliuli	Kamoku	1
Preview 10	00754	Kaunahi	Oahu	Ewa	Honouliuli	Niukee	1
Preview 11	00755	Keinohanani	Oahu	Ewa	Honouliuli	Niukee, Kailikahi, Kaakau	1
Preview 12	00756	Kaouou	Oahu	Ewa	Honouliuli	Kaaumakua	1

Preview 13	00757	Kaniau	Oahu	Ewa	Honouliuli	Kuwiliwili	0
Preview 14	00758	Nihua	Oahu	Ewa	Honouliuli	Niukee	1
Preview 15	00759	Liliu	Oahu	Ewa	Honouliuli	Loloulu	0
Preview 16	00760	Kuhemu	Oahu	Ewa	Honouliuli	Kamaipipipi, Niukee, Naopala, Kailikahi	1
Preview 17	00761	Kinolua	Oahu	Ewa	Honouliuli	Niukee, Kailikahi, Ilikahi, Palahemo	1
Preview 18	00762	Kalama	Oahu	Ewa	Honouliuli	Kaaumakua	1
Preview 19	00763	Keliiaa, Solomona	Oahu	Ewa	Honouliuli	Hiwa, Poohilo, Mauakapua, Uani / Maui, Polapola	1
Preview 20	00764	Maeaea	Oahu	Ewa	Honouliuli	Lihue	0
Preview 21	00765	Kamalaee	Oahu	Ewa	Honouliuli	Niukee, Kailikahi, Palahemo	1
Preview 22	00766	Paele	Oahu	Ewa	Honouliuli	Niukee, Kaluamooiki, Kailikahi	1
Preview 23	00767	Hapauea	Oahu	Ewa	Honouliuli	Niukee, Kapapahi	1
Preview 24	00768	Pio	Oahu	Ewa	Honouliuli	Kahaumakua, Niukee, Waioha	1

Preview 25	00769	Pekane	Oahu	Ewa	Honouliuli	Kaamakua	0
Preview 26	00831	Kaekuna	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 27	00832	Opiopio	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 28	00834	Oni	Oahu	Ewa	Honouliuli	Poohilo, Kailikahi	1
Preview 29	00839	Kaaiwaawa	Oahu	Ewa	Honouliuli	Kamilomilo, Kailikahi, Haole, Poohilo	1
Preview 30	00844	Kuailau	Oahu	Ewa	Honouliuli	Puehuehu, Poohilo	0
Preview 31	00845	Kekukahiko	Oahu	Ewa	Honouliuli	Kapapahi, Niukee	1
Preview 32	00847	Hinaa	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 33	00848	Kapule	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 34	00869	Pue	Oahu	Ewa	Honouliuli	Maui	1
Preview 35	00872	Kahakuliili	Oahu	Ewa	Honouliuli	Loloulu, Paakai, Papaioa	1
Preview 36	00874	Laamaikahiki	Oahu	Ewa	Honouliuli	Polapola, Hiwa	1
Preview 37	00876	Nohunohu, Iopa	Oahu	Ewa	Honouliuli	Niukee, Nukee	1

Preview 38	00881	Kikala	Oahu	Ewa	Honouliuli	Polapola	1
Preview 39	00883	Kumupopo, Iona	Oahu	Ewa	Honouliuli	Poohilo, Puaaluu, Kaamakua, Loloulu	0
Preview 40	00886	Kahalewai	Oahu	Ewa	Honouliuli	Kamoku, Manuwa	1
Preview 41	00887	Kaihikapu	Oahu	Ewa	Honouliuli	Kalaieka, Kapapapuhi, Kuainihi, Kalokoeli, Pakai	1
Preview 42	00892	Aoa, Samuela	Oahu	Ewa	Honouliuli	Kapapahi, Niukee	1
Preview 43	00895	Kekuahiko	Oahu	Ewa	Honouliuli	Nukee, Niukee	0
Preview 44	00898	Kaneaola	Oahu	Ewa	Honouliuli, Waieke	Polapola, Kahawai, Hiwa	1
Preview 45	00901	Kuahine	Oahu	Ewa	Honouliuli	Nukee / Niukee,	1
Preview 46	00902	Haakue, wahine	Oahu	Ewa	Honouliuli	Waimanalo	0
Preview 47	00905	Kaimuena	Oahu	Ewa	Honouliuli	Kaamakua	1
Preview 48	00906	Kanoho	Oahu	Ewa	Honouliuli	Kamoku	1
Preview 49	00907	Luana	Oahu	Ewa	Honouliuli	Kamaipipipi, Niukee	1
Preview 50	00910	Nunu	Oahu	Ewa	Honouliuli	Kaamakua	1

Preview 51	00911	Kauhailepa	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 52	00914	Kamaala	Oahu	Ewa	Honouliuli	Niukee, Kapapahi	1
Preview 53	00916	Kama	Oahu	Ewa	Honouliuli	Loloulu, Makau	1
Preview 54	00917	Kaulu	Oahu	Ewa	Honouliuli	Kamilomilo, Kaaumakua	1
Preview 55	00946	Kaunui	Oahu	Ewa	Honouliuli	Poohilo	0
Preview 56	00947	Kaopala	Oahu	Ewa	Honouliuli	Loloulu, Kaulaula	1
Preview 57	00960	Poopuu	Oahu	Ewa	Honouliuli	Loloulu	1
Preview 58	01019	Kukuiaina	Oahu	Ewa	Honouliuli		0
Preview 59	01565	Kaalauahi	Oahu	Ewa	Honouliuli	Niukee, Kapapahi	1
Preview 60	01566	Kaheananui	Oahu	Ewa	Honouliuli	Loloulu	0
Preview 61	01570	Kekua	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 62	01570B	Paekane	Oahu	Ewa	Honouliuli	Kaaumakua	1
Preview 63	01570C	Naholowaa	Oahu	Ewa	Honouliuli	Kaaumakua	1
Preview 64	01573	Kawahamana	Oahu	Ewa	Honouliuli	Niukee, Kapapahu	1

Preview 65	01580	Kanahuna	Oahu	Ewa	Honouliuli	Kamilomilo	1
Preview 66	01580B	Kapioho/Kapiioho	Oahu	Ewa	Honouliuli	Polapola, Kahiwapalaai	1
Preview 67	01596	Kahawai	Oahu	Ewa	Honouliuli	Poohilo	0
Preview 68	01598	Kekua	Oahu	Ewa	Honouliuli	Loloulu, Kapapahi	1
Preview 69	01605B	Nakai	Oahu	Ewa	Honouliuli	Mahuna, Niukee	1
Preview 70	01666	Mauwele	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 71	01666B	Kuahilo	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 72	01670	Moano	Oahu	Ewa	Honouliuli	Loloulu, Kaaumakua	1
Preview 73	01672	Makue	Oahu	Ewa	Honouliuli	Kamoku, Kapapahu	1
Preview 74	01688	Poopuu	Oahu	Ewa	Honouliuli	Loloulu	0
Preview 75	01699	Leleiaupa	Oahu	Ewa	Honouliuli	Maui, Poaiwaikele	1
Preview 76	01701	Alaluka	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 77	01703	Aimaikai	Oahu	Ewa	Honouliuli	Kamilomilo	1
Preview 78	01713	Healani	Oahu	Ewa	Honouliuli	Niukee, Kapapahu	1
Preview 79	01719	Hilea	Oahu	Ewa	Honouliuli	Kaaumakua	1

Preview 80	01720	Hilinae	Oahu	Ewa	Honouliuli	Polapola	1
Preview 81	03857	Puaa	Oahu	Ewa	Honouliuli	Kalahaka, Lahueiki	0
Preview 82	05204	Kalama 2	Oahu	Ewa	Honouliuli	Bolabola, Polapola	1
Preview 83	05653	Kua	Oahu	Ewa	Honouliuli	Maui, Polapola, Kahui	1
Preview 84	05653B	Kanehikili	Oahu	Ewa	Honouliuli	Poohilo	1
Preview 85	05653C	Kalaulii	Oahu	Ewa	Honouliuli	Polapola	0
Preview 86	05654	Kuhiena	Oahu	Ewa	Honouliuli	Maui, Poohilo	1
Preview 87	05670	Kawaakele	Oahu	Ewa	Honouliuli	Polapola	0
Preview 88	05670B	Kaohai	Oahu	Ewa	Honouliuli	Kaihuopalaai, Polapola	1
Preview 89	05670C	Kumupopo	Oahu	Ewa	Honouliuli	Poohili, Kepoe, Loloulu, Puaaluu	1
Preview 90	05950	Pihana	Oahu	Ewa	Honouliuli	Kamoku	1
Preview 91	08658	Kapoli	Oahu	Ewa	Honouliuli	Loloulu	0
Preview 92	08878	Kou, S.	Oahu	Ewa	Honouliuli		0
Preview 93	09037	Kahakai, H.	Oahu	Ewa	Honouliuli	Waimanalo	0

Preview 94	09351	Kauakahilau	Oahu	Ewa	Honouliuli	Poohilo	0
Preview 95	10933	Uia	Oahu	Ewa	Honouliuli	Niukee	1
Preview 96	11216*O	Kekauonohi, Mikahela	Oahu	Ewa, Koolauloa	Honouliuli, Waimalu, Makao		1

Honouliuli RP (73)

	RP Number	Patentee	Island	District	Ahupuaa	TMK
Preview	0869	Kinolua	Oahu	Ewa	Honouliuli	
Preview	1082	Pue	Oahu	Ewa	Honouliuli	
Preview	1083	Kaihekapu	Oahu	Ewa	Honouliuli	1-9-4-001, 049
Preview	1084	Kauakahilau	Oahu	Ewa	Honouliuli	
Preview	1085	Opiopio	Oahu	Ewa	Honouliuli	
Preview	1086	Paele	Oahu	Ewa	Honouliuli	
Preview	1277	Keinohanamui no Kaope	Oahu	Ewa	Honouliuli	1-9-1-22
Preview	1278	Kahakuliilii	Oahu	Ewa	Honouliuli	
Preview	1493	Kaihekapu, see 1083	Oahu	Ewa	Honouliuli	1-9-4-001, 049
Preview	2337	Pio no Wahinenui	Oahu	Ewa	Honouliuli	
Preview	2865	Kalama 2	Oahu	Ewa	Honouliuli	
Preview	2866	Kaulu no Kaoliko	Oahu	Ewa	Honouliuli	
Preview	2867	Mahina	Oahu	Ewa	Honouliuli	
Preview	2868	Kapiioho/Kapioho	Oahu	Ewa	Honouliuli	
Preview	2869	Haae	Oahu	Ewa	Honouliuli	1-9-1-20

Preview	2870	Hiilea	Oahu	Ewa	Honouliuli	
Preview	2871	Kikala	Oahu	Ewa	Honouliuli	1-9-1-21
Preview	3078	Kua	Oahu	Ewa	Honouliuli	
Preview	3084	Alauka	Oahu	Ewa	Honouliuli	
Preview	3085	Kaohai	Oahu	Ewa	Honouliuli	
Preview	3086	Kapule	Oahu	Ewa	Honouliuli	
Preview	3087	Kekua	Oahu	Ewa	Honouliuli	
Preview	3088	Kuhiena	Oahu	Ewa	Honouliuli	
Preview	3089	Laamaikahiki	Oahu	Ewa	Honouliuli	
Preview	3090	Kaopala	Oahu	Ewa	Honouliuli	1-9-1-19, 21
Preview	3091	Kaopala	Oahu	Ewa	Honouliuli	
Preview	3092	Hinaa	Oahu	Ewa	Honouliuli	1-9-1-19
Preview	3287	Hilinae	Oahu	Ewa	Honouliuli	
Preview	3384	Keliiaa, Solomona	Oahu	Ewa	Honouliuli	1-9-1-21
Preview	3386	Kaneaola	Oahu	Ewa	Honouliuli	
Preview	3415	Oni	Oahu	Ewa	Honouliuli	1-9-1-19
Preview	3518	Kekua	Oahu	Ewa	Honouliuli	1-9-1-19
Preview	3548	Moano	Oahu	Ewa	Honouliuli	
Preview	3717	Kanoho no	Oahu	Ewa	Honouliuli	1-9-1-20

		Abrahamson				
Preview	3718	Kawahaea	Oahu	Ewa	Honouliuli	
Preview	3803	Kuhemu	Oahu	Ewa	Honouliuli	1-9-1-22
Preview	3856	Kaunahi	Oahu	Ewa	Honouliuli	1-9-1-22
Preview	3857	Kaalauahi	Oahu	Ewa	Honouliuli	
Preview	4157	Kukahiko	Oahu	Ewa	Honouliuli	
Preview	4162	Luana	Oahu	Ewa	Honouliuli	
Preview	4163	Kamaala	Oahu	Ewa	Honouliuli	
Preview	4179	Nakai	Oahu	Ewa	Honouliuli	1-9-1-22
Preview	4244	Kawahamana	Oahu	Ewa	Honouliuli	
Preview	4309	Nihua	Oahu	Ewa	Honouliuli	
Preview	4584	Kaekuna	Oahu	Ewa	Honouliuli	
Preview	4585	Kaaiawawa	Oahu	Ewa	Honouliuli	1-9-1-19
Preview	4700	Nohunohu, Iopa	Oahu	Ewa	Honouliuli	
Preview	5018	Kanahuna	Oahu	Ewa	Honouliuli	
Preview	5036	Nunu	Oahu	Ewa	Honouliuli	
Preview	5134	Pekane	Oahu	Ewa	Honouliuli	
Preview	5141	Kalama	Oahu	Ewa	Honouliuli	2-4-6-16, 19, 26, 27
Preview	5142	Manua	Oahu	Ewa	Honouliuli	1-9-1-20

Preview	5457	Makue	Oahu	Ewa	Honouliuli	1-9-1-20
Preview	5483	Kauhailepa	Oahu	Ewa	Honouliuli	
Preview	5521	Healani	Oahu	Ewa	Honouliuli	
Preview	6261	Kama	Oahu	Ewa	Honouliuli	1-9-1-22
Preview	6509	Kamalaie	Oahu	Ewa	Honouliuli	
Preview	6641	Poopuu	Oahu	Ewa	Honouliuli	1-1-8-05, 1-2-2-20
Preview	6767	Aoao, Samuela	Oahu	Ewa	Honouliuli	
Preview	6768	Naholowaa	Oahu	Ewa	Honouliuli	
Preview	6771	Aemaikai	Oahu	Ewa	Honouliuli	
Preview	6806	Kumupopo	Oahu	Ewa	Honouliuli	
Preview	6820	Kaimuena	Oahu	Ewa	Honouliuli	
Preview	6825	Kalauhala	Oahu	Ewa	Honouliuli	
Preview	6826	Pio	Oahu	Ewa	Honouliuli	
Preview	6827	Kanehekili	Oahu	Ewa	Honouliuli	1-9-1-20
Preview	6828	Uia or Uwia	Oahu	Ewa	Honouliuli	
Preview	6829	Leleiupa	Oahu	Ewa	Honouliuli	1-9-1-21
Preview	6878	Kalauli	Oahu	Ewa	Honouliuli	1-9-1-20, &
Preview	6934	Kauouo	Oahu	Ewa	Honouliuli	
Preview	6935	Puuiawa	Oahu	Ewa	Honouliuli	1-9-1-20

Preview	6971	Kekauonohi, M.	Oahu	Ewa	Honouliuli	1-9-1	
Preview	7356	Mauwele	Oahu	Ewa	Honouliuli		

APPENDIX H
Signed Consent Forms

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APPENDIX C

TERRESTRIAL VEGETATION AND WILDLIFE SURVEYS



Report of Findings

**Terrestrial Vegetation and Wildlife Surveys
East Kalaeloa Energy Corridor
'Ewa, O'ahu, Hawai'i**

Prepared for:
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Prepared by:
ICF Jones & Stokes, Inc.
620 Folsom Street, Suite 200
San Francisco, California 94107

And:
LeGrande Biological Surveys, Inc.
68-310 Kikou Street
Waialua, Hawaii 96791

July 2013

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INTRODUCTION

The proposed project lies within the East Kalaeloa Energy Corridor and is part of a comprehensive redevelopment effort ultimately stemming from the closure of the Barbers Point Naval Air Station (NAS) in 1999. The State of Hawaii took ownership of the released lands in the former NAS Barbers Point and assigned planning and administration of redevelopment, and improvements to area infrastructure, to the Hawaii Community Development Authority (HCDA) (State of Hawaii 2006). To spur development within the Kalaeloa Community Development District, HCDA has embarked on two projects to provide a reliable, non-military, source of electricity (i.e., from HECO) into the District. The first was along Fort Barrette Road/Enterprise Avenue, between Kapolei Parkway and Midway Road, which was intended to energize the District's central area. The second is intended to energize the District's eastern and southern boundaries and is the subject of this study (Belt Collins Hawaii 2013). This second project will involve the installation of electrical and communication distribution system along Tripoli Road, Essex Road, Gambier Bay and Bismark Sea Roads, with in interconnection between Hawaiian Electric Company, Inc. and proposed privately-developed photovoltaic solar energy facility. The proposed corridor is located within the existing road rights-of-way for a distance of approximately 17,000 ft., and is approximately 40 ft. wide (Figure 1).

This report presents the findings of a plant and animal inventory conducted along the East Kalaeloa Energy Corridor following the proposed alignment of overhead electric power and communication lines. The overhead lines are to be supported by 65 ft. high power poles. The inventory focuses upon Listed, Proposed, and Candidate Endangered Species, critical habitats, and Species of Special Concern. It is prepared for Belt Collins Hawaii LLC in support of HRS §343 and HRS §195-D compliance requirements.

SITE DESCRIPTION

The East Kalaeloa Energy Corridor (Corridor) lies within the arid 'Ewa Plain, an area of roughly 29 square miles, which encompasses an emergent limestone reef to the west of Pearl Harbor on the Island of O'ahu. Soils are generally shallow and the limestone substratum is dotted with numerous depressions and sink holes. Principal soil types within the Corridor include "Coral Outcrop" (CR) from the corner of Essex Road at the south-east corner of the golf course south to the intersection of Coral Sea Road and Tripoli Road, and "Malama Stony Silty Clay Loam" (MnC) for the northern section of the survey area (NRDC 2013). Annual average rainfall is low, but infrequent rainfall associated with cyclonic storms and periodically strong advection can be locally heavy, resulting in ephemeral ponds forming within limestone depressions. Ordy Pond, is a flooded sink hole roughly 230 feet in diameter and 18 feet deep, situated just north of the Corridor along Tripoli Road in Lot 13058-F (Department of the Navy BRAC Management Office 2011). The pond is considered brackish (Schoonmaker, et al. 2003); however, it has no surface connection to the sea nor does it harbor endemic brackish water species characteristic of 'anchialine' ponds.



Figure 1
Project Overview



The biological inventory encompassed a 17,000 ft. by 40 ft. corridor along Tripoli Road, beginning at the intersection of Tripoli and Coral Sea Roads, east to Essex Road, then north to Geiger Road, and to a section of cleared vegetation parallel to the Honouliuli Waste Water Treatment Plant (WWTP). The Corridor follows the southern-most margins of Lot 13058-F (Ordy Pond), southern and eastern-most margins of Lot 13058-G (Southern Trap and Skeet Range), eastern-most margin of Lot 13058-D (Northern Trap and Skeet Range), and the southern and eastern-most boundaries of Lot 13058-B (Navy Golf Course) as defined in Department of the Navy BRAC Management Office (2011).

Four primary terrestrial habitats were encountered in the study area. Tripoli Road is bounded on both the north and south by dense *kiawe-haole koa* scrub vegetation. Essex Road is bordered on the east by dense *kiawe-haole koa* scrub and on the west by open lands which include a sod farm and construction yard, both of which contained standing water. The Navy Golf Course, which encompasses the Gambier Bay Road and Bismark Sea Road corridor, consists of open manicured grasses with scattered ornamental trees, and scattered copses of *kiawe*. Lands adjacent to the golf course include an open construction area and tract housing to the south, and *kiawe haole-koa* scrub to the east. The relatively open lands adjacent to the northern-most section of the Corridor adjacent to the Honouliuli WWTP are high disturbed by heavy vehicular traffic, vegetation clearing, and grading. Photographs of the project area are found in Appendix A.

Char and Balakrishnan (1979) noted two ponds in lands adjacent to the Corridor. Maps provided in their report illustrate both Ordy Pond and an irregularly shaped, unnamed “pond” that lies just east of Ordy Pond and north of and adjacent to Tripoli Road. Ordy Pond is well inside the fence line north of and outside the Corridor. The area identified by Char and Balakrishnan (1979) as “pond” actually consists of several low limestone depressions which held standing water and considerable algal growth at the time of our survey. It is not known if these standing waters represent jurisdictional wetlands under Section 404 of the Clean Water Act (33 U.S.C. 1344) or Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). These scattered basins lie to the north of the chain link fence along Tripoli Road and are thus outside, but adjacent to, the Corridor.

METHODS OF STUDY

The inventory was conducted by biologist John Ford (ICF Jones & Stokes) and botanist Maya LeGrande (LeGrande Biological Surveys). Both are long-time Hawaii residents, University of Hawaii graduates, and professional consultants intimately familiar with Hawaii’s island biota. Prior to conducting field work, the biologists reviewed existing scientific literature, previously prepared environmental impact assessments and statements, biological survey reports, topographic maps and images, and engineering drawings relevant to the proposed project. Field data was collected on April 22 and 24, 2013 between 6:15am and 12:30pm. Additional incidental wildlife observations were also made on April 22 in the afternoon between 1:30pm and 5:00pm, and again in the evening hours of April 25, 2013 between 4:30pm and 7:00pm. Portions of the Navy Golf Course were resurveyed on June 4, 2013 between 6:00am and 9:30am.

Prior to conducting field work, the biologists reviewed the U.S. Fish and Wildlife database (USFWS 2010a) in order to determine if any Threatened or Endangered taxa are known to reside within the study area or in close proximity. Plants were inventoried during a pedestrian survey along the 17,000 ft. long by 40 ft. wide Corridor, with some areas surveyed up to 80 or 100 feet from the Corridor centerline. Notes were collected on plant associations and plant distribution, disturbances, topography, substrate types, exposure, drainage, and related factors.

Birds were observed at 15 point count stations established at varying intervals of 500 – 2000 ft. along the 17,000 ft. alignment of the Corridor. Four stations were situated along Tripoli Road, three on Essex Road above the corner of Tripoli Road, five along Essex Road at the golf course, one at the intersection of Gambier Bay and Bismark Sea Roads, and two in the vicinity of the Honouliuli WWTP (Figure 2). One eight-minute point count was conducted at each station on April 22, 2013. Additional observations were also collected as noted above. Birds were identified visually with Nikon 8 x 42 6.3° binoculars, and also by vocalizations. Weather during the course of surveys began with heavy overcast and scattered rain showers in the early morning, becoming partly cloudy toward mid-day with very light winds. Observations of mammals, amphibians, reptiles, and insects were made incidental to the collection of avian point-counts and related surveys of vegetation. Visual observations of animals, animal vocalizations, tracks, and scat were tallied. No effort was made to develop quantitative estimates of mammal populations within the project area. Since it is located outside the Corridor, the biota of Ordy Pond was not surveyed during this study.

Eric Link (ICF Jones & Stokes) produced the maps used for this report with ESRI ArcGIS 10.1 software. The avian point count location data was collected in the field by ICF biologist John Ford with a Trimble GeoXt 6000 series GPS unit with sub-meter precision, and was post-processed to achieve the highest level of accuracy. The Hawaii base map foundation data were acquired from ESRI. Water bodies and protected area boundaries were obtained from Char and Balakrishnan (1979) and USFWS (2010a), and lot boundaries were obtained from the Department of the Navy (2011). These data were digitized and geo-referenced by Eric Link. The maps are projected to StatePlane_Hawaii_3_FIPS_5103_Feet and based upon the North American (NAD) 1983 datum.

SURVEY RESULTS

Vegetation

We observed a total of 106 plant species within the Corridor. These species are listed in Appendix B. Ninety eight (98) of the 106 species observed, or over 92% of the total number of species found, are alien to Hawai’i. Eight species are native to Hawai’i, two of which are endemic species and six are indigenous (see Appendix B). We did not find any of the plant species listed as a threatened, endangered species, or a species of concern (U.S. Fish and Wildlife Service, 2010) within the Corridor.

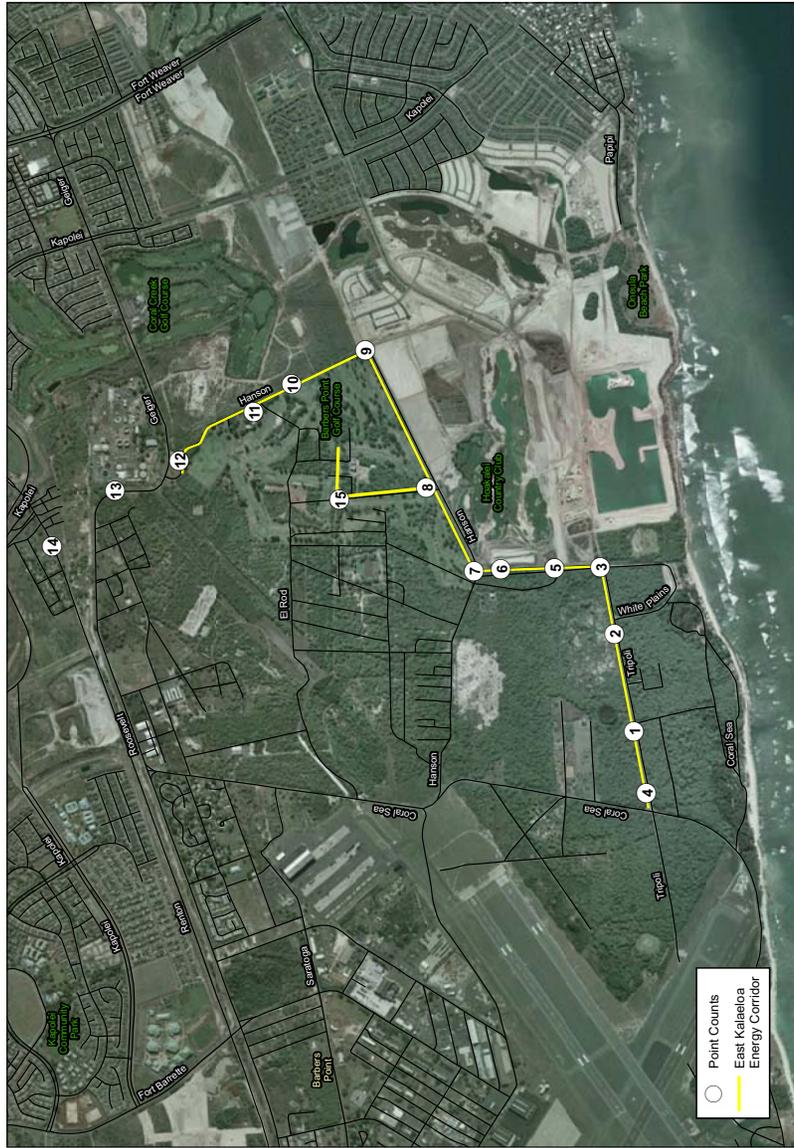


Figure 2
Avian Point Count Locations

The vegetation along the Tripoli Road alignment is dominated by large *kiawe* (*Prosopis pallida*) trees with weeds and grasses dominating the shoulder of the roadway. These include buffelgrass (*Cenchrus ciliaris*) and swollen fingergrass (*Chloris barbata*). Vines such as ivy gourd (*Coccinea grandis*) and purple allamanda (*Allamanda blanchetii*) were observed growing in the tree canopy, with an understory of Guinea grass (*Panicum maximum*), *Ipomoea obscura*, and false mallow (*Malvastrum coromandelianum*). Wild bean (*Macroptilium lathyroides*) vines were observed growing on the chain link fence. The hybrid *Pluchea* (*Pluchea x fosbergii*) was observed near areas just north of the fence line where ponding occurs.

The north-south portion of Essex Road extending from Tripoli Road to the Navy Golf Course is closed to vehicular traffic. The absence of vehicular traffic on this segment has allowed vegetation to grow across the roadway. Weedy vegetation dominates this segment with *kiawe* trees mixed with opiuma (*Pithecellobium dulce*) and *koa haole* (*Leucaena leucocephala*). The understory is dominated by Guinea grass and buffelgrass. Whistler (2012) observed two native sandalwood trees or 'iliah alo'e (*Santalum ellipticum*) in the general area of the alignment; however, we found only a single sandalwood growing at the base of the chain link fence on the eastern side of Essex Road. Other native species observed in this section of the alignment include *anunu* (*Sicyos pachycarpus*), *kauna'oa pehu* (*Cassythia filiformis*), 'ilima (*Sida fallax*), 'ilie'e (*Plumbago zeylanica*), *popolo* (*Solanum americanum*), and *uhaloa* (*Waltheria indica*).

Vegetation on Essex Road along the southern edge of the Navy Golf Course and along the Gamber Bay Road and Bismark Sea Road alignment includes a mix of *kiawe* forest, maintained fairways, roughs, and greens, and ornamental plantings. The sections of *kiawe* forest were dominated by buffelgrass with scattered 'ilima, *uhaloa*, khaki weed (*Alternanthera pungens*), opiuma, and Christmas berry (*Schinus terebinthifolius*). Several ornamental tree species are planted along the alignment, including monkeypod (*Samanea saman*), coconut (*Cocos nucifera*), *kukui* (*Aleurites moluccana*), and earpod (*Entereolobium cyclocarpum*).

Kiawe thickets and Guinea grass dominate intersection of Essex Road and Geiger Road. Large sections of the alignment have been cleared of vegetation or are paved with asphalt. Along the edges of these barren zones are shrubs of *koa haole*, opiuma, and weedy grass species.

Alien grasses dominate the Corridor along the alignment adjacent to the Honouliuli WWTP. A substantial area has been recently cleared here, apparently by a backhoe-operated forestry mower, leaving a thick ground cover of *kiawe* wood chips. The alignment turns west at the northern end of the Honouliuli WWTP. This section is characterized by an old asphalt roadway that is now used as a casual dumping site. The alien Zulu-giant or carrion flower plant (*Stapelia gigantea*) was observed all along the margins of the roadway.

The northern terminus of the Corridor passes north from Roosevelt Road across a narrow strip of vacant land area to Renton Road. This stretch of land is dominated by weedy grasses

and shrubs including buffelgrass and swollen fingergrass, *kiawe*, *opiuma*, and *koa haole*. Scattered native *'ilima*, *uhaloa*, and *popolo* were also observed here.

Wildlife

Two hundred sixty four (264) individual birds representing 21 species and 15 separate families were observed and/or heard along the Corridor during the study (Table 1). All but two of the bird species observed during the inventory are naturalized aliens. Counts of individuals were slightly lower than those obtained during previous surveys in the 'Ewa Plain (David and Guinther 2006, 2007), possibly due to weather conditions.

Table 1 lists bird species by relative abundance and distribution among the four principal habitats along the Corridor, and Appendix C presents a listing of all avian species reported from the general vicinity of the project area by this and previous surveys. The most conspicuous and broadly distributed species are non-native introductions, including the spotted dove (*Streptopelia chinensis*), northern cardinal (*Cardinalis cardinalis*), red-vented bulbul (*Pycnonotus cafer*), Japanese white-eye (*Zosterops japonicus*), and the common mynah (*Acridotheres tristis*). Other species frequently observed or heard include the zebra dove (*Geopelia striata*), gray francolin (*Francolinus pondicerianus*), common waxbill (*Estrilda astrild*), and house finch (*Carpodacus mexicanus*).

Cattle egrets (*Bulbulcus ibis*) were locally observed in large numbers on the Navy Golf Course where freshly mowed fairways provided a host of insect food. Indigenous migratory Pacific golden-plovers or *kolea* (*Pluvialis fulva*) in breeding plumage were also found on and immediately adjacent to the Navy Golf Course. These findings are consistent with at least ten previous avian surveys conducted in the 'Ewa Plains (as summarized in David and Guinther 2006).

Two ducks, possibly listed endangered Hawaiian ducks (or *koloa*) x mallard hybrids (*Anas wyvilliana* x *A. platyrhynchos*), were observed in a ponded construction area east of Essex Road just outside the project area. A single black-necked stilt or *a'eo* (*Himantopus mexicanus knudseni*), a Listed Endangered species, was observed foraging along the south shore of Ordy Pond just north of the Corridor on Tripoli Road. Black-necked stilt were also heard but not seen east of Essex Road (outside the project area) on the morning of April 22, 2013. Three black-necked stilt were observed flying from east to west at low altitude across the Corridor near the junction of Essex and Tripoli Roads, and back again on the morning of April 24, 2013. Two black-necked stilt were seen flying at low altitude west to east across the Corridor at Essex Road on the evening of April 25, 2013.

Several Indian mongooses (*Herpestes a. auropunctatus*) were observed at the Navy Golf Course, mongoose tracks were seen along Essex Road, and mongooses were often heard within the thick brush along Tripoli Road. This species undoubtedly occurs throughout the project area. Feral cats (*Felis catus*) were seen on the margins of the golf course at Essex Road, cat tracks were found, and cat fights were also heard here.

Three domesticated dogs (*Canis familiaris*) were observed running free within the fenced construction area east of Essex Road across from the golf course, and a single domesticated dog was observed walking with its owner along Essex Road. Norway rats (*Rattus norvegicus*), Polynesian rats (*Rattus exulans hawaiiensis*), Roof rats (*Rattus r. rattus*), and European house mice (*Mus domesticus*) most likely also inhabit the project area (David and Guinther 2006), although none were observed during our surveys. All these introduced predators are known to have detrimental impacts upon populations of native wildlife, and also serve as a means of passive transport for propagules of invasive and noxious plants.

Table 1. Birds Observed Within the East Kalaheo Energy Corridor Ranked by Relative Abundance and Distribution Across Point Count Stations on April 22, 2013.

Common Name*	Species Name	Status	Number of Point Count Stations	RA**	Location and Number of Point Counts				
					Tripoli Road (4)	Essex Road (3)	Golf Course (5)	Gambier Bay Road (1)	Honouliuli STP (2)
Number of Individuals Observed									
Spotted dove	<i>Streptopelia chinensis</i>	A	11	2.71	9	6	16	6	1
Northern cardinal	<i>Cardinalis cardinalis</i>	A ¹	11	1.57	9	5	2	2	4
Red-vented bulbul	<i>Pycnonotus cafer</i>	A	10	1.86	4	5	7	3	7
Japanese white-eye	<i>Zosterops japonicus</i>	A	10	1.00	4	3	2	4	1
Common mynah	<i>Acridotheres tristis</i>	A	9	3.14	2	4	22	12	4
House finch	<i>Carpodacus mexicanus</i>	A ¹	6	0.50	1	2	3	1	
Cattle egret	<i>Bulbulcus ibis</i>	A ¹	5	2.79			35	3	1
Zebra dove	<i>Geopelia striata</i>	A	5	2.43	4	1	25	3	1
Common waxbill	<i>Estrilda astrild</i>	A	5	0.93	6	1	6		
White-rumped shama	<i>Copsychus malabaricus</i>	A	5	0.71	6	1		3	
Gray francolin	<i>Francolinus pondicerianus</i>	A	5	0.57	5	1	2		
Red-crested cardinal	<i>Paroaria coronata</i>	A	4	1.14	1	2	7	6	
Pacific golden plover	<i>Pluvialis fulva</i>	IM ²	4	0.50		1	5		1
Black-necked stilt	<i>Himantopus mexicanus knudseni</i>	ER ³ LE	3	0.43	1	3	2		
Chestnut munia	<i>Lonchura atricapilla</i>	A	2	0.86	2	10			
Lavender waxbill	<i>Estrilda caerulescens</i>	A	2	0.29		3	1		
Red avadavat	<i>Amandava amandava</i>	A	2	0.29	1		3		
Black francolin	<i>Francolinus francolinus</i>	A	2	0.14	1	1			
Northern mockingbird	<i>Mimus polyglottos</i>	A ¹	1	0.14			2		
Common peafowl	<i>Pavo cristatus</i>	A	1	0.07			1		
Red jungle fowl	<i>Gallus gallus</i>	A	1	0.07					1
Total Number of Birds at Each Location					56	49	141	43	21

* Species listed by broadest relative distribution across 15 point count stations established along the 12,000' long power line alignment.
 ** RA=Relative abundance (total no. observations/total no. point count stations)
 Key to Status: A=alien introduced by humans; IM=indigenous migratory; ER=endemic resident; LE=listed endangered
¹ Denotes protection under the Migratory Bird Treaty Act (MBTA).

No amphibians or reptiles were observed during the survey.

Numerous insect species were conspicuous, particularly along Tripoli and Essex Roads. These included the green darner dragonfly (*Anax junius*), globe skimmer dragonfly (*Pantala flavescens*), roseate skimmer dragonfly (*Orthemis ferruginea*), black saddlebags dragonfly (*Tramea lacerata*), and Chinese skimmer dragonfly (*Crocothemis servilia*); along with the Familiar bluet damselfly (*Enallagma civile*) and Rambur's forktail damselfly (*Ischnura ramburi*). The carpenter bee (*Xylocopa sonorina*) was also commonly seen, as were the passion vine butterfly (*Agraulis vanillae*), painted lady butterfly (*Vanessa cardui*), western pygmy-blue butterfly (*Brephidium exilis*), Lantana scrub-hairstreak butterfly (*Strymon bazochii*), and the cabbage butterfly (*Pieris rapae*).

Many different unidentified spiders were found in net sweeps taken in the buffel grass along Essex Road, along with the large garden spider *Argiope appensa*. In the evening hours, swarms of gnats (tentatively *Scatella* sp.) were observed hovering over roadside vegetation south of the golf course. Several species of dragonflies were actively feeding on the swarm. Although special attention was devoted to the inspection of 'ilima (*Sida fallax*) and morning glory (*Ipomoea* spp.) blossoms throughout the project area, we did not find any native Hawaiian yellow-faced bees (*Hylaeus* spp.).

DISCUSSION

The results of our field work represent a one-time snapshot of the wildlife and plants inhabiting the Corridor. As such, these data cannot be considered a definitive list of all species that utilize habitats within the project area. Many species are diminutive and cryptic in nature making observation difficult. Other species are nocturnal and/or may use the area infrequently depending upon season, weather, interaction with other species, and dynamic changes in their populations. Yet other species may also be itinerant or accidental visitors to the site. However, when considered together with the results of historical data and previous surveys by other investigators (e.g. Whistler 2012, David and Guinther 2005, 2006, 2007; Englund et al 2000; Bruner 1989), we have compiled a reasonably accurate description of the environment and biota of the project area.

The area to the west of Essex Road, known as Lot 13058-D (Northern Trap and Skeet Range), has been set aside as a preserve (Figure 3) for the Endangered 'Ewa Plains 'akoko (*Chamaesyce skottsbergii* var. *kalaeloana*) an extremely rare plant species only found in the Kalaeloa area of O'ahu (Whistler 2012; Wagner and Herbst 1999). On August 2, 2011, the US Fish and Wildlife Service (USFWS) published a Proposed Rule listing 23 species as Endangered on O'ahu and designating critical habitat for 124 species, among them *Chamaesyce skottsbergii* var. *kalaeloana*, the 'Ewa Plains 'akoko. Proposed Critical Habitat Lowland Dry-Unit 11 encompasses Lot 13058-D and Lot 13058-G to the west of Essex Road. The Final Rule published by USFWS (2012a) on September 18, 2012 formally designated Lowland Dry-Unit 11 as Critical Habitat under 50 CFR Part 17 for the 'Ewa Plains 'akoko (77 FR 181, 57648).

The City and County of Honolulu Department of Planning and Permitting (2013) indicated that the rare *Chamaesyce degeneri* (beach sandmat, or *kōkōmālei*) is known from the project area; however, we found no plants of this species during our surveys of the energy corridor.

Other avian species previously reported from the general vicinity of Kalaeloa but not observed by us during the present study include the Black-crowned night heron or 'auku'u (*Nycticorax nycticorax hoactli*), great frigate bird or 'iwa (*Fregata minor palmerstoni*), sanderling (*Calidris alba*), ruddy turnstone (*Arenaria interpres*), wandering tattler or 'ūlili (*Heteroscelus incanus*), house sparrow (*Passer domesticus*), barn owl (*Tyto alba*), and the Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*) (Botanical Consultants 1984; NAVFAC Pacific 1994; David and Guinther 2006, 2007; Navy Region Hawaii 2012; DHHL 2012).

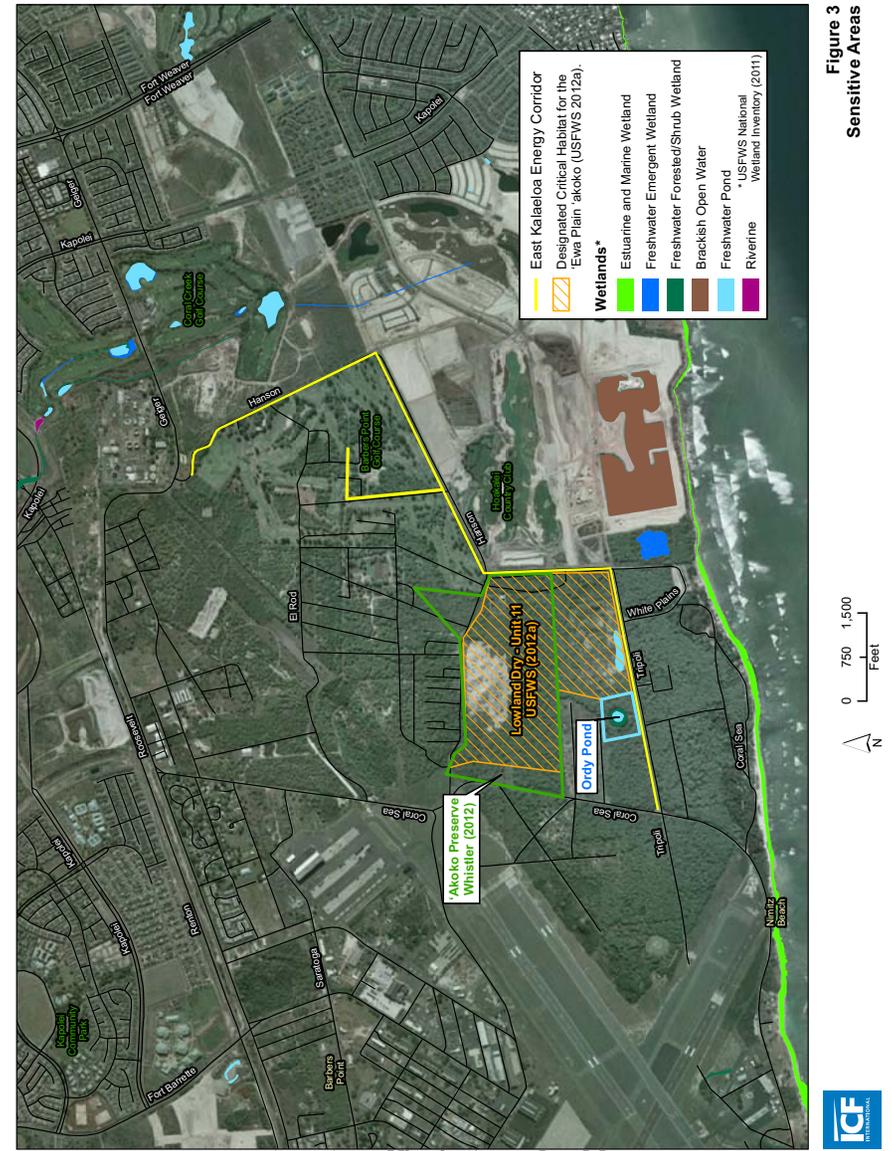


Figure 3
Sensitive Areas

The endemic Hawaiian short-eared owl is listed as Endangered by the State of Hawaii on the Island of O'ahu. *Pueo* occupy a variety of habitats and are most common in open grasslands and shrublands, often in urban areas. The *pueo* is a ground nesting species; however, its key habitat requirements are difficult to determine due to a lack of historical population data (DOFAW 2005). None were observed during our survey of the Corridor.

The federally-listed Endangered Hawaiian stilt (*Himantopus mexicanus knudseni*) is found in the general vicinity of the project area. It is known to frequent water features of area golf courses as well as the nearby Honouliuli and Waiawa Units of the Pearl Harbor National Wildlife Refuge, ponds at the Chevron refinery, wetlands near the U.S. Coast Guard Station at Barbers Point, Fort Kamehameha reef flats, and a host of wetland habitats around the perimeter of Pearl Harbor (USFWS 2010b) (Figure 3).

The Department of the Navy (2011) indicated that dense mangrove forests (*Rhizophora mangle*) around Ordy Pond had eliminated foraging habitat for stilt. Recently, however, the mangrove vegetation surrounding the pond was cleared to facilitate the removal of unexploded ordnance (Cole 2013), leaving the exposed margins of the pond open once again to foraging by black-necked stilt. In addition, Nadig (pers. comm.) indicated that stilt are now nesting at Ordy Pond. These conditions may foster an increase in stilt populations in the area, resulting in an increase in the overflights across the power line between Ordy Pond and other wetlands to the east and west of the project alignment.

While the threat of collision between stilt and power poles, lines, and guy wires is difficult to estimate, we believe that risk of collision is minimal. Evans et al (1994) concluded that the potential impacts associated with electromagnetic radiation, electrocution, and collision risk with wire support structures (towers) do not constitute a significant threat to endangered Hawaiian waterbirds, resident wading birds, or migratory shorebirds and waterfowl associated geothermal energy development. Extensive monitoring of meteorological (met) towers associated with wind farms throughout the Hawaiian Islands have not revealed any stilt mortality attributable to collision with wires or met towers (Nadig, pers. comm.).

Despite the rich abundance of insect food in edge habitats throughout the Corridor, no Listed Endangered Hawaiian hoary bats, or 'ope'ape'a (*Lasiurus cinereus semotus*), were observed. Given the recent contributions to our knowledge of bat activity on O'ahu gained in part from the extensive deployment of ultrasonic bat detectors and the availability of roosting habitat and food sources for bats within the Corridor, it is reasonable to assume that Hawaiian hoary bats may visit the project area.

'Ope'ape'a, are known to occur from sea level to upper elevations across a wide range of relatively undisturbed and highly modified habitats, and may roost in both native and introduced tree species (USFWS 1998, Mitchell et al 2005). Menard (2001) estimated hoary bat population levels for all the main Hawaiian Islands ranging from hundreds to a few thousand individuals. Hawaiian hoary bats are seasonally found to be more common at lower elevations during the breeding season between April and August (Menard 2001; Bonaccorso 2011).

The Hawaiian hoary bat is crepuscular, typically feeding at twilight and after dark within edge habitats along tree lines bordering roads, and often adjacent to or near water bodies and coastlines. They are known to feed on both native and alien insects (Whitaker and Tomich 1983, USFWS 1998, Fullard 2001, Mitchell et al 2005), including insects attracted to lights.

The potential for bats to collide with power poles and lines is considered to be negligible largely because such structures are immobile and should be readily detectable by the bats' echolocation. Extensive monitoring of met towers associated with wind farms throughout the Hawaiian Islands have not revealed any hoary bat mortality attributable to collision with wires or met towers (SWCA 2010, 2011).

RECOMMENDATIONS

No listed, proposed, or candidate Endangered or Threatened plant species were found within the East Kalaheo Energy Corridor, and no impacts to endangered plant species or their habitats are anticipated.

Plant and wildlife habitats along the Corridor have been highly modified by human activities, including the intentional and accidental introduction of alien species (Whistler 2012, Athens 2009, Athens et al 1999, Char and Balakrishnan 1979). The majority of the plant and animal species observed within the subject property are introduced alien species. However, portions of the Corridor around Tripoli Road and lower Essex Road to the south of the Navy Golf Course are in close proximity to the preserve set aside for the 'Ewa Plains 'akoko and now designated as Critical Habitat for that species (Whistler 2012). The presence of: a) designated Critical Habitat for the Listed Endangered 'Ewa Plains 'akoko immediately adjacent to portions of the East Kalaheo Energy Corridor; b) listed Endangered Black-necked stilt in the immediate vicinity of the Corridor, and; c) the potential presence of Listed Endangered Hawaiian hoary bats will likely require consultation with the USFWS in accordance with the Endangered Species Act (USFWS 2012b).

Potential impacts can be eliminated or minimized by limiting construction activities within the 40 ft. wide Corridor along the existing roadways, and limiting clearing as necessary for the construction of individual power poles. We have assumed that power/communication line maintenance can be performed from the existing roadways, and that further road grading and extensive clearing will be unnecessary.

While Ordy Pond and the standing water in limestone depressions north of Tripoli Road are outside the proposed project alignment, they lie adjacent to it. Best management practices should be employed to avoid soil erosion and runoff that may be associated with the construction of power poles.

Additionally and in accordance with current guidance (USFWS 2012b) for mitigation of impacts to Hawaiian hoary bats, the project should avoid or minimize the removal of trees

over 15 ft. in height and prohibit clearing of these trees from June 1 to September 15 to help ensure that non-volant Hawaiian hoary bat pups are not harmed.

Although no seabirds were observed during our survey and the Great frigatebird (*Fregata minor*) is the only seabird reported here during previous surveys, it would be prudent to employ accepted mitigation to help prevent fall out of fledgling seabirds (USFWS 2012). Therefore, consideration may be given to shading any lighting to be installed on power poles as illustrated in Appendix D.

GLOSSARY

Alien	Introduced by humans
Anchialine ponds	Land-locked bodies of brackish water adjacent to the sea
BRAC	Base Realignment and Closure
BRAC PMO	Base Realignment and Closure Program Management Office
CFR	Code of Federal Regulations
Crepuscular	Referring to twilight hours
DBEDT	Department of Business, Economic Development, and Tourism
EA	Environmental Assessment
Endangered	Formally protected by applicable Federal and/or State laws
Endemic	Native species occurring only in the Hawaiian Islands
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
Feral	Domesticated, non-native species established in the wild
HCDA	Hawai'i Community Development Authority
Incidental Observation	Observations of species made outside formal point-counts
Indigenous	Hawaiian native species naturally occurring elsewhere
MBTA	Migratory Bird Treaty Act
NAS	Naval Air Station
Navy	Department of the Navy
NEPA	National Environmental Policy Act
Nocturnal	Referring to night time
Non-volant	Young bats or birds not yet able to fly and escape harm
NRCS	Natural Resource Conservation Service
Ruderal	Characterized by highly disturbed waste lands and rubble
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Services
WWTP	Wastewater Treatment Plant

LITERATURE REVIEWED

American Ornithologists Union. 2005. List of the 2,037 Bird Species (with scientific and English names) known from the A.O.U. checklist area. 55pp.

Athens, S.J. 2009. *Rattus exulans* and the catastrophic disappearance of Hawai'i's native lowland forest. *Biol. Invasions* 11: 1489-1501.

Athens, S.J., J.V. Ward, H.D. Tuggle, and D.J. Welch. 1999. Environmental, vegetation change, and early human settlement on the 'Ewa Plain: a cultural resource inventory of Naval Air Station, Barbers Point, O'ahu, Hawai'i; part III: paleo-environmental investigations. Contract report prepared for Belt Collins Hawaii, Honolulu.

Belt Collins Hawaii LLC. 2013. Memorandum from Trina Onuma to S. Sakai and J. Hiramatsu, May 13, 2013, regarding project description.

Belt Collins Hawaii LLC. 2011. Final Environmental Assessment Kalaeloa Energy Corridor, 'Ewa District, O'ahu, Hawai'i. Contract document prepared for Hawai'i Community Development Authority. 41p + appendices.

Belt Collins Hawaii LLC. 2007. Draft Environmental Assessment for Proposed Biodiesel Facility, Kalaeloa, Barbers Point Harbor, O'ahu, Hawai'i. Contract report prepared for Imperium Renewables Hawaii LLC. 43p + appendices.

Bonaccorso, J.F. 2011. *Ōpe'ape'a* – solving the puzzles of Hawai'i's only bat. *Bats* 28(4):10-12.

Char, W.P. and N. Balakrishnan. 1979. 'Ewa Plains Botanical Survey. Contract report prepared for the US Fish and Wildlife Service, Honolulu, Hawai'i. 119p + maps.

City and County of Honolulu Department of Planning and Permitting. 2013. Letter from Mr. George I. Atta, Director, to Ms. Joanne E. Hiramatsu, Senior Planner at Belt Collins Hawaii, dated May 23, 2013, regarding East Kalaeloa Energy Corridor Environmental Assessment Pre-consultation (2013/ELOG-669(ds)). 2p.

Cole, W. 2013. Military junk pulled for Kalaeloa pond raises fresh concerns. Honolulu Star Advertiser article posted 1:30am February 3, 2013.

Commander, Navy Region Hawaii. 2012. Draft Environmental Assessment. Kalaeloa Renewable Energy Park, Kalaeloa, O'ahu, Hawai'i.

David, R.E. and E. Guinther. 2007. Draft survey of botanical, avian, mammalian resources, Imperium Renewable Bio-Diesel Production Plant, 'Ewa District, O'ahu, Hawai'i. Contract report prepared for Belt Collins Hawaii LLC. 14p.

David, R.E. and E. Guinther. 2006. A survey of botanical, avian, and mammalian resources, Kapolei Harborside Center, 'Ewa District, O'ahu, Hawai'i. Contract report prepared for Group 70 International, Inc. 21p.

Department of the Navy, NAVFAC Pacific, and Isla Botanica. 2012. Botanical Survey for the 'Ewa Plains 'Akoko (*Chamaesyce skottsbergii* var. *kalaeloa*), Northern and Southern Trap and Skeet Range, Former Naval Air Station Barbers Point, O'ahu, Hawai'i. 23p. Report prepared for the BRAC Management Office.

Department of the Navy. 2011. Final Environmental Assessment for Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, O'ahu, Hawai'i. Contract report prepared for the BRAC Management Office by Helber Hastert and Fee, Honolulu, Hawai'i.

Department of the Navy. 1999. Final Environmental Impact Statement for Disposal and Reuse of Naval Air Station Barbers Point.

DOFAW. 2005. Hawai'i's Comprehensive Wildlife Conservation Strategy. State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, Honolulu.

Dye, T.S. and H.D. Tuggle. 1998. Land Snail Extinctions at Kalaeloa, O'ahu. *Pacific Science* 52(2): 111-140.

Englund, R.A., and K. Arakaki, D.J. Preston, S.L. Coles, and L.G. Eldredge. 2000. Non-indigenous freshwater and estuarine species introductions and their potential to affect sportfishing in the lower stream and estuarine regions of the south and west shores of O'ahu, Hawai'i. Bishop Museum Technical Report No. 17; Contribution No. 2000-002 to the Hawaii Biological Survey. 121p.

Evans, K., D. Woodside, and M. Bruegmann. 1994. A survey of endangered waterbirds on Maui and O'ahu and assessment of potential impacts to waterbirds from the proposed Hawai'i Geothermal Project Transmission Corridor. U.S. Fish and Wildlife Service, Pacific Islands Office, Ecological Services. Final Report submitted to U.S. Department of Energy, Oak Ridge, Tenn. 36p.

Evenhuis, N.L. and L.G. Eldredge, editors. 1999-2002. Records of the Hawaii Biological Survey. Bishop Museum Occasional Papers Nos. 58-70.

Federal Register. 2002. Department of the Interior, Fish and Wildlife Service, 50 CFR 17.

Fullard, J.H. 2001. Auditory sensitivity of Hawaiian moths (Lepidoptera: Noctuidae) and selective predation by the Hawaiian hoary bat (Chiroptera: *Lasiurus cinereus semotus*). *Proceedings of the Royal Society of London B*. 268:1375-1380.

Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidate or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petition; Annual Description of Progress on Listing Actions. *Federal Register*, **67** No. 14 (Thursday, June 13, 2002): 40657-40679.

Garrison, G.H. 2002. Holocene Sedimentary and Aquatic Biogeochemical Responses Reflected in Ordy Pond, O'ahu, Hawai'i and Contemporary Modeling of Submarine Groundwater Discharge in Kahana Bay, O'ahu, Hawai'i. PhD dissertation in Geology and Geophysics, University of Hawaii at Manoa.

Hawaii Army National Guard. 2003. Final Environmental Assessment for the Relocation and Consolidation of the Hawaii Army National Guard to Kalaeloa, O'ahu, Hawai'i: Including Construction and Renovation of New and Existing Buildings and Infrastructure. 42p + appendices.

Hawaii Audubon Society. 2005. Hawaii's Birds, 6th Edition, Honolulu, HI. 141 pp.

James, H.F. 1987. A late Pleistocene avifauna from the Island of O'ahu, Hawaiian Islands. *Docum. Labl Geol. Lyon*. No. 99: 221-230.

Lepage, D. 2013. Avibase Bird Checklists of the World: O'ahu. <http://avibase.bsc-eoc.org/checklist.jsp?region=USHioa> last accessed April 15, 2013.

Menard, T. 2001. Activity Patters of the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) in Relation to Reproductive Time Periods. Master's thesis, University of Hawai'i at Manoa.

Mitchell, C., C. Ogura, D. Meadows, A. Kane, L. Strommer, S. Fretz, D. Leonard, and A. McClung. 2005. Hawai'i's Comprehensive Wildlife Conservation Strategy. Department of Land and Natural Resources. Honolulu, Hawaii. 722p.

Nadig, A. Personal Communication. U.S. Fish and Wildlife Service, Division of Ecological Services, Honolulu, Hawai'i. Phone conversation on May 15, 2013.

Natural Resource Conservation Service. 2013. Accessed May 8, 2013. <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

NAVFAC Pacific (PAC) 1994. Environmental Baseline Survey, Naval Air Station Barbers Point, Barbers Point, Hawai'i. Prepared for Pacific Division Naval Facilities Engineering Command, Pearl Harbor, Hawai'i. Environmental and Energy Services Co., Inc. June 1994.

North Shore Consultants LLC. 2012. Final Environmental Assessment Kalaeloa Home Lands Solar LLC, 5.0 MW Photovoltaic Park, Kalaeloa, O'ahu, Hawai'i TMK#9-1-013:029. Contract report prepared for State of Hawaii Department of Hawaiian Home Lands. 49p + appendices.

Schoonmaker, J., G. Garrison, J. Uchikawa, C. Glenn. 2003. Holocene record of seasonality in a tropical pond, Oahu, Hawaii. Paper No. 17-12, Seattle Annual Meeting (November 2-5, 2003), Geological Society of America 35(6): 62.

SSFm, Inc. 2010. Acquisition of Land for the Expansion of Kalaeloa Barbers Point Harbor Draft Environmental Assessment, 'Ewa, O'ahu, Hawai'i. Prepared for State of Hawaii Department of Transportation, Harbors Division. 32p + appendices.

State of Hawaii. 2006. Kalaeloa Master Plan, prepared by Belt Collins, EDAW, SMS, BAE, and Ebisu for the Department of Business Economic Development and Tourism. 78p.

SWCA. 2010. Kahuku Wind Power Habitat Conservation Plan. Contract report prepared for Kahuku Wind Power LLC, March 2010. 119p.

SWCA. 2011. Final Environmental Assessment Kawaiioa Wind Power Facility Habitat Conservation Plan. Contract report prepared for the State of Hawaii Department of Land and Natural Resources, September 2011. 151p + appendices.

USFWS. 2012a. Final Rule formally designated Lowland Dry-Unit 11 as Critical Habitat under 50 CFR Part 17 for the 'Ewa Plains 'akoko. September 18, 2012 (77 FR 181, 57648).

USFWS. 2012b. Letter to Mr. Jim Spaeth, U.S. Department of Energy, Honolulu, Hawaii: Amended Notice of Intent to Prepare the Hawaii Clean Energy Programmatic Environmental Impact Statement, from Mr. Loyal Mehrhoff, Field Supervisor, U.S. Fish and Wildlife Service Division of Ecological Services, Honolulu, Hawaii, October 9, 2012.

USFWS. 2010a. Hawaiian Islands Plants: Updated August 3, 2010 Listed and Candidate Species, as Designated under the U.S. Endangered Species Act. 21pp.

USFWS. 2010b. Recovery Plan for Hawaiian Waterbirds, Second Revision. Region 1, Portland, Oregon. 233p.

USFWS. 2003. Letter dated May 22, 2003, from Mr. Paul Henson, Ph.D., Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai'i to Mr. Timothy W. Sutterfield, Environmental Planning Division, Department of the Navy, Pacific Division, Pearl Harbor, Hawai'i regarding Section 7 ESA consultation and disposal of Lot 13058-F and Lot 13073-A.

USFWS. 2000. Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning. Revised November 20, 2010.

USFWS. 1998. Recovery Plan for the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). U.S. Fish and Wildlife Service, Portland, OR.

Wagner, W.L. and D.R. Herbst. 1999. Supplement to the Manual of the flowering plants of Hawaii, pp. 1855-1918. In: Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawaii. Revised Edition. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu.

Whistler, A. 2012. Botanical Survey for the 'Ewa Plains 'Akoko (*Chamaesyce skottsbergii* var. *kalaeloana*), Northern and Southern Trap and Skeet Range, Former Naval Air Station Barbers Point, O'ahu, Hawai'i. Prepared for Department of the Navy, NAVFAC Pacific & BRAC PMO West.

Whistler, A. 2008. Botanical Surveys for 'Akoko on Seven Parcels at Kalaeloa, O'ahu, Hawai'i. *Isle Botanica, Honolulu, Hawai'i*. Prepared for Helber Hastert, & Fee, Planners.

Whistler, A. 2003. 'Akoko (*Chamaesyce skottsbergii* var. *kalaeloana*) survey of the northern trap and skeet range' at the former Naval Air Station, Barbers Point. *Isle Botanica*. Prepared for the Department of the Navy.

Whistler, A. 1998. *Chamaesyce skottsbergii* botanical survey of the Naval Air Station Barbers Point, O'ahu, Hawai'i. Unpublished report prepared for Belt Collins Hawaii.

Whitaker, J.O., and P.Q. Tomich. 1983. Food Habits of the Hoary Bat *Lasiurus cinereus* from Hawaii. *Journal of Mammalogy* 64:151-52.

APPENDIX A – SITE PHOTOGRAPHS



Fig. 1. Typical vegetation along Tripoli Road consists of *kiawe* forest with alien grasses.



Fig. 2. Vegetation along Essex Road. The eastern-most margin of the 'Akoko Preservation Area lies to the west of Essex Road.



Fig.3. The dense *kiawe* forest understory along Essex Road includes native *anunu* vine.



Fig. 4. Vegetation along the margins of the Navy Golf Course include *kiawe* trees as well as manicured lawns and planted ornamentals.



Fig. 5. The eastern boundary of the Navy Golf Course is dominated by mowed grass and planted ornamentals including coconuts and *kukui* trees.



Fig. 6. Vegetation at the intersection of Essex and Geiger Roads includes cleared areas with bare dirt and limestone along with alien plants such as opiuma and weedy grasses.



Fig. 7. Gambier Bay Road alignment is bounded by manicured golf course fairways to the west; and by *kiawe*, alien grasses and weeds along its eastern margin.



Fig. 8. This view towards the east of the Bismark Sea Road alignment at the intersection with Gambier Bay Road illustrates a mix of manicured golf course vegetation, planted ornamentals, and *kiawe* forest.



Fig. 9. Above Geiger Road, the vegetation of the Corridor is dominated by bare ground and weedy grasses.



Fig. 10. The Corridor bordering the Honouliuli WWTP was recently cleared by a forestry mower and is covered with *kiawe* chips.



Fig. 11. Vegetation within the Corridor between Roosevelt Avenue and Renton Road is dominated by weedy grassland with shrubs including *kiawe* and *koa haole*.

APPENDIX B: PLANT SPECIES LIST

The following checklist is an inventory of all the plant species observed along the proposed East Kalaheo Energy Corridor. The plant names are arranged alphabetically by family and then by species into each of two groups: Monocots, and Dicots. The taxonomy and nomenclature of the flowering plants (Monocots and Dicots) are in accordance with Wagner *et al.* (1990), Wagner and Herbst (1999) and Staples and Herbst (2005). Recent name changes are those recorded in the Hawaii Biological Survey series (Evenhuis and Eldredge, eds., 1999-2002). For each species, the following name is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
 E= endemic= native only to the Hawaiian Islands.
 I= indigenous= native to the Hawaiian Islands and elsewhere.
 X=introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is Cook's arrival in the islands in 1778

SCIENTIFIC NAME	COMMON NAME	STATUS
MONOCOTS		
AGAVACEAE		
<i>Cordyline fruticosa</i> (L.) A.Chev.	<i>Ti, ki</i>	X
ALOEACEAE		
<i>Aloe vera</i> (L.) N.L.Burm.	<i>'Aloe</i>	X
ARACEAE		
<i>Dracaena sp.</i> L.	Dracaena	X
ARECACEAE		
<i>Areca catechu</i> L.	Betel nut palm	X
<i>Cocos nucifera</i> L.	Coconut	X
CYPERACEAE		
<i>Cyperus rotundus</i> L.	<i>Kili o'opu</i>	X
POACEAE		
<i>Brachiaria mutica</i> (Forssk.) Stapf	California grass	X
<i>Cenchrus ciliaris</i> L.	Buffelgrass	X
<i>Cenchrus echinatus</i> L.	Common sandbur	X
<i>Chloris barbata</i> (L.) Sw.	Swollen fingergrass	X
<i>Cynodon dactylon</i> (L.) Pers	<i>Mānienie</i>	X
<i>Digitaria insularis</i> (L.) Mez ex Ekman	Sourgrass	X
<i>Eleusine indica</i> (L.) Gaertn.	Wiregrass	X

POACEAE (CONT).

<i>Eragrostis tenella</i> (L.) P.Beauv. Ex Roem.&Schult.		X
<i>Melinis repens</i> (Willd.) Zizka	Natal redtop	X
<i>Panicum maximum</i> L.	Guinea grass	X
<i>Paspalum dilatatum</i> Poir.	Dallis grass	X
<i>Paspalum urvillei</i> Steud.	Vasey grass	X
<i>Setaria verticillata</i> (L.) P.Beauv.	Bristly foxtail	X

DICOTS**ACANTHACEAE**

<i>Asystasia gangetica</i> (L.) T. Anderson	Chinese violet	X
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AIZOACEAE

<i>Trianthema portulacastrum</i> L.		X
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AMARANTHACEAE

<i>Achyranthes aspera</i> L.		X
<i>Alternanthera pungens</i> Kunth	Khaki weed	X
<i>Amaranthus spinosus</i> L.	Spiny amaranth	X
<i>Amaranthus viridis</i> L.	Slender amaranth	X

ANACARDIACEAE

<i>Mangifera indica</i> L.	Mango	X
<i>Schinus terebinthifolius</i> Raddi	Christmas berry	X

APOCYNACEAE

<i>Allamanda blanchetii</i>	Purple allamanda	X
<i>Thevetia peruviana</i> (Pers.) K.Schum.	Be-still tree	X

ARALIACEAE

<i>Schefflera actinophylla</i> (Endl.) Harms	Octopus tree	X
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ASCLEPIADACEAE

<i>Stapelia gigantea</i> N.E.Br.	Zulu-giant	X
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ASTERACEAE

<i>Bidens alba</i> (L.) DC. var. <i>radiata</i> (Sch. Bip.)	Beggar tick	X
Ballard ex Melchert		
<i>Bidens pilosa</i> L.	Spanish needle	X
<i>Conyza bonariensis</i> (L.) Cronq.	Hairy horseweed	X
<i>Crassocephalum crepidioides</i> (Benth.) S.Moore	Crassocephalum	X
<i>Emilia fosbergii</i> Nicolson	Red pualele	X
<i>Lactuca serriola</i> L.	Prickly lettuce	X
<i>Pluchea carolinensis</i> (Jacq.) G. Don	Sour bush	X
<i>Pluchea indica</i> (L.) Less.	Indian fleabane	X
<i>Pluchea x fosbergii</i> Cooper. & Galang	Fleabane	X
<i>Sonchus oleraceus</i> L.	Pualele	X
<i>Tridax procumbens</i> (L.)	Coat buttons	X
<i>Verbesina encelioides</i> (Cav.) Benth. & Hook	Golden crown-beard	X

BIGNONIACEAE

<i>Spathodea campanulata</i> P. Beauv.	African tulip	X
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BORAGINACEAE

<i>Heliotropium curassavicum</i> L.	<i>Kipūkai</i>	I
<i>Heliotropium procumbens</i> Mill. var. <i>depressum</i> (Cham.) Fosberg		X

CARICACEAE

<i>Carica papaya</i> L.	Papaya	X
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CASUARINACEAE

<i>Casuarina equisetifolia</i> L.	ironwood	X
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CHENOPODIACEAE

<i>Atriplex semibaccata</i> R.Br.	Australian saltbush	X
<i>Chenopodium murale</i> L.	Aheahea	X

CLUSIACEAE

<i>Clusia rosea</i> Jacq.	Autograph tree	X
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COMMELINACEAE

<i>Commelina benghalensis</i> L.	Hairy honohono	X
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CONVOLVULACEAE

<i>Ipomoea cairica</i> (L.) Sweet	<i>Koali ai</i>	X
<i>Ipomoea obscura</i> (L.) Ker Gawl.	Morning glory	X
<i>Ipomoea triloba</i> L.	Little bell	X
<i>Merremia aegyptia</i> (L.) Urb.	Hairy merremia	X

CUCURBITACEAE

<i>Coccinea grandis</i> (L.) Voigt	Ivy gourd	X
<i>Momordica charantia</i> L.	Balsam pear	X
<i>Sicyos pachycarpus</i> Hook. & Arn.	<i>Kūpala, 'ānunu</i>	E

EUPHORBIACEAE

<i>Aleurites moluccana</i> (L.) Willd.	<i>Kukui</i>	X
<i>Chamaesyce hirta</i> (L.) Millsp.	Hairy garden spurge	X
<i>Chamaesyce hypericifolia</i> (L.) Millsp.	Graceful spurge	X
<i>Chamaesyce hyssopifolia</i> (L.) Small		X
<i>Euphorbia heterophylla</i> L.	<i>Kaliko</i>	X
<i>Ricinus communis</i> L.	Castor bean	X

FABACEAE

<i>Acacia farnesiana</i> (L.) Willd.	Klu, aroma, <i>kolū</i>	X
<i>Chamaecrista nictitans</i> (L.) Moench	Partridge pea	X
<i>Crotalaria incana</i> L.	Fuzzy rattlepod	X
<i>Crotalaria pallida</i> Aiton	Smooth rattlepod	X
<i>Desmanthus pernamucanus</i> (L.) Thell.	Slender or virgate mimosa	X

FABACEAE (CONT.)

<i>Desmodium tortuosum</i> (Sw.) DC	Florida beggarweed	X
<i>Enterolobium cyclocarpum</i> (N.Jacquin) Grisebach	Earpod	X
<i>Indigofera hendecaphylla</i> Jacq.	Creeping indigo	X
<i>Indigofera suffruticosa</i> Mill.	' <i>Nikō</i>	X
<i>Leucaena leucocephala</i> (Lam.) de Wit	<i>Koa haole</i>	X
<i>Macroptilium lathyroides</i> (L.) Urb.	Wild bean	X
<i>Peltophorum pterocarpum</i> (A.P. de Candolle) K. Heyne	Yellow poinciana	X
<i>Pithecellobium dulce</i> (Roxb.) Benth.	Opiuma	X
<i>Prosopis pallida</i> (Humb. & Bonpl. Ex Willd.) Kunth	<i>Kiawe</i> , algaroba	X
<i>Samanea saman</i> (Jacq.) Merr.	Monkeypod	X
<i>Tamarindus indica</i> L.	Tamarind	X

LAMIACEAE

<i>Hyptis pectinata</i> (L.) Poit.	Comb hyptis	X
<i>Leonotis nepetifolia</i> (L.) R.Br.	Lion's ear	X

LAURACEAE

<i>Cassytha filiformis</i> L.	<i>Kauna'oa pehu</i>	I
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MALVACEAE

<i>Abutilon grandifolium</i> (Willd.) Sweet	Hairy abutilon	X
<i>Abutilon incanum</i> (Link.) Sweet	Hoary abutilon	X
<i>Malva parviflora</i> L.	Cheese weed	X
<i>Malvastrum coromandelianum</i> (L.) Garcke	False mallow	X
<i>Sida ciliaris</i> L.		X
<i>Sida fallax</i> Walp.	' <i>Ilima</i>	I
<i>Sida rhombifolia</i> L.		X
<i>Sida spinosa</i> L.	Prickly sida	X
<i>Thespesia populnea</i> (L.) Sol. Ex Correa	<i>Milo</i>	

MORACEAE

<i>Ficus microcarpa</i> L.f.	Chinese banyan	X
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NYCTAGINACEAE

<i>Boerhavia coccinea</i> Mill.		X
<i>Bougainvillea sp.</i> A.L. Jussieu	Bougainvillea	X

PASSIFLORACEAE

<i>Passiflora foetida</i> L.	Love-in-a-mist	X
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PLUMBAGINACEAE

<i>Plumbago zeylanica</i> L.	' <i>Ilie'e</i>	I
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POLYGONACEAE

<i>Antigonon leptopus</i> Hook&Arnott	Mexican creeper	X
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PORTULACACEAE

<i>Portulaca oleracea</i> L.	pigweed	X
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SANTALACEAE

<i>Santalum ellipticum</i> Gaudich.	' <i>Iliahi 'aloe</i>	E
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SOLANACEAE

<i>Nicotiana glauca</i> Graham	Tree tobacco	X
<i>Solanum americanum</i> Mill.	Glossy nightshade, <i>pōpōlo</i>	I
<i>Solanum lycopersicum</i> L. var. <i>cerasiforme</i> (Dunal)	Cherry tomato	
Spooner, G.J. Anderson & R.K. Jansen		
<i>Solanum seafortianum</i> Andrews		X

STERCULIACEAE

<i>Waltheria indica</i> L.	' <i>uhaloa</i>	I
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VERBENACEAE

<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Jamaican vervain	X
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APPENDIX C: AVIAN SPECIES LIST

The following checklist is an inventory of all the bird species observed within or immediately adjacent to the proposed East Kalaeloa Energy Corridor by ICF (this survey) and previous surveys. Refer to Table 1 for supplemental information on the occurrence and status of each species observed within the project area during this survey. Species names are arranged according to the nomenclature employed by The American Ornithologists' Union Checklist of North American Birds 7th Edition, and applicable supplements. <http://www.aou.org/checklist/north/print.php>, last accessed May 20, 2013

SCIENTIFIC NAME	COMMON NAME	ICF SURVEY	PREVIOUS SURVEYS
ANSERIFORMES			
ANATIDAE			
<i>Anas wyvilliana</i> x <i>A. platyrhynchos</i>	Koloa x Mallard hybrid	X	X
GALLIFORMES			
PHASANIDAE			
<i>Francolinus pondicerianus</i>	Gray francolin	X	X
<i>Francolinus francolinus</i>	Black francolins	X	X
<i>Gallus gallus</i>	Red junglefowl	X	
<i>Pavo cristatus</i>	Common peafowl	X	
PELECANIFORMES			
FREGATIDAE			
<i>Fregata minor</i>	Great frigatebird		X
CICONIFORMES			
ARDEIDAE			
<i>Nycticorax nycticorax hoactli</i>	Black crowned night heron	X	X
CHARADRIIFORMES			
CHARADRIIDAE			
<i>Pluvialis fulva</i>	Pacific golden plover	X	X
RECURVIROSTRIDAE			
<i>Himantopus mexicanus knudseni</i>	Black-necked stilt	X	X
SCOLOPACIDAE			
<i>Arenaria interpres</i>	Ruddy turnstone		X
<i>Heteroscelus incanus</i>	Wandering tattler		X
<i>Calidris alba</i>	Sanderling		X

COLUMBIFORMES

COLUMBIDAE

<i>Streptopelia chinensis</i>	Spotted dove	X	X
<i>Geopelia striata</i>	Zebra dove	X	X

STRIGIFORMES

TYTONIDAE

<i>Tyto alba</i>	Barn owl		X
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STRIGIDAE

<i>Asio flammeus sandwichensis</i>	Hawaiian short-eared owl		X
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PASSERIFORMES

PYCNONOTIDAE

<i>Pycnonotus cafer</i>	Red-vented bulbul	X	X
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ZOSTEROPIDAE

<i>Zosterops japonicus</i>	Japanese white-eye	X	X
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TURDIDAE

<i>Copsychus malabaricus</i>	White-rumped shama	X	X
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MIMIDAE

<i>Mimus polyglottos</i>	Northern mockingbird	X	X
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STURNIDAE

<i>Acridotheres tristis</i>	Common mynah	X	X
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EMBERIZIDAE

<i>Paroaria coronata</i>	Red-crested cardinal	X	X
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CARDINALIDAE

<i>Cardinalis cardinalis</i>	Northern cardinal	X	X
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FRINGILIDAE

<i>Carpodacus mexicanus</i>	House finch	X	X
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Passer domesticus

	House sparrow		X
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ESTRILDIDAE

<i>Estrilda caerulescens</i>	Lavender waxbill	X	
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<i>Estrilda astrild</i>	Common waxbill	X	X
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<i>Amandava amandava</i>	Red avadavat	X	X
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<i>Lonchura atricapilla</i>	Chestnut munia	X	X
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APPENDIX D – SEABIRD FRIENDLY LIGHTING SOLUTIONS

Source: USFWS (2012) and <http://www.kauai-seabirdhcp.info/minimization/lights/>



SEABIRD FRIENDLY LIGHTING SOLUTIONS

Help eliminate seabird light attraction. Select the best fixture for your application using this guide. Avoid uplighting, always shield floodlights, and aim downlights carefully to avoid light trespass. For more information go to www.kauai-seabirdhcp.info.



Unacceptable / Discouraged Fixtures that produce glare and light trespass	Acceptable Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night
<p>Unshielded Floodlights or Poorly-shielded Floodlights</p>	<p>Flat lens Full Cutoff Fixtures Fully Shielded Walkway Bollards</p>
<p>Unshielded Wallpacks & Unshielded or Poorly-shielded Wall Mount Fixtures</p>	<p>Fully Shielded Wallpack & Wall Mount Fixtures</p>
<p>Drop-Lens & Sag-Lens Fixtures w/ exposed bulb / refractor lens</p>	<p>Fully Shielded Fixtures</p>
<p>Unshielded Streetlight Unshielded Security Light Unshielded 'Period' Style Fixtures</p>	<p>Full Cutoff Streetlight Fully Shielded Security Light Fully Shielded 'Period' Style Fixtures bulb shielded in opaque top</p>
<p>Unshielded PAR Floodlights Drop-Lens Canopy Fixtures</p>	<p>Shielded / Properly-aimed PAR Floodlights Flush Mounted Canopy Fixtures</p>
<p>Unshielded floodlight that is angled incorrectly</p> <p>Standard Floodlight Waste Light, Light Trespass Task Area Neighbor</p>	<p>Shielded floodlight that is angled correctly</p> <p>Shielded Floodlight Task Area Neighbor</p>

Illustrations from www.darksky.org and www.darkskysociety.org

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APPENDIX D

PRECONSULTATION LETTERS

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

RECEIVED

2013 APR 12 PM 12:52
BELT COLLINS HAWAII



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

March 10, 2013

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:
13-080
Kalaeloa Energy



August 20, 2013
2012.33.4000/13P-064

Ms. Joanne E. Hiramatsu
Senior Planner/Project Manager
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

SUBJECT: Kalaeloa East Energy Corridor, Environmental Assessment Preconsultation

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your letter dated March 29, 2013. Thank you for allowing us to review and comment on the subject document. The document was routed to the Clean Water Branch in the DOH. They will provide specific comments to you if necessary. EPO recommends that you review the Standard Comments (www.hawaii.gov/health/epo under the land use tab). You are required to adhere to all Standard Comments specifically applicable to this application.

EPO suggests that you examine the many sources available on strategies to support the sustainable design of communities, including the:

- U.S. Environmental Protection Agency's report, "Creating Equitable, Health and Sustainable Communities: Strategies for Advancing Smart Growth, Environmental Justice, and Equitable Development" (Feb. 2013), <http://www.epa.gov/smartgrowth/pdf/equitable-dev/equitable-development-report-508-011713b.pdf>;
- U.S. Environmental Protection Agency's sustainability programs: www.epa.gov/sustainability;
- U.S. Green Building Council's LEED program: www.new.usgbc.org/leed; and
- World Health Organization, www.who.int/hia.

The DOH encourages everyone to apply these sustainability strategies and principles early in the planning and review of projects. We also request that for future projects you consider conducting a Health Impact Assessment (HIA). More information is available at www.cdc.gov/healthypplaces/hia.htm. We request you share all of this information with others to increase community awareness on sustainable, innovative, inspirational, and healthy community design.

We request a written response confirming receipt of this letter and any other letters you receive from DOH in regards to this submission. You may mail your response to: 919 Ala Moana Blvd., Ste. 312, Honolulu, Hawaii 96814. However, we would prefer an email submission to epo@doh.hawaii.gov. We anticipate that our letter(s) and your response(s) will be included in the final document. If you have any questions, please contact me at (808) 586-4337.

Mahalo,

Laura Leialoha Phillips McIntyre, AICP
Manager, Environmental Planning Office

Ms. Laura Leialoha Phillips McIntyre, AICP
Manager, Environmental Planning Office
Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Dear Ms. McIntyre:

**Kalaeloa East Energy Corridor
Environmental Assessment Preconsultation**

Thank you for your preconsultation comments on the proposed Kalaeloa East Energy Corridor project dated March 10, 2013. We appreciate your routing of proposed project information to the Department of Health (DOH) Clean Water Branch for review and comment.

In regards to the Standard Comments, these will be reviewed and integrated into the Draft Environmental Assessment (DEA) where appropriate.

In regards to the sustainability strategies and Health Impact Assessment, these will be reviewed and integrated into the DEA where appropriate. The DEA will discuss public health and appropriate mitigation measures, if any are needed.

If you have any questions, please feel free to call me at 521-5361, ext. 309, or you can email me at jhiramatsu@beltcollins.com.

Sincerely,

BELT COLLINS HAWAII LLC

Joanne E. Hiramatsu
Senior Planner/Project Manager

DAA/JEH;jdk

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 26, 2013

April 4, 2013

Belt Collins Hawaii LLC
Attention: Ms. Joanne E. Hiramatsu
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

via email: jhiramatsu@beltcollins.com

Dear Ms. Hiramatsu,

SUBJECT: Kalaeloa East Energy Corridor, Environmental Assessment
Preconsultation

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

At this time, enclosed are comments from (1) Land Division – Oahu District; and (2) Division of Forestry Wildlife. No other comments were received as of our suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)

MEMORANDUM

TO: *RL*

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division - Oahu District
- Historic Preservation

FROM: ^{1st} Russell Y. Tsuji, Land Administrator

SUBJECT: Kalaeloa East Energy Corridor, Environmental Assessment Preconsultation

LOCATION: Kalaeloa, East Energy Corridor

APPLICANT: Hawaii Community Development Authority, by its consultant, Belt Collins Hawaii LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by **April 25, 2013**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

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

Signed: *RL*

Print Name: *RL*

Date: *4/5/2013*

c: Central Files *en*

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 4, 2013

MEMORANDUM

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division - Oahu District
- Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
 SUBJECT: Kalaeloa East Energy Corridor, Environmental Assessment Preconsultation
 LOCATION: Kalaeloa, East Energy Corridor
 APPLICANT: Hawaii Community Development Authority, by its consultant, Belt Collins Hawaii LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by **April 25, 2013**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

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

Signed: *[Signature]*
 Print Name: *Roger H. Imoto*
 Date: *4/16/13*

c: Central Files

RECEIVED
 13 APR -4 P 3:06
 FORESTRY & WILDLIFE
 STATE OF HAWAII

RECEIVED
 LAND DIVISION
 2013 APR 22 AM 10:50
 DEPT. OF LAND &
 NATURAL RESOURCES
 STATE OF HAWAII

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL ST., ROOM 325
HONOLULU, HAWAII 96813
TEL (808) 587-0166 FAX (808) 587-0160

April 10, 2013

TO: Russell Y. Tsuji, Land Administrator
 THRU: Roger H. Imoto, DOFAW Administrator *[Signature]*
 FROM: David G. Smith, Oahu Branch Manager
 SUBJECT: Kalaeloa East Energy Corridor, EA Consultation

Power-lines are a known source of migratory seabird mortality on Oahu. This issue should be addressed by the Environmental Assessment. An alternatives analysis for putting the lines underground should be included.

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSIONER OF WATER RESOURCES MANAGEMENT

ESTHER KIA'AINA
VICE CHIEF

WILLIAM H. TASI
DEPUTY DIRECTOR, WATER

AGRICULTURE RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONSERVATION
COMMISSIONER OF WATER RESOURCE MANAGEMENT
CONSERVATION AND FACTORY LANDS
CONSERVATION AND RESOURCES ENHANCEMENT
LANDS
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KALAEOLOA ISLAND RESERVE COMMISSIONER
LAND
STATE PARKS



August 20, 2013
2012.33.4000/13P-063

Mr. Russell Y. Tsuji
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Tsuji:

**Kalaeloa East Energy Corridor
Environmental Assessment Preconsultation**

Thank you for your preconsultation comments on the proposed Kalaeloa East Energy Corridor project dated April 26, 2013. We appreciate your routing of the proposed project information to the DLNR divisions for review and comment. The Land Division, we understand, had no comment at this time.

The concern of your Fish and Wildlife Division regarding seabird mortality due to overhead power lines will be addressed in the Draft Environmental Assessment (DEA). An underground option for the proposed project will be included in the Alternatives Considered section of the DEA.

If you have any questions, please feel free to call me at 521-5361, ext. 309, or you can email me at jhiramatsu@beltcollins.com.

Sincerely,
BELT COLLINS HAWAII LLC

Joanne E. Hiramatsu
Senior Planner/Project Manager

DAA/JEH:jdk

NEIL ABERCROMBIE
GOVERNOR



RECEIVED

2013 JUN 14 PM 12:51

BELT COLLINS HAWAII

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

June 7, 2013

GLENN M. OKIMOTO
DIRECTOR

Deputy Directors
JADE T. BUTAY
FORD N. FUCHIGAMI
RANDY GRUNE
JADINE URASAKI

IN REPLY REFER TO:

STP 8.1231

Ms. Joanne E. Hiramatsu
Senior Planner/Project Manager
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

Subject: Kalaeloa East Energy Corridor
Environmental Assessment Preconsultation

The State Department of Transportation (DOT) previously commented on the subject proposed action in its letter STP 8.1201 dated May 7, 2013 (attached), and now offers the following supplemental comments.

1. Any work within the Oahu Railway & Land Company (OR & L) right-of-way will need to be reviewed by the Hawaiian Railroad Society, Department of Land and Natural Resources Historic Preservation Office and DOT.
2. The Applicant should address the following bikeways that are planned in the area:
 - a. The entire segment of Roosevelt Avenue (Leeward bikeway)
 - b. The entire segment of Coral Sea Road and Saratoga Avenue
 - c. The entire segment of Essex Road and Hanson Road

If there are any questions, including the need to meet with DOT staff, please contact Mr. Garrett Smith of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Very truly yours,

GLENN M. OKIMOTO, Ph.D.
Director of Transportation

NEIL ABERCROMBIE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

May 7, 2013

Ms. Joanne E. Hiramatsu
Senior Planner/Project Manager
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

Subject: Kalaeloa East Energy Corridor
Environmental Assessment Preconsultation

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project. DOT understands that the Hawaii Community Development Authority (HCDA) proposes to install an above ground 12kV power line on 65-foot poles within the east perimeter of the Kalaeloa Community Development District.

Given the project location, DOT's nearby State airport (Kalaeloa Airport) and highway facility (Roosevelt Avenue) will be impacted.

DOT offers the following regarding potential impacts to the State airport: Please have HCDA file a Federal Aviation Administration (FAA) Form 7460-1 since the proposed project is in close proximity of Kalaeloa Airport and the above ground electrical lines and poles may pose a hazard to air operations.

The DOT Highways Division is still conducting its review and has not yet provided comments. The Statewide Transportation Planning Office will inform you of any further DOT comments once received.

DOT appreciates the opportunity to provide comments. If there are any questions, please contact Mr. Garrett Smith of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Very truly yours,

GLENN M. OKIMOTO, Ph.D.
Director of Transportation

EKT:jm
bc: AIR-EP, HWY-P, STP (13-EC-044)

MAI 10 2013

GLENN M. OKIMOTO
DIRECTOR

Deputy Directors
JADE T. BUTAY
FORD N. FUCHIGAMI
RANDY GRUNE
JADINE URASAKI

IN REPLY REFER TO:
DIR 0483
STP 8.1201

Handwritten initials



Mr. Glenn M. Okimoto, Director
Department of Transportation
869 Punchbowl Street, Room 509
Honolulu, HI 96813-5097

Dear Mr. Okimoto:

**Kalaeloa East Energy Corridor
Environmental Assessment Preconsultation**

Thank you for your preconsultation comments on the proposed Kalaeloa East Energy Corridor project dated May 7, 2013 and June 7, 2013. Your response indicated a range of concerns regarding the proposed project which we intend to discuss in the Draft Environmental Assessment (DEA).

Regarding potential impacts to the Kalaeloa Airport, HCDA has submitted a Federal Aviation Administration (FAA) Form 7460-1 and the FAA has determined that the power poles in the proposed project do not pose a hazard to air navigation.

Regarding the Oahu Railway & Land Company (OR & L) right-of-way, the project area does not cross the OR & L right-of-way or associated train operation areas. Cultural and historical resources will be covered in the DEA. Additionally, the Department of Land and Natural Resources, State Historic Preservation Division, was included in the preconsultation.

Regarding bikeways, the DEA will note planned bikeways within the project area. The Oahu Bike Plan will be reviewed. The DEA will discuss bikeways and other roadway facilities and appropriate mitigation measures, if any are needed.

We appreciate your preconsultation comments. If you have any questions, please feel free to call me at 521-5361, ext. 309, or you can email me at jhiramatsu@beltcollins.com.

Sincerely,

BELT COLLINS HAWAII LLC

Joanne E. Hiramatsu
Senior Planner/Project Manager

DAA/JEH;jdk

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

August 20, 2013
2012.33.4000/13P-068

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-8041
DEPT. WEB SITE: www.honolulu.gov • CITY WEB SITE: www.honolulu.gov

RECEIVED

2013 MAY 29 PM 12: 55

BELT COLLINS HAWAII LLC
GEORGE I. ATTA, FAICP,
DIRECTOR
ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

2013/ELOG-669(ds)



May 23, 2013

Ms. Joanne E. Hiramatsu
Senior Planner/Project Manager
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

SUBJECT: Kalaeloa East Energy Corridor
Environmental Assessment Preconsultation

In response to your request for preconsultation on the subject project, we provide the following comments:

A. Ewa Development Plan

The draft environmental assessment (DEA) should include a discussion of the project's consistency with the provisions of the Ewa Development Plan (DP) relating to the following:

1. Historic and cultural resources, including scenic resources, the Ewa Marine Corps Air Field, and the OR&L Historic Railway and associated train operations in both the Ewa DP and the proposed Ewa DP under the City and County of Honolulu Bill No. 65 (2012), CD1. Please refer to Section 3.4, Historic and Cultural Resources and Table 3.1, Significant Ewa Historic and Cultural Resources of the Ewa DP when preparing your discussion.
2. Potential adverse impacts on the makai portions of the proposed Kalaeloa Regional Park with respect to adequate bike lanes and sidewalks along Tripoli Road and the appropriateness of the scale of the poles in relationship to the surrounding Kalaeloa Park. For provisions relating to the makai areas of the proposed Kalaeloa Regional Park, please refer to Section 3.7.4, Kalaeloa (Barbers Point Naval Air Station) of the Ewa DP and Section 3.13, Kalaeloa of the proposed Ewa DP.
3. The project's impact on the City's plans for expansion of the Honouliuli Wastewater Treatment Plant since the proposed transmission line will cross land recently acquired for plant expansion. Please refer to Section 4.3, Wastewater Treatment of the current and proposed Ewa DPs.

Ms. Joanne E. Hiramatsu
Senior Planner/Project Manager
Belt Collins Hawaii LLC
May 23, 2013
Page 2

4. The benefits and disadvantages of above or below ground installation of the transmission lines. Please refer to Section 4.4, Electrical Power Development in the current and proposed Ewa DPs.
- B. Endemic Flora
Chamaesyce degenerii is known to inhabit the area. The State Department of Land and Natural Resources, Division of Forestry and Wildlife and the U. S. Fish and Wildlife Service should be consulted regarding protection of endemic and listed plants. Potential impacts to federally listed or protected species and mitigation measures should be addressed in the DEA, if applicable.
- C. Construction Plan Preparation
For your information, at the time of construction plan preparation, the following should be shown on the plans:
1. The exact location of the power poles should be shown on all streets currently and anticipated to be under the jurisdiction of the City.
 2. The location of future road rights-of-way in relation to the location of the power poles.
- D. Easements
If easements are required for the proposed transmission lines, an application for the designation of easements must be submitted for review and approval.

We also suggest that the Department of Environmental Services, the Department of Parks and Recreation, and the Hawaiian Railway Society be consulted in the preparation of the DEA.

Should you have any questions, please contact Dennis Silva, Jr. of our Community Planning Branch at 768-8904.

Very truly yours,

George I. Atta, FAICP, Director
Department of Planning and Permitting

GIA:js

kalaeloaEAPreconsult



August 20, 2013
2012.33.4000/13P-165

Mr. George I. Atta, FAICP, Director
Department of Planning and Permitting
650 King Street, 7th floor
Honolulu, HI 96813

Dear Mr. Atta:

**Kalaeloa East Energy Corridor
Environmental Assessment Preconsultation**

Thank you for your preconsultation comments on the proposed Kalaeloa East Energy Corridor project dated May 23, 2013. Your response indicated a range of concerns regarding the proposed project, which we intend to discuss or note in the Draft Environmental Assessment (DEA).

Regarding the Ewa Development Plan, we will use, as suggested, the most recent version which was approved by Council on July 10, 2013. The DEA will discuss provisions of the Development Plan relating to historic and cultural resources, Tripoli Street and the proposed Kalaeloa Regional Park, the Honouliuli Wastewater Treatment Plant, and overhead vs. underground power lines.

The project has been undergoing some adjustments since our initial contact with your office. New power poles were recently installed from near the intersection of Roosevelt Avenue and Essex Road to near Renton Road, passing near the Honouliuli Wastewater Treatment Plant (HWWTP); therefore this project in the vicinity of HWWTP will be limited to installation of new electrical lines on the existing poles.

Regarding the endemic flora concerns, a flora and fauna survey was conducted and the results of the study will be part of the DEA. Both the Department of Land and Natural Resources and U.S. Fish and Wildlife Service were included in the preconsultation. The DEA will discuss vegetation and wildlife and appropriate mitigation measures, if any are needed.

Regarding construction plan preparation, Hawaii Community Development authority (HCDA) concurs that the exact location of power poles will be shown at the time of construction plan preparation. The power poles at present are proposed to replace the existing power poles within the mauka side of the existing Tripoli Street right of way.

Mr. George I. Atta, FAICP, Director
August 20, 2013 / 13P-065
Page 2

Regarding easements, HCDA is presently exploring the easement requirements for the proposed corridor. Your comments on the application for the designation of easements are noted and will be included in the list of permits required.

Regarding consultation with other agencies and organizations, Department of Environmental Services, Department of Parks and Recreation, and Hawaiian Railway Society will be included in the distribution list for the DEA.

We appreciate your preconsultation comments. If you have any questions, please feel free to call me at 521-5361, ext. 309, or you can email me at jhiramatsu@beltcollins.com.

Sincerely,
BELT COLLINS HAWAII LLC


Joanne E. Hiramatsu
Senior Planner/Project Manager

DAA/JEH;jdk

Preconsultation comments from Haseko Development, Inc.

Emails received 4/25/13.

From: Sharene Tam [<mailto:stam@haseko.com>]
Sent: Thursday, April 25, 2013 4:34 PM
To: Joanne Hiramatsu
Cc: John Chung
Subject: RE: Buyer questions/concerns

Thought so. By the way, the thing that has people freaked out the most (at least based on what I have heard/been told thus far) is not the height of the poles, but (as anticipated) the future higher voltage line... Here's an excerpt from the latest inquiry that was forwarded to me: "I am concerned about the possible health hazards associated with these high-tension power lines being placed so close to residences..."

If the letter were solely feedback on the project I would send it to you, but it is mostly complaining about Haseko not doing enough to stop the project.

From: Joanne Hiramatsu [<mailto:jhiramatsu@beltcollins.com>]
Sent: Thursday, April 25, 2013 4:30 PM
To: Sharene Tam
Cc: John Chung
Subject: RE: Buyer questions/concerns

Formal written letter would be best.

From: Sharene Tam [<mailto:stam@haseko.com>]
Sent: Thursday, April 25, 2013 4:29 PM
To: Joanne Hiramatsu
Cc: John Chung
Subject: RE: Buyer questions/concerns

Do you prefer email or formal written letter?

From: Joanne Hiramatsu [<mailto:jhiramatsu@beltcollins.com>]
Sent: Thursday, April 25, 2013 4:27 PM
To: Sharene Tam
Cc: John Chung
Subject: RE: Buyer questions/concerns

Sharene:

Yes, any potential buyer or home owner can ask to receive a copy of the EA. We typically send out CDs, unless they specifically request a hard copy. They can also view or download it from the OEQC website as it is published there in pdf format for all to see. <http://oeqc.doh.hawaii.gov/default.aspx> We are accepting feedback at this early stage. A letter would be the best option rather than calling so their concerns will be published in the EA and we can address their concerns in the EA.

I do have some good news though. The existing poles will be replaced by the wooden poles, so other than the height there will not be an additional obstruction in terms of views. To some degree the higher height is better because the residents won't see the wires hanging from their second floor window, although the cable and telephone lines are typically installed at a height of about 26 feet and the lowest 12 kV line will be at about elevation 35 feet, so above the roof line. If people want to see what those wooden poles look like, they are installed along Fort Weaver Road.

The EA won't come out for another couple of months. We need to have HCDA review the draft before we publish. Plus respond to any comments received in this pre-consultation process. So the best is to have concerned people write a letter so it is official. My contact information is shown below.

If you have any additional questions, please feel free to contact me any time.

Thanks,
Joanne

Joanne Hiramatsu | Senior Planner/Project Manager
Belt Collins Hawaii LLC
2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
T: 808.521.5361 | F: 808.538.7819 | www.beltcollins.com

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From: Sharene Tam [<mailto:stam@haseko.com>]
Sent: Thursday, April 25, 2013 4:09 PM
To: Joanne Hiramatsu
Cc: John Chung
Subject: Buyer questions/concerns

Aloha Joanne,

If a buyer/homeowner wants to be sent a copy of the EA directly, can they contact you to ask for that? Are you also collecting feedback at this early stage from members of the general public? The sales folks say they have buyers who are upset about the East Energy Corridor Project. Okay to refer them directly to you so you can document it?

Thus far, we have been telling people it would be best to wait for the EA to come out so they have all the details they need to provide informed feedback to you. Any idea when the EA will come out?

Please let me know.

Mahalo,

Sharene

Sharene Saito Tam
Vice President
Haseko Development, Inc.
91-1001 Kaimālie Street Suite 205
'Ewa Beach, HI 96706
B.808.689.7772 x237
F.831.597.2216
C.808.478.6599

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Thank you.