

DEPARTMENT OF PLANNING AND PERMITTING  
**CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET, 7<sup>TH</sup> FLOOR • HONOLULU, HAWAII 96813  
PHONE: (808) 768-8000 • FAX: (808) 768-6041  
DEPT. WEB SITE: [www.honolulu.gov](http://www.honolulu.gov) • CITY WEB SITE: [www.honolulu.gov](http://www.honolulu.gov)

**FILE COPY**

**APR 23 2013**

KIRK CALDWELL  
MAYOR



13 APR -5 A7:10

GEORGE I. ATTA, FAICP  
DIRECTOR DESIGNATE

ARTHUR D. CHALLACOMBE  
DEPUTY DIRECTOR

2013/ED-3(MS)

April 3, 2013

Mr. Gary Gill, Acting Director  
Office of Environmental Quality Control  
State of Hawaii  
State Office Tower, Room 702  
235 South Beretania Street  
Honolulu, Hawaii 96813

Dear Mr. Hooser:

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

Project: Chevron Photovoltaic Solar Facility  
Landowner: Chevron USA Inc.  
Applicant: Chevron Technology Ventures  
Agent: URS Corporation (Darla Guerrero)  
Location: 91-39 Hanua Street – Honouliuli  
Tax Map Keys: 9-1-31: 2  
Proposal: Special Management Area-Major (SMA) Permit to allow the installation of a new ground mounted photovoltaic (PV) facility.

We respectfully request publication of the project summary of the Draft Environmental Assessment (DEA) in the next edition of The Environmental Notice on April 23, 2013. Enclosed is a copy of the DEA document in PDF format on a compact disk and the Publication Form. The Publication Form, including project summary, was also sent via electronic mail to your office.

If you have any questions, please contact Malynne Simeon of our staff at 768-8023.

Very truly yours,

A handwritten signature in black ink that reads "George I. Atta".

George I. Atta, FAICP  
Director Designate  
Department of Planning and Permitting

GIA:hd

Attachments

RECEIVED  
13 APR -8 3:30

**DRAFT REPORT**

**DRAFT ENVIRONMENTAL ASSESSMENT**

**CHEVRON HAWAI'I  
PHOTOVOLTAIC SOLAR PROJECT  
CHEVRON'S 10-ACRE SITE  
AT 91-39 HANUA STREET  
KAPOLEI, O'AHU, HAWAI'I**



Prepared for:

Chevron Technology Ventures  
6001 Bollinger Canyon Road K1104  
San Ramon, CA 94583

**March 2013**

Prepared by:

URS Corporation  
615 Piikoi Street, #900  
Honolulu, Hawai'i 96814

## PROJECT SUMMARY

<b>Project:</b>	<b>Chevron Hawai‘i Photovoltaic Solar Project at Chevron’s 10-acre Site</b>
<b>Applicant:</b>	Chevron Technology Ventures, LLC 6001 Bollinger Canyon Road K1104 San Ramon, CA 94583 Contact: Jarom Feriante (650-280-4780)
<b>Approving Agency:</b>	Department of Planning and Permitting City and County of Honolulu 650 South King Street, 7 <sup>th</sup> Floor Honolulu, HI 96813
<b>Location:</b>	Campbell Industrial Park (Chevron 10-acre Site) 91-39 Hanua Street Kapolei, O‘ahu, HI 96707
<b>Proposed Action:</b>	Install Solar Modules to generate Photovoltaic (PV) Solar Electricity (500-1000 kW) for a HECO Feed-In-Tariff (FIT) at the Chevron 10-acre Site
<b>Associated Actions Requiring Environmental Assessment</b>	Construction within the Special Management Area Status 1 designated for this Site.
<b>Tax Map Key:</b>	(1) 9-1-031:002
<b>Parcel Area:</b>	10 acres
<b>Project Area:</b>	4.5 acres
<b>Judicial District:</b>	Kapolei
<b>Community/Development Plan Designation:</b>	Ewa Development Plan and O‘ahu General Plan
<b>State Land Use District:</b>	Urban
<b>County Zoning:</b>	I-2 Intensive Industrial
<b>Required Permits and Approvals:</b>	Special Management Area Permit National Pollutant Discharge Elimination System – Notice of Intent (Construction) (NPDES-NOI(C)) Minor Modification to Existing Use Permit Grubbing, Grading, and Stockpiling Permit Building Permits
<b>Anticipated Determination:</b>	Finding of No Significant Impact
<b>Parties Consulted:</b>	See Chapter 7
<b>Consultant:</b>	URS Corporation 615 Piikoi Street, # 900 Honolulu, HI 96814 Contact: Darla Guerrero (808-593-1116)

**EXECUTIVE SUMMARY ..... ES-1**

ES.1 PROPOSED ACTION ..... ES-1

ES.2 PROPOSED ACTION LOCATION ..... ES-1

ES.3 PURPOSE AND NEED ..... ES-2

ES.4 ALTERNATIVES ..... ES-2

ES.5 POTENTIAL ENVIRONMENTAL RESOURCE IMPACTS AND PROPOSED MITIGATION MEASURES ..... ES-2

**Section 1 LOCATION, PURPOSE OF AND NEED FOR ACTION ..... 1-1**

1.1 SUMMARY OF THE PROPOSED ACTION ..... 1-1

1.2 PROJECT LOCATION AND EXISTING USES ..... 1-1

1.3 PURPOSE AND NEED ..... 1-1

1.4 REGULATORY OVERVIEW ..... 1-2

1.4.1 Chapter 25, Revised Ordinances of Honolulu ..... 1-2

1.4.2 Chapter 205, Hawai‘i Revised Statutes – Land Use Law ..... 1-5

1.4.3 Chapter 343, Hawai‘i Revised Statutes ..... 1-5

1.4.4 Historic Sites Act of 1935 (16 USC §§ 461-467) ..... 1-6

1.4.5 National Historic Preservation Act (16 USC § 470 et seq.) ..... 1-6

1.4.5.1 Section 106 of the Federal Guidelines (16 USC §106) ..... 1-6

1.4.6 Federal Coastal Zone Management Act (16 USC §1456 (c)(1)) ..... 1-7

1.4.7 Hawai‘i Coastal Zone Management Program (Chapter 205A, HRS) ..... 1-7

1.4.8 Endangered Species Act of 1973 (16 United States Code § 1531 et seq.; 50 Code of Federal Regulations Parts 17 and 222) ..... 1-7

1.4.9 Hawai‘i Endangered Species Law (HI ST §195D -1 - 32) ..... 1-7

1.4.10 Clean Air Act (42 U.S.C. § 7401 et seq.) ..... 1-8

1.4.11 Hawai‘i Department of Health, Clean Air Branch ..... 1-8

1.4.12 Federal Clean Water Act of 1977 (33 United States Code §§ 1251-1376; 30 Code of Federal Regulations § 330.5(a) (26)) ..... 1-8

1.4.13 O‘ahu General Plan and Ewa Development Plan ..... 1-9

1.4.14 Noise Regulatory Setting ..... 1-9

1.4.15 Environmental Permits and Required Approvals ..... 1-10

**Section 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION ..... 2-1**

2.1 INTRODUCTION ..... 2-1

2.2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES ..... 2-1

2.2.1 Proposed Action ..... 2-1

2.2.2 Project Location ..... 2-2

2.2.2.1 Proposed Action site ..... 2-2

2.2.2.2 Proposed Action site Access ..... 2-4

2.2.3 Alternatives ..... 2-4

2.2.3.1 Alternative 1 ..... 2-4

2.2.3.2 No Action Alternative ..... 2-5

2.3 ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES ..... 2-5

**Section 3 ENVIRONMENTAL RESOURCES ..... 3-1**

3.1 AIR QUALITY ..... 3-1

3.1.1	Definition of Resource.....	3-1
3.1.2	Affected Environment.....	3-1
3.2	NOISE.....	3-3
3.2.1	Definition of Resource.....	3-3
3.2.2	Affected Environment.....	3-4
3.3	INFRASTRUCTURE .....	3-5
3.3.1	Definition of Resource .....	3-5
3.3.2	Affected Environment.....	3-5
3.3.3	Roadways and Existing Traffic Conditions .....	3-6
3.4	CLIMATE.....	3-8
3.4.1	Definition of Resource.....	3-8
3.4.2	Affected Environment.....	3-8
3.5	VISUAL RESOURCES.....	3-11
3.5.1	Definition of Resource.....	3-11
3.5.2	Affected Environment.....	3-12
3.6	HAZARDOUS MATERIALS AND WASTE.....	3-13
3.6.1	Definition of Resource.....	3-13
3.6.2	Affected Environment.....	3-13
3.7	RECREATIONAL RESOURCES .....	3-13
3.7.1	Definition of Resource.....	3-13
3.7.2	Affected Environment.....	3-14
3.8	GEOLOGY AND SOILS .....	3-14
3.8.1	Definition of Resource.....	3-14
3.8.2	Affected Environment.....	3-14
3.9	WATER RESOURCES .....	3-18
3.9.1	Definition of Resource.....	3-18
3.9.2	Affected Environment.....	3-18
	3.9.2.1 Surface Water	3-18
	3.9.2.2 Groundwater	3-20
	3.9.2.3 Wetlands	3-20
	3.9.2.4 Near-Shore Water	3-20
3.10	BIOLOGICAL RESOURCES .....	3-23
3.10.1	Definition of Resource.....	3-23
3.10.2	Affected Environment.....	3-23
	3.10.2.1 Botanical Resources	3-23
	3.10.2.2 Mammalian and Avian Resources	3-24
	3.10.2.3 Special Status Species	3-24
3.11	CULTURAL RESOURCES .....	3-24
3.11.1	Definition of Resource.....	3-24
3.11.2	Affected Environment.....	3-25
	3.11.2.1 Historical Context	3-25
	3.11.2.2 Historical Research and Field Check	3-25
3.12	LAND USE.....	3-26
3.12.1	Definition of Resource.....	3-26
3.12.2	Affected Environment.....	3-26
3.13	SOCIOECONOMIC RESOURCES .....	3-29
3.13.1	Definition of Resource.....	3-29
3.13.2	Affected Environment.....	3-29

---

<b>Section 4</b>	<b>POTENTIAL ENVIRONMENTAL IMPACTS.....</b>	<b>4-1</b>
4.1	AIR QUALITY.....	4-1
	4.1.1 Proposed Action.....	4-1
	4.1.2 Alternative 1.....	4-2
	4.1.3 No-Action Alternative.....	4-2
4.2	NOISE.....	4-2
	4.2.1 Proposed Action.....	4-2
	4.2.2 Alternative 1.....	4-3
	4.2.3 No-Action Alternative.....	4-3
4.3	INFRASTRUCTURE.....	4-4
	4.3.1 Proposed Action.....	4-4
	4.3.2 Alternative 1.....	4-4
	4.3.3 No-Action Alternative.....	4-4
4.4	CLIMATE.....	4-5
	4.4.1 Proposed Action.....	4-5
	4.4.2 Alternative 1.....	4-5
	4.4.3 No-Action Alternative.....	4-6
4.5	VISUAL RESOURCES.....	4-6
	4.5.1 Proposed Action.....	4-6
	4.5.2 Alternative 1.....	4-17
	4.5.3 No-Action Alternative.....	4-17
4.6	HAZARDOUS MATERIALS AND WASTE.....	4-17
	4.6.1 Proposed Action.....	4-17
	4.6.2 Alternative 1.....	4-17
	4.6.3 No-Action Alternative.....	4-18
4.7	RECREATIONAL RESOURCES.....	4-18
	4.7.1 Proposed Action.....	4-18
	4.7.2 Alternative 1.....	4-18
	4.7.3 No-Action Alternative.....	4-18
4.8	GEOLOGY AND SOILS.....	4-19
	4.8.1 Proposed Action.....	4-19
	4.8.2 Alternative 1.....	4-19
	4.8.3 No-Action Alternative.....	4-20
4.9	WATER RESOURCES.....	4-20
	4.9.1 Proposed Action.....	4-20
	4.9.2 Alternative 1.....	4-22
	4.9.3 No-Action Alternative.....	4-22
4.10	BIOLOGICAL RESOURCES.....	4-22
	4.10.1 Proposed Action.....	4-22
	4.10.2 Alternative 1.....	4-22
	4.10.3 No-Action Alternative.....	4-23
4.11	CULTURAL RESOURCES.....	4-23
	4.11.1 Proposed Action.....	4-23
	4.11.2 Alternative 1.....	4-24
	4.11.3 No-Action Alternative.....	4-24
4.12	LAND USE.....	4-25
	4.12.1 Proposed Action.....	4-25
	4.12.2 Alternative 1.....	4-25
	4.12.3 No-Action Alternative.....	4-25

4.13	SOCIOECONOMIC RESOURCES .....	4-27
4.13.1	Proposed Action.....	4-27
4.13.2	Alternative 1 .....	4-27
4.13.3	No-Action Alternative .....	4-27
4.14	CUMULATIVE IMPACTS.....	4-27
4.14.1	Proposed Action.....	4-27
4.14.2	Alternative 1 .....	4-28
4.14.3	No-Action Alternative .....	4-28
4.15	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES.....	4-28
4.16	RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY .....	4-28
<b>Section 5 SUMMARY OF IMPACTS AND MITIGATION MEASURES .....</b>		<b>5-1</b>
5.1	DETERMINATION OF SIGNIFICANCE.....	5-2
5.2	FINDINGS AND REASONS SUPPORTING THE ANTICIPATED DETERMINATION .....	5-2
<b>Section 6 SPECIAL MANAGEMENT AREA PERMIT ASSESSMENT APPLICATION....</b>		<b>6-1</b>
6.1	SPECIAL MANAGEMENT AREA.....	6-1
6.2	SHORELINE SETBACK .....	6-1
6.3	TECHNICAL CHARACTERISTICS .....	6-1
6.3.1	Use Characteristics .....	6-1
6.3.2	Physical Characteristics .....	6-1
6.3.3	Construction Characteristics .....	6-2
6.3.4	Utility Requirements.....	6-2
6.3.5	Liquid Waste Disposal.....	6-2
6.3.6	Solid Waste Disposal.....	6-2
6.3.7	Access to Site.....	6-4
6.3.8	Other Pertinent Information.....	6-4
6.4	ECONOMIC AND SOCIAL CHARACTERISTICS.....	6-4
6.5	ENVIRONMENTAL CHARACTERISTICS.....	6-4
6.5.1	Soils .....	6-4
6.5.2	Topography.....	6-4
6.5.3	Surface Runoff, Drainage, and Erosion Hazard.....	6-4
6.5.4	Federal FIRM Zone, Land Use Ordinance Flood Hazard District, Other Geological Hazards .....	6-4
6.6	AFFECTED ENVIRONMENT .....	6-5
6.6.1	A Brief Description of Proposed Action Site in Relation to Surrounding Area .....	6-5
6.6.2	Proposed Action Site in Relation to Publicly Owned or Used Recreation Areas .....	6-5
6.6.2.1	Publicly Owned Beaches, Parks, and Recreation Areas	6-5
6.6.2.2	Rare, Threatened, or Endangered Species and Their Habitats/Wildlife and Wildlife Preserves	6-6
6.6.2.3	Fisheries and Fishing Grounds	6-6
6.6.2.4	Other Coastal/Natural Resources	6-6
6.6.3	Relation to Historic, Cultural, and Archaeological Resources .....	6-6
6.6.3.1	Historical	6-6
6.6.3.2	Cultural	6-6
6.6.3.3	Archaeological	6-7
6.6.4	Coastal Views from Surrounding Public Viewpoints .....	6-7
6.6.5	Quality of Receiving Waters and Groundwater Resources .....	6-7

# List of Contents

6.6.5.1	Streams	6-7
6.6.5.2	Marine Waters	6-7
6.6.5.3	Flood Zones	6-7
6.6.5.4	Groundwater	6-8
6.6.6	Other Pertinent Information	6-8
6.7	COASTAL ZONE IMPACTS	6-8
6.7.1	Recreational Resources	6-8
6.7.2	Historical Resources	6-8
6.7.3	Scenic and Open Space Resources	6-9
6.7.4	Coastal Ecosystems	6-9
6.7.5	Economic Uses	6-9
6.7.6	Coastal Hazards	6-9
6.7.7	Managing Development	6-10
6.7.8	Public Participation	6-10
6.7.9	Beach Participation	6-10
6.7.10	Marine Resources	6-10
6.8	SMA GUIDELINES	6-11
6.8.1	All Development in the Special Management Area	6-11
6.8.1.1	Adequate Public Access	6-11
6.8.1.2	Adequate and Properly Located Public Recreation Areas and Wildlife Preserves	6-11
6.8.1.3	Provisions Made for Solid and Liquid Waste Treatment, Disposal and Management	6-11
6.8.1.4	Alterations to Existing Land Forms and Vegetation	6-12
6.8.2	No Development shall be Approved unless the Council has First Found that	6-12
6.8.2.1	Minimize to the Extent Practicable and Clearly Outweighed by Public Health and Safety, or Compelling Public Interest	6-12
6.8.2.2	Objectives and Policies Set Forth in Section 25-3.1 and Area Guidelines Contained in HRS Section 205A-26	6-12
6.8.2.3	Consistent with the County General Plan, Development Plans, and Zoning	6-13
6.8.2.4	Minimize the Risk from Coastal Hazards	6-13
6.8.2.5	Not Impede Public Access to the Shoreline	6-13
6.8.3	The Council shall Seek to Minimize, where Reasonable	6-13
6.8.3.1	Dredging, Filling, or Otherwise Altering Any Bay	6-13
6.8.3.2	Reduce the Size of Any Beach or Other Area Usable for Public Recreation	6-13
6.8.3.3	Reduce or Impose Restrictions upon Public Access to Tidal and Submerged Lands	6-14
6.8.3.4	Interfere with or Detract from the Line of Sight toward the Sea	6-14
6.8.3.5	Water Quality, Existing Areas of Open Water Free of Visible Structures	6-14
<b>Section 7</b>	<b>LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED</b>	<b>7-1</b>
7.1	CHAPTER 25, ROH DRAFT EA DISTRIBUTION	7-1
7.2	NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 CONSULTATION	7-3
<b>Section 8</b>	<b>REFERENCES</b>	<b>8-1</b>
<b>Section 9</b>	<b>LIST OF PREPARERS</b>	<b>9-1</b>

# List of Tables, Figures, Photographs, and Appendices

---

## Tables

Table ES-1	Summary of Potential Environmental Resource Impacts and Proposed Mitigation Measures
Table 1-1	Potential Permits, Approvals, and Consultations Associated with the Proposed Action
Table 2-1	Summary of Environmental Effects of the Proposed Action and Alternatives
Table 3-1	State and National Ambient Air Quality Standards
Table 3-2	Hawai'i Administrative Rules §11-46 Noise Limits
Table 4-1	Visual Impacts from Adjacent Locations
Table 4-2	Visual Impacts from Distant Locations
Table 5-1	Summary of Affected Environmental Resources, Impact and Mitigation Measures
Table 7-1	List of Agencies and Organizations Receiving the Draft Environmental Assessment

## Figures

### Section 1

Figure 1-1	Neighboring Parcels
Figure 1-2	Special Management Area Map

### Section 2

Figure 2-1	PV System Examples
Figure 2-2	Location Map
Figure 2-3	Proposed Action Site Location
Figure 2-4	Picture of Site – Sparse Vegetation
Figure 2-5	Driveway Access Point
Figure 2-6	Alternate 1 Location

### Section 3

Figure 3-1	Existing Roadways
Figure 3-2	Flood Insurance Rate Map
Figure 3-3	Tsunami Evacuation Zone Map
Figure 3-4	Campbell Industrial Park
Figure 3-5	South Side of Parcel – Berm along Shoreline
Figure 3-6	Ameron Concrete Plant
Figure 3-7	Recreational Resources
Figure 3-8	Level Site with Coral Outcroppings
Figure 3-9	Soil Map
Figure 3-10	Drainage Area Map
Figure 3-11	Aquifer Map
Figure 3-12	Underground Injection Control Areas
Figure 3-13	Eastern Area and Western Portion
Figure 3-14	Zoning Map
Figure 3-15	Industrial Park Master Plan Land Use

## **List of Tables, Figures, Photographs, and Appendices**

---

### Section 4

Figure 4-1	Berm along Shoreline
Figure 4-2	Concrete Plant to the North
Figure 4-3	Various Viewpoints and Directions from Adjacent Locations
Figure 4-4	Viewshed #1 – Looking from North (From Hanua Street)
Figure 4-5	Viewshed #2 – Looking from East to West
Figure 4-6	Viewshed #3 – Looking from South-East End
Figure 4-7	Viewshed #4 – Looking from South to North (from Shoreline)
Figure 4-8	Viewshed #5 – Looking from West to East
Figure 4-9	Viewshed #6 – Makakilo Viewpoint – Panama Street
Figure 4-10	Viewshed #7 – Panoramic View
Figure 4-11	Site Grading – Existing
Figure 4-12	Water Resources
Figure 4-13	Shoreline Setback

### Section 6

Figure 6-1	Special Management Area Determination
Figure 6-2	Power Converter
Figure 6-3	Panel Layout

### **Appendices**

Appendix A	Biological Resources Survey Report
Appendix B	Archaeological Assessment
Appendix C	State Historic Preservation Division Concurrence Letter for the Compliance with Section 106 of the National Historic Preservation Act
Appendix D	Notice of Proposed Construction or Alteration

## List of Acronyms and Abbreviations

---

°F	Fahrenheit
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
BMPs	Best Management Practices
BWS	Board of Water Supply
CAA	Clean Air Act
CCH	City and County of Honolulu
CERCLA	Comprehensive Environmental Response Compensation and Liabilities Act
CFR	Code of Federal Regulations
CIP	Campbell Industrial Park
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
CSH	Cultural Surveys Hawai‘i
CTV	Chevron Technology Ventures
CWA	Clean Water Act
CZM	Coastal Zone Management
DLNR	State of Hawai‘i Department of Land and Natural Resources
dB	decibals
dBA	A-Weighted Sound Level
DPP	Department of Planning and Permitting
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIT	Feed-In-Tariff
FONSI	Finding of No Significant Impact

## List of Acronyms and Abbreviations

---

H <sub>2</sub> S	hydrogen sulfide
HAR	Hawai‘i Administrative Rules
HDOH	State of Hawai‘i Department of Health
HECO	Hawai‘ian Electric Company
HCEI	Hawai‘ian Clean Energy Initiative
HESL	Hawai‘i Endangered Species Law
HPD	Hawai‘i Preservation District
HRS	Hawai‘i Revised Statutes
Hz	Hertz
IRHB	Indoor Radiological Health Board (HDOH)
LCA	Life Cycle Assessment
Leq	Equivalent Sound Level
LNAPL	Light Non-Aqueous Phase Liquid
LRFI	Literature Review and Field Inspection
LUO	Land Use Ordinance
m	meter(s)
mm	millimeter(s)
m <sup>2</sup>	square meter(s)
mph	mile(s) per hour
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NO <sub>2</sub>	nitrogen dioxide
NOI	Notice of Intent
NO <sub>x</sub>	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSR	New Source Review
O <sub>3</sub>	ozone

## List of Acronyms and Abbreviations

---

OEQC	Office of Environmental Quality Control
Pb	lead
PM <sub>10</sub>	particulate matter with an aerodynamic diameter less than or equal to 10 microns
PM <sub>2.5</sub>	particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
PPB	Parts Per Billion
PPE	Personal Protective Equipment
PPM	Parts Per Million
PSD	Prevention of Significant Deterioration
PV	Photovoltaic
RCRA	Resource Conservation and Recovery Act
ROH	Revised Ordinances of Honolulu
SAAQS	State Ambient Air Quality Standards
SHA	Safe Harbor Agreement
SHPD	State Historic Preservation Division
SHPO	State Historic Preservation Office
SLUC	State Land Use Commission
SMA	Special Management Area
SO <sub>2</sub>	sulfur dioxide
SPL	sound pressure level
SSA	Shoreline Setback Area
TMK	Tax Map Key
TSP	Total Suspended Particulates
UIC	Underground Injection Control
USC	United States Code
USDOT	US Department of Transportation
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USOSHA	US Occupational Safety and Health Administration
VOC	Volatile Organic Compounds
µg	micrograms
µPa	micropascals

### EXECUTIVE SUMMARY

This Environmental Assessment (EA) was prepared in accordance with Chapter 25, Revised Ordinances of Honolulu (ROH), in support of a Special Management Area (SMA) Permit application. This EA demonstrates that construction and operation of the Proposed Action would not result in any significant effects to the environment. Pursuant to Special Management Area Law, Section 25-3.3, ROH, should a Finding of No Significant Impact (FONSI) be determined, an Environmental Impact Statement (EIS) would not be required.

#### ES.1 PROPOSED ACTION

The Chevron Technology Venture (CTV) is proposing the construction of a Photovoltaic (PV) system facility located at the Campbell Industrial Park (CIP) in Kapolei. CTV is planning to sell renewable energy generated from this PV facility to HECO through its feed-in tariff (FIT) program. It is to encourage addition of more renewable energy projects in Hawai'i. Pre-established and standardized FIT contract terms provide an easy way for individuals, governmental entities, and developers such as CTV to sell eligible renewable energy to HECO.

The proposed PV system consists of multiple PV panels, DC/AC power converter, solar panel support system, electrical interconnections, and mounting components. The PV system includes a solar tracker that aims the solar panels directly at the sun throughout the day to harness the energy of sunlight. The renewable energy generated from the PV facility will be fed into the electric grid that meets the HECO's Tier 3 Eligible Renewable Energy Generating Facilities (Schedule FIT) criteria. The PV facility uses the energy of sunlight and produces up to 10 million watts of electric power, contributing to the peak demand use.

The proposed PV system will fully comply with federal, state and local permits and programs designed for the protection and stewardship of Hawai'i's environmental resources. The following sections provide discussions of the purpose and need, Proposed Action location, alternatives, potential environment effects, and mitigation measures of the Proposed Action.

#### ES.2 PROPOSED ACTION LOCATION

The Proposed Action is proposed to be located in the CIP site to minimize potential impact to the natural environment that might otherwise result from selection of an environmental sensitive area. By selecting the industrial nature site, the Proposed Action will utilize many of the existing facilities. The property is adjoined to the west side of Ameron Incorporated, and the south side of the property is in front of the Pacific Ocean. The Proposed Action site will be located on approximately 4.5-acres of the 10-acres owned by Chevron.

### ES.3 PURPOSE AND NEED

The Proposed Action system is needed to assist the State of Hawai‘i in reaching the Hawai‘ian Clean Energy Initiative (HCEI) goal of having 70 percent of the State’s energy coming from renewable resources by 2030. While the Proposed Action system and increased renewable energy projects will not eliminate the need for fossil fuels generated energy, it will increase electricity sources from renewable energy. The State will also benefit from reduction in greenhouse gas emissions, cutback in foreign fossil fuel consumption, and associated environmental risks for transporting and storing fossil fuel.

### ES.4 ALTERNATIVES

Alternatives to the Proposed Action were evaluated by comparing them to the criteria or requirements with federal, state and local permits and programs established in procurements related to the PV system as detailed in Sections 2, 3, and 4. Reasonable alternatives to the Proposed Action include an alternate site on approximately 17-acres (Alternative 1) of the 248-acre property owned by Chevron. It is situated approximately 0.9 mile northwest of the Proposed Action site.

The No Action Alternative is evaluated as a baseline for comparison with the Proposed Action and Alternative 1. Under this alternative, the Proposed Action would not be constructed. Therefore, Chevron would not benefit from the revenue brought in by selling the electricity to HECO. In addition, there would be a lost opportunity to assist the State in reaching the HCEI goal of having 70 percent of the State’s energy come from renewable resources by 2030.

### ES.5 POTENTIAL ENVIRONMENTAL RESOURCE IMPACTS AND PROPOSED MITIGATION MEASURES

The Proposed Action is planning to be built at the CIP site. By selecting this industrial area, the Proposed Action will cause marginal environmental impacts to the existing industrial nature. The vast majority of potential environmental impacts can and will be fully mitigated. This will be accomplished through the use of proper planning (avoidance or minimization in design stages), construction mitigation, and compliance with the rules and regulatory policies. They are in place to govern such effects and to ensure protection of the natural and human environment. The following table summarizes the potential impacts to the environmental resources and proposed mitigation measures:

**Table ES-1 Summary of Potential Environmental Resource Impacts and Proposed Mitigation Measures**

Environmental Resources	Impacts and Mitigation
Air Quality	<p><i>Impact:</i> Fugitive dust will be expected as a result of construction.</p> <p><i>Mitigation:</i> Fugitive dust during construction will result, but the Proposed Action will be in compliance with applicable grading permit regulations and will utilize dust control plan to mitigate fugitive dust.</p>
Climate	<p><i>Impact:</i> There will be no impacts on climate.</p> <p><i>Mitigation:</i> None</p>
Noise	<p><i>Impact:</i> Temporary and permanent noise impacts are projected, but no significant impacts are estimated due to the existing industrial nature of the site and its surroundings.</p> <p><i>Mitigation:</i> None</p>
Roadway Infrastructures	<p><i>Impact:</i> Temporary impacts are expected as well as a minor impact from operational levels. However, no significant permanent impacts to roadway levels-of-service are projected.</p> <p><i>Mitigation:</i> None</p>
Utility Infrastructures	<p><i>Impact:</i> Impacts are expected due to additional utility connection.</p> <p><i>Mitigation:</i> There will be a marginal increase in demand on storm water and solid waste infrastructure.</p>
Hazardous Materials and Waste	<p><i>Impact:</i> Due to the existing industrial nature of the Proposed Action site and its surroundings, hazardous materials or wastes may be discovered or released during construction.</p> <p><i>Mitigation:</i> Handling and disposing of the hazardous materials or wastes will be in accordance with applicable federal, state, and local agency laws and regulatory policies.</p>
Recreation Resources	<p><i>Impact:</i> There will be no impacts on recreation resources.</p> <p><i>Mitigation:</i> None</p>
Geology and Soils	<p><i>Impact:</i> Impacts, both temporary and permanent, are to previously disturbed areas. Soil erosion will be expected as a result of construction.</p> <p><i>Mitigation:</i> None</p>
Water Resources	<p><i>Impact:</i> Potential stormwater runoff will result during construction.</p> <p><i>Mitigation:</i> The Proposed Action will be constructed in compliance with applicable NPDES permit regulations and will utilize best management practices to mitigate stormwater runoff.</p>
Biological Resources	<p><i>Impact:</i> Due to the existing industrial nature of the Proposed Action site and its surroundings, the site has been previously disturbed, and there is very little vegetation. Thus, impacts on biological resources are negligible.</p> <p><i>Mitigation:</i> None</p>

Cultural Resources	<p><i>Impact:</i> The Proposed Action site has been previously disturbed. Possible cultural resources may be discovered as a result of construction.</p> <p><i>Mitigation:</i> In the event of a discovery, construction will be stopped for archaeological investigation.</p>
Land Use	<p><i>Impact:</i> No significant impacts on land use are estimated due to the existing industrial nature of the site and its surroundings.</p> <p><i>Mitigation:</i> None</p>
Socioeconomic Resources	<p><i>Impact:</i> It is estimated that there will be a temporary boost to the area economy during construction, but not enough to impact schools, housing, or cause other cumulative effects. The permanent increase of employment will be small in the overall economy and negligible with respect to potential impacts.</p> <p><i>Mitigation:</i> None</p>

Based on the review of potential environmental resource impacts, the construction and operation of the Proposed Action would not result in any significant environmental impacts. The vast majority of potential impacts can and will be fully mitigated with the use of proper planning, construction mitigation, and compliance with the rules and regulatory policies. They will be in place to govern such impacts and to ensure protection of the natural and human environment. Thus, the Proposed Action will not contribute to any significant cumulative impacts or reasonably foreseeable direct or indirect effects on any coastal use or resource of the State's coastal zone.

**SECTION 1 LOCATION, PURPOSE OF AND NEED FOR ACTION****1.1 SUMMARY OF THE PROPOSED ACTION**

CTV is marketing to HECO renewable electric energy from a Photovoltaic (PV) system facility. PV systems use solar panels to convert sunlight into electricity. The proposed system consists of multiple PV panels, DC/AC power converter, solar panel support system, electrical interconnections, and mounting components. The PV system includes a solar tracker that maneuvers the solar panels to aim directly at the sun throughout the day. CTV is developing this PV system at Chevron's 10-acre site located in Kapolei, O'ahu, Hawai'i. CTV is planning to sell eligible renewable energy generated from this PV facility to HECO through its feed-in tariff (FIT) program.

HECO's FIT program is designed to encourage additional renewable energy projects in Hawai'i. Pre-established and standardized FIT contract terms provide an avenue for individuals, governmental entities, and developers such as CTV to sell renewable energy to HECO. HECO will pay above-market prices for renewable energy fed into the electric grid that meets the HECO's Tier 3 Eligible Renewable Energy Generating Facilities (Schedule FIT) criteria. The policy specifies that the Tier 3 energy generator must produce alternating current greater than 500kW up to 5MW or 1% of the system peak load.

CTV will construct the PV system to meet all applicable safety and performance standards of the Tier Eligible Renewable Energy Generating Facilities requirements. The PV system is designed to operate an average of 12 hours a day, year round, which is approximately 4,380 hours annually.

**1.2 PROJECT LOCATION AND EXISTING USES**

The Proposed Action site is located in Campbell Industrial Park, approximately two (2) miles southwest of the town of Kapolei. It is south of the Waianae Mountain Range in the southwest corner of O'ahu. The 10-acre property is denoted by TMK Parcel (1) 9-1-031:002, bound to the west by Hanua Street, and located within a designated SMA. The property is adjoined to the west side of Ameron Incorporated, and the south side of the property is the Pacific Ocean (see **Figure 1-1**). The Proposed Action site will be located on approximately 4.5-acres of the 10-acres owned by Chevron. The Proposed Action site was previously graded and possibly backfilled, with no growing vegetation. There are existing underground and overhead utilities at the Proposed Action site, including fuel pipelines, storm drainage facilities, water services, and overhead electrical distribution lines. CTV currently uses the Proposed Action site for industrial use including stockpile and equipment storage.

**1.3 PURPOSE AND NEED**

The purpose of the Proposed Action is to add more renewable energy projects into HECO's electricity grid and assist the State in reaching the HCEI goal of having 70 percent of the State's energy coming from renewable resources by 2030. The reduced dependence on fossil fuels for energy generation has the following benefits to Hawai'i's environment:

- Reduction in fossil fuels;
- Reduction in greenhouse gas emissions;
- Reduction in dependency on foreign imports of fossil fuel and associated price volatility;
- Reduction in the volume of fossil fuel and associated environmental risks during transport and storage; and
- Increase electricity sources from renewable energy.

### 1.4 REGULATORY OVERVIEW

#### 1.4.1 Chapter 25, Revised Ordinances of Honolulu

Chapter 25, ROH provides the regulations and procedures that apply to all lands within the SMA of the CCH (see **Figure 1-2**). It is CCH's policy to preserve, protect, and where possible, to restore the natural resources of the coastal zone of Hawai'i. An applicant must prepare and submit an EA pursuant to the SMA Law, Section 25-3.3, ROH, and shall identify potential impacts, evaluate potential significance of each impact, and provide detailed study of the significant impacts. After reviewing the EA, the CCH, Department of Planning and Permitting (DPP) will provide a notice of determination pursuant to Chapter 25, ROH. An action will be determined to be eligible for a FONSI if it does not meet any of the following significance criteria established by HAR §11-200-12:

- Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
- Curtails the range of beneficial uses of the environment;
- Conflicts with the state's long term environmental policies or goals and guidelines as expressed in Chapter 25, ROH, and any revisions thereto, court decisions, or executive orders;
- Substantially affects the economic welfare, social welfare, and cultural practices of the community or State;
- Substantially affects public health;
- Involves substantial secondary impacts, such as population changes or effects public facilities;
- Involves a substantial degradation of environmental quality;
- Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;
- Substantially affects a rare, threatened, or endangered species, or its habitat;
- Detrimentially affects air or water quality or ambient noise levels;
- 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;
- Substantially affects scenic vistas and viewplanes identified in county or state plans or studies; or,
- Requires substantial energy consumption.



**AERIAL PHOTO:**  
 Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>  
**REFERENCE:**  
 State of Hawaii GIS: <http://gis.hicentral.com>

**NEIGHBORING PARCELS**  
 Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



**FIGURE 1-1**

P:\Chevron\2012 Chevron\26537586 Chevron LCPV Solar\Permitting\01-Figures\FIG 1-2 SMA Map.dwg, 12/20/2012 9:40:45 AM



**AERIAL PHOTO:**

Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>

**REFERENCE:**

State of Hawaii GIS: <http://gis.hicentral.com>

**SPECIAL MANAGEMENT AREA MAP**

Environmental Assessment

Chevron Hawaii PV (10 acre Site)

TMK: (1)9-1-031-002

Kapolei, Oahu, Hawaii



FIGURE 1-2

**1.4.2 Chapter 205, Hawai'i Revised Statutes – Land Use Law**

Chapter 205, Hawai'i Revised Statutes (HRS), established the State Land Use Commission (SLUC), giving it the authority to designate all lands in the State as Urban, Rural, Agricultural, or Conservation District lands. The Counties have the authority to make all land use decisions within the Urban Districts in accordance with their respective County general plans, development plans, and zoning ordinances. The Counties can also regulate land use in the Rural and Agricultural Districts, but within the limits allowed by Chapter 205.

As designated by the SLUC, the Proposed Action is in the Urban District. HAR §15-15-18 characterizes the Urban District as “city like” concentrations of people, structures, streets, urban level of services and other related land issues. Based on this characterization, the Proposed Action is consistent with the land uses envisioned for the Urban District.

The total land that would be disturbed by the proposed improvements incorporated in this project is approximately 4.5 acres. Consequently, the project will require coverage under the State of Hawai'i National Pollutants Discharge Elimination System (NPDES) General Permit program (HAR §11-55)

**1.4.3 Chapter 343, Hawai'i Revised Statutes**

Chapter 343, HRS, establishes a system of environmental review at the State and County levels. The statute ensures that appropriate environmental, economic and technical considerations are accounted for in the decision making process for proposed projects and developments (State of Hawai'i 2011b). Chapter 343, HRS, is incorporated into the “Guide to the Implementation and Practice of the Hawai'i Environmental Policy Act, 2012 Edition” published by the Office of Environmental Quality Control (OEQC). The Guidebook provides an explanation of the Hawai'i Environmental Policy Act (HEPA), its practice, and its implementation. The Guidebook outlines the information to be provided to State and County agencies, prior to construction, that allows the agencies to evaluate the environmental, social and economic impacts of proposed developments. The following nine (9) statutory conditions are key factors designed to achieve the standards of HEPA and Chapter 343, HRS, as identified in the Guidebook. For applicant actions that trigger one (1) or more of the nine (9) statutory conditions, EA review is required by the approving agency. EA review is triggered by these statutory conditions prior to the actual implementation of a proposed action.

- Use of state or county lands or funds;
- Use of conservation district lands;
- Use within shoreline setback area;
- Use of historic site or district;
- Use of land in the Waikiki district;
- Amendment to county general plan;
- Reclassification of conservation lands;
- Construction or modification of helicopter facilities; or

- Construction or modification of a wastewater facility, waste-to-energy facility, landfill, oil refinery, or power-generating facility

#### **1.4.4 Historic Sites Act of 1935 (16 USC §§ 461-467)**

The Historic Sites Act of 1935 establishes a national policy to preserve for public use, historic sites, buildings, and objects of national significance for the inspiration and benefit of the American people (USACE, 2011). The act authorizes the designation of national historic sites and landmarks, authorizes interagency efforts to preserve historic resources, and establishes a maximum fine for violations of the act. It also authorizes surveys of historic and archaeological sites, buildings, and objects to determine which are significant, and provides for the restoration, reconstruction, rehabilitation, preservation, and maintenance of historic or prehistoric properties of national significance. As part of the Act, the Secretary of the Interior, through the National Park Service, is authorized to conduct surveys and studies, collect information, and purchase significant historic properties. The Secretary also is authorized to restore, preserve, maintain, and rehabilitate structures and sites.

The act led to the eventual establishment within the National Park Service of the Historic Sites Survey, the Historic American Building Survey, Historic American Engineering Record, and the National Historic Landmarks Program.

#### **1.4.5 National Historic Preservation Act (16 USC § 470 et seq.)**

The National Historic Preservation Act (NHPA) establishes the nation's policy for historic preservation, and sets in place a program for the preservation of historic properties by requiring Federal agencies to consider effects to significant cultural resources (i.e., historic properties) prior to undertakings.

##### **1.4.5.1 Section 106 of the Federal Guidelines (16 USC §106)**

Section 106 of the NHPA requires Federal agencies to take in to account the effects of projects on historic properties (resources included in or eligible for the National Register of Historic Places [NRHP]). Section 106 also gives the Advisory Council on Historic Preservation (ACHP) and State Historic Preservation Offices (SHPOs) an opportunity to consult. In most cases, the Hawai'i Department of Land and Natural Resources' (DLNRs') State Historic Preservation Division (SHPD) acts for the Advisory Council to undertake this review process. The SHPD must agree that the Proposed Action will have no effect on historic properties.

At the request of URS Corporation, Cultural Surveys Hawai'i (CSH), Inc. prepared an archaeological assessment report in support of the Proposed Action. CSH completed the archaeological investigations and indicated in the report that no historic properties have been identified within the 10-acre property or the immediate vicinity. The SHPD reviewed and concurred with the archaeological assessment report in a response letter dated September 4, 2012 (see **Appendix B** for both CSH Archaeological Assessment and SHPD letter).

**1.4.6 Federal Coastal Zone Management Act (16 USC §1456 (c)(1))**

The Federal Coastal Zone Management (CZM) Act was enacted to ensure that Federal agencies undertaking an activity within or outside the coastal zone, which affects any land or water use or natural resource of the coastal zone, shall be carried out in a manner consistent with the enforceable policies of state approved management programs. Federal activities, permits, and financial assistance in Hawai‘i are required to be consistent with the Hawai‘i CZM Program. The Proposed Action and Alternative 1 impacts on the Program are discussed in Section 6.7.

**1.4.7 Hawai‘i Coastal Zone Management Program (Chapter 205A, HRS)**

Hawai‘i enacted the Hawai‘i CZM Program in 1977. The entire State is considered a coastal zone under the CZM Program, including all marine waters seaward to the extent of the State’s policy power and management authority. The CZM Program focuses on policy objectives for: recreation resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

The CZM establishes a permit system to control development within SMAs managed at the county level. Shoreline Setback Areas (SSAs) serve as buffers against coastal hazards and erosion, and protect view sheds and marine and coastal resources. SSAs extend not less than 20 feet (6 m) and not more than 40 feet (12 m) from the shoreline. Additionally, SSAs prevent mining of sand or removal of coral or rubble from the shoreline and within 1,000 feet (305 m) seaward from the shoreline or within waters up to 30 feet (9 m) deep. HRS Section 205A-45(a) also states that where counties, through rules adopted pursuant to Chapter 91 or ordinance, may require that shorelines setback lines be established at distances greater than that established in Part III of HRS 205 A.

**1.4.8 Endangered Species Act of 1973 (16 United States Code § 1531 et seq.; 50 Code of Federal Regulations Parts 17 and 222)**

The Endangered Species Act (ESA) provides broad protection for species of fish, wildlife, and plants listed as threatened or endangered and their determined critical habitats. The United States Fish and Wildlife Service (USFWS) is the Federal agency responsible for administering this act, designating critical habitat, and determining if a change in listing status should occur with a particular species.

**1.4.9 Hawai‘i Endangered Species Law (HI ST §195D -1 - 32)**

Under the Hawai‘i Endangered Species Law (HESL), any aquatic, wildlife, or land plant species listed as endangered pursuant to the ESA is considered an endangered species in Hawai‘i. Any indigenous aquatic, wildlife, or land plant species listed as threatened under the ESA is considered threatened in Hawai‘i. Additionally, HESL empowers the State of Hawai‘i to determine whether any indigenous species of aquatic life, wildlife, or land plant should be listed as endangered or threatened species to protect Hawai‘i’s unique ecosystem. HESL prevents removal, possession, or sale of endangered or threatened species. The State of Hawai‘i DLNR is the agency responsible for the enforcement of the HESL.

**1.4.10 Clean Air Act (42 U.S.C. § 7401 et seq.)**

The Clean Air Act (CAA) is the comprehensive Federal law that regulates air emissions from stationary and mobile sources (USEPA 2011a). Among other things, the CAA authorizes the US Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and to regulate emissions of criteria air pollutants as well as hazardous air pollutants. The CAA requires all areas of the country to meet or strive to meet NAAQS for sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM<sub>10</sub>) and 2.5 microns (PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), lead (Pb), and ozone (O<sub>3</sub>).

The New Source Review (NSR) program is one of the key programs designed to achieve NAAQS. The NSR program is a preconstruction review process for new and modified stationary sources. The Prevention of Significant Deterioration (PSD) program for attainment areas typically requires new or modified sources to install state-of-the-art pollution controls to ensure that the ambient air quality will not be degraded. Different requirements apply to non-attainment areas (i.e., regions with poor air quality that do not satisfy the NAAQS). Permits are required for new construction or major modifications that substantially increase a facility's emissions of regulated pollutants.

**1.4.11 Hawai'i Department of Health, Clean Air Branch**

The Hawai'i Department of Health (HDOH), Clean Air Branch administers the HAR for Air Pollution Control (Title 11, Chapter 60.1). The following Rules area applicable to the Proposed Action:

- §11-60.1-32 Visible emissions – Presents visible emission restrictions for stationary sources.
- §11-60.1-33 Fugitive dust – Prohibits visible fugitive dust to become airborne without taking reasonable precautions.
- §11-60.1-76 Applications for modifications – Provides guidance on the process to modify a noncovered permit.

**1.4.12 Federal Clean Water Act of 1977 (33 United States Code §§ 1251-1376; 30 Code of Federal Regulations § 330.5(a) (26))**

The Clean Water Act (CWA) of 1977 protects wetlands, regulates discharges of pollutants, sets water quality standards for individual pollutants, and provides a framework for permitted pollutant discharge from a point source. The administering Federal agencies for the CWA are the USEPA and United States Army Corps of Engineers (USACE). The CWA authorizes the USEPA to issue NPDES permits and to set pretreatment standards for the purpose of regulating discharges to surface waters. The CWA charges states with setting specific water quality criteria appropriate for their water and developing pollution control programs to meet them. In Hawai'i, oversight lies with the HDOH. The HDOH reviews and certifies NPDES permit applications and the USEPA coordinates, drafts, and issues NPDES permits for storm water and point source pollution discharges.

**1.4.13 O‘ahu General Plan and Ewa Development Plan**

The O‘ahu General Plan is a dynamic comprehensive statement of the objectives and policies that is intended to serve as a guide to help plan and improve the physical, environmental, social, and economical concerns of the people of O‘ahu, and to address the overall development of the island (CCH 2002). The General Plan also states the CCH’s vision for O‘ahu and establishes the strategies to help achieve that vision.

In 1977 Ewa was designated as the location for a Secondary Urban Center for O‘ahu which was to be centered around Kapolei. The Ewa Development Plan ordinance presents a vision for Ewa’s future development and what it should look like when “fully developed”. The Plan provides regulations and standards for land development, open space, transit corridor, set limits to development, and updated Open Space, Land Use, and Zoning maps. The Refinery is located within the Campbell Industrial Park and is surrounded by industrial parcels as depicted in **Figure 1-1**.

**1.4.14 Noise Regulatory Setting**

Title 11, Chapter 46 (Community Noise Control) of the HAR defines the maximum permissible A-Weighted Sound Level (dBA). These rules provide for the prevention, control, and abatement of noise pollution from excessive noise sources. They include stationary noise stationary sources and agricultural, construction, and industrial activities (State of Hawai‘i 2011a). Noise quality standards to protect public health and welfare and to prevent the significant degradation of the environment and quality of life are also established in the rules. Code §11-46-4 in Title 11, Chapter 46 of the HAR specifies the following maximum permissible A-Weighted sound levels for classification of zoning districts.

<b>Classification of Zoning Districts</b>	<b>Daytime (7 AM to 10PM) Sound Levels (dBA)</b>	<b>Nighttime (10 PM to 7 AM) Sound Levels (dBA)</b>
A	55	45
B	60	50
C	70	70

Limits on construction noises are 10 dBA higher than these thresholds.

Construction projects that are anticipated to exceed these limits are expected to have approved community noise permits and limit construction to specified daytime hours (Monday through Friday between 7 AM and 6 PM and Saturday between 9 AM and 6 PM). Special equipment or activities like pile-driving and impact hammers are limited to Monday through Friday, 9 AM to 5:30 PM. The O‘ahu edition of the Noise Reference Manual states that an approved community noise permit may be required for construction projects exceeding 78 dBA (HDOH 2008). Construction noise anticipated to occur outside of these daytime hours, or on Sundays or holidays, requires application and approval of a variance.

Occupational exposure to noise is regulated by Title 29, CFR, Part 1910.95, which describes that protection against the effects of noise exposure shall be provided when the sound levels exceed an average of 90 dBA for an 8-hour period. When employees are subjected to sound exceeding this limit, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within 90 dBA, personal protective equipment (PPE) shall be provided and used to reduce sound levels within the limits. The employer shall administer a continuing, effective hearing conservation program whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 dBA (measured via slow response). For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with 29 CFR 1910.95 “Appendix A” (noise exposure computation) without regard to any attenuation provided by the use of PPE.

**1.4.15 Environmental Permits and Required Approvals**

**Table 1-1** lists potential Federal and State and Local environmental permits, approvals, and consultations that are associated with the Proposed Action.

**Table 1-1 Potential Permits, Approvals, and Consultations  
Associated with the Proposed Action**

Permit/Approval/Consultation	Lead Agency(ies)/Groups
<b>FEDERAL</b>	
NHPA, Section 106 Consultation	State Historic Preservation Officer Office of Hawai’ian Affairs
<b>STATE of HAWAII</b>	
Community Noise Permit Application	HDOH, Indoor and Radiological Health Branch (IRHB)
Application for Permit Modification	HDOH, Clean Air Branch
<b>LOCAL</b>	
Special Management Area Use Permit	Honolulu City Council
Fire Protection	CCH, Honolulu Fire Department
Building and Grading Permit	CCH, DPP
Zoning Permit	CCH, DPP
Conditional Use Permit Modification, File No. _____	CCH, DPP

**SECTION 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION****2.1 INTRODUCTION**

This section describes the Proposed Action and a reasonable alternative that Chevron selected based on the criteria of meeting the project's purpose and need, as described in Section 1.2. The No Action Alternative is also described in this section.

**2.2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES****2.2.1 Proposed Action**

The Proposed Action will utilize PV technologies to generate electricity to feed into the HECO grid. PV technologies will utilize solar cells to produce direct electricity from the sun which can be routed to HECO's grid and sold to Hawaiian Electric Company.

The PV technology used for the Proposed Action is shown in **Figure 2-1**. The tracker follows the location of the sun through the day to maximize exposure to sunlight.



**Figure 2-1 PV System Examples**

The PV system consists of three (3) major components: solar panels, mounting system, and tracking system. As the sun rises, the field will begin tracking the sun and producing electricity. Operations and maintenance activities will include monthly to quarterly preventative maintenance such as lubrication and cleaning. Provisions for site drainage and access roads will be addressed on site improvement designs to support the Proposed Action maintenance activities.

**2.2.2 Project Location**

The Proposed Action site will be approximately two (2) miles southwest of the town of Kapolei on the western side of O‘ahu. The Proposed Action will be located on approximately 4.5-acres that are within the larger 10-acre property owned by Chevron. As depicted in **Figure 2-2**, the 10-acre property is denoted by TMK Parcel (1) 9-1-031:002 and is identified as Proposed Action Site, which also lies within the SMA as discussed in the previous Section 1.4.1.

The Proposed Action site is located at Barber’s Point along the western portion of the ‘Ewa Plain, Island of O‘ahu (**Figure 2-3**). It is within the Campbell Industrial Park, which is the largest heavy industrial area in the State (DPP, 2000). The Proposed Action site is bordered on the west by Hanua Street, on the south by the Pacific Ocean, and on the east and north by Ameron International Corporation’s concrete facility. The shoreline runs parallel with the southerly side of the Proposed Action site, approximately 520 feet. The Proposed Action site is generally level, and storm water runoff drains towards the southwest where it ponds and eventually infiltrates into the ground.



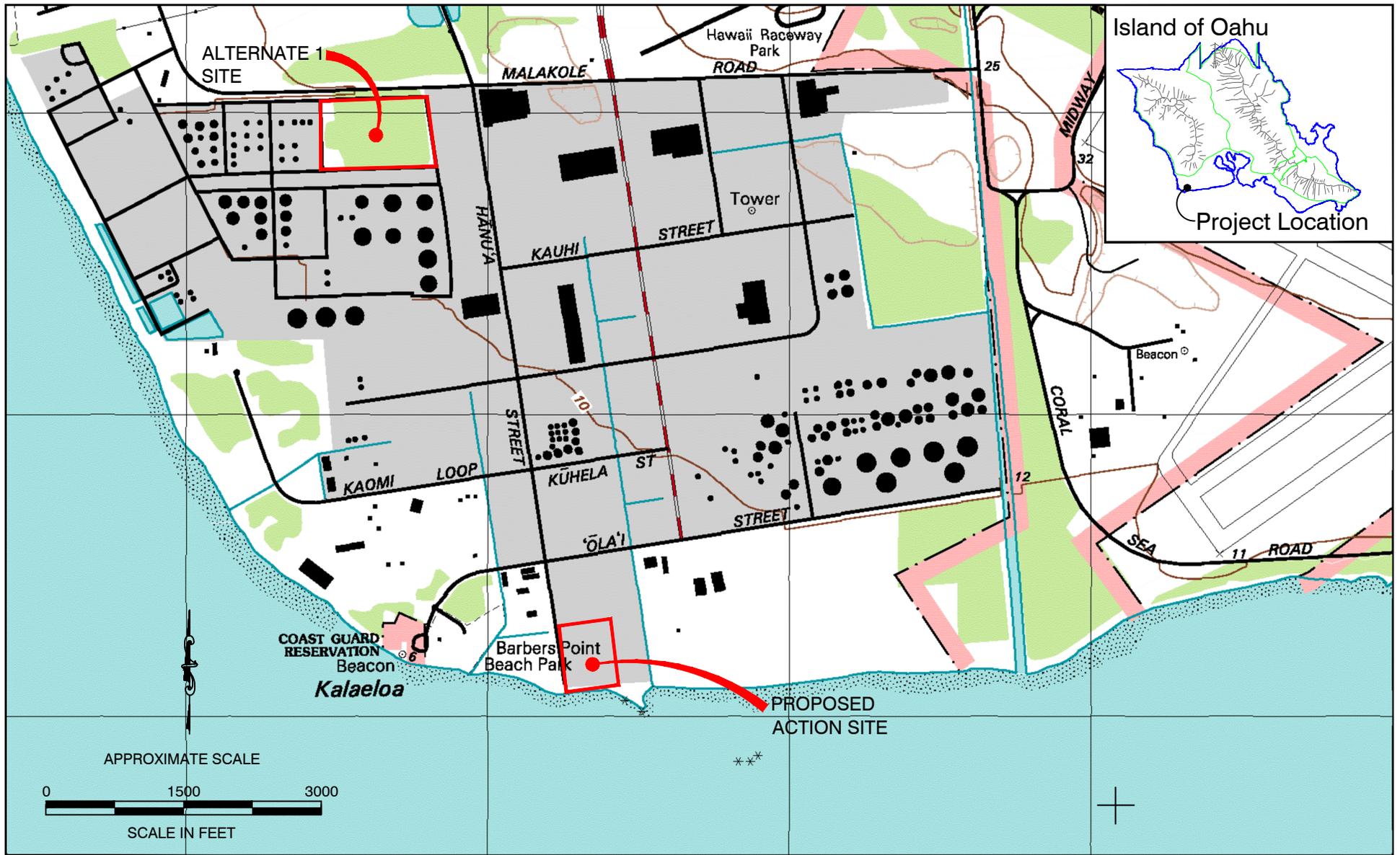
**Figure 2-3 Proposed Action Site Location**

**2.2.2.1 Proposed Action site**

The Proposed Action will be located on a vacant, approximately 10-acre, site that is cleared of vegetation (**Figure 2-4**). In addition to its location, Chevron selected the Proposed Action site for its generally level terrain and minimal environmental resources. The Proposed Action site is characterized by previous leveling operations down to the reef limestone or old construction excavation backfill. The excess material resulting from the leveling operations was pushed toward the ocean, which formed a berm along the shoreline. The north-south limestone boulder stockpile along the easterly third of the property is overgrown with Ki ‘awe trees.



**Figure 2-4 Picture of Site - Sparse Vegetation**



REFERENCE:  
 Horizons Technology, Inc.  
 Sure Maps Raster  
 U.S.G.S. Topographic Map (1998)  
 Ewa Quadrangle  
 Ewa, Oahu, Hawaii

**LOCATION MAP**  
 Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



FIGURE 2-2

## 2.2.2.2 Proposed Action site Access

There is an existing gravel driveway at the northwestern corner of the Proposed Action site, as shown in **Figure 2-5**. The driveway will serve as maintenance access for the PV systems.



Figure 2-5 Driveway Access Point

## 2.2.3 Alternatives

An EA must consider alternatives to the Proposed Action in accordance with Chapter 343, HRS. However, detailed analysis is only required for those alternatives determined to be reasonable.

Reasonable alternatives are alternatives that could attain the purpose and need of the Proposed Action, regardless of cost. This EA identifies and evaluates the environmental impacts of an alternative location on the Chevron Refinery 248-acre property (Alternative 1) capable of attaining the purpose and need of the Proposed Action. Additionally, this EA evaluates environmental consequences of the No Action Alternative as a baseline for comparison with the environmental effects of Alternative 1 and the Proposed Action.

### 2.2.3.1 Alternative 1

Under Alternative 1, the PV system would be constructed and operated on the 17.1-acre site located northwest of the Proposed Action Site as depicted in **Figure 2-2**. Alternative 1 would be located on approximately 17.1-acre site of the 248-acre property owned by Chevron (TMK Parcel (1) 9-1-014:010). Alternate 1 is capable of attaining the purpose and need of the Proposed Action. The site is currently heavily wooded and would not be enhancing environmental quality, nor avoiding, reducing, or minimizing adverse environmental effects, costs, and risks associated with the clearing and grading of the site relative to the Proposed Action (see **Figure 2-6**). The Ki 'awe Area and the Asphalt Cap are being used for other solar projects.



Figure 2-6 Alternative 1 Location

**2.2.3.2 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not be developed. Chevron would not benefit from the revenue brought in by selling the electricity to HECO. In addition, there would be a lost opportunity to assist the State in reaching the HCEI goal of having 70 percent of the State’s energy come from renewable resources by 2030. Therefore, the No Action alternative does not meet the purpose and need and is not a feasible alternative. It represents existing conditions and is useful as a baseline, against which to measure the impacts of the Proposed Action.

**2.3 ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES**

**Table 2-1** summarizes the environmental effects of the Proposed Action, Alternative 1, and the No-Action Alternative. This table summarizes the conclusions of the environmental impact analysis provided in Section 4, Environmental Consequences.

**Table 2-1 Summary of Environmental Effects of the Proposed Action, Alternative 1, and No-Action Alternative**

<b>Environmental Effect</b>	<b>Proposed Action</b>	<b>Alternative 1</b>	<b>No-Action Alternative</b>
Air Quality	No Impact	No Impact	No Impact
Noise	No Impact	No Impact	No Impact
Infrastructure	No Impact	No Impact	No Impact
Climate	No Impact	No Impact	No Impact
Visual Resources	No Impact	No Impact	No Impact
Hazardous Materials and Waste	No Impact	No Impact	No Impact
Recreational Resources	No Impact	No Impact	No Impact
Geology and Soils	No Significant Impact with implementation of Best Management Practices (BMPs)	No Significant Impact with implementation of Best Management Practices (BMPs)	No Impact
Water Resources	No Significant Impact with Implementation of BMPs	No Significant Impact with implementation of BMPs	No Impact
Biological Resources	No Significant Impact	No Significant Impact	No Impact
Cultural Resources	No Significant Impact	No Significant Impact	No Impact
Land Use	No Significant Impact	No Significant Impact	No Impact
Socioeconomic Resources	No Significant Impact	No Significant Impact	No Impact

**SECTION 3 ENVIRONMENTAL RESOURCES**

This section describes the existing environmental setting and baseline conditions in the areas that would be affected by the Proposed Action. The description of the affected environment serves as the basis of comparison for analysis of potential environmental effects of the Proposed Action.

**3.1 AIR QUALITY****3.1.1 Definition of Resource**

Air quality is defined by ambient air concentrations of specific pollutants of concern with respect to the health and welfare of the general public. Air quality is generated by many different sources. “Stationary sources” can include factories, power plants, and refineries. “Mobile sources” include automobiles, buses, planes, truck, and train. “Natural sources” are usually events such as wildfires, windblown dust, and volcanic eruptions. “Fugitive dust generation” is usually from construction and site preparation.

The USEPA, under the requirements of the CAA, as amended in 1977 and 1990 (CAA Amendments), has established NAAQS for six (6) contaminants, referred to as criteria pollutants (40 CFR Part 50): CO, NO<sub>2</sub>, O<sub>3</sub> (with [NO<sub>x</sub>] and volatile organic compounds [VOCs] as precursors), particulate matter (PM) (PM<sub>10</sub> – less than 10 microns in particle diameter; PM<sub>2.5</sub> – less than 2.5 microns in particle diameter), Pb, and SO<sub>2</sub>. Areas where concentration levels are below the NAAQS for a criteria pollutant are designated as being in “attainment.” Areas where a criteria pollutant level equals or exceeds the NAAQS are designated as being in “nonattainment.”

In addition to NAAQS, the HDOH established State Ambient Air Quality Standards (SAAQS) to further protect human health. SAAQS exist for the following pollutants: CO, NO<sub>2</sub>, O<sub>3</sub>, PM<sub>10</sub>, Pb, hydrogen sulfide (H<sub>2</sub>S), and SO<sub>2</sub>. Performance standards exist for VOC and total suspended particulates (TSP) within HAR and are controlled by permit.

**3.1.2 Affected Environment**

Based on air quality data collected and published by the HDOH, the State of Hawai‘i meets or exceeds the standards of the CAA, including the NAAQS and SAAQS. Campbell Industrial Park is likely the largest source of stationary air emissions on the Island of O‘ahu, yet due to the consistent trade winds, the regulated air pollutants are within the air quality limits established by the CAA. There are currently three (3) air monitoring stations near Campbell Industrial Park; Kapolei, which monitors CO, NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>; West Beach, which monitors NO<sub>2</sub>, SO<sub>2</sub>, and PM<sub>10</sub>; and Makaiwa, which monitors SO<sub>2</sub>, as well as wind speed and direction. Air quality data collected at these sites and downtown Honolulu during 2009 are presented in **Table 3-1**. As shown by these data, air quality in the area has never exceeded the short-term or long-term State or National standards for PM<sub>10</sub>, H<sub>2</sub>S, or CO (the two (2) pollutants that could be released during construction of the proposed project) during the period of measurement.

**Table 3-1 State and National Ambient Air Quality Standards**

Pollutant	Unit	Averaging Period	NAAQS	SAAQs
CO	ppm <sup>a</sup>	1-hour	35 <sup>a</sup>	9
		8-hour	9 <sup>a</sup>	4.4
Pb	µg/m <sup>3</sup>	Quarterly	1.5 <sup>b</sup>	1.5
NO <sub>2</sub>	ppb	1-hour	100	None
	ppm	Annual	0.053 <sup>c</sup>	0.04
H <sub>2</sub> S	ppm	1-hour	None	0.025
PM <sub>10</sub>	µg/m <sup>3</sup>	24-hour	150 <sup>a</sup>	150
		Annual	None <sup>d</sup>	50
PM <sub>2.5</sub>	µg/m <sup>3</sup>	24-hour block average	35	None
		Annual	15 <sup>e</sup>	None
O <sub>3</sub>	ppm	8-hour rolling average	0.075 <sup>b</sup>	0.08
SO <sub>2</sub>	ppm	3-hour	0.5 <sup>f</sup>	0.5
		24-hour	0.14 <sup>a</sup>	0.14
		Annual	0.03 <sup>c</sup>	0.03
Notes: a. Not to be exceeded more than once per year. b. The 3-year average of the fourth highest daily maximum value must not exceed the level of the standard. c. Average of all 1-hour values in the year may not exceed the level of the standard. d. USEPA revoked the annual PM <sub>10</sub> standard effective December 17, 2006 due to lack of evidence linking health problems to long-term exposure. The State still has an annual standard. e. The 3-year average of 24-hour values must not exceed the level of the standard. f. Federal Secondary Standard.				
Source: DOH (2010)				

Based on the expected size of the project, the reduction in carbon dioxide equivalent (CO<sub>2</sub>e) emissions is approximately 5,000 tons per year. The reduction in fossil fuel combustion is estimated at an annual maximum of 10,000 barrels of oil equivalent.

The marginal increase in emissions from construction activities will occur over a temporary, short-term period of 2 to 6 months. Use of water as-needed for dust control during construction will minimize the potential for visible emissions HAR §11-60.1-32. The Proposed Action will comply with the provisions of HAR §11-60.1-33 on fugitive dust by requiring the contractor to select appropriate measures to comply with the provision.

**3.2 NOISE****3.2.1 Definition of Resource**

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although prolonged exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise; the perceived importance of the noise, and its appropriateness in the setting; the time of day and the type of activity during which the noise occurs; and the sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the pitch of the sound and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. The minimum change in the sound level of individual events that an average human ear can detect is about 1 to 2 dB. A 3 to 5 dB change is readily perceived. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or if -10 dB, halving) of the sound's loudness.

Sound level is usually expressed by reference to a known standard. This EA refers to sound pressure level (SPL), with a reference value of 20  $\mu$ Pa. Most sounds one hears in the environment do not consist of a single frequency and instead are composed of a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects the typical frequency-dependent sensitivity of average healthy human hearing. This is called "A-weighting," and the decibel level measured is called the A-weighted sound level (dBA). Although sound level value may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (Leq) may be used to describe sound that is changing in level. Leq is the energy-mean dBA during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given source to equal the acoustic energy contained in the fluctuating sound level measured.

The maximum permissible sound levels specified in HAR, code §11-46-4(b) apply to any excessive noise source emanating within the specified zoning district. These maximum permissible sound levels may also apply to points beyond the property line of the premises, as deemed appropriate by the Director of HDOH. Mobile noise sources, such as construction equipment or motor vehicles are not required to meet the 70 dBA noise limit (see **Table 3-2**).

**Table 3-2 Hawai‘i Administrative Rules §11-46 Noise Limits**

Zoning District	Noise Limit (in dBA)	
	Daytime (7:00 AM to 10:00 PM)	Nighttime (10:00 PM to 7:00 AM)
Class A: All areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type.	55	45
Class B: All areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C: All areas equivalent to lands zoned agriculture, country, industrial, or similar type.	70	70
Source: HAR §11-46 "Community Noise Control"		

Construction noise is generated by the use of heavy equipment and portable powered tools on job sites and is generally considered temporary. The noise can vary greatly in overall duration and aggregate magnitude depending on the construction processes or activities being conducted, the type and condition of equipment used, the layout of the construction site and the proximity of sensitive receptors. Generally, construction noise levels primarily represent the acoustical contribution of two (2) categories of dominant sources: impact devices (e.g., jackhammers, pile drivers) that produce high amplitude impulsive or intermittent noise, and large fossil-fueled engine-driven equipment and vehicles (e.g., bulldozers, backhoes, dump trucks) that produce noise as they idle, move, or utilize engine power to perform a function.

Operation and maintenance noise refers to the sounds produced by the completed project (i.e., post-construction) under typical conditions and includes activities, equipment, and building systems that may occur during the day, night, or continuously.

**3.2.2 Affected Environment**

The existing environment for the Proposed Action site is characterized by relatively high noise level environment. It is associated with the concrete plant on the north and east sides, other intensive industrial factories in the area, and traffic volumes along nearby roadways.

Grading and construction activities will involve the use of excavators, trucks, and other heavy equipment. Some of the construction equipment is inherently noisy. However, those activities will be short term, less than four (4) months.

The greatest source of typical daytime and nighttime noise is generated by the concrete plant adjacent to the Proposed Action site. Per **Table 3-2**, the noise level for industrial areas is 70 dBA, daytime and nighttime, so the construction activities may blend in with the surrounding noise. The affected environment for the Proposed Action, from a noise perspective, is below the noise generated from the concrete plant.

### **3.3 INFRASTRUCTURE**

#### **3.3.1 Definition of Resource**

Infrastructure is the basic structure of the affected environment, including utilities, transportation facilities, drinking water, and wastewater systems.

#### **3.3.2 Affected Environment**

Interstate H-1 runs from Kapolei to Kahala (just east of Honolulu); it is the main roadway linking the west side of the island with Honolulu. Access to the Proposed Action site from the H-1 is southerly along Kalaeloa Boulevard (State Route 95), west on Malakole Street approximately 0.3 mile to Hanua Street, and southerly along Hanua Street for approximately one (1) mile. Both of these roads are heavily travelled with trucks and delivery vehicles due to business at Campbell Industrial Park, which begins at the intersection of Kalaeloa and Malakole.

The Proposed Action will use water to clean the solar panels, twice a year. The Proposed Action site currently gets its water from the Board of Water Supply (BWS). There will not be significant additional water volume as a result of the Proposed Action. The BWS water system also provides a water main on Hanua Street with a fire hydrant located on the north-west end of the Proposed Action site supplying the required water flow for fire-fighting.

The Proposed Action will not be using the existing sanitary sewer, which is owned and maintained by CCH. Electrical services will not be needed as the PV system will be feeding electricity into the HECO grid. The CCH manages stormwater runoff and flood hazards through Department of Environmental Services, Storm Water Management Plan and the Flood Control Ordinance. Stormwater will be allowed to infiltrate at its current location. A retention pond will be constructed to contain the stormwater as it infiltrates. The Proposed Action will not generate any solid waste, so recycling and disposing of solid waste at Waimanalo Gulch Landfill will not be required. Hazardous waste and materials are discussed in Section 3.6.

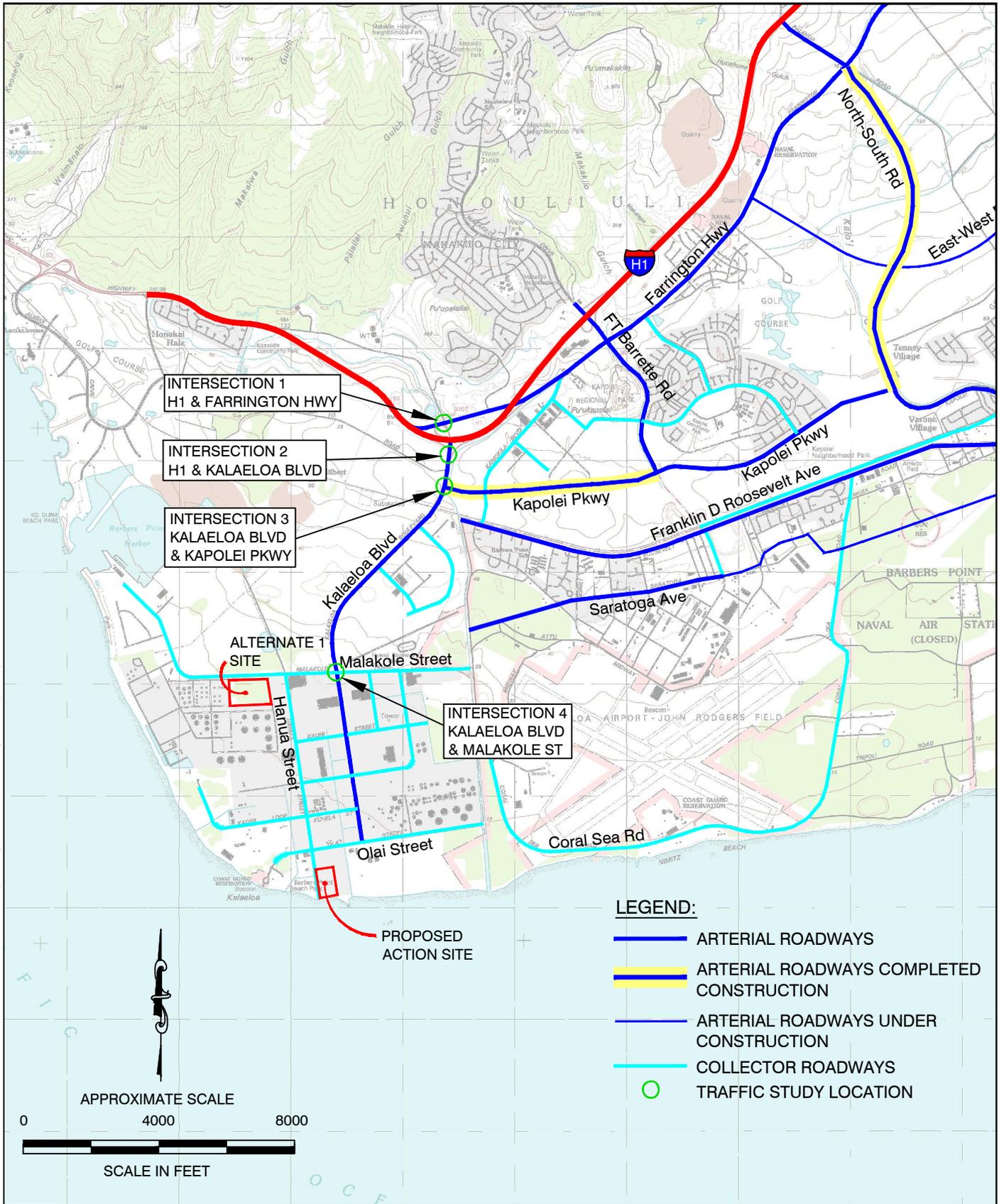
### 3.3.3 Roadways and Existing Traffic Conditions

This section discusses the access to the Proposed Action site. The Proposed Action site is located at the intersection of Hanua Street and Olai Street (southwest of Kalaeloa Boulevard and Malakole Road intersection). The Proposed Action site will be accessed from Hanua Street. To reach the Proposed Action site, traffic proceeds through four (4) main intersections as follows, from north to south on Kalaeloa Boulevard:

1. Kalaeloa Boulevard and H-1 Westbound Ramps (North-South Stop Signs)
2. Kalaeloa Boulevard and H-1 Eastbound Ramps (Eastbound Stop Signs)
3. Kalaeloa Boulevard and Honolulu Advertiser Building (Traffic Signal)
4. Kalaeloa Boulevard and Malakole Road (Traffic Signal)

These intersections are depicted, from north to south, in **Figure 3-1**. From the H-1 Freeway exiting ramps, they are the only major crossroad locations on Kalaeloa Boulevard that reach the Proposed Action site. These are the locations that changes in traffic caused by the Proposed Action will likely be felt. Kalaeloa Boulevard ends just north of Farrington Road/H-1 Westbound Ramps, into a private driveway. South of Malakole Road, traffic begins to disperse over a much larger network of local and collector-distributor type roadways. The Proposed Action site is only a few blocks south of Malakole Road, and there will be no significant traffic impacts south of Malakole Road. Furthermore, there will be no significant impacts on traffic conditions during and after the construction of the Proposed Action in the vicinity and at those major crossroads. Other environmental and traffic factors related to the Proposed Action in the vicinity and the major crossroads will be discussed in Section 4.

P:\Chevron\2012 Chevron\26537586 Chevron LCPV Solar\Permitting\01-Figures\FIG 3-1 Existing Roadways.dwg, 12/20/2012 9:59:52 AM



REFERENCE:  
 Horizons Technology, Inc.  
 Sure Maps Raster  
 U.S.G.S. Topographic Map (1998)  
 Ewa Quadrangle  
 Ewa, Oahu, Hawaii



**EXISTING ROADWAYS**  
 Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii

FIGURE 3-1

**3.4 CLIMATE****3.4.1 Definition of Resource**

Climate refers to meteorological conditions, such as the temperature range, precipitation levels, and wind conditions in a particular region. Due to their connection with precipitation levels, flooding hazards are addressed under climate for purposes of this EA.

**3.4.2 Affected Environment**

The island of O‘ahu lies just south of the Tropic of Cancer in the belt of the northeast trade winds. Its climate is generally mild year round. The annual average temperature is 76 °F although temperatures occasionally exceed 88 °F. Annual rainfall at Kapolei is approximately 5 inches. Trade winds prevail about 80 percent of the time and generally blow from the northeast at 5 to 15 mph. Departures from normal trade wind weather, known as Kona storms, tend to occur during winter months. Such storms are characterized by several day variable winds blowing from the south and west.

According to the Hawai‘i-National Flood Insurance Program (NFIP) Flood Hazard Assessment Tool, the areas that would be affected by the Proposed Action and alternatives under consideration are designated Zones D. Zone D denotes areas where there are possible but undetermined flood hazards, as no flood hazards has been conducted (Hawai‘i NFIP, 2011). A portion of the Proposed Action site near the shoreline is designated Zone VE which denotes areas within the coastal flood zone with some wave actions (see **Figure 3-2**). Additionally, the Proposed Action site is located within the tsunami evacuation zone identified by the O‘ahu Civil Defense Agency (CCH Civil Defense Agency 2011) (see **Figure 3-3**).



**AERIAL PHOTO:**  
 Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>  
**REFERENCE:**  
 State of Hawaii GIS: <http://gis.hicentral.com>

**FLOOD INSURANCE RATE MAP**  
 Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



FIGURE 3-2

P:\Chevron\2012 Chevron\26537586\_Chevron ICDV Solar\Permittina\01-Figures\FIG-3-3\_Tsunami Evac Zone Map.dwg\_12/20/2012 10:28:02 AM



**AERIAL PHOTO:**  
 Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>

**REFERENCE:**  
 State of Hawaii GIS: <http://gis.hicentral.com>

## TSUNAMI EVACUATION ZONE MAP

Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



FIGURE 3-3

## 3.5 VISUAL RESOURCES

### 3.5.1 Definition of Resource

Visual resources are public in nature and include views of a project to and from neighboring scenic resources (see **Figure 3-4**). When evaluating scenic quality, both natural and manmade components of the existing visual environment should be collectively considered. These components may be evaluated in terms of whether each contributes or detracts to the overall scenic landscape character. In turn, this evaluation contributes to the assessment of scenic quality levels, which are established by evaluating the distinctiveness and diversity of a particular landscape setting.

Public concern over adverse visual impacts is also an important part of the visual impact assessment process. Public concerns over the visual impacts associated with a project are often directly connected to the size and scale of a project. Additionally, the number and presence of people or activities nearby will further inform the level of concern for impacts to the existing scenic quality of the area.

Visual impacts associated with a project can be evaluated in the following objective terms: form, line, color and texture. Such terms are used to measure the existing scenic quality and proposed scenic quality with the addition of the project. This methodology allows for an objective assessment of visual resources. The visibility of a project determines how a project will be seen from particular viewing areas, which directly relates to the level of concern nearby viewers will have. In general, however, perception of details relating to form, line, color, and texture diminishes with increasing distance.



Figure 3-4 Campbell Industrial Park

## 3.5.2 Affected Environment

The Proposed Action site is currently used for industrial purposes. As a result, vegetation within the Proposed Action site boundaries is sparse. The topography of the Proposed Action site is relatively flat and is located adjacent to the shoreline. Although the Proposed Action is located along the shoreline there is a berm that runs parallel with the south side of the parcel and is approximately 5 to 7 feet high which makes any possible view of the ocean nearly impossible from ground level (see **Figure 3-5**).

The proposed development will have a relatively low profile. At peak elevation the panels will be no more than 12 to 15 feet above ground level. These panels will not be seen from outside of the Proposed Action site, as the concrete plant and structures (see **Figure 3-6**) block the view from the mauka side. However, when the panels are rotated to a vertical position they may be partially seen from the makai side.



**Figure 3-5 South Side of Parcel - Berm along Shoreline**



**Figure 3-6 Ameron Concrete Plant**

**3.6 HAZARDOUS MATERIALS AND WASTE****3.6.1 Definition of Resource**

In general, materials and waste are considered hazardous when they pose a threat to human health or the environment. The federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) define hazardous substances as substances that are severely harmful to human health and the environment. Many substances defined as hazardous are harmless in their normal uses but dangerous when released. Hazardous waste is defined under the federal RCRA as a solid waste which, because of its quality, concentration, or other characteristic, may cause or contribute to serious impacts to human health or the environment that are specified in the law. Substances are defined as hazardous under CERCLA, RCRA, and other federal laws.

**3.6.2 Affected Environment**

Hazardous substances are controlled in the US primarily by Federal laws and regulations administered by the USEPA, the US Occupational Safety and Health Administration (USOSHA), and the US Department of Transportation (USDOT). Each agency incorporates hazardous substance safeguards according to its unique Congressional mandate. USEPA regulations focus on the protection of human health and the environment. USOSHA regulations primarily protect employee and workplace health and safety. USDOT regulations promote the safe transportation of hazardous substances used in commerce. The Proposed Action site had a fuel leak from the petroleum pipeline that is located on the easterly portion of the property in 1997. An Environmental Assessment report prepared by Dames and Moore in March 1998 evaluated the soil contamination levels as a result of the petroleum leak incident. The report stated that workers and vendors on-site would not be exposed to unacceptable levels of chemicals in the soil and volatilized chemicals from the light non-aqueous phase liquid (LNAPL). In addition, the soil samples that were taken in July 2012 contained very little or no trace of petroleum spills from the leak. The footings for the solar panels will not be deep enough to penetrate the ground water table.

**3.7 RECREATIONAL RESOURCES****3.7.1 Definition of Resource**

Recreational resources offer opportunities for residents and visitors to engage in leisurely activities. Recreational resources include parks and open space as well as other infrastructure facilitating leisurely activities on land or water, such as piers and harbors. Recreational resources offer opportunities such as hiking, fishing, beachcombing, and boating. Recreational opportunities and resources are important to economic activity and quality of life.

### **3.7.2 Affected Environment**

Recreational resources in the vicinity of the Proposed Action and alternative under consideration include the following parks (see **Figure 3-7**) and other recreational infrastructure within the nearby towns of Kapolei and Ewa and along the shoreline (distances provided are relative to the Proposed Action):

- Kalaeloa City and County Beach Park (Barber’s Point Beach Park) (0.2 mile to the west);
- Kalaeloa Regional Park (0.6 mile to the east);
- Barber’s Point Lighthouse (0.3 mile to the west);
- Ko‘Oolina Beach Park (0.3 mile to the west).

## **3.8 GEOLOGY AND SOILS**

### **3.8.1 Definition of Resource**

Geology refers to the surface and subsurface materials of which a land area is composed, including soils and rocks. Important geologic characteristics of soils and underlying rocks include stability, slope, compatibility, shear strength, and productivity. Discussions of geology and soils typically identify existing conditions and determine how the Proposed Action and alternatives under consideration would likely affect, and be affected by, geology and soils.

### **3.8.2 Affected Environment**

The Proposed Action site is located along the Ewa Coastal Plain of southwest O‘ahu, Hawai‘i and lies within the near-shore coastal outwash plain of the Ewa Caprock. The Ewa Coastal Plain covers an area of approximately 28 square miles and consists of an exposed, emergent limestone reef composed of sequences of relatively flat marine sedimentary deposits (calcareous silts, sands and gravels and reef limestone layers) intercalated with terrestrial alluvium deposits (silts and clays derived from the upslope volcanic rocks). Marine limestone and calcareous deposits are 100 to 200 feet thick throughout most of the plain. The sediments of the Ewa Caprock occur as a wedge starting several miles inland and increase in thickness to a maximum of about 1000 feet at the coastline. The inland boundary is approximately parallel to Farrington Highway. The caprock thins northward toward the Waianae Volcano where it intertwines with the alluvium and underlying weathered volcanic rocks.

P:\Chevron\2012 Chevron\26537586 Chevron LCPV Solar\Permitting\01-Figures\FIG 3-7 Recreational Resources.dwg, 12/20/2012 10:41:50 AM



REFERENCE:  
 Horizons Technology, Inc.  
 Sure Maps Raster  
 U.S.G.S. Topographic Map (1998)  
 Ewa Quadrangle  
 Ewa, Oahu, Hawaii

## RECREATIONAL RESOURCES

Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



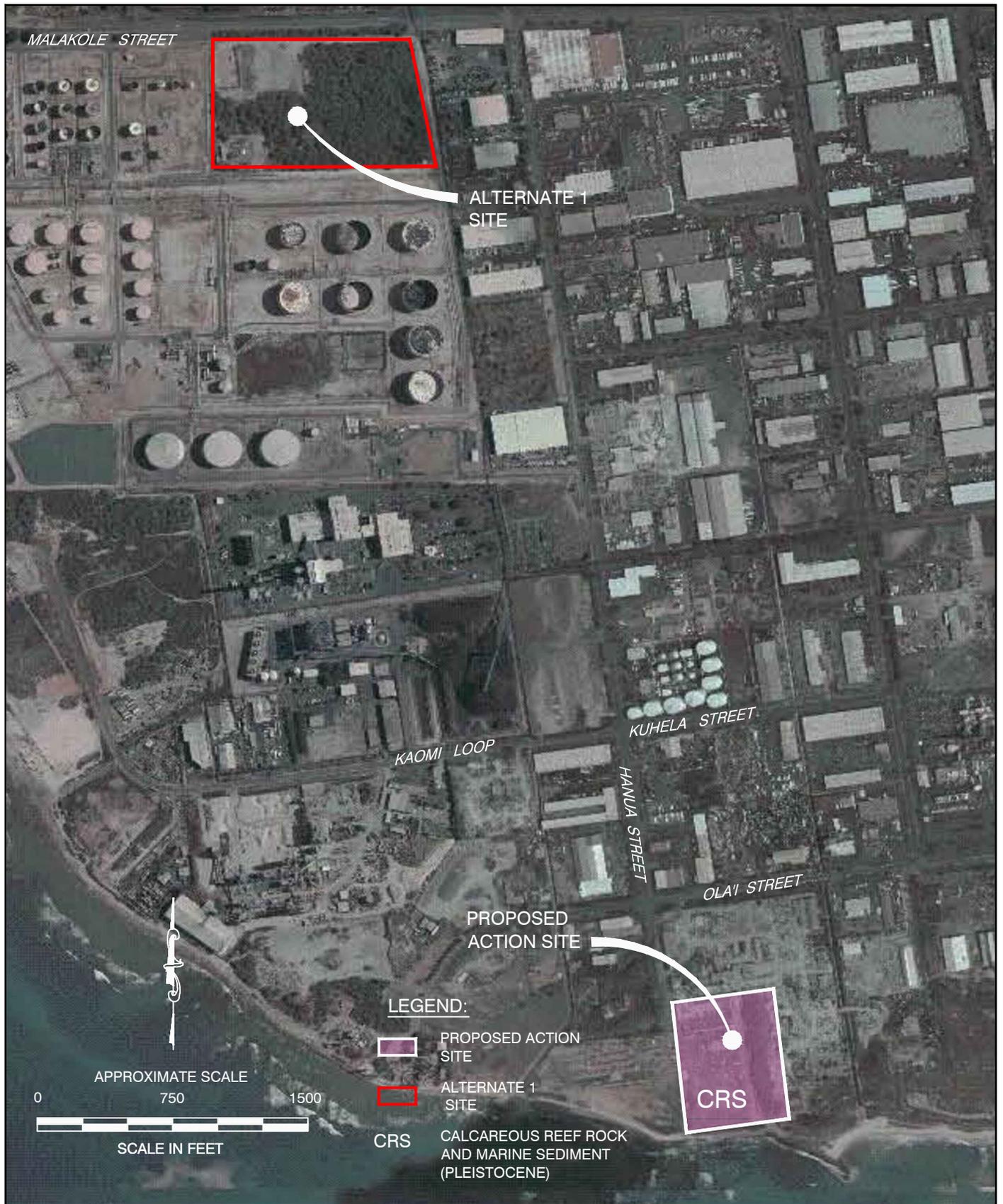
FIGURE 3-7

The Proposed Action is located on Pleistocene emerged reef deposits, which are composed of calcareous marine sediments (Sterns and Valsvik, 1935). These reef forming deposits were formed during numerous cycles of transgression and regression of sea level during the Pleistocene epoch. These formations are primarily constructed of coral reef material composed of coral heads, coralline algae, and coral beach sand cemented by a lime matrix. This classification of calcareous reef rock and marine sediment is found sub-aerially on O‘ahu only. Yet similar deposits are found as active and extinct submarine reefs that ring all the islands (Sherrod et al, 2007). The maximum thickness of the reef deposits above sea level is approximately 90 feet. However, Sterns and Vaksvik (1935) identified numerous thicker submerged reefs in deep wells.

The Proposed Action site is generally flat and level (see **Figure 3-8**). The Proposed Action will not change the soils composition of the property, nor will it impact any significant geologic features or resources (see **Figure 3-9**). Small portions of the project elements, such as footings and storm drainage will require excavation that may encounter soft rock that will have to be removed using heavy equipment during construction. This material does not have any notable natural resource value, and it is not suitable for agriculture or other productive uses. All of the soils and underlying rock that would be affected by the Proposed Action are suitable for construction of the proposed facilities as they are designed. Routine operation and maintenance of the Proposed Action does not have the potential to affect geological or soil resources.



Figure 3-8 Flat and Level Site



AERIAL PHOTO:  
 Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>  
 REFERENCE:  
 State of Hawaii GIS: <http://gis.hicentral.com>

**SOIL MAP**  
 Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



FIGURE 3-9

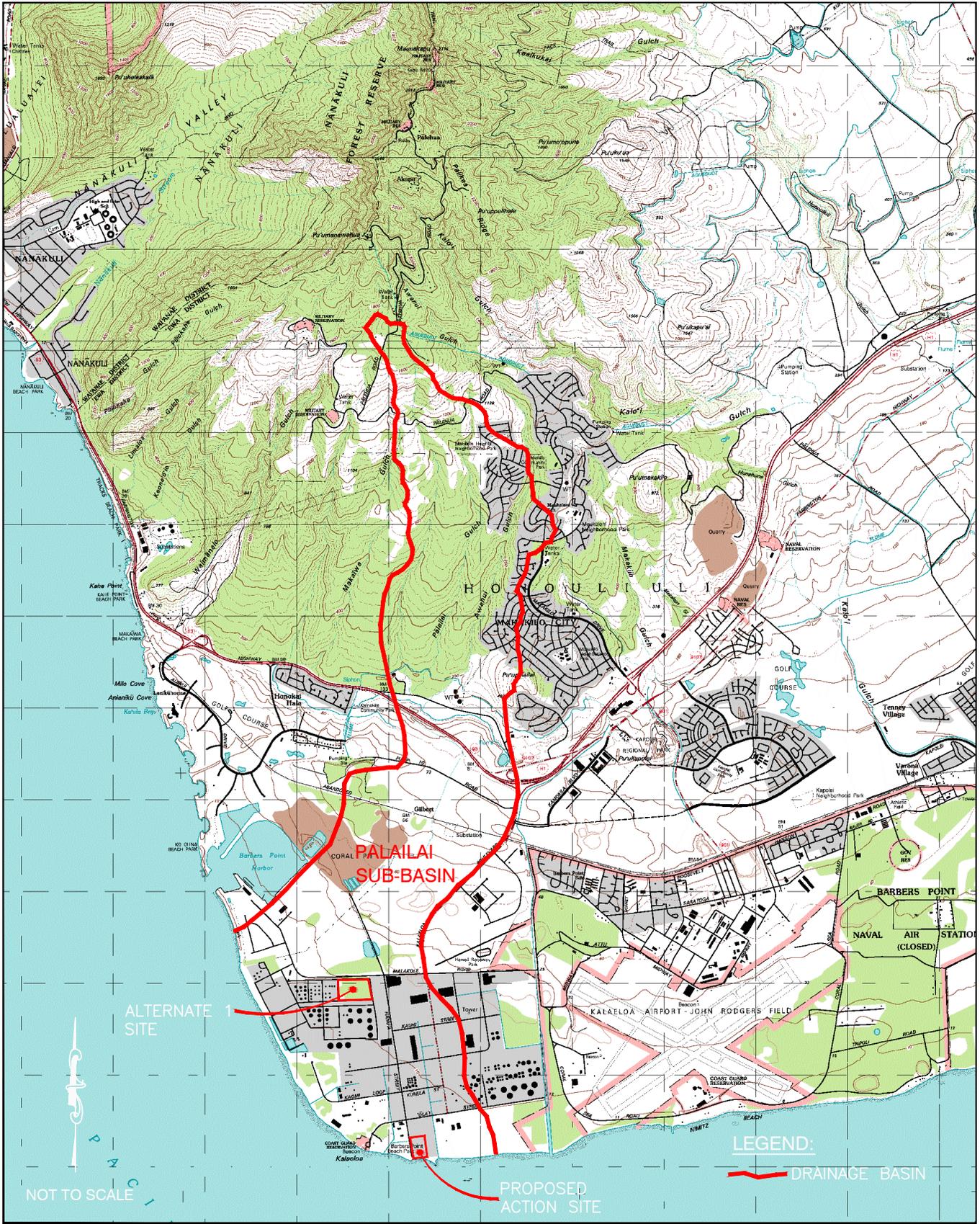
**3.9 WATER RESOURCES****3.9.1 Definition of Resource**

Water resources is a broad term that encompasses surface water, groundwater, near-shore water, wetlands, and other sources of water that support a variety of human activities, plant and wildlife species, habitats, and ecosystems. Surface water resources typically include stormwater, lakes, streams, and rivers, while water located beneath the ground surface within soil pore spaces or the fractures of rock formations is known as groundwater. Near-shore water is generally considered the area extending seaward from the shoreline beyond the surf zone. A wetland is an area of land that is saturated with water either permanently or seasonally. Water within wetlands can be saltwater, freshwater, or brackish. Examples of wetlands include marshes and swamps. Wetlands play a number of roles in the environment, principally water purification, flood control, and shoreline stability. Wetlands are also considered the most biologically diverse of all ecosystems, serving as home to a wide range of plant and animal life.

**3.9.2 Affected Environment****3.9.2.1 Surface Water**

The Proposed Action is within the Palailai subbasin (see **Figure 3-10**), part of the Ewa watershed, which is 1.71 miles in length, with a maximum elevation of 2,200 feet. The direction of runoff is towards the southwest. The basin runoff flows down the gulch, then under the H-1, and into a drainage channel which eventually outfalls into the Pacific Ocean. In spite of the basin's vast area, its runoff does not flow into the Proposed Action site. The Proposed Action site's surface water currently pools at the southerly end of the site where it eventually infiltrates.

The Proposed Action site lies within the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Map (FIRM) Panel 15003C0312G, effective date January 19, 2011. The FIRM Panel illustrates that the Proposed Action site is in "Other Flood Areas" Zone D and Zone VE. Zone D is designated as "unstudied areas where flood hazards are undetermined, but flooding is possible" and Zone VE denotes areas within the coastal flood zone with some wave actions as depicted in **Figure 3-2**.



REFERENCE:  
Horizons Technology, Inc.  
Sure Maps Raster  
U.S.G.S. Topographic Map (1998)  
Ewa Quadrangle  
Ewa, Oahu, Hawaii



### DRAINAGE AREA MAP

Environmental Assessment  
Chevron Hawaii PV (10 acre Site)  
TMK: (1)9-1-031-002  
Kapolei, Oahu, Hawaii

FIGURE 3-10

**3.9.2.2 Groundwater**

The Proposed Action is within the Ewa aquifer system of the Pearl Harbor Aquifer sector (see **Figure 3-11**). There is a deeper confined aquifer in a deep layer of basalt and a shallow unconfined aquifer in the overlying caprock. The underlying aquifer does not meet the State of Hawai'i drinking water standards, thus it is not used as potable water. The groundwater in the confined aquifer is brackish with a chloride content ranging from 250 to 1,000 milligrams per liter. Groundwater depth at the Proposed Action site is approximately six (6) feet below ground surface and may vary with tidal conditions.

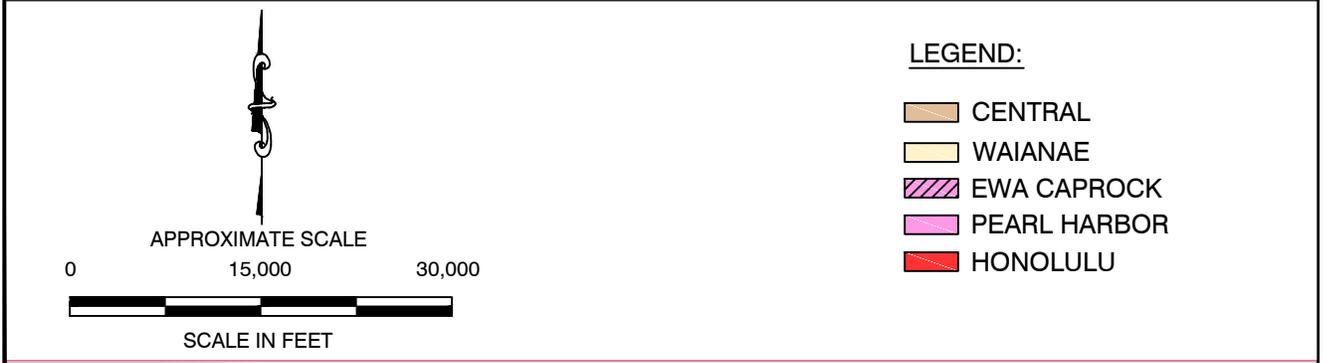
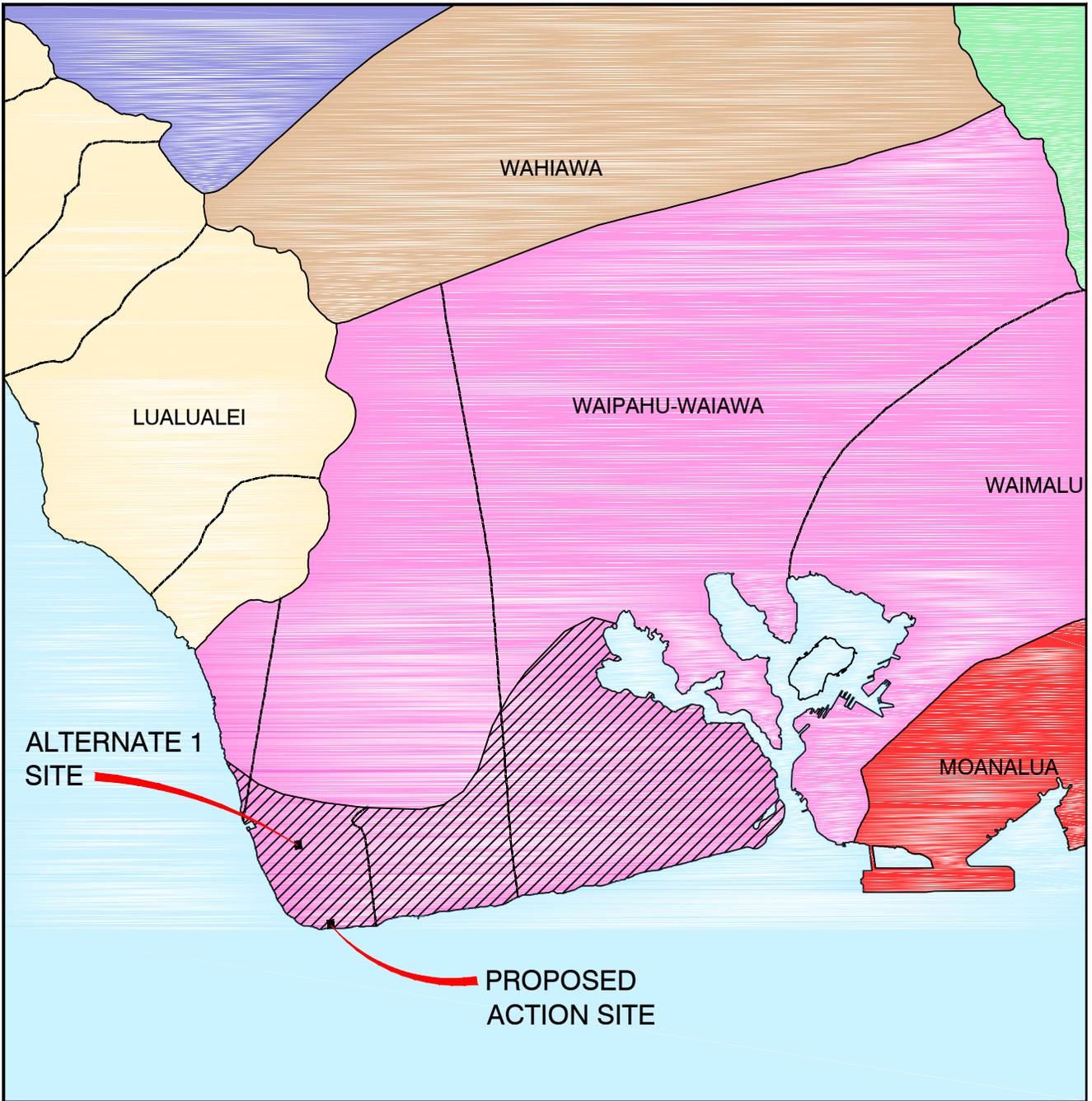
The boundary between non-drinking water aquifers and underground sources of drinking water is generally referred to as the "Underground Injection Control (UIC) Line" (see **Figure 3-12**). Restrictions on injection wells differ, depending on whether the area is above (mauka) or below (makai) the UIC line. The Proposed Action site is below the UIC line. UIC maps are available on the HDOH website at: (<http://hawaii.gov/health/environmental/water/sdwb/uic/uicprogrm.html>).

**3.9.2.3 Wetlands**

Historically, the Ewa Plain was primarily characterized by sugar plantations. There are no wetlands on the Proposed Action site. The nearest wetlands are Honouliuli National Wildlife Refuge, Apokaa Ponds and Batis Salt Marsh at Ewa Marina. The Honouliuli National Wildlife Refuge is approximately 37 acres and borders the West Loch, which is about six (6) miles to the east of the Proposed Action site. The refuge is a freshwater wetland and is extensively managed for varieties of water birds including Hawai'i's endangered water birds and migrant waterfowl. These standing bodies of water will have potential to attract birds foraging for food.

**3.9.2.4 Near-Shore Water**

Near-shore waters closest to the Proposed Action are classified as Class A, Open Coastal Waters. It is the objective of Class A waters that they are for recreational purposes and aesthetic enjoyment. In addition, Class A waters shall not act as receiving waters for any discharge that has not received the best degree of treatment of control compatible with the criteria established for Class A water (Chapter 11-54-3, HAR).

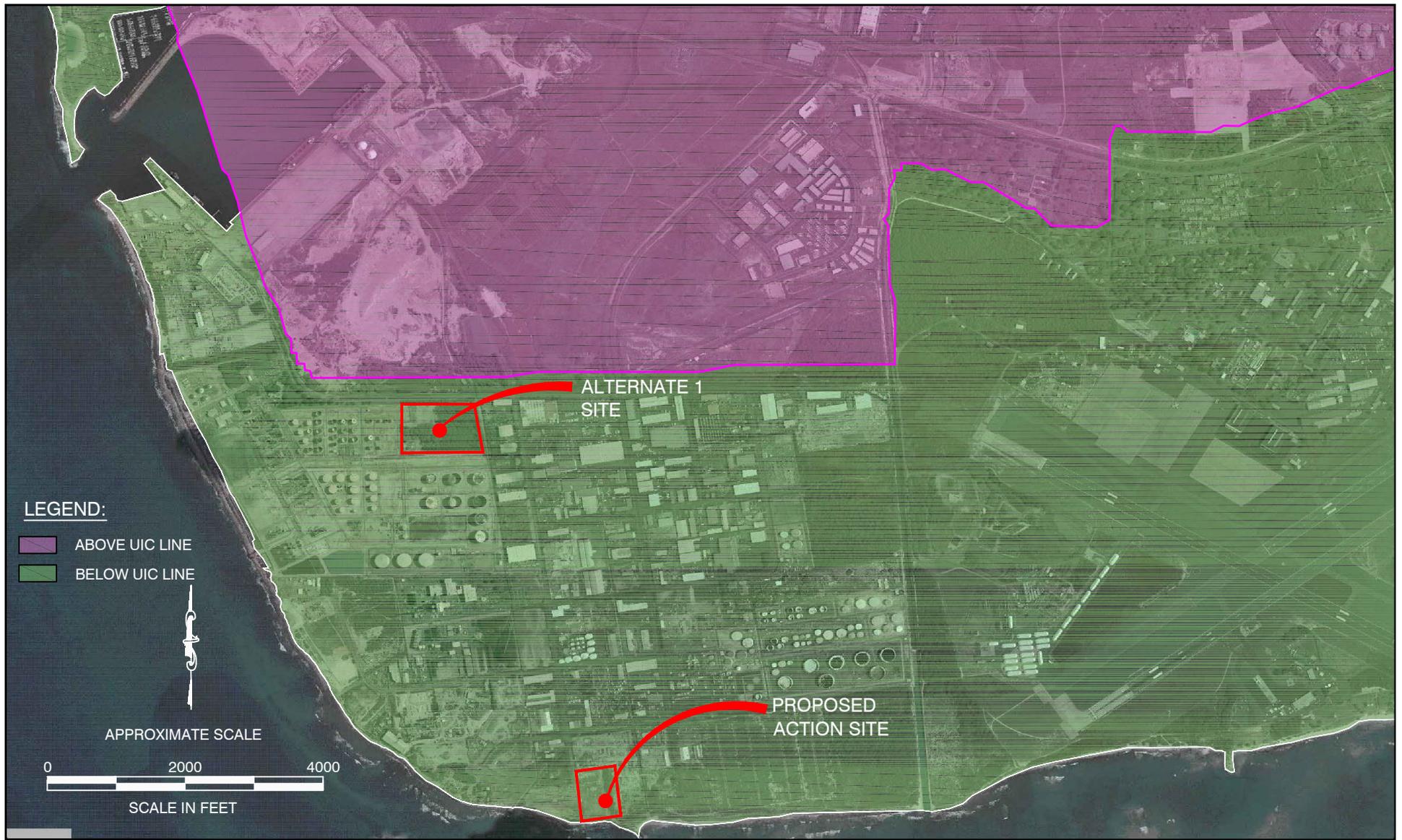


REFERENCE:  
 Horizons Technology, Inc.  
 Sure Maps Raster  
 U.S.G.S. Topographic Map (1998)  
 Ewa Quadrangle  
 Ewa, Oahu, Hawaii

### AQUIFER MAP

Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii





**AERIAL PHOTO:**  
 Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>  
**REFERENCE:**  
 State of Hawaii GIS: <http://gis.hicentral.com>

## Underground Injection Control Areas

Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



FIGURE 3-12

## 3.10 BIOLOGICAL RESOURCES

### 3.10.1 Definition of Resource

Biological resources include species of vegetation, wildlife, and fisheries, and habitat. Biological resources discussed in this section include botanical, avian, or mammalian resources of special concern, particularly species listed under federal or state endangered species law. Also discussed are species considered sensitive, protected, or proposed for protection.

### 3.10.2 Affected Environment

The affected environment for biological resources described below is based on the biological resources survey report prepared for this EA by SWCA Environmental Engineers, June 2012 (see **Appendix A**).

#### 3.10.2.1 Botanical Resources

The Proposed Action site is currently being used as a storage site. Old equipment, debris, stockpiles, pipe and buildings are on the western portion of the Proposed Action site. The eastern third of the Proposed Action site is mostly vegetated, but will not be used for the solar panel installation (see **Figure 3-13**). The western two-thirds of the Proposed Action site are largely devoid of vegetation. The minimal vegetation in this area is mostly comprised of ornamental landscaping, as well as non-native grasses and herbaceous plants that are common in disturbed coastal areas in throughout the Hawai‘ian Islands.



Figure 3-13 Eastern and Western Areas

**3.10.2.2 Mammalian and Avian Resources**

A total of four (4) species of bird and zero (0) specie of mammal was observed during the point count taken at the Proposed Action site. The four (4) species were introduced to the Hawai‘ian Islands and are common throughout the Hawai‘ian Islands, particularly in areas of human habitation. A red-vented bulbul (*Pycnonotus cafer*) was observed during the point counts, within the kiawe stand along the eastern boundary of the parcel. Several grey francolins (*Francolinus pondicerianus*) were observed within the inner fence, as well as outside the fenced area. Zebra doves (*Geophila straiata*) were the most common species observed, then the House sparrow (*Passer domesticus*), which made up of 85 percent of the 23 birds observed. None of the bird species observed during the point count survey are native to the Hawai‘ian Islands, and all are common throughout Hawai‘i, particularly in disturbed and developed areas (HAS 2005).

Five (5) additional bird species were observed outside of the point counts. A spotted dove (*Spilopelia chinensis*) and Japanese white-eye (*Zosterops japonicas*) were observed in the Ki‘awe stand (eastern third). In addition, domestic chickens (*Gallus gallus domesticus*) and one (1) peafowl (*Pavo christatus*) were also observed in the Ki‘awe stand.

A flock of mallards (*Anas platyrhychos*), consisting of five (5) birds were observed flying westward along the shoreline south of the Proposed Action site.

No mammal species were observed during the biological survey of the Proposed Action site and surrounding area, except for a dead mongoose.

**3.10.2.3 Special Status Species**

According to the biological resources survey report (**Appendix A**), the Proposed Action site does not contain any plant or mammal species protected or proposed for protection under either Federal or State endangered species programs. No federally-designated critical habitat is present on or adjacent to the Proposed Action site. There is no equivalent statute designating critical habitat under state law (SWCA Environmental Engineers, 2012).

**3.11 CULTURAL RESOURCES****3.11.1 Definition of Resource**

Significant cultural resources are defined by the NHPA and Chapter 343 of the HRS. According to the NHPA, a historic resource is defined as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register...” According to Chapter 343 of the HRS, cultural resources are defined as “cultural beliefs, practices, and resources of native Hawai‘ians and other ethnic groups.” Chapter 343 requires that the EA process account for cultural resources in determining the significance of impacts that could occur as a result of a Proposed Action.

**3.11.2 Affected Environment****3.11.2.1 Historical Context**

Various legends and early historical accounts indicate that the *ahupua'a* of Honouliuli was once heavily populated by pre-contact Hawai'ians. This substantial settlement is attributable for the most part to the plentiful marine and estuarine resources available at the coast. The Hawai'ian *ali'i* were also attracted to this region. One historical account of particular interest refers to an *ali'i* residing in Ko'Olina, approximately six (6) miles northwest of the current Proposed Action site. Ko'Olina is in Waimanalo near the boundary of Ewa and Waianea. This was a vacationing place for chief Kakuhihewa and the priest Napuaikamao was the caretaker of the place.

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

In 1921, Barber's Point Military reservation was established. Between 1937 and 1942, two (2) sets of two (2) Panama Mounts, 155-mm guns were stationed on the point. One (1) set of the two (2) Panama Mounts has been documented in an archeological study approximately 984 feet (300 m) to the west of the present Proposed Action site.

**3.11.2.2 Historical Research and Field Check**

An Archaeological Literature Review and Field Inspection (LRFI) of the proposed Proposed Action site was completed May 15 & 24, 2012 by Cultural Surveys Hawai'i, Inc and is documented in the archaeological assessment. The assessment was completed for this study and serves as the primary source for summary information provided in this section (Cultural Surveys Hawai'i, 2012). The cultural resources survey report is located in **Appendix B**. The purpose of the LRFI was to identify, as feasible, the presence of cultural resources within the Proposed Action site as a result of historical research and a limited field investigation. Documents reviewed included archival sources, historic maps, Life Cycle Assessment (LCA) requests, and previous archaeological reports. A technical report was completed to present the results of the LRFI and to identify any sensitive areas within the Proposed Action site that may need further investigation or mitigation.

The eastern one-third of the Proposed Action site was apparently formed in the mid 1950's when an offshore oil pipeline was being developed and the temporary pier was dismantled once the pipeline had been constructed. The construction material (largely basalt boulders) was stockpiled in a linear pile along the eastern third of the parcel. Currently the boulders are covered with mature Ki'awe trees.

No historic properties have been identified in the present Proposed Action site or in the immediate vicinity. Barber's Point Beach Park, approximately 660 feet (2000 m) to the west, had no subsurface deposits, cultural material or sinkholes during archaeological monitoring in 2010. Since the Proposed

Action site has been graded down to raised reef limestone, the potential for sinkholes is not believed to be present.

### **3.12 LAND USE**

#### **3.12.1 Definition of Resource**

Land use includes the past, present, and planned land uses and government policies governing the preservation and development of land.

#### **3.12.2 Affected Environment**

The Proposed Action site is in a zoned Intensive Industrial area (see **Figure 3-14**). According to the Ewa Development Plan, Campbell Industrial Park (see **Figure 3-15**), Barber's Point Harbor, Kenai Industrial Park and Kapolei Business Park should continue to grow as one of O'ahu and the State's most important industrial areas. Campbell Industrial Park is one of the State's largest heavy industrial areas and an important industrial harbor and fuel transfer point on O'ahu.

The surrounding area is primarily industrial, much of which has been developed into industrial parks similar to Campbell Industrial Park. The expansion of industrial uses at Barber's Point Deep Draft Harbor, Kapolei Business Park, and growth of the Ko'Oolina Resort will provide additional jobs for the increase in population in the area. Also present are commercial businesses and recreational areas including Ewa Marina, several parks and golf courses. Waimanalo Gulch Landfill is located 2.5 miles to the north of the Proposed Action site. Approximately two (2) miles to the north is Kapolei, with a population of 15,186 (US Census 2010). The Proposed Action site is located within the SMA or SSA under the Hawai'i CZM Program (see Section 1.4.5 for discussion of the Hawai'i CZM Program). Parks and other recreational areas in the surrounding area are discussed in Section 3.7.

The Proposed Action site is approximately two (2) miles to the west of Kalaeloa Airport. Due to the proximity between the Proposed Action site and the airport, URS Corporation submitted the *Notice of Proposed Construction or Alteration (FAA Form 7460-1)* to the USDOT, FAA for a compliance review of the glint and glare from the solar panels, structure height, and penetration of airport's imaginary surface (see **Appendix D**). Additionally, FAA will require the contractor to file the FAA Form 7460-2 prior to the construction phase of the Proposed Action.

P:\Chevron\2012 Chevron\26537586 Chevron LCPV Solar\Permitting\01-Figures\FIG 3-14 Zoning Map.dwg, 12/20/2012 11:37:42 AM



**LEGEND:**

-  PROPOSED ACTION SITE
-  ZONE AREAS
- I-2 INTENSIVE INDUSTRIAL
- P-2 GENERAL PRESERVATION
- F-1 FEDERAL AND MILITARY PRESERVATION

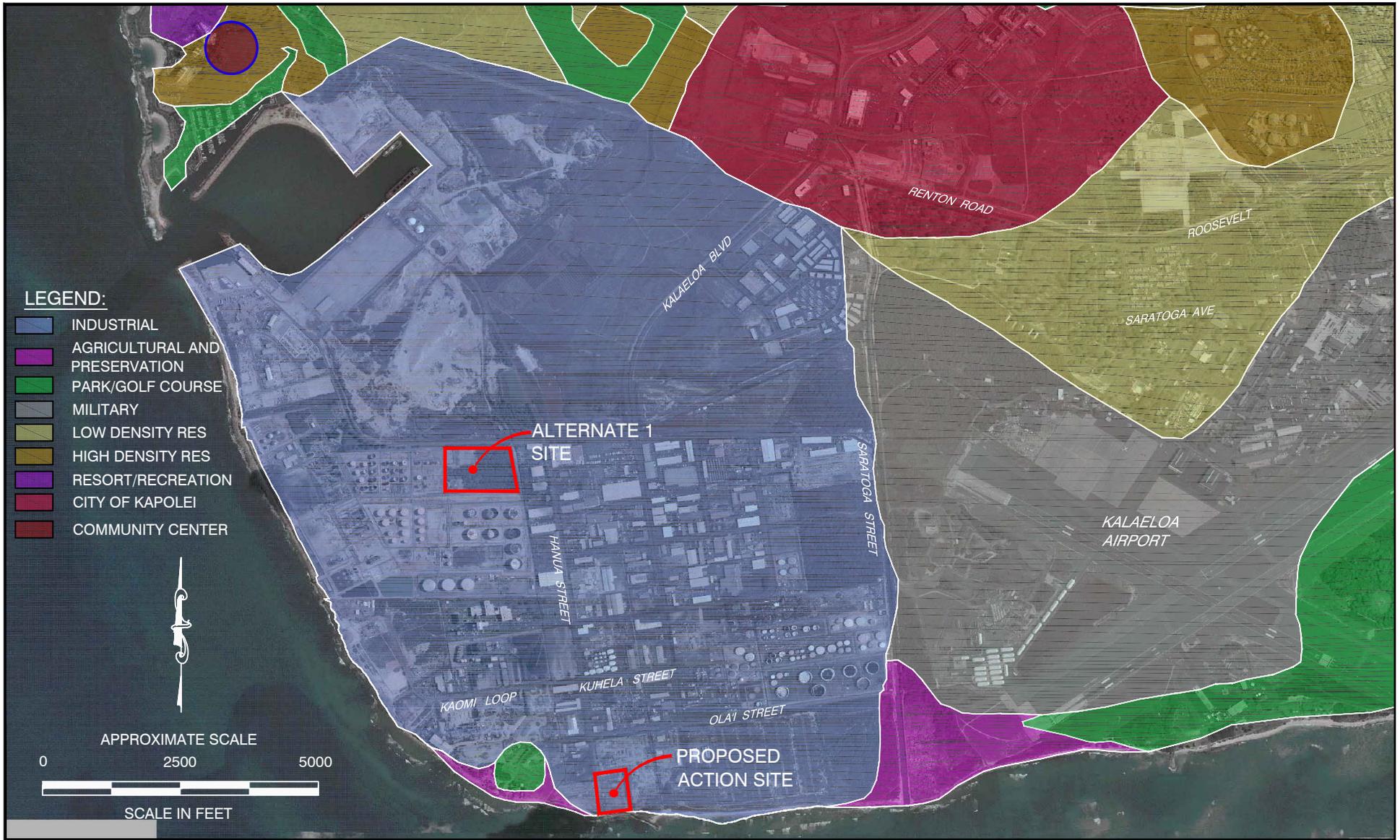
APPROXIMATE SCALE  
 0 750 1500  
 SCALE IN FEET

**AERIAL PHOTO:**  
 Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>  
**REFERENCE:**  
 State of Hawaii GIS: <http://gis.hicentral.com>

**ZONING MAP**  
 Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii



FIGURE 3-14



**AERIAL PHOTO:**  
Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>

**REFERENCE:**  
State of Hawaii GIS: <http://gis.hicentral.com>



## INDUSTRIAL PARK MASTER PLAN LAND USE

Environmental Assessment  
Chevron Hawaii PV (10 acre Site)  
TMK: (1)9-1-031-002  
Kapolei, Oahu, Hawaii

**3.13 SOCIOECONOMIC RESOURCES****3.13.1 Definition of Resource**

Socioeconomic resources refer to the social and economic qualities of the human environment, such as demographic characteristics, employment and income-generating activities, and the ways in which people live, relate to one another, organize to meet their needs, and engage in leisurely activities.

**3.13.2 Affected Environment**

The population of O‘ahu was 953,207 in 2010 (US Census 2010). The town nearest to the Proposed Action site is Kapolei, located approximately two (2) miles to the north. The population of Kapolei was 15,186 in 2010 (US Census 2010). Approximately 31 percent of the population is 17 years or younger, and approximately 6 percent is 65 years or older. Median age is approximately 40 years. There are 4,343 total housing units in Kapolei, approximately 77 percent of which are occupied (3,383 units). Average household size is 3.56 persons. Median household income is \$91,528.

Kapolei is racially diverse with no majority group. Asians represent 34.4 percent of the population, 13.0 percent are Caucasian, 14.6 percent are Native Hawai‘ian and other Pacific Islander, and 35.1 percent are two or more races. African American, American Indian and Alaska Native, and Other Race represent the remaining 2.9 percent of the population.

**SECTION 4 POTENTIAL ENVIRONMENTAL IMPACTS**

This section evaluates the direct and indirect, short- and long-term impacts of the Proposed Action, Alternative 1, and the No-Action Alternative on the surrounding environment and community. Also evaluated are cumulative impacts that could result from the incremental effects of the Proposed Action or alternatives under consideration when considered together with effects from past, present, and reasonably foreseeable future actions. Where appropriate in Sections 4.1 through 4.14, the discussion includes the measures that the Proposed Action and Alternate 1 propose to take to minimize or mitigate potential adverse effects.

**4.1 AIR QUALITY****4.1.1 Proposed Action**

Construction of the Proposed Action will temporarily affect air quality on the site and in the immediate vicinity by marginally increasing air pollutant emissions associated with dust generation, equipment use, and vehicle use. In general, fugitive dust generation is expected to result from minor site preparation, ground disturbance, and grading activities, as well as installation of footings for solar reflectors. The Contractor shall prepare and implement a Dust Control Plan prior to initiating construction. Equipment used to prepare the Proposed Action site and construct the PV solar system and vehicles used to transport construction workers, equipment, and materials to and from the Proposed Action site will result in air pollutant emissions associated with fossil fuel combustion. Up to ten (10) construction workers are expected to be on-site during the most intensive periods of construction. The marginal increase in emissions from these sources will occur over a period of three (3) months. Use of water as-needed for dust control during construction will minimize the potential for visible emissions and fugitive dust and satisfy HAR §11-60.1-32.

The Proposed Action shall comply with the provisions of HAR §11-60.1-33 on fugitive dust. The contractor shall select appropriate measures to comply with fugitive dust requirements. The following dust control measures can substantially reduce fugitive dust:

- Planning the different phases of construction in an effort to minimize land disturbance
- Use watering trucks to moisten disturbed soils and locating potential dust-generating equipment in areas of the least impact
- Use low emission equipment when feasible
- Cover loads when hauling dirt, controlling dust from daily operations of material being processed, and hauled to and from the facility
- Cover soil stockpiles if exposed for long periods of time
- Use windbreaks to prevent accidental dust pollution
- Limit the number of vehicular paths and stabilize temporary roads
- Maintain stabilized construction area ingress/egress areas

- Wash and clean trucks prior to leaving construction sites
- Minimize unnecessary vehicular activities

Mobile-source pollution can be reduced by minimizing unnecessary vehicular and machinery activities and limiting traffic disruptions, particularly during peak travel periods. All State and Local regulations for dust control and other air quality emission reduction controls will be followed.

The existing Chevron Refinery workers will be responsible for the operation of the Proposed Action that will have limited potential to affect air quality. These include maintenance work that involves exterior cleaning and refinishing, operation of the Proposed Action, and worker and vendor vehicular traffic to and from the site. These will be very limited in magnitude and will have no significant impacts on air quality. In addition, the Proposed Action will use a DC power motor to control the sunlight tracking system. There are no fuel costs or emissions during operation of the sunlight tracking; thus, it would also have no significant impacts on air quality.

#### **4.1.2 Alternative 1**

Compared to the Proposed Action, Alternative 1 would generate a similar amount of air emissions in the same general area. Therefore, air quality impacts under Alternative 1 will be the same as the Proposed Action. There would be no significant impacts to air quality under Alternative 1.

#### **4.1.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. As a result, no additional impacts to air quality would occur.

### **4.2 NOISE**

#### **4.2.1 Proposed Action**

Project construction activity will involve an assortment of noise-generating equipment (e.g., excavators, trucks) for typical construction phases such as minor site preparation, ground disturbance, grading activities, and site clean-up. The types of equipment used for construction of the Proposed Action are expected to exceed 78 dBA.<sup>1</sup> As a result, the Proposed Action will be required to obtain a Community Noise Permit from the HDOH, Indoor and Radiological Health Branch (IRHB) (the Proposed Action's cost of greater than \$250,000 also triggers the requirements for a Community Noise Permit). The permit allows construction to occur from 7:00 AM to 6:00 PM, Monday through Friday and 9:00 AM to 6:00 PM on Saturdays. The use of certain demolition and construction equipment (such as hydraulic hammer and jackhammers) is limited to 9:00 AM to 5:30 PM, Monday through Friday. The Proposed Action will not exceed maximum permissible sound levels before 7:00 AM and after 6:00 PM, Monday through Friday,

---

<sup>1</sup> Federal Highway Administration (FHWA), Construction Equipment Noise Levels and Ranges. Available at: [http://www.fhwa.dot.gov/environment/noise/construction\\_noise/special\\_report/hcn06.cfm](http://www.fhwa.dot.gov/environment/noise/construction_noise/special_report/hcn06.cfm)

or before 9:00 AM and after 6:00 PM on Saturdays, or at any time on Sundays and holidays. Therefore, a Community Noise Variance is not required.

Vehicles used to transport construction workers, equipment, and materials to and from the Proposed Action site also will generate noise at the Proposed Action site, in the vicinity, and along roadways to the site, including State Route 95 and Hanua Street. Up to ten (10) construction workers will be on-site during the most intensive periods of construction. Trucks also will deliver equipment and materials to the Proposed Action site.

Construction equipment and vehicles would result in minor noise generation on the Proposed Action site over a period of three (3) months. Because the affected environment is characterized by relatively high noise levels associated with the adjacent concrete plant, other intensive industrial uses in the vicinity, and traffic volumes along nearby roadways, construction of the Proposed Action will not generate a significant increase in noise levels on the Proposed Action site or in the vicinity. Moreover, because the Proposed Action site is surrounded by industrial land uses, there are no sensitive noise receptors that could be adversely affected by construction noise. Vehicles used to transport workers, materials, and equipment to the Proposed Action site will not create a perceptible noise increase relative to existing conditions on surrounding roadways. Surrounding roadways are already heavily travelled by heavy-duty trucks and delivery vehicles travelling to and from Campbell Industrial Park. Construction workers exposed to average noise levels of 85 dBA or more for eight (8) or more hours will be protected through implementation of a Hearing Conservation Program and appropriate controls such as administrative, engineering, and application of PPE.

Operation of the Proposed Action would result in similar if not lower long-term noise levels relative to existing conditions. The Proposed Action site is located within the industrial noise environment of CIP. There are no significant impacts anticipated due to the existing industrial nature of the site and its surroundings. Thus, the operation of the Proposed Action does not require a noise permit.

#### **4.2.2 Alternative 1**

Alternative 1, approximately 0.9 mile northwest of the Proposed Action site, would situate the project site closer to noise sources like Malakole Street and Kalaeloa Airport, but generally within an environment having similar ambient sound to that of the Proposed Action: intensive industrial land uses, as well as vehicle traffic and aircraft departures and arrivals are the dominant noise sources. The construction and operation noise of the Proposed Action would also apply to Alternative 1, and similarly no significant impact from noise would be expected. Alternative 1 is located along the fenceline, which is also the right-of-way line of Malakole Street and is also in close proximity to vehicle traffic along State Route 95 and Malakole Street, which is expected to be the dominant source of noise in the affected environment.

#### **4.2.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. As a result, no impacts from noise would occur.

**4.3 INFRASTRUCTURE****4.3.1 Proposed Action**

Construction and operation activities of the Proposed Action will rely on public utility services and infrastructure at the Proposed Action site, including Kalaeloa Boulevard and Hanua Street. The activities will require electricity from HECO, water from Board of Water Supply, City storm water systems, and Waimanalo Gulch Landfill.

The Proposed Action will connect to HECO for electricity at an interconnection location near the westerly property line. Construction will marginally increase passenger vehicle trips due to the maximum of ten (10) construction workers, heavy-duty truck trips for delivery of equipment and materials, water consumption for dust control, storm water runoff, and solid waste generation due to site clean-up and removal of waste and debris. Short-term construction activities are not expected to affect the electricity system. The Proposed Action will use water for panel cleaning, twice a year. As a result, the total water consumption at the Proposed Action site will marginally increase. Operation may involve infrequent heavy-duty truck trips, and is not expected to result in increased passenger vehicle trips or generation of wastewater and solid waste since the Proposed Action will not result in additional workers on the Proposed Action site or at the refinery. Hazardous waste and materials are discussed in Section 4.6.

The marginal increase in demand on transportation, storm water, and solid waste infrastructure associated with the Proposed Action would not adversely affect any of these systems. Water consumption would not increase. These infrastructure systems have adequate capacity to accommodate the marginal effects associated with construction and operation of the Proposed Action. The Proposed Action would not require any new infrastructure or upgrades of existing infrastructure at the Proposed Action site or in the vicinity. Storm water runoff would be managed in accordance with applicable standards as discussed in Section 4.9. The Proposed Action would not result in any significant effects to infrastructure.

**4.3.2 Alternative 1**

The PV system proposed under Alternative 1 would be the same as the Proposed Action. Minimal alterations to the layout would be made where necessary due to the different orientation and dimensions of the Alternative 1 site relative to the Proposed Action site. Alternative 1 would use the same transportation, water, electric, and solid waste infrastructure. Nevertheless, Alternative 1 would affect the capacity of the water and electricity infrastructure systems in the same manner as the Proposed Action. It would comply with CCH standards for stormwater. As a result, marginal increases in demand for infrastructure under Alternative 1 would be the same as under the Proposed Action. Alternative 1 would not result in any significant effects to infrastructure.

**4.3.3 No-Action Alternative**

The No-Action Alternative would not change existing levels of infrastructure demand. Therefore, significant effects to infrastructure would not result.

**4.4 CLIMATE****4.4.1 Proposed Action**

The climate of the west side of O‘ahu would not be adversely affected by the Proposed Action. According to the Hawai‘i-NFIP Flood Hazard Assessment Tool, the Proposed Action is located within Zone D and VE. Zone D denotes areas in which flood hazards are possible but undetermined since the area has not been studied (2012), and Zone VE denotes areas within the coastal flood zone with some wave actions as depicted in **Figure 3-2**. Additionally, the Proposed Action is located within a tsunami evacuation zone identified by the O‘ahu Civil Defense Agency (CCH Civil Defense Agency 2011). The CCH Flood Control Ordinance does not promulgate flood protection regulations for development within Zone D beyond the general requirements of the building code (ROH Article 11 Section 21-9). The Proposed Action will comply with applicable sections of ROH (ROH, Article 11 Section 16-11) regarding flood-proofing, waterproofing, and structural requirements for buildings and structures potentially subject to coastal flood waters due to tsunami. Moreover, there is a major berm (approximately 5 to 7 feet in height) along the *makai* edge of the Proposed Action site, which buffers the Proposed Action site from the ocean (see **Figure 4-1**).



**Figure 4-1** Berm along Shoreline

The Proposed Action would involve up to ten (10) construction workers on the site in the tsunami evacuation zone during the temporary construction period of three (3) months. Existing workers already employed at the refinery would work on the Proposed Action site during operations (e.g., cleaning panels and conducting maintenance). Chevron would implement the existing policies and procedures in place for notification or evacuation of any workers or visitors on the Proposed Action site in the event a tsunami watch, warning, or evacuation advisory or order is issued by the Honolulu Department of Emergency Management. As a result, the Proposed Action would not result in significant impacts to people or property due to a flooding hazard, including hazards related to coastal flooding due to a tsunami.

**4.4.2 Alternative 1**

Alternative 1 would not result in any significant effects to the climate of western of O‘ahu. The PV system proposed under Alternative 1 would be substantially the same as the Proposed Action. Minimal alterations to the layout would be made where necessary due to the different orientation and dimensions of the Alternative 1 site relative to the Proposed Action site. Additionally, Alternative 1 is not located within a 100-year flood plain or tsunami hazard zone and would not be subject to flooding hazards, including hazards related to coastal flooding due to a tsunami.

**4.4.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. Therefore, no impacts associated with the climate of western of O‘ahu or flooding hazards would occur.

**4.5 VISUAL RESOURCES****4.5.1 Proposed Action**

The Proposed Action site is currently used for industrial purposes, and is part of Chevron’s property. As a result, vegetation within the site boundaries is sparse. The topography of the Proposed Action site is relatively flat and is located adjacent to the shoreline. As depicted in **Figure 4-1**, a berm runs parallel with the south side of the Proposed Action site and is approximately 5 to 7 feet high, which completely obstructs views of the ocean from ground level.

Short-term and localized visual changes would occur on the Proposed Action site and in the vicinity from the presence of construction equipment, vehicles, and workers during construction. However, because of the temporary nature of the construction activities and the location on a heavily disturbed site near the concrete plant, visual changes as a result of construction will not have an adverse effect on the aesthetics of the area or scenic quality (see **Figure 4-2**).



**Figure 4-2 Concrete Plant to the North**

Long-term, the development of a PV system on a heavily disturbed site will change the visual appearance of the Proposed Action site. The proposed development will have a relatively low profile. At peak elevation the panels will be no more than 12 to 15 feet above ground level. The approximately 5 to 7 feet tall berm to the south of the Proposed Action site, combined with the Proposed Action site’s approximately five (5) feet elevation above mean sea level, will substantially screen the Proposed Action from the ocean, although the uppermost portions of the panels may still be visible to some viewers. The berm will also shield nearby viewers from possible glint and glare from the solar panels. Furthermore, the Proposed Action will be largely obscured from the public view by mazes of existing structures between industrial buildings and landscapes.

As described in **Table 4-1** and **Table 4-2** and depicted in **Figure 4-3** through **Figure 4-10**, the Proposed Action will not adversely disturb the visual environment from adjacent locations as well as from distant locations.

**Table 4-1 Visual Impacts from Adjacent Locations**

<b>Viewshed No.</b>	<b>Location</b>	<b>Description of Visual Impact</b>
1	Looking From North (From Hanua Street)	From this viewpoint, the primary objects are the chain-link fences and above-ground utilities. The proposed solar panels will be visible this location, but the visual impact is considered moderately low.
2	Looking From East To West	From this viewpoint, the primary objects are the berm and sparse vegetation. The proposed solar panels will not be visible from this location, and there is no visual impact.
3	Looking From South-East End	From this viewpoint, the primary objects are the chain-link fences, berms, and vegetation. The proposed solar panels will be mostly out of sight from this location, and the visual impact is considered low.
4	Looking From South To North (From Shoreline)	From this viewpoint, the primary objects are the numerous industrial structures, chain-link fences, berm, and sparse vegetation. The proposed solar panels will be visible from this location, but the visual impact is considered very low.
5	Looking From West To East	From this viewpoint, the primary objects are the berm, sparse vegetation, refinery holding tanks and stacks, industrial buildings, and Ameron structures within the Campbell Industrial Park. The proposed solar panels will be visible from this location, but the visual impact is considered low.



Figure 4-3 Various Viewpoints and Directions from Adjacent Locations



**BEFORE VIEW OF THE SITE PHOTO #1**



**AFTER VIEW OF THE SITE PHOTO #1**

**VIEWSHED #1 – LOOKING FROM NORTH (FROM HANUA STREET)**

**FIGURE 4-4**



**BEFORE VIEW OF SITE PHOTO #2**



**AFTER VIEW OF SITE PHOTO #2  
(Panels not visible from this view point)**

**VIEWSHED #2 – LOOKING FROM EAST TO WEST**

**FIGURE 4-5**



**BEFORE VIEW OF SITE PHOTO #3**



**AFTER VIEW OF SITE PHOTO #3**

**VIEWSHED #3 – LOOKING FROM SOUTH-EAST END**

**FIGURE 4-6**



**BEFORE VIEW OF SITE PHOTO #4**



**AFTER VIEW OF SITE PHOTO #4**

**VIEWSHED #4 – LOOKING FROM SOUTH TO NORTH (FROM SHORELINE)**

**FIGURE 4-7**



**BEFORE VIEW OF SITE PHOTO #5**



**AFTER VIEW OF SITE PHOTO #5**

**VIEWSHED #5 – LOOKING FROM WEST TO EAST**

**FIGURE 4-8**

**Table 4-2 Visual Impacts from Distant Locations**

<b>Viewshed No.</b>	<b>Location</b>	<b>Description of Visual Impact</b>
6	Makakilo Viewpoint – Panama Street (from about 2.5 miles away)	From this viewpoint, the primary objects are the refinery holding tanks and stacks. The proposed solar panels will not be visible from this location, the visual impact is considered very low.
7	Panoramic View (aerial from one mile high)	From this viewpoint, the primary objects are the berm, sparse vegetation, refinery holding tanks and stacks, industrial buildings, and Ameron structures within the Campbell Industrial Park. The proposed solar panels will be visible from this location, but the visual impact is considered very low.



**BEFORE VIEW OF SITE PHOTO #6**



**AFTER VIEW OF SITE PHOTO #6  
(Panels not visible from this view point)**

**VIEWSHED #6 – MAKAKILO VIEWPOINT – PANAMA STREET**

**FIGURE 4-9**



**BEFORE VIEW OF SITE PHOTO #7**



**AFTER VIEW OF SITE PHOTO #7**

**VIEWSHED #7 – PANORAMIC VIEW**

**FIGURE 4-10**

**4.5.2 Alternative 1**

The Alternative 1 site provides a visually compatible industrial interface. The site is surrounded with existing petroleum refinery structures and industrial buildings. As a result, Alternative 1 is relatively inconspicuous, and it can be obscured from public view. Also, installation of a chain link fence with privacy screen around the Alternative 1 site provides a visual resource that would be similar to those described under the Proposed Action. Alternative 1 would be located approximately 1.5 miles from the nearest portion of a runway at Kalaeloa Airport. Therefore, glint and glare from the solar panels would not adversely affect arriving or departing aircraft. No significant impacts to visual resources would occur as a result of Alternative 1.

**4.5.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would remain the same. As a result, no impacts to visual resources would occur.

**4.6 HAZARDOUS MATERIALS AND WASTE****4.6.1 Proposed Action**

There is no evidence of hazardous materials or waste on or adjacent to the Proposed Action site, with the exception of a LNAPL plume that is no longer being monitored with groundwater monitoring wells (see Sections 3.6.2 and 4.9 for discussion of groundwater).

Hazardous materials or wastes are not expected to be encountered or released during construction or operation of the Proposed Action. The Proposed Action, including PV modules and other components and materials, do not include hazardous materials that pose a threat to human health or the environment. While not expected, if hazardous materials or wastes are discovered or released during construction or operations they will be handled, removed, and disposed of in accordance with applicable state and federal laws, regulations, ordinances, and standards. No significant effects associated with hazardous materials or waste would occur.

**4.6.2 Alternative 1**

Similar to the Proposed Action, there is no evidence of hazardous materials or waste on or adjacent to Alternative 1, and hazardous materials and wastes are not expected to be encountered or released during construction or operation. A portion of the LNAPL plume underlies the Alternative 1 site. Installation of solar footings would not exceed three (3) feet below ground surface. As a result, limited footing options would be available on the Alternative 1 site. While not expected, if such materials or wastes are discovered or released during construction or operations they would be handled, removed, and disposed of in accordance with applicable state and federal laws, regulations, ordinances, and standards. No significant effects associated with hazardous materials or waste would occur.

**4.6.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. No significant effects associated with hazardous materials or waste would occur.

**4.7 RECREATIONAL RESOURCES****4.7.1 Proposed Action**

The Proposed Action will be located on a heavily disturbed site within a larger industrial area. From the shoreline, a 5 to 7 feet tall berm separates the Proposed Action site. There are no recreational resources on the Proposed Action site. The nearest recreational resource is Barber's Point Beach Park, located 0.2 mile to the west. Other resources are located 0.3 to 0.5 mile away as depicted in **Figure 3-7**. The Proposed Action would not adversely affect any recreational resources nor affect access to any recreational resources.

**4.7.2 Alternative 1**

Similar to the Proposed Action site, the Proposed Action would be located at the existing refinery within a larger industrial area. There are no recreational resources on or adjacent to Alternative 1. Similar to the Proposed Action site, the nearest recreational resource is located approximately 0.5 mile from the Alternate 1 site. Alternative 1 would not adversely affect any recreational resources, nor access to any recreational resources.

**4.7.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. Therefore, no significant effects to recreational resources would occur.

**4.8 GEOLOGY AND SOILS****4.8.1 Proposed Action**

The Proposed Action site consists of previously graded reef limestone hard pan (see **Figure 4-11**). The Proposed Action site is generally level terrain that drains to the southwest. The entire site has been drastically altered by historic and modern land use including grubbing and grading during the pipeline and temporary pier construction. A major berm along the *makai* edge of the property is composed of bulldozer push from the grading and grubbing of the Proposed Action site. There are occasional coral outcrops, which appear to have been graded flat. Construction of the Proposed Action would involve minor site preparation,



**Figure 4-11 Site Grading - Existing**

grading, and ground disturbance that would minimally alter the topography of the Proposed Action site. Installation of solar footings would not exceed 3 to 5 feet below ground surface. Soils and underlying rock on the Proposed Action site are suitable for construction of the Proposed Action. The Proposed Action site does not contain significant geologic features or natural resources that could be affected by the Proposed Action. The Proposed Action shall be consistent with drainage standards established by CCH, Department of Environmental Services, Storm Water Management Plan. Implementation of BMPs for erosion and sediment controls during construction will ensure that geologic or soil hazards and adverse effects to water quality do not occur. Because the Proposed Action site does not contain soils suitable for agriculture, the Proposed Action will not affect agricultural productivity. The Proposed Action would not result in significant impacts associated with geology and soils.

**4.8.2 Alternative 1**

Like the Proposed Action, Alternative 1 features generally level terrain. The Proposed Action site also features soil and geology similar to the Proposed Action. The Alternative 1 site has also been previously graded and used as a tank farm. Alternative 1 would minimally alter the topography of the Proposed Action site, comply with applicable drainage standards, and implement BMPs for erosion and sediment controls during construction. Alternative 1 would not result in significant impacts associated with geology and soils.

### 4.8.3 No-Action Alternative

Under the No-Action Alternative, existing environmental conditions would not change. No significant impacts associated with geology and soils would occur.

## 4.9 WATER RESOURCES

### 4.9.1 Proposed Action

The Proposed Action would implement standard construction phase BMPs during construction. These BMPs would help deter stormwater runoff from construction from reaching the shoreline located south of the property line. With implementation of construction BMPs, surface water would not be impacted by the Proposed Action. Construction disturbing greater than one acre requires a NPDES Permit to monitor runoff and protect water resources during the construction process. Since greater than one acre would be disturbed, an NPDES permit would be obtained for the Proposed Action.

During operations, the Proposed Action will use infiltration as a stormwater control method to deter stormwater from being discharged into the Class A nearshore waters (see **Figure 4-12**). If unable to be retained within the Proposed Action site, stormwater discharge into Class A nearshore waters is permitted so long as the discharge meets the basic water quality requirements specified in Chapter 11-54-4 HAR and applicable requirements specified in Chapter 11-55 HAR.

Installation of PV modules with standard foundations or slab on grade, would not exceed 3 to 5 feet below ground surface. Groundwater depth at the Proposed Action site is approximately six (6) feet below ground surface. As a result, construction activities are not expected to reach the underlying groundwater. Additionally, the Proposed Action will not involve any substances, materials, or processes that would adversely affect groundwater quality beneath the Proposed Action site; therefore, groundwater would not be impacted by the Proposed Action.

The Proposed Action lies within the FEMA's FIRM Panel 15003C0312G, effective date January 19, 2011. The FIRM Panel illustrates that the Proposed Action is in "Other Areas" Zone D and Zone VE. Zone D is designated as "unstudied areas where flood hazards are undetermined, but flooding is possible" and Zone VE denotes areas within the coastal flood zone with some wave actions (see **Figure 3-2**). There are no wetlands on the Proposed Action site.

The CCH Flood Control Ordinance does not promulgate flood protection regulations for development within Zone D beyond the general requirements of the building code (ROH, Article 11 Section 21-9). The Proposed Action will comply with applicable sections of ROH (Article 11 Section 16-11 regarding flood-proofing, waterproofing, and structural requirements for buildings and structures. Therefore, no significant impacts related to flooding hazards would occur. No significant environmental consequences associated with water resources would result from the Proposed Action.



**AERIAL PHOTO:**  
Courtesy of the U.S. Geological Survey  
<http://www.usgs.gov>  
**REFERENCE:**  
State of Hawaii GIS: <http://gis.hicentral.com>



**WATER RESOURCES**  
Environmental Assessment  
Chevron Hawaii PV (10 acre Site)  
TMK: (1)9-1-031-002  
Kapolei, Oahu, Hawaii

FIGURE 4-12

### **4.9.2 Alternative 1**

The Alternative 1 site also lies within FEMA's FIRM Panel 15003C0304G, effective date January 19, 2011. Therefore, flooding hazards would be similar to the Proposed Action, and no significant impacts related to flooding hazards would occur. In addition to flooding hazards, other impacts to water resources would be the same as those previously described under the Proposed Action. There would be no significant impacts to surface water, ground water, or wetland resources under Alternative 1.

### **4.9.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. Therefore, no impacts to surface water, groundwater, wetlands, or near-shore waters would occur due to construction of the solar panels.

## **4.10 BIOLOGICAL RESOURCES**

### **4.10.1 Proposed Action**

Unless otherwise noted this section is based on the *Biological Resources Survey Report, Chevron PV Project at TMK 9-1-031:002, Barber's Point, O'ahu, Hawai'i* prepared by SWCA Environmental Consultants, June 2012 (see **Appendix A**). The entire Proposed Action site has been intensively disturbed and highly altered by human activity. The Proposed Action will not result in adverse impacts to any plant or animal species currently listed or proposed for listing under federal or state endangered species statutes, because no such species have been found on or near the Proposed Action site according to recent surveys of the Proposed Action site and Campbell Industrial Park. The Proposed Action site includes six (6) native plants of which one, pa'u-o-hi'iaka (*Jacquemontia ovalifolia* subsp. *Sandwicensis*), is found only in the Hawai'ian Islands. This plant is not protected by federal or state endangered special statutes; therefore removal would not be considered a significant biological resources impact. Nine (9) bird species were observed within the Proposed Action site.

The Proposed Action site does not include and would not affect USFWS critical habitat. The Proposed Action does not extend to the potentially jurisdictional water feature located adjacent to the Proposed Action site and would not directly impact this feature. There would be no significant impact to biological resources under the Proposed Action.

### **4.10.2 Alternative 1**

Like the Proposed Action, the Alternative 1 site is part of the existing refinery. Alternative 1 is located approximately 0.8 mile to the northwest of the Proposed Action. As discussed in Section 4.10.1 and the attached biological resources technical report, previous surveys in Campbell Industrial Park have not detected any plant or animal species currently listed or proposed for listing under federal or state endangered species statutes. Alternative 1 would not affect the 2005 Safe Harbor Agreement (SHA) among DLNR, USFWS, and Chevron Hawai'i Refinery to provide habitat for and protect the Hawai'ian

stilt and the Hawai‘ian coot. The Proposed Action site is not expected to attract the water-bird species covered by the SHA.

USFWS critical habitat is not located or adjacent to the Proposed Action site. Alternative 1 will not extend to any potentially jurisdictional water feature. Impacts to biological resources under Alternative 1 will be similar to the impacts under the Proposed Action. There would be no significant impacts to biological resources under Alternative 1.

#### **4.10.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. Therefore, no impacts to biological resources would occur due to construction and installation of the solar panels.

### **4.11 CULTURAL RESOURCES**

#### **4.11.1 Proposed Action**

Unless otherwise noted this section is based on the *Draft Archaeological Assessment For a Chevron Products Company, Solar Site at James Campbell Industrial Park, Honouliuli Ahupua‘a, Ewa District, Island of O‘ahu (TMK (1) 9-1-031:002 por.)* prepared by Cultural Surveys Hawai‘i, Inc. (CSH), June 2012 (see **Appendix B**). The archaeological assessment completed by CSH supports the Proposed Action’s historic preservation review under HRS Chapter 6E-42 and HAR Chapter 13-13-284, as well as the Project’s environmental review under ROH Chapter 25. The archaeological assessment also supports project-related historic preservation consultation with State and County stakeholder agencies and interested Native Hawai‘ian and community groups. CSH performed a field inspection, historical research, and reviewed past archaeological and paleontological studies.

The Proposed Action site consists entirely of previously graded raised reef limestone hard pan. The entire site has been drastically altered by historic and modern land use including grubbing and grading during the oil pipeline and temporary pier construction. A major berm along the *makai* (seaward) edge of the property is composed of bulldozer push from the grading and grubbing of the Proposed Action site. No surface historic properties were observed within or in the immediate vicinity of the Proposed Action. No intact sinkholes, sand dune deposits, or cultural material were observed within the Proposed Action site, and none are believed to be present. Moreover, while the Proposed Action site is located within the Campbell Industrial Park, which includes heavy and medium industrial developments and the State’s only two (2) oil refineries, there are no historic-period built environment resources, which are over 50 years old within the Proposed Action site.

Further consultation with the SHPD will be necessary to establish appropriate mitigation measures should unidentified cultural resources be inadvertently discovered. In the unlikely instance that cultural resources, including but not limited to limestone sinkholes of three (3) feet in diameter or greater or other significant cultural deposits are encountered, work in the immediate area would cease and notification of the proper authorities, including the SHPD, would occur immediately according to applicable law.

The Archaeological Assessment was submitted to the SHPD offices for their review and concurrence. In a response letter dated September 4, 2012, SHDP indicated that no historic properties have been identified within the 10-acre property or the immediate vicinity and that the 5-acre area of potential effect (APE) “has been graded entirely previously down to raised reef limestone hard pan” within the planned solar Proposed Action site. SHPD concurred with no further work within the APE, but stipulates that an inventory survey will be required prior to any ground-disturbing activities within the section of the property outside the APE. If any sinkholes, cultural deposits, or burials are identified, all work shall be stopped, and SHPD shall be notified and consulted on the development of an appropriate mitigation strategy. Also, any inadvertent discovery of human skeletal remains will be dealt with according to HAR §13-300-40.

#### **4.11.2 Alternative 1**

Cursory online research of the general location of Alternative 1 did not identify any sites eligible for the NRHP. In addition, no historic properties were identified on the Proposed Action site using the SHPD Data Resource Internet Site. However, previous archaeological surveys summarized in the Archaeological Assessment indicate that the vicinity of Alternative 1 includes sinks, some of which contain the remains of extinct species (see page 25, Sinoto 1979 and Hammatt and Folk 1981, sixth and ninth paragraphs, respectively). If cultural resources were present under Alternative 1, appropriate mitigation measures would be established through consultation with the SHPD, and if encountered, work in the immediate area would cease and notification of the proper authorities, including the SHPD, would occur immediately according to applicable law. Therefore, similar to the Proposed Action, there would be no significant impacts to cultural resources under Alternative 1.

#### **4.11.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. Therefore, no impacts to cultural resources would occur.

**4.12 LAND USE****4.12.1 Proposed Action**

The Proposed Action would occur on land zoned for Intensive Industrial development. The Proposed Action is consistent with this zoning designation. Moreover, the Proposed Action would be consistent with the vision of the Ewa Development Plan for Campbell Industrial Park and the surrounding area to continue to grow as one of the most important industrial areas in O‘ahu and the State.

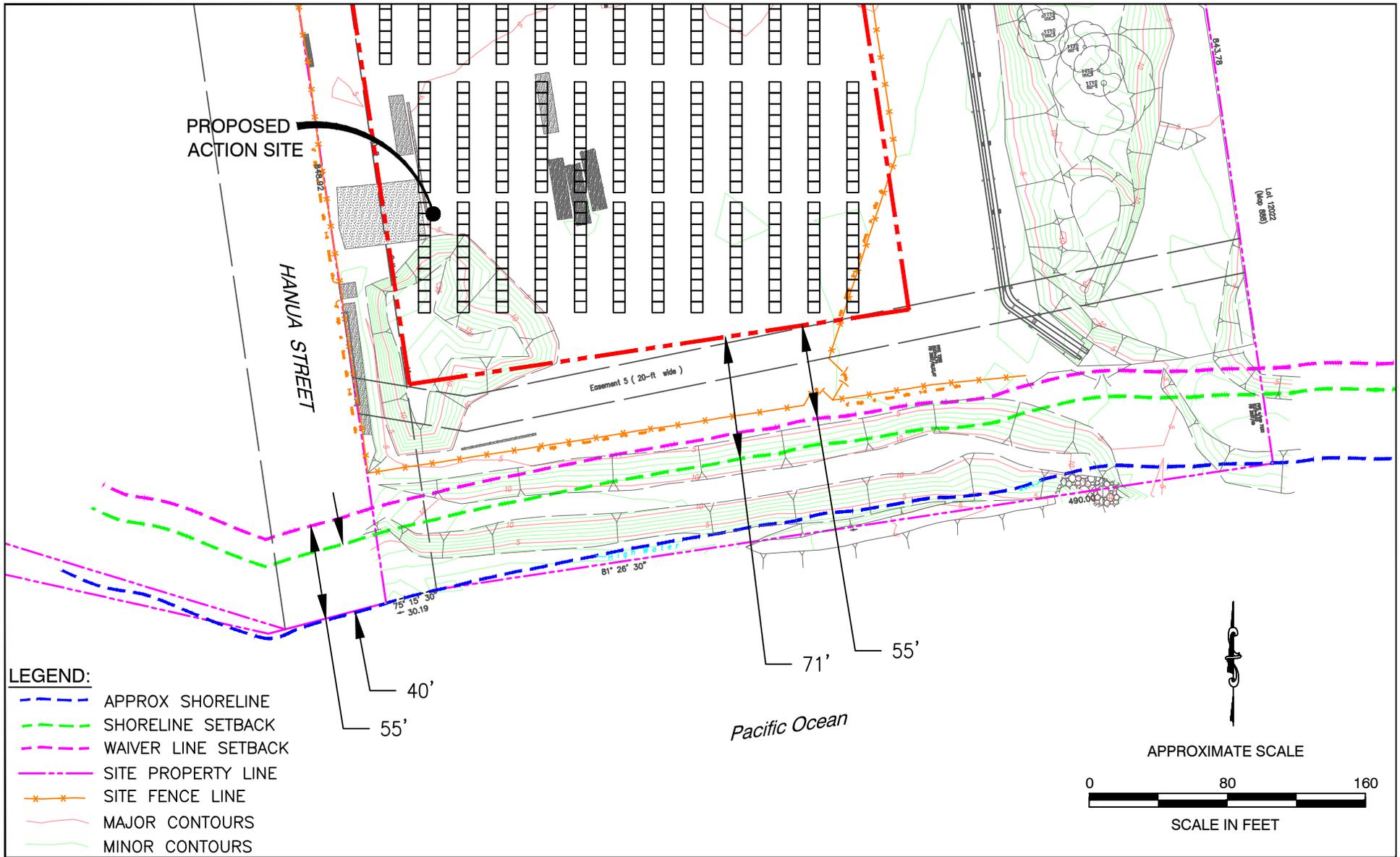
As shown in **Figure 1-2**, the Proposed Action is located within the SMA and subject to the Hawai‘i CZM Program. The Proposed Action is not within the SSA, and it is approximately 110 feet from the shoreline (see **Figure 4-13**). With a cost of greater than \$500,000 a SMA permit is required for the Proposed Action. The Proposed Action will comply with the requirements for a SMA permit as set forth in Chapter 25 of the ROH and the SMA Guidelines set forth in HRS §205A-26. No significant land use impacts would occur.

**4.12.2 Alternative 1**

Similar to the Proposed Action, Alternative 1 would be consistent with its Intensive Industrial zoning designation and surrounding industrial land uses. Moreover, development on the Alternative 1 site would be consistent with the vision of the Ewa Development Plan for Campbell Industrial Park and the surrounding area to continue to grow as one of the most important industrial areas in O‘ahu and the State. Alternative 1 is not located within an SMA or SSA. The Alternative 1 site is located approximately 1.5 miles west of the Kalaeloa Airport and will not affect operations as described in Section 4.5. Similar to the Proposed Action, no significant land use impacts would occur under Alternative 1.

**4.12.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. No significant land use impacts would occur.



REFERENCE:  
 Survey prepared by Park  
 Engineering  
 for Chevron July, 2012

## SHORELINE SETBACK

Environmental Assessment  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii

FIGURE 4-13



**4.13 SOCIOECONOMIC RESOURCES****4.13.1 Proposed Action**

Up to ten (10) construction workers will be on-site during the most intensive periods of construction. Operation of the Proposed Action will be serviced by existing workers from the refinery for activities like cleaning and maintenance. Operation of the Proposed Action will not increase the number of workers at the refinery. Adverse effects to population, employment levels, and the local economy would not occur. The Proposed Action would not result in direct or indirect effects that could adversely affect cultural practices of nearby communities, the island of O‘ahu, or State of Hawai‘i.

Moreover, the Proposed Action is located at an existing parcel within a larger industrial area. The Proposed Action would not be located in close proximity to any human populations, and, as described throughout this EA, the Proposed Action would not create substantial risks to public health or safety. Therefore, no populations would be disproportionately affected by the Proposed Action, including children, minority, and disadvantaged groups. No significant socioeconomic impacts would occur.

**4.13.2 Alternative 1**

Since Alternative 1 is located approximately 0.9 mile northwest of the Proposed Action in the same community, socioeconomic resources impacts to the surrounding community would be substantially the same under both scenarios. No significant socioeconomic impacts would occur under Alternative 1.

**4.13.3 No-Action Alternative**

Under the No-Action Alternative, existing environmental conditions would not change. Therefore, no socioeconomic resources impacts would occur.

**4.14 CUMULATIVE IMPACTS****4.14.1 Proposed Action**

No other present or planned projects have been identified within the vicinity of the Proposed Action site in which the environmental effects of other projects could combine with the environmental consequences of the Proposed Action. Moreover, the Proposed Action would not result in significant impacts for any environmental issue evaluated in this EA. As described in Sections 4.1 and 4.2, the Proposed Action would not affect cumulative air quality and noise levels. The incremental effects of the Proposed Action would not be compounded or increased by the incremental effects of other projects in the vicinity. In addition, the incremental effects of the Proposed Action would not contribute to cumulatively considerable effects when considered together with similar effects from past projects. The incremental effects of the Proposed Action would not contribute to cumulatively considerable effects for any environmental resource evaluated in this EA. No significant cumulative impacts would occur.

**4.14.2 Alternative 1**

Since Alternative 1 would be located 0.9 mile northwest of the Proposed Action, the potential for cumulative impacts under Alternative 1 would be basically the same as the Proposed Action. No significant cumulative impacts would occur.

**4.14.3 No-Action Alternative**

Under the No-Action Alternative, the affected environment would not change. The No-Action Alternative would not have any incremental effects that could combine with similar effects from past, present, or future projects to result in cumulatively considerable effects. Therefore, no significant cumulative impacts would occur.

**4.15 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

Irreversible and irretrievable resources cannot be recovered once committed. Non-renewable resources that would be irretrievably lost if the Proposed Action or Alternative 1 were implemented include gasoline, diesel, water, and electricity from non-renewable sources consumed during construction and operations. However, the Proposed Action would utilize solar energy to generate electricity that will be interconnected to HECO, which would increase the use of renewable energy. Human labor during construction and operation also would be irretrievable. No cultural, biological, or other natural resources would be lost or irretrievably committed by the Proposed Action or Alternative 1. Neither the Proposed Action nor Alternative 1 would irreversibly curtail the range of potential uses of the environment, including but not limited to cultivation of crops and agricultural uses.

**4.16 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY**

This section describes the relationship between local short-term uses of humanity's environment and the maintenance and enhancement of long-term productivity. Trade-offs between short-term and long-term gains and losses are discussed.

As described in Sections 4.1 to 4.14, neither the Proposed Action nor Alternative 1 would result in significant effects to the environment or long-term risks to health or safety. Under the Proposed Action and Alternate 1, a solar PV system would be constructed on disturbed land. Alternate 1 is located at the existing refinery and the Proposed Action is located on property outside of the refinery.

Marginal increases in air emissions, noise levels, and traffic would occur during construction. Construction will use fossil fuel-powered equipment and vehicles. The Proposed Action would not increase overall water consumption at the Proposed Action site. Neither the Proposed Action or Alternative 1 sites are available for cultivation. Development on either site would alter the visual appearance of each site, although not adversely.

In contrast with the relatively minor uses of the environment described above, the Proposed Action and Alternative 1 would each result in major long-term productivity benefits, particularly with respect to

renewable energy. Both the Proposed Action and Alternative 1 would assist the State in reaching the HCEI goal of having 70 percent of the State's energy come from renewable resources by 2030. Moreover, the Proposed Action and Alternative 1 would each develop an industrial facility on an undeveloped parcel consistent with the vision of the Ewa Development Plan for Campbell Industrial Park and the surrounding area to continue to grow as one of the most important industrial areas in O'ahu and the State.

**Section 5 SUMMARY OF IMPACTS AND MITIGATION MEASURES**

**Table 5-1 Summary of Affected Environmental Resources, and Impact and Mitigation**

Affected Environmental Resources	Level of Concern	Impact and Mitigation
Air Quality	No	<i>Impact:</i> Fugitive dust during construction <i>Mitigation:</i> Grading Permit to include Dust Control Plan
Noise	No	<i>Impact:</i> Additional noise during construction <i>Mitigation:</i> Noise negligible during operation and consistent with surrounding during construction
Infrastructure	Low	<i>Impact:</i> Additional traffic and utility connection <i>Mitigation:</i> Marginal increase in demand on transportation, storm water, and solid waste infrastructure
Climate	No	<i>None</i>
Visual Resources	No	The area is industrial and currently has no scenic vistas or unique view planes
Hazardous Materials and Waste	Low	<i>Impact:</i> hazardous materials or wastes are discovered or released during construction or operations <i>Mitigation:</i> If discovered or released, they will be handled, removed, and disposed of in accordance with applicable state and federal laws, regulations, ordinances, and standards
Recreational Resources	No	<i>None</i>
Geology and Soils	Low	<i>Impact:</i> Soil erosion during construction <i>Mitigation:</i> Grading Permit to include Erosion Control Plan
Water Resources	Low	<i>Impact:</i> Potential stormwater runoff during construction <i>Mitigation:</i> NPDES construction permitting with best management practices
Biological Resources	Low	<i>None:</i> Area is previously disturbed with very little vegetation
Cultural Resources	Low	<i>Impact:</i> Possible discovery during construction, but not likely due to previous grading and fill <i>Mitigation:</i> Stop construction in the event of a discovery
Land Use	No	<i>None:</i> Area is within the Campbell Industrial Park, designated heavy industrial
Socioeconomic Resources	Low	<i>None</i>
Cumulative Impacts	No	<i>None</i>
Irreversible and Irretrievable Commitment of Resources	Positive	<i>Impact:</i> Non-renewable resources being consumed during construction <i>Mitigation:</i> Short term consumption, utilizes solar energy to generate electricity

**5.1 DETERMINATION OF SIGNIFICANCE**

This EA was prepared in accordance with Chapter 25, ROH. This EA demonstrates that construction and operation of the Proposed Action would not result in any significant environmental effects. Therefore, pursuant to Chapter 25, ROH, should a FONSI be determined, an EIS would not be required.

**5.2 FINDINGS AND REASONS SUPPORTING THE ANTICIPATED DETERMINATION**

The anticipated negative determination for the Proposed Action was based on review of the significance criteria specified in § 11-200-12, HAR, which states, “In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a Proposed Action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action. The Proposed Action will not have a significant effect on the environment since it does not meet any of the criteria below. In most instances, an action shall be determined to have a significant effect on the environment if it...” meets any one of the following criteria:

- **Involve an irrevocable commitment or loss of or destruction of natural or cultural resources.** The Proposed Action is not anticipated to result in an irrevocable commitment, loss or destruction of any protected natural resources. No threatened or endangered species were identified within the development area. An archaeological reconnaissance conducted for the benefit of this EA concluded that there is no evidence of cultural or historical artifacts within the area of the Proposed Action.
- **Curtail the range of beneficial uses of the environment.** The Proposed Action is not anticipated to curtail the range of beneficial uses of the environment at the Proposed Action site or surrounding area. The property has been previously graded and the land that will be used is currently vacant. Instead, the Proposed Action will contribute to a beneficial use through renewable energy and construction of something useful on property that is currently used for stockpiling.
- **Conflict with the State’s long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive order.** The purpose of HRS 344 is to establish a state policy which will encourage productive and enjoyable harmony between people and their environment. This renewable energy project will potentially reduce Hawai‘i’s reliance on fossil fuels to produce energy and reduce the amount of greenhouse gases generated from energy production.
- **Substantially affect the economic welfare, social welfare, and cultural practices of the community or State.** The Proposed Action has beneficial impacts on socioeconomics during construction related to employment opportunity and purchase of materials. During operations, the benefit to social welfare of the community and State will be realized cumulatively as other renewable energy projects are developed decreasing the State’s reliability on fossil fuels for energy production.
- **Substantially affect public health.** The Proposed Action is not anticipated to create substantial impacts to public health. The Proposed Action is not anticipated to create significant impacts to air quality or noise as it will not generate substantial pollutants or unreasonably increase ambient

noise levels. Additionally, the Proposed Action will not introduce any hazardous materials, nor will it degrade the Proposed Action site and surrounding geological resources, or impact overall water quality. The Proposed Action site is also located outside the 0.1% annual chance floodplain, and is therefore not subject to frequent flooding.

- **Involve substantial secondary impacts, such as population changes or effect public facilities.** The Proposed Action will not induce substantial secondary impacts to population counts or negatively affect existing public facilities / infrastructure. The Proposed Action will not significantly add to or use existing public facilities/infrastructure for its operation.
- **Involve a substantial degradation of environmental quality.** The Proposed Action will not substantially degrade or impact existing air quality, biological resources, visual resources, soils, or water quality. The Proposed Action will not create additional emissions that would substantially degrade air quality levels. Furthermore, it will not degrade any sensitive habitat for plant and animal species. No sensitive view-sheds have been identified in the surrounding area. Soil and water quality levels will also remain unaffected by the addition of the Proposed Action.
- **Is individually limited and cumulatively has considerable effect upon the environment, or involves a commitment for larger actions.** The Proposed Action will construct a PV Facility on property that has been previously developed. This construction will not result in substantial changes to the existing environmental conditions. Therefore the Proposed Action will not involve a commitment for larger actions.
- **Substantially affect a rare, threatened, or endangered species or its habitat.** The Proposed Action will not impact any rare, threatened or endangered natural plant community or animal species. Currently there are no rare, threatened or endangered plants or animals that live on the Proposed Action site as noted in the Biological Study in **Appendix A**.
- **Detrimentially affect air or water quality or ambient noise levels.** The Proposed Action will not detrimentally affect air, or water quality, or ambient noise levels. Though the Proposed Action will introduce noise from construction related activities, these are short term and will not significantly increase ambient noise levels. Consequently, no detrimental impacts to noise levels will occur. Likewise, the Proposed Action will comply with all State and Federal agency permitting requirements and will not degrade existing water quality levels. Air quality levels will not be degraded as the Proposed Actions will not add significant air pollutants, but may actually reduce levels.
- **Affect, or is likely to suffer damage by being located in an environmentally sensitive area such as a floodplain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.** The Proposed Action site is located in a tsunami zone, but the Proposed Action site is not in the 100-year floodplain, geologically hazardous land, or erosion-prone area and would not affect wetlands, coastal waters, or beaches. In addition, the PV panels will be designed at a height above the floodplain elevation.
- **Substantially affect a scenic vista or viewplanes identified in county or State plans or studies.** The Ewa Development Plan has identified locations of a scenic vista or viewplane (see **Figure 4-13**). The scenic vistas or viewplanes that are within the viewshed of the Proposed Action will not be affected.

- **Require substantial energy consumption.** The Proposed Action will not require substantial energy to construct or operate. While construction will cause the irreversible and irretrievable loss of resources such as electricity, gasoline, and diesel fuels, consumption of these resources will not be collectively substantial. Operation of the system will increase the amount of electricity, 500-1000 KW, going into the existing HECO power grid, thus contributing to the trend of decreasing Hawai'i's dependence on petroleum based electricity.
- Based on the analysis of the 13 significance criteria listed above, the Proposed Action is not expected to result in any significant adverse environmental impacts.

## Section 6 SPECIAL MANAGEMENT AREA PERMIT ASSESSMENT APPLICATION

This section has been included as an introduction to the next step in the SMA Permit Application process. Since DPP is no longer processing an EA and the SMA permit concurrently, this may help reduce the time necessary to process the second step, the SMA Permit.

### 6.1 SPECIAL MANAGEMENT AREA

The Proposed Action will be constructed within the SMA (see **Figure 6-1**).

### 6.2 SHORELINE SETBACK

The Proposed Action site will be 110 feet from the shoreline (see **Figure 4-14**), therefore, it is outside of the 40-foot shoreline setback area and the 55-foot waiver setback line. Therefore, the Proposed Action is in compliance with the Determination of the Shoreline Setback Line, Subpart 2 Shoreline Setbacks, Chapter 13, and Shoreline Setback Ordinance, Chapter 23, ROH.



Figure 6-1 Special Management Area Determination

### 6.3 TECHNICAL CHARACTERISTICS

#### 6.3.1 Use Characteristics

A PV facility will be used to generate electricity that will be connected into the HECO grid. The Proposed Action will provide a source of electricity that does not require the use of fossil fuels. The PV Facility is expected to operate during the hours of the year, approximately 4,380 hours annually, when the sun is bright enough. This Facility will generate approximately 500-1000 kW of electricity.



Figure 6-2 Power Converter

#### 6.3.2 Physical Characteristics

The PV Facility uses solar panels to convert sunlight into electricity. The system is made up of solar panels, converters (see **Figure 6-2**), and the interconnections and mountings for the other components.

The PV system will be connected to the existing HECO grid. **Figure 6-3** depicts the panel layout of the PV system on the Proposed Action site.

### **6.3.3 Construction Characteristics**

Construction of the solar panels will consist of the following activities:

- Demolishing existing structures within the Proposed Action site. This will be accomplished using backhoes and excavators.
- Removing stockpiles and debris from the Proposed Action site. This will be accomplished using backhoes and excavators.
- Preliminary grading and constructing foundations for the panels. This will be accomplished using backhoes and excavators.
- Final grading and stormwater control devices. This will be accomplished using backhoes and excavators.
- Installation of the solar panels and electrical connections. This will be accomplished using standard building techniques and equipment.

### **6.3.4 Utility Requirements**

The Proposed Action site currently gets water and electricity from the following:

- Water, supplied by the Honolulu BWS.
- Electricity, FIT interconnection with HECO.

### **6.3.5 Liquid Waste Disposal**

There will not be a need for liquid waste disposal, since no waste is generated.

### **6.3.6 Solid Waste Disposal**

During the construction phase, the Proposed Action will generate solid waste within the SMA. However, the Proposed Action will not generate solid waste after construction.

Prior to construction the contractor will be required to prepare the following plans and implement them during construction to mitigate potential construction impacts related to waste:

- Construction Safety and Security Plan
- Construction Health and Safety Plan
- Construction Contaminant Management Plan
- Construction Contingency Plan
- Solid Waste Management Plan

During operation of the PV Facility there will not be a need for solid waste disposal, since no waste will be generated.



REFERENCE:  
Survey prepared by Park  
Engineering  
for Chevron July, 2012

## PANEL LAYOUT

Environmental Assessment  
Chevron Hawaii PV (10 Acre Site)  
TMK: (1)9-1-031-002  
Kapolei, Oahu, Hawaii



FIGURE 6-3

**6.3.7 Access to Site**

The Proposed Action site is located at the end of Hanua Street. Currently access to the site is by a gravel driveway that is an extension of the existing roadway. Street improvements, curb, gutter and sidewalk, will be constructed to better situate and distinguish the PV Facility access driveway.

**6.3.8 Other Pertinent Information**

The Proposed Action will support the HCEI goal of having 70 percent of the State's energy come from renewable sources by 2030.

**6.4 ECONOMIC AND SOCIAL CHARACTERISTICS**

The Proposed Action will be serviced by workers from the existing refinery for activities such as cleaning and maintenance. Therefore, operation of the Proposed Action will not increase the number of workers.

The Proposed Action site is located within Campbell Industrial Park which is a large industrial area. The Proposed Action will not be located in close proximity to any residential areas.

**6.5 ENVIRONMENTAL CHARACTERISTICS****6.5.1 Soils**

The Proposed Action site is predominately designated as coral outcrop, which consists of coral or cemented calcareous sand typically covering 95 percent of the surface. The remainder is covered with a gravel access road.

**6.5.2 Topography**

The Proposed Action site topography is generally flat. Site grading will be done to level and grade the parcel to drain properly.

**6.5.3 Surface Runoff, Drainage, and Erosion Hazard**

Currently surface runoff from the Proposed Action site travels to the southwest corner where it ponds until it infiltrates into the ground. No runoff will leave the Proposed Action site nor discharge into the ocean. The flat slope of the area and the soil type contribute to a minimal erosion hazard.

**6.5.4 Federal FIRM Zone, Land Use Ordinance Flood Hazard District, Other Geological Hazards**

The FIRMs designate the Proposed Action site as a "Zone D" area. Zone D is an unstudied area where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities. The project will not cross or

be within any flood zones, and therefore is in compliance with the LUO Flood Hazard District requirements.

Therefore, the Proposed Action will be designed to meet the design standards related to natural hazards. The Proposed Action site is located within a tsunami evacuation area, and can also be susceptible to floods, hurricanes and earthquakes.

## **6.6 AFFECTED ENVIRONMENT**

As part of the SMA permit application the excerpts are followed by a brief discussion about the Proposed Action:

### **6.6.1 A Brief Description of Proposed Action Site in Relation to Surrounding Area**

Provide a brief description of Proposed Action site in relation to surrounding area and the description of surrounding area. Include considerations and information on existing lands uses; General Plan land use designations; zoning; and unique features.

The Proposed Action site is located on the south end of Campbell Industrial Park at the south end of Hanua Street. Structures within or adjacent to the Proposed Action site include the existing perimeter security fence, pipeline, boulder berm and equipment storage areas. The existing surrounding land use is zoned as I-2, Intensive Industrial. Campbell Industrial Park includes heavy and medium industrial developments and the State's only two (2) oil refineries. North and east of the property is a concrete plant. Barber's Point Deep Draft Harbor is located approximately 1.8 miles north of the Proposed Action site.

### **6.6.2 Proposed Action Site in Relation to Publicly Owned or Used Recreation Areas**

Proposed Action site in relation to publicly owned or used beaches, parks and recreation areas; rare, threatened, or endangered species and their habitats; wildlife and wildlife preserves; wetlands, lagoons, tidal lands and submerged lands; fisheries and fishing ground; other coastal/natural resources.

#### **6.6.2.1 Publicly Owned Beaches, Parks, and Recreation Areas**

The following recreational facilities are adjacent to and/or near the Proposed Action site and within the SMA: Pacific Ocean coastline and beaches (parallel to the property's south property line), Barber's Point Beach Park (0.2 mile westerly), Ko'Olina Beach Park (2 miles to the northwest), and Kalaeloa Regional Park (0.6 mile to the east). The Proposed Action will not impact any of these parks, and therefore, no adverse impact is anticipated due to the Proposed Action site being located in the SMA.

**6.6.2.2 Rare, Threatened, or Endangered Species and Their Habitats/Wildlife and Wildlife Preserves**

Coordination with governmental agencies, biological study and the literature review indicate that there are no designated critical habitats within the SMA.

*Flora*

No state or federally listed threatened, endangered, or candidate endangered plant species, or rare native Hawai‘ian plant species are located within the SMA. The majority of the Proposed Action site is devoid of vegetation with less than 5 percent of the site having vegetative cover.

*Fauna*

No state or federally listed threatened, endangered, or candidate bird, mammal, or insect species are located within the Proposed Action site. Many of the native birds of O‘ahu have been extirpated or are extinct, particularly at lower elevations.

**6.6.2.3 Fisheries and Fishing Grounds**

The Proposed Action site will not impact the use or availability of coastal or stream-based fishing grounds used because the Proposed Action site is located on Chevron property and is completely fenced off from public. The Proposed Action will not limit any access that currently has access to fishing locations.

**6.6.2.4 Other Coastal/Natural Resources**

The Proposed Action will not adversely affect the opportunities for public enjoyment and use of any recreational, coastal or natural resources within the SMA.

**6.6.3 Relation to Historic, Cultural, and Archaeological Resources****6.6.3.1 Historical**

The Historic OR & L Railway/Bikeway Corridor, which runs east-west, is approximately three (3) miles to the northeast of the Proposed Action site. Therefore, the Proposed Action will not impact the corridor and no adverse impact is anticipated due to the Proposed Action being in the SMA.

**6.6.3.2 Cultural**

Archival and ethnographic research shows that most of the traditional cultural resources within the Proposed Action site were destroyed by previous development. Therefore, the construction of the Proposed Action will not impact any cultural resources.

### **6.6.3.3 Archaeological**

An archaeological study of the Proposed Action site was completed and found that no archaeological materials were observed within the site and none are believed to be present. There is a historic archaeological district (Barber's Point Archaeological District) to the north of the Proposed Action site. Therefore, there will be no adverse impacts to these resources.

### **6.6.4 Coastal Views from Surrounding Public Viewpoints**

Coastal views from surrounding public viewpoints and from the nearest coastal highway across the site to the ocean or to coastal landform.

The Proposed Action will install PV collectors which harvest solar radiation from the sun and convert it into direct current electricity using semiconductors that exhibit the photovoltaic effect. These collectors are relatively low in height (approximately 12 to 15 feet tall), compared to the existing structures in the surrounding vicinity. The installation of these parts will not have an adverse impact on the coastal views as there are no surrounding public viewpoints. The nearest coastal highway is State Highway 95 (Kalaeola Boulevard) which runs north-south and is approximately 1.3 miles to the north of the Proposed Action property. The views from the highway will not be adversely affected because the Proposed Action site is located on the south end of Campbell Industrial Park which consists of numerous industrial structures and storage tanks that will obscure the solar panels.

### **6.6.5 Quality of Receiving Waters and Groundwater Resources**

Quality of receiving waters and groundwater (including potable water) resources. Describe effects on the groundwater recharge cycle within the groundwater control area, show existing and proposed well locations with pumping estimates. Describe effects on receiving waters—streams and ocean waters.

#### **6.6.5.1 Streams**

The Proposed Action will not cross any stream within the SMA. Therefore, there will be no adverse impacts.

#### **6.6.5.2 Marine Waters**

The Proposed Action site is adjacent to the Pacific Ocean coastline. There is a berm, approximately 5 to 7 feet in height, that was constructed between the Proposed Action site and the coastline. Therefore, there will be no adverse impacts.

#### **6.6.5.3 Flood Zones**

The Proposed Action site is in "Other Flood Areas" Zone D, as depicted in **Figure 3-2**, which is designated as "unstudied areas where flood hazards are undetermined, but

flooding is possible”. Any impacts to the floodplains caused by the Proposed Action will be mitigated through design to comply with current flood zone regulations.

#### **6.6.5.4 Groundwater**

The Proposed Action site is within the Ewa-Kunia aquifer system of the Pearl Harbor Aquifer sector. There is a deeper confined aquifer in a layer of basalt and a shallow unconfined aquifer in the overlying caprock. The groundwater in the deeper confined aquifer is brackish with a chloride content ranging from 250 to 1,000 milligrams per liter. Groundwater depth at the Proposed Action site is approximately six (6) feet below ground surface and may vary with tidal conditions.

There is a UIC line that is to the north of the Proposed Action site, as depicted in **Figure 3-12**, and the project will not have an effect on this injection line. Therefore, this project will not have adverse effects on the groundwater recharge cycle.

#### **6.6.6 Other Pertinent Information**

A Draft EA, compliant with CCH Chapter 25, has been prepared for the Proposed Action. The information herein is drawn from information used for preparation of that document, including the technical reports that include detailed information concerning the Project-specific field studies performed to support the Draft EA.

### **6.7 COASTAL ZONE IMPACTS**

The text in italics below is copied directly from HRS Section 205A-2, *Coastal Zone Management Program; Objectives and Policies*. This section helps describe the proximity to the coast and any impacts that the Proposed Action may create.

#### **6.7.1 Recreational Resources**

*Provide coastal recreational opportunities accessible to the public.*

The Proposed Action will not create any new coastal recreational opportunities for the public, and it will not adversely affect the existing coastal recreational resources or their uses by the public.

#### **6.7.2 Historical Resources**

*Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawai‘ian and American history and culture.*

Section 4.11 of this Draft EA discusses the Proposed Action’s effect on archaeological, cultural, and historic resources.

Most of the Proposed Action site was previously disturbed from activity that developed the storage structures and stockpile areas. The combination of the installation of an oil pipeline related to the refinery and decades of cultivation has significantly impacted or destroyed any surface or subsurface materials that may have existed within the Proposed Action site.

### **6.7.3 Scenic and Open Space Resources**

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

Section 4.7 of this Draft EA identifies the Proposed Action impacts and mitigation measures related to protected views. Scenic impacts associated with the Proposed Action in the SMA will not be affected as the PV units are low to the ground. The concrete plant stacks and buildings will screen the PV units from the mauka side, and the berm along the shoreline will screen the PV units from the makai side.

### **6.7.4 Coastal Ecosystems**

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

Section 4.9 of this Draft EA identifies the Proposed Action's effect on water quality, which could impact coastal ecosystems. The Proposed Action will not have an adverse impact on coastal ecosystems. There will be no direct drainage into the Pacific Ocean due to the distance between the Proposed Action site and the coast. The Proposed Action will be designed to minimize environmental impacts through the use of temporary and permanent BMPs. Stormwater will continue to be allowed to infiltrate into the ground.

### **6.7.5 Economic Uses**

*Provide public and private facilities and improvements to the State's economy in suitable locations.*

Section 4.13 of this Draft EA discusses the Proposed Action's effect on economic activity. The Proposed Action will assist the State in reaching the HCEI goal of having 70 percent of the State's energy come from renewable resources by 2030. The reduced dependence on fossil fuels for energy generation will be a benefit to Hawai'i's environment.

### **6.7.6 Coastal Hazards**

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

The Proposed Action is located within the tsunami evacuation zone, thus being exposed to an associated risk. The Proposed Action will be designed to applicable standards and specifications regarding storm weather and associated risks. Erosion is not an issue in this area due to the flat slope, as well as the soil type. Foundations for the PV units will be installed to a depth sufficient to prevent subsidence. The Proposed Action will actually reduce pollution since the PV facility will help reduce the use of fossil fuels.

### **6.7.7 Managing Development**

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

The Proposed Action will require State and City permits and approvals as described in Section 1.4.13 that include provisions for public participation and ensure protection of coastal resources. The Proposed Action is consistent with land use requirements and Campbell Industrial Park development plans.

### **6.7.8 Public Participation**

*Stimulate public awareness, education, and participation in coastal management.*

The Proposed Action involves the construction of a PV Facility, which supports the HCEI goal of having 70 percent of the State's energy come from renewable sources by 2030. The EA and SMA process keeps the public aware of new projects that are being constructed within the SMA.

### **6.7.9 Beach Participation**

*Protect beaches for public use and recreation.*

The Proposed Action site is within the Campbell Industrial Park and does not have an access point to the beach. The PV facility will not inhibit public access to the beach, therefore protecting the public use and recreation.

### **6.7.10 Marine Resources**

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

The Proposed Action site is adjacent to the coastline but will be approximately 110 feet from the shoreline. There is a relatively high berm located between the shoreline and the Proposed Action site. Therefore, the Proposed Action will indirectly promote the protection, use and development of marine and costal resources. The PV facility will not affect marine resources, therefore helping to assure their sustainability.

**6.8 SMA GUIDELINES**

The text in italics below is copied directly from ROH Chapter 25-3.2, *Review Guidelines*. This section helps describe the SMA guidelines and any impacts that the Proposed Action may create.

**6.8.1 All Development in the Special Management Area**

*Shall be subject to reasonable terms and conditions set by the council to ensure that:*

**6.8.1.1 Adequate Public Access**

*By dedication or other means, to and along the publicly owned or used beaches, recreation areas and natural reserves is provided to the extent consistent with sound conservation principle;*

The Proposed Action site, entirely on Chevron's property, is within the Campbell Industrial Park and will not encroach or prohibit public access to the beach adjacent to the property. Therefore the Proposed Action will not adversely affect access to and along publicly owned beaches, recreation areas, and natural reserves.

**6.8.1.2 Adequate and Properly Located Public Recreation Areas and Wildlife Preserves**

*Are reserved;*

The Proposed Action site is located on previously developed land which is owned by Chevron. Therefore the Proposed Action improvements will not affect the government's ability to reserve adequate and properly locate public recreation areas and wildlife preserves.

**6.8.1.3 Provisions Made for Solid and Liquid Waste Treatment, Disposal and Management**

*That will minimize adverse effects upon special management area resources; and*

The Proposed Action will only generate solid or liquid waste during construction. The existing structures (to be demolished) will constitute the primary sources of solid waste. The contractor will be required to properly contain, treat, and dispose of solid and liquid wastes during construction in accordance with Federal, State, and local regulations, thereby minimizing adverse impacts to SMA resources.

**6.8.1.4 Alterations to Existing Land Forms and Vegetation**

*Except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, wind damage, wave damage, storm surge, landslides, erosion, sea level rise, siltation or failure in the event of earthquake.*

The Proposed Action will not affect landforms or vegetation, as discussed in Section 3.5.2 nor will it have an adverse effect on water resources. However, during construction of the Proposed Action temporary BMPs for the management of stormwater will be designed, installed, and maintained to reduce the potential for impacts to water resources from erosion and other construction activities. The Proposed Action will not impact floodways, cause wind damage, wave damage, storm surges, landslides, erosion of coastal resources, sea level rise, or siltation. The Proposed Action will be designed to meet seismic standards and other natural hazards as applicable.

**6.8.2 No Development shall be Approved unless the Council has First Found that****6.8.2.1 Minimize to the Extent Practicable and Clearly Outweighed by Public Health and Safety, or Compelling Public Interest**

*The development will not have any significant adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health and safety, or compelling public interest. Such adverse effect shall include but not be limited to the potential cumulative impact of individual developments, each one of which taken in itself might not have a significant adverse effect and the elimination of planning options;*

The Proposed Action will not have any substantial individual or cumulative adverse impacts on environmental or ecological resources as discussed in Sections 3 and 4. The Proposed Action is not part of a larger development which could have added adverse effects or eliminate planning options in the future.

**6.8.2.2 Objectives and Policies Set Forth in Section 25-3.1 and Area Guidelines Contained in HRS Section 205A-26**

*The development is consistent with the objectives and policies set forth in Section 25-3.1 and area guidelines contained in HRS Section 205A-26;*

The Proposed Action conforms to County and State land use regulations. The use of the site for a PV facility will not result in adverse impacts to coastal resources or processes protected by HRS Chapter 205A-26 and the SMA Rules and Regulations.

**6.8.2.3 Consistent with the County General Plan, Development Plans, and Zoning**

*The development is consistent with the county general plan, development plans, and zoning. Such a finding of consistency does not preclude concurrent processing where a development plan amendment or zone change may also be required;*

The Proposed Action is located within the Campbell Industrial Park and is zoned Intensive Industrial. The PV facility is consistent with the current County General Plan, Ewa Development Plan, and Zoning.

**6.8.2.4 Minimize the Risk from Coastal Hazards**

*The development has been adequately planned to minimize the risk from coastal hazards such as tsunamis, hurricanes, wind, storm waves, flooding, erosion, and sea level rise and;*

The Proposed Action will be adequately planned and designed to the extent practical to minimize the risk from coastal hazards. The design of the Proposed Action will meet applicable standards and specifications regarding storm weather and construction in floodplains. Temporary and permanent BMPs will be included in the design to minimize the risk to coastal areas from erosion.

**6.8.2.5 Not Impede Public Access to the Shoreline**

*The development does not impede public access to the shoreline or beach area.*

The Proposed Action is currently being used as a stockpile site and there is a fence that surrounds the site. Since currently there is no public access to the beach, the PV facility will not impede public access to the shoreline or beach area.

**6.8.3 The Council shall Seek to Minimize, where Reasonable****6.8.3.1 Dredging, Filling, or Otherwise Altering Any Bay**

*Estuary, salt marsh, river mouth, slough, or lagoon;*

The Proposed Action site is located on developed land and will not be altering the existing conditions, with the exception of minor grading. Therefore the Project Action will not require filling, dredging, or altering any bay, estuary, salt march, river mouth, slough or lagoon.

**6.8.3.2 Reduce the Size of Any Beach or Other Area Usable for Public Recreation**

*Any development that would reduce the size of any beach or other area usable for public recreation;*

The Proposed Action site is located on Chevron's property and is not part of any beach or other area usable for public recreation. Therefore the PV facility will not reduce the size of any beach or other area usable for public recreation.

#### **6.8.3.3 Reduce or Impose Restrictions upon Public Access to Tidal and Submerged Lands**

*Any development that would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management area, and the mean high tide line where there is no beach;*

The Proposed Action site is located on Chevron's property and does not have any public access points to tidal and submerged lands, beaches, portions of rivers and streams or the mean high tide line. The Proposed Action will impose any reductions or restrictions on public access to any coastal resource in the area.

#### **6.8.3.4 Interfere with or Detract from the Line of Sight toward the Sea**

*Any development that would substantially interfere with or detract from the line of sight toward the sea from the State highway nearest the coast; and*

The Proposed Action will not have an adverse impact on the coastal views as there are no surrounding public viewpoints. The nearest coastal highway is State Highway 95 (Kalaeola Boulevard) which runs north-south and is approximately 1.3 miles north of the Proposed Action site. The views from the highway will not be adversely affected because the Proposed Action site is located behind the concrete plant which consists of numerous industrial structures and storage tanks so the Proposed Action will blend in or be hidden by these structures. The views from the sea will not be adversely affected because the Proposed Action site is located behind an existing shoreline berm.

#### **6.8.3.5 Water Quality, Existing Areas of Open Water Free of Visible Structures**

*Any development that would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agriculture uses of land.*

The Proposed Action will not have an adverse impact on the water quality in this area, nor existing and potential fishing grounds. The Proposed Action will not have an adverse effect on any wildlife habitats or potential or existing agricultural uses of land, as it will be constructed within the Campbell Industrial Park.

# **SECTION SEVEN List Of Agencies, Organizations And Individuals Consulted**

## **SECTION 7 LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED**

### **7.1 CHAPTER 25, ROH DRAFT EA DISTRIBUTION**

The agencies and organizations listed in **Table 7-1** will receive electronic copies of the Draft EA as part of the Chapter 25, review process.

**Table 7-1 List of Agencies and Organizations Receiving the Draft Environmental Assessment**

<b>AGENCY</b>	<b>COMMENTS RECEIVED</b>
<b>FEDERAL</b>	
United States Army Corps of Engineers Pacific Ocean Division, Building 230 Fort Shafter, HI 96858-5440	
United States Department of the Interior Fish and Wildlife Service Pacific Islands Fish and Wildlife Office 300 Ala Moana Blvd., Room 3-122, Box 50088 Honolulu, HI 96813	
Federal Aviation Administration Western-Pacific Region Airports Division Office 300 Ala Moana Blvd. Room 7-128 Honolulu, HI 96850-0001	
Federal Aviation Administration Southwest Regional Office Obstruction Evaluation Group 2601 Meacham Boulevard Fort Worth, TX 76137	
<b>STATE</b>	
State of Hawai'i Department of Business, Economic Development and Tourism Office of Planning P.O. Box 2359 Honolulu, HI 96804	
Hawai'i State Energy Office Department of Business, Economic Development and Tourism 235 S. Beretania, 5th Floor Honolulu, HI 96813	
State of Hawai'i Department of Health Clean Water Branch P.O. Box 3378 Honolulu, HI 96801-3378	

## **SECTION SEVEN List Of Agencies, Organizations And Individuals Consulted**

AGENCY	COMMENTS RECEIVED
<b>STATE CONTINUED</b>	
State of Hawai'i Department of Health Clean Air Branch 919 Ala Moana Blvd., Suite 203 Honolulu, HI 96814	
State of Hawai'i Department of Land and Natural Resources Historic Preservation Division Kakuhihewa Building 601 Kamokila Blvd., Room 555 Kapolei, HI 96707	
State of Hawai'i Department of Land and Natural Resources Aquatic Resources Division 1151 Punchbowl St, Room 330 Honolulu, HI 96813	
State of Hawai'i Department of Land and Natural Resources Division of Forestry and Wildlife 1151 Punchbowl St, Room 325 Honolulu, HI 96813	
State of Hawai'i Department of Land and Natural Resources Office of Conservation and Coastal Lands 1151 Punchbowl St, Room 131 Honolulu, HI 96813	
Office of Hawai'ian Affairs 711 Kapiolani Blvd., Ste. 500 Honolulu, HI 96813	
University of Hawai'i Environmental Center Krauss Annex 19 2500 Dole Street Honolulu, HI 96822	
<b>CITY &amp; COUNTY</b>	
Board of Water Supply 630 S. Beretania Street Honolulu, HI 96843	
Honolulu Fire Department 636 South Street Honolulu, HI 96813-5007	
Department of Planning and Permitting 650 S. King Street, 7th Floor Honolulu, HI 96813	
Department of Parks and Recreation 1000 Uluohia Street, Suite 309 Kapolei, HI 96707	
Department of Transportation Services 650 S. King Street, 3rd Floor Honolulu, HI 96813	

## **SECTION SEVEN List Of Agencies, Organizations And Individuals Consulted**

CITY AND COUNTY OF HONOLULU AGENCIES	COMMENTS RECEIVED
<b>CITY &amp; COUNTY CONTINUED</b>	
Neighborhood Board # 34 Neighborhood Commission Office 530 South King Street, Room 406 Honolulu, HI 96813	
Satellite City Hall #7 1000 Uluohia Street Kapolei, HI 96707	
<b>ADJACENT AND NEARBY PROPERTIES</b>	<b>COMMENTS RECEIVED</b>
Kapolei Public Library 1020 Manawai Street Kapolei, HI 96707	

### **7.2 NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 CONSULTATION**

The State Historic Preservation Division was consulted in compliance with Section 106 of the NHPA. Their concurrence letter is included in **Appendix C**.

**SECTION 8 REFERENCES**

City and County Honolulu, 1997. "Ewa Development Plan", August 1997 (Revised May 2000).

City and County Honolulu, 1992. "General Plan Objective and Policies", Amended October 3, 2002.

Cultural Surveys Hawai'i, 2012. "Draft Archaeological Assessment For a Chevron Products Company, Solar Site at James Campbell Industrial Park, Honouliuli Ahupua'a, Ewa District, Island of O'ahu, TMK: (1) 9-1-031:002 (por.)" June 2012.

FEMA. 2011. Federal Emergency Management Agency Map Service Center <http://www.fema.gov> Accessed March 7, 2012.

Foote, D. et al. 1972. Soil Survey of the Islands of Kauai, O'ahu, Maui, Molokai, and Lanai, State of Hawai'i issued August 1972.

Hawai'i State Department of Health (DOH), 2008. "Noise Reference Manual, O'ahu Edition." <http://hawaii.gov/health/environmental/noise/noisesection/noisesection/pdf/noiseO'ahu.pdf>. Accessed March 6, 2012.

Helber Hastert & Fee, Planners, Honolulu General Plan Update, "Sustainability Trend Report", February 2011.

State Department of Health, Clean Air Branch. "2010 Annual Report on Air Emissions from Facilities at Campbell Industrial Park", November 2010.

State Historic Preservation Division (SHPD). *Data Resource Internet Site*. <http://www6.hawaii.gov/dlnr/shpdgis/>. Accessed on 6, March 2012.

State of Hawai'i, Office of Environmental Quality Control (OEQC), 2004. *The Environmental Guidebook: A Guidebook for the Hawai'i State Environmental Review Process*. <http://hilo.hawaii.edu/~sdalhelp/links/EIA/HI%20State%20Environmental%20Review%20Guidebook%202004.pdf>. Accessed on March 6, 2012.

State of Hawai'i, 2011a. Administrative Rules, Chapter 200.

SWCA Environmental Consultants. "Biological Resources Survey Report" Chevron PV Project at TMK 9-1-031:002, Barber's Point, O'ahu, Hawai'i, June 2012.

<http://gen.doh.hawaii.gov/sites/har/AdmRules1/11-200.htm> , Accessed on March 6, 2012

State of Hawai'i, 2011b. Hawai'i Revised Statutes, Chapter 343. [http://luc.state.hi.us/docs/hrs\\_343.pdf](http://luc.state.hi.us/docs/hrs_343.pdf) Accessed on March 6, 2012.

United States Census Bureau. 2010. <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>  
Accessed on April 17, 2012.

United States Environmental Protection Agency (USEPA), 2011a. *Summary of the Clean Air Act*.  
<http://www.epa.gov/regulations/laws/caa.html> Accessed March 7, 2012.

USEPA. 2008. Air Data: Attainment Areas. <http://www.epa.gov/air/data/geosel.html>

USEPA. 2009. Environmental Protection Agency Envirofacts Warehouse CERCLIS.  
[http://oaspub.epa.gov/enviro/cerclis\\_web.report?pgm\\_sys\\_id=HIN000906089](http://oaspub.epa.gov/enviro/cerclis_web.report?pgm_sys_id=HIN000906089)

USEPA. 2010. National BMP Menu. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

USFWS, 2004. Critical Habitat for the Pacific Islands. <http://hawaii.gov/dbedt/gis/criticalhab.html>  
Accessed March 7, 2012.

**SECTION 9 LIST OF PREPARERS**

This report was prepared for Chevron by URS. Members of the URS professional staff are listed below.

***Project Management***

- Darla Guerrero, PE

***Quality Assurance***

- Mark Howland

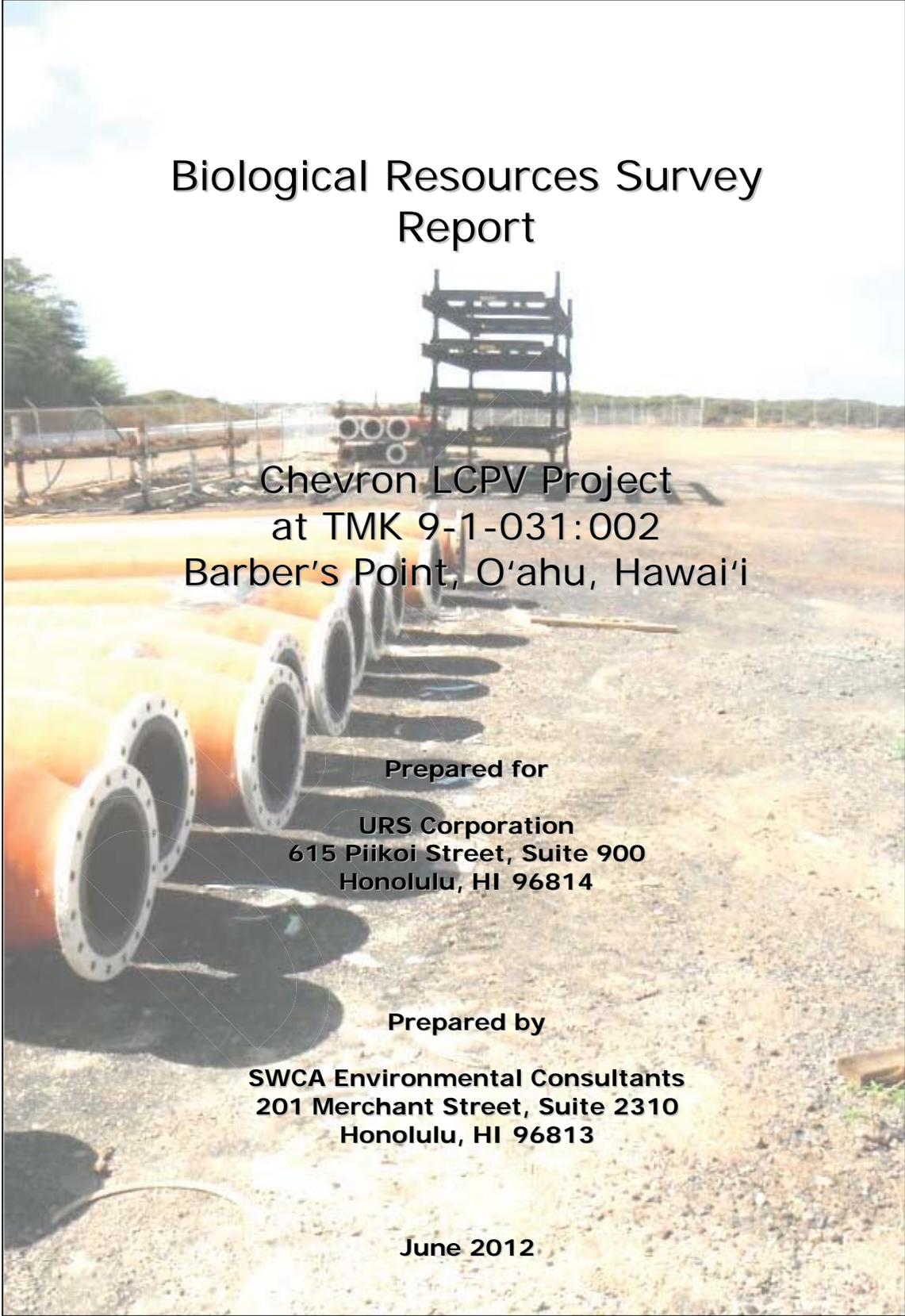
***Technical Analysts***

- Kenneth Ma, PE
- Rika Uechi

***Graphic Design***

- Lawrence Seeney
- Ryan Kondo, EIT

**APPENDIX A**  
**BIOLOGICAL RESOURCES SURVEY REPORT**  
**FOR CHEVRON PV PROJECT**



**Biological Resources Survey  
Report**

**Chevron LCPV Project  
at TMK 9-1-031:002  
Barber's Point, O'ahu, Hawai'i**

**Prepared for**

**URS Corporation  
615 Piikoi Street, Suite 900  
Honolulu, HI 96814**

**Prepared by**

**SWCA Environmental Consultants  
201 Merchant Street, Suite 2310  
Honolulu, HI 96813**

**June 2012**

*This Page Intentionally Left Blank*

**TABLE OF CONTENTS**

1.0 INTRODUCTION ..... 1

2.0 DESCRIPTION OF THE PROJECT SITE ..... 1

3.0 METHODS ..... 1

    3.1 Flora ..... 1

    3.2 Fauna ..... 1

        3.2.1 Avifauna ..... 1

        3.2.2 Other Fauna ..... 3

4.0 RESULTS ..... 4

    4.1 Flora ..... 4

    4.2 Fauna ..... 6

        4.2.1 Avifauna ..... 6

        4.2.2 Mammals ..... 6

        4.2.3 Reptiles and Amphibians ..... 6

        4.2.4 Insects and Other Invertebrates ..... 7

5.0 CONCLUSION AND RECOMMENDATIONS ..... 8

6.0 LITERATURE CITED ..... 9

APPENDIX A ..... 10

APPENDIX B ..... 15

**LIST OF FIGURES**

Figure 1: Location of the project site. .... 2

Figure 2. Western portion of the project site showing stored equipment and debris, and rubble pile in background ..... 5

Figure 3. Eastern portion of the project site showing narrow *Prosopis pallida* (kiawe) stand and large rocks ..... 5

## 1.0 INTRODUCTION

SWCA Environmental Consultants (SWCA) was tasked by URS Corporation to conduct a flora and fauna survey and prepare a biological resources report for an approximately 10 acre (4 hectare) parcel (TMK 9-1-031:002) located within Campbell Industrial Park at Barber's Point, O'ahu (henceforth referred to as the "project site"). URS Corporation proposes to construct a solar energy facility at the site for a project known as Chevron LCPV Project (URS Project # 26537586.00300). This report provides an assessment of the biological resources within the project site to support an environmental assessment (EA) for the proposed solar energy facility.

This report summarizes the findings of the flora and fauna survey conducted by SWCA biologists Jaap Eijzena and Tiffany Thair on June 1, 2012. The objectives of the flora and fauna survey were:

1. Identify and document the presence and distribution of plant species and vegetation communities within the project boundaries;
2. Identify and document the presence and relative abundance of bird, mammal, amphibian, reptile, and invertebrate macrofauna which occur within the project boundaries;
3. Identify any state or federally listed candidate, threatened, or endangered species, species of concern and/ or rare (either locally or state-wide) species found or known to occur at the project boundaries; and
4. Describe any known resource issues and conflicts unique to the project site.

## 2.0 DESCRIPTION OF THE PROJECT SITE

The approximately 10 acre (4 hectare) project site is located at Barber's Point along the western portion of the 'Ewa Plain, Island of O'ahu (Figure 1). It is located within Campbell Industrial Park, which is the largest heavy industrial area in the State (DPP 2000). The project site is bordered on the west by Hanua Street, on the south by the Pacific Ocean, and on the east and north by Ameron International Corporation's concrete facilities. Various industrial facilities occur within the vicinity of the site. The entire project site is fenced.

## 3.0 METHODS

SWCA biologists conducted a literature review of available scientific and technical literature regarding natural resources within the vicinity of the project site. On June 1, 2012, one SWCA botanist and wildlife biologist surveyed the project site. A hand-held GPS unit was employed along with a site map furnished by URS to determine the survey area. The areas within the inner fence, as well as the rock pile area on the western side of the project area were surveyed.

### 3.1 Flora

A pedestrian survey of the area was conducted on June 1, 2012. Areas more likely to support native plants (i.e., rocky outcrops, shady areas) were more intensively examined. All plant species observed within the survey area were documented and notes were made on relative abundances (e.g., abundant, common, uncommon, rare), communities, and disturbances.

### 3.2 Fauna

#### 3.2.1 Avifauna

Point count surveys were conducted on March 26, 2012. Eight minute, 60m (200 ft) radius standard point counts were conducted from four points within the project boundary. Field observations of birds were conducted using 10 x 50 binoculars with a 6.5 degree field of vision. The observer also listened for vocalizations and all birds, either heard or seen, were recorded as part of the point counts.

A SWCA biologist estimated relative species densities using 8-minute point counts conducted during peak bird activity periods (0800–1100 and 1600–1800 hours). Observations were of eight-minute duration to maximize the likelihood of detecting new species during the survey (Lynch 1995). Rare or previously unrecorded bird species seen between count stations were also noted.



Figure 1: Location of the project site.

### 3.2.2 Other Fauna

Mammals, reptiles, amphibians, and invertebrates seen or heard during the point count surveys or between count stations were also documented.

## 4.0 RESULTS

The project site is heavily disturbed due to various industrial activities. It is currently being used as a storage site. Old equipment, debris, stockpiles, pipes, and buildings occur within the western portion of the site (Figure 2). The eastern third of the site is mostly vegetated, with plants growing over piles of large rocks and boulders (Figure 3). The substrate primarily consists of gravel, or concrete. Some areas of the site (particularly the eastern portion) are coral, covered by a thin layer of sand or soil material. No permanent water features occur within the project site. The topography of the site is mostly flat, with the exception of several rubble piles, one of which is located in the south-western corner of the inner fenced area, and one large rubble pile is located along the eastern side of the parcel, outside the inner fence.

Sunny weather conditions prevailed throughout the survey. The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. It is possible that additional surveys conducted at a different time of the year would likely result in variations in the number and species of plants and animals observed.

### 4.1 Flora

No state or federally listed threatened, endangered, or candidate endangered plant species, or rare native Hawaiian plant species were observed at the project site. The project site does not contain critical habitat for threatened or endangered plants as designated by the U.S. Fish and Wildlife Service.

Fifty-five (55) plant species were recorded at the site during the survey. Of these, six species are native to the Hawaiian Islands. Only pā'ū-o-hi'iaka (*Jacquemontia ovalifolia* subsp. *sandwicensis*) is endemic, or found only in the Hawaiian Islands. The remaining five species are indigenous, or found in Hawai'i and elsewhere, and include: kīpūkai (*Heliotropium curassavicum*), naio (*Myoporum sandwicense*), hala (*Pandanus tectorius*), pōpolo (*Solanum americanum*), and 'uhaloa (*Waltheria indica*). Additionally, koali 'ai (*Ipomoea cairica*) is considered possibly indigenous, but may be an introduced species (Wagner et al. 1999). None of these species are considered rare and most are common in strand vegetation throughout the Hawaiian Islands (Wagner et al. 1999). A list of all plant species observed by SWCA biologists within the project site is included in Appendix A of this report.

The western two-thirds of the project site are largely devoid of vegetation (Figure 2). The minimal vegetation in this area is mostly comprised of ornamental landscaping, as well as non-native grasses and herbaceous plants that are common in disturbed coastal areas throughout the Hawaiian Islands. Buffelgrass (*Cenchrus ciliaris*), swollen fingergrass (*Chloris barbata*), and *Flaveria trinervia* are widely scattered throughout this area. Other non-native species found scattered sparsely throughout include golden crown-beard (*Verbesina encelioides*), tree tobacco (*Nicotiana glauca*), prickly lettuce (*Lactuca sativa*), creeping indigo (*Indigofera hendecaphylla*), and *Bidens alba* var. *radiata*. Several ornamental trees or large shrubs were planted near the buildings in this area such as monkeypod (*Samanea saman*), coconut trees (*Cocos nucifera*), hala (*Pandanus tectorius*), and kukui (*Aleurites moluccana* var. *katoī*). Besides the planted hala, the only other native plants seen in this portion of the site were kīpūkai and 'uhaloa.

A kiawe (*Prosopis pallida*) stand occurs along the eastern boundary of the project site. The area is dominated by a narrow stand of large kiawe trees, roughly 15 to 29 ft (5-6 m) tall, with Indian fleabane (*Pluchea indica*) and buffelgrass in the understory (Figure 3). Other non-native plant species scattered throughout the trees include hairy abutilon (*Abutilon grandifolium*), Chinese violet (*Asystasia gangetica*), swollen fingergrass, *Flaveria trinervia*, tree tobacco, West Indian dropseed (*Sporobolus indicus*), and golden-crown beard. Thickets of Indian fleabane are present near the coast. These shrubs were all dead, evidently due to recent application of herbicide.



**Figure 2. Western portion of the project site showing stored equipment and debris, and rubble pile in background**



**Figure 3. Eastern portion of the project site showing narrow kiawe (*Prosopis pallida*) stand and large rocks**

## 4.2 Fauna

No native state or federally listed threatened, endangered, or candidate bird, mammal, or insect species were observed during our survey. Many of the native birds of Oahu have been extirpated or are extinct, particularly at lower elevations. Extant populations continue to decline, and their range has been highly reduced. Leading causes for population declines and extinctions across the Hawaiian Islands include habitat destruction, introduced predators, and avian disease (Ralph and Van Riper 1985).

### 4.2.1 Avifauna

Only four (4) bird species were recorded during the point count survey (Appendix B). House sparrows (*Passer domesticus*) and zebra doves (*Geopelia striata*) were recorded at both point count stations, zebra doves being the more abundant of the two during the survey. These birds were mostly utilizing the fence and the kiawe trees for perching. A red-vented bulbul (*Pycnonotus cafer*) was observed during the point counts, within the kiawe stand along the eastern boundary of the parcel. Several grey francolins (*Francolinus pondicerianus*) were observed within the inner fence, as well as outside the fenced area. None of the bird species observed during the point count survey are native to the Hawaiian Islands, and all are common throughout Hawaii, particularly in disturbed and developed areas (HAS 2005).

Five additional bird species were observed at the site outside of the point counts. A spotted dove (*Spilopelia chinensis*) and Japanese white-eye (*Zosterops japonicus*) were observed in the kiawe stand. Both species are naturalized species, common throughout the Hawaiian Islands (HAS 2005). In addition domestic chickens (*Gallus gallus domesticus*) and one peafowl (*Pavo christatus*) were observed in the kiawe stand. Reportedly these birds were once pets associated with the abandoned residence at the adjacent lot.

A flock of mallards (*Anas platyrhynchos*), consisting of five (5) individuals were observed flying westward along the shoreline south of the project site. Most mallards in Hawaii are assumed to have descended from feral stock (HAS 2005), and are considered a threat to the native, endangered koloa, or Hawaiian duck (*Anas wyvilliana*), with which it hybridizes (Mitchell et al. 2005).

### 4.2.2 Mammals

The Hawaiian hoary bat (*Lasiurus cinereus semotus*) is the only native mammal species which is still extant within the Hawaiian Islands (USFWS 1998). The Hawaiian hoary bat has been recorded on Oahu as well as on Molokai, Maui, Kauai, and Hawaii, but no historical or current population estimates or information exist for this endemic subspecies. Population estimates for all islands in the state in the recent past have ranged from hundreds to a few thousand bats (Menard 2001). The Hawaiian hoary bat is believed to occur primarily below an elevation of 4,000 feet (1,220 m). Since tree removal is not expected to be necessary, impacts to this species are not anticipated; therefore, nocturnal acoustic surveys were not performed. No records of threatened or endangered species were found for the survey area. The survey area does not contain critical habitat and is not near critical habitat for any listed vertebrate or invertebrate species as designated by the U.S. Fish and Wildlife Service.

No live mammals were directly observed during the one-day field survey, but a dead mongoose (*Herpestes javanicus*) was found at the rock pile long the eastern boundary of the project site. Although not observed during the survey rats (*Rattus spp.*) and mice (*Mus musculus*) are expected to occur within the project site.

### 4.2.3 Reptiles and Amphibians

There are no native reptiles or amphibians in Hawaii (McKeown 1996). No reptiles or amphibians were observed during the survey.

#### 4.2.4 Insects and Other Invertebrates

Few common, non-native invertebrates were encountered during the survey. The most common invertebrate within the project site was the long-legged ant (*Anoplolepis gracilipes*), and some houseflies (*Musca domestica*), and Sonoran carpenter bees (*Xylocopa sonorina*) were observed as well. Garden spiders (*Argiope appensa*) were common throughout the kiawe stand along the eastern border of the project site. The project site does not contain critical habitat for threatened or endangered invertebrates as designated by the U.S. Fish and Wildlife Service.

## 5.0 CONCLUSION AND RECOMMENDATIONS

The proposed project is not expected to have a significant adverse impact on any state or federally listed candidate, threatened, or endangered species, species of concern, and/ or rare plants or animals. The entire site has been intensively disturbed and highly altered by human activity. The flora and fauna within the project site are predominantly non-native (89% and 100%, respectively). In addition, recent surveys and assessments in the Campbell Industrial Park also did not reveal the presence of listed threatened, endangered, or candidate endangered plant species, or rare native Hawaiian plant species (R.M. Towill Corporation 2009, SSFM International 2010).

The six native plant species found at the project site are not considered rare in coastal areas on O'ahu or throughout the main Hawaiian Islands. No native animals were found using the project site.

This one-time survey provides valuable insight into the natural resources on the project site. A more definitive assessment of flora and fauna would entail monitoring the property seasonally. It is not likely that any listed endangered or threatened species would occur within the project site; however, should any such species subsequently be observed there, assistance should be requested from the U.S. Fish and Wildlife Service office in Honolulu prior to any disturbance of the site.

SWCA recommends that native Hawaiian plants be employed for landscaping to the maximum extent practicable. Potential coastal native plants that may be appropriate for landscaping include: naio (*Myoporum sandwicense*), naupaka (*Scaevola taccada*), 'ilima (*Sida fallax*), 'ākulikuli (*Sesuvium portulacastrum*), 'ākia (*Wikstroemia uva-ursi*), and pōhinahina (*Vitex rotundifolia*). If native plants do not meet landscaping objectives, plants with a low risk of becoming invasive may be substituted. Additional information on selecting appropriate plants for landscaping can be obtained from the following sites:

- <http://nativeplants.hawaii.edu/>
- <http://www.botany.hawaii.edu/faculty/daehler/wra/default2.htm>
- <http://www.hear.org/alternativestoinvasives/>

To avoid potential impacts to bats, the clearing of trees above 15 feet in height should be avoided between June 1 and September 15, which is when non-volant Hawaiian hoary bat juveniles may be present within the project area. We believe that this measure, promulgated by the U.S. Fish and Wildlife Service, will be sufficient to mitigate for any potential negative impacts associated with the proposed solar energy project.

## 6.0 LITERATURE CITED

- American Ornithologists' Union (AOU). 2005. List of The 2,037 Bird Species (With Scientific and English Names) Known From The A.O.U. Checklist Area. 55 pp.
- DPP (Department of Planning and Permitting, City and County of Honolulu). 2000. Ewa Development Plan.
- Hawaii Audubon Society. 2005. *Hawaii's Birds*, 6<sup>th</sup> Edition. Honolulu, Hawaii. 141 pp.
- Lynch, J.F. 1995. Effects of point count duration, time-of-day, and aural stimuli on detectability of migratory and resident bird species in Quintana Roo, Mexico. USDA Forest Service General Technical Report PSW-GTR-149.
- McKeown, S. 1996. A field guide to reptiles and amphibians in the Hawaiian Islands. Los Osos, CA: Diamond Head Publishing.
- Menard, T. 2001. Activity Patterns of the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) in Relation to Reproductive Time Periods. Master's thesis, Univ. of Hawai'i at Mānoa.
- Mitchell, C., C. Ogura, D.W. Meadows, A. Kane, L. Strommer, S. Fretz, D. Leonard, and A. McClung. 2005. Hawaii's Comprehensive Wildlife Conservation Strategy. Department of Land and Natural Resources, Honolulu, HI.
- Ralph, C.J., and C. van Riper III. 1985. Historical and current factors affecting Hawaiian native birds. Pages 7-42 in S.A. Temple, editor. Bird Conservation. Madison, WI: University of Wisconsin Press.
- R. M. Towill Corporation. 2009. Final Environmental Assessment Kalaeloa Boulevard Improvements. Prepared for the City & County of Honolulu.
- SSFM International. 2010. Draft Environmental Assessment, Acquisition of Land for the Expansion of Kalaeloa Barbers Point Harbor, 'Ewa, O'ahu, Hawai'i. Prepared for the Hawai'i Department of Transportation, Harbors Division.
- Staples, G.W. and D.R. Herbst. 2005. Garden Flora. Plants cultivated in the Hawaiian Islands and other tropical places. Bishop Museum Press, Honolulu, HI.
- USFWS. 1998. Recovery Plan for the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). U.S. Fish and Wildlife Service, Portland, OR. 50 pp.
- Wagner, W.L. and D.R. Herbst. 1999. Supplement to the Manual of the Flowering Plants of Hawai'i, pg 1855-1918. In: Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawai'i. University of Hawai'i Press and Bishop Museum Press: Honolulu, HI.
- . 2003. Supplement to the Manual of the Flowering Plants of Hawai'i, Version 3.1 (12 Dec 2003).
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. Manual of the Flowering Plants of Hawai'i. University of Hawai'i Press and Bishop Museum Press: Honolulu, HI.
- Wagner, W.L., D.R. Herbst, N. Khan, and T. Flynn. 2012. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the *Flowering Plants of Hawai'i and Hawai'i's Ferns and Fern Allies. Version 1.3.*

**APPENDIX A  
CHECKLIST OF PLANTS OBSERVED AT 10 ACRE BARBER'S POINT PARCEL ON JUNE 1, 2012.**

The following checklist is an inventory of all the plant species observed by SWCA biologists on June 1, 2012 during the survey of the project site as designated by URS Corporation, at Barber's Point on the Island of O'ahu, Hawai'i. The plant names are arranged alphabetically by family and then by species into two groups: Monocots and Dicots. The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999), Wagner and Herbst (2003), and Staples and Herbst (2005). Recent name changes are those recorded in Wagner et al. (2012).

**Status:**

- E = endemic = native only to the Hawaiian Islands.
- I = indigenous = native to the Hawaiian Islands and elsewhere.
- P = Polynesian = introduced by Polynesians.
- X = introduced/ alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (Cook's arrival in the islands in 1778).

**Relative Site Abundance:**

- A = Abundant = forming a major part of the vegetation within the survey area.
- C = Common = widely scattered throughout the area or locally abundant within a portion of it.
- U = Uncommon = scattered sparsely throughout the area or occurring in a few small patches.
- R = Rare = only a few isolated individuals within the survey area.

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
<b><u>MONOCOT</u></b>			
<b>Agavaceae</b>			
<i>Agave</i> sp.	agave	X	R
<i>Dracaena angustifolia</i> Roxburgh	--	X	R
<b>Arecaceae</b>			
<i>Cocos nucifera</i> L.	niu, lolani, coconut	P	R

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
<i>Dypsis lutescens</i> (H. Wendland) Beentje & J. Dransfield	areca palm, butterfly palm	X	R
<b>Pandanaceae</b>			
<i>Pandanus tectorius</i> S. Parkinson ex Z	hala	I	R
<b>Poaceae</b>			
<i>Cenchrus ciliaris</i> L.	buffelgrass	X	A
<i>Chloris barbata</i> Sw.	swollen fingergrass	X	A
<i>Eragrostis amabilis</i> (L.) Wight & Arn.	--	X	R
<i>Sporobolus indicus</i> (L.) R.Br.	West Indian dropseed, smutgrass	X	U
<i>Urochloa maxima</i> (Jacq.) R.D. Webster	Guinea grass	X	R
<b><u>DICOT</u></b>			
<b>Acanthaceae</b>			
<i>Asystasia gangetica</i> (L.) T. Anderson	Chinese violet	X	U
<b>Aizoaceae</b>			
<i>Sesuvium verrucosum</i> Raf.	verrucose seapurslane, western sea purslane	X	R
<i>Trianthema portulacastrum</i> L.	--	X	R
<b>Amaranthaceae</b>			
<i>Alternanthera pungens</i> Kunth	khaki weed	X	R
<i>Amaranthus viridis</i> L.	slender amaranth, pakai	X	R
<i>Atriplex suberecta</i> Verdc.	--	X	R

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
<b>Apocynaceae</b>			
<i>Plumeria</i> sp.	plumeria	X	R
<b>Asteraceae</b>			
<i>Bidens alba</i> var. <i>radiata</i> (Sch.Bip.) Ballard ex Melchert	--	X	U
<i>Bidens pilosa</i> L.	kī, kī nehe	X	R
<i>Emilia fosbergii</i> Nicolson	pualele	X	R
<i>Flaveria trinervia</i> (Spreng.) C. Mohr	--	X	A
<i>Lactuca sativa</i> L.	prickly lettuce	X	U
<i>Pluchea carolinensis</i> (Jacq.) G. Don	sourbush	X	R
<i>Pluchea x fosbergii</i> Cooperr. & Galang	--	X	R
<i>Pluchea indica</i> (L.) Less.	Indian fleabane, Indian pluchea	X	C
<i>Sonchus oleraceus</i> L.	sow thistle, pualele	X	R
<i>Tridax procumbens</i> L.	coat buttons	X	R
<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.	golden crown-beard	X	C
<b>Boraginaceae</b>			
<i>Heliotropium curassavicum</i> L.	kīpūkai, nena, seaside heliotrope	I	U
<b>Cactaceae</b>			
<i>Opuntia ficus-indica</i> (L.) Mill.	pickly pear, pānini	X	R

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
<b>Convolvulaceae</b>			
<i>Ipomoea cairica</i> (L.) Sweet	koali 'ai, koali, ivy leaved morning glory	I?	R
<i>Ipomoea obscura</i> (L.) Ker Gawl.	--	X	R
<i>Jacquemontia ovalifolia</i> subsp. <i>sandwicensis</i> (A.Gray) K.R.Robertson	pā'ū-o-hi'iaka, kākua-ohi'iaka	E	R
<b>Euphorbiaceae</b>			
<i>Aleurites moluccana</i> (L.) Willd. var. <i>katoi</i> O. Deg., I. Deg. & B. C. Stone	kukui	P	R
<i>Euphorbia hypericifolia</i> (L.)	graceful spurge	X	R
<i>Ricinus communis</i> L.	castor bean	X	R
<b>Fabaceae</b>			
<i>Desmanthus pernambucanus</i> (L.) Thell.	slender or virgate mimosa	X	R
<i>Indigofera hendecaphylla</i> Jacq.	creeping indigo	X	U
<i>Leucaena leucocephala</i> (Lam.) de Wit	koa haole	X	U
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	kiawe, algaroba, mesquite	X	C
<i>Samanea saman</i> (Jacq.) Merr.	monkeypod, rain tree	X	R
<b>Malvaceae</b>			
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon, ma'o	X	U
<i>Malva parviflora</i> L.	cheese weed	X	R
<i>Malvastrum coromandelianum</i> subsp. <i>coromandelianum</i> (L.) Garcke	false mallow	X	R
<i>Sida acuta</i> N.L. Burm.	--	X	R

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
<i>Sida ciliaris</i> L.	--	X	R
<i>Waltheria indica</i> L.	'uhaloa	I	R
<b>Myoporaceae</b>			
<i>Myoporum sandwicense</i> A.Gray	naio	I	R
<b>Nyctaginaceae</b>			
<i>Boerhavia coccinea</i> Mill.	--	X	R
<b>Passifloraceae</b>			
<i>Passiflora foetida</i> L.	love-in-a-mist	X	R
<b>Portulacaceae</b>			
<i>Portulaca oleracea</i> L.	pigweed, 'ākulikuli kula	X	R
<b>Solanaceae</b>			
<i>Nicotiana glauca</i> R.C. Graham	tree tobacco	X	U
<i>Solanum americanum</i> Mill.	glossy nightshade, pōpolo	I?	R
<i>Solanum lycopersicum</i> var. <i>cerasiforme</i> (Dunal) D.M. Spooner, G.J. Anderson & R.K. Jansen	tomato	X	R
<b>Zygophyllaceae</b>			
<i>Tribulus terrestris</i> L.	puncture vine	X	R

**APPENDIX B  
RELATIVE ABUNDANCE OF BIRDS OBSERVED DURING POINT COUNT SURVEYS**

The following checklist is an inventory of all the bird species observed by SWCA biologists on June 1, 2012 during surveys of the survey area designated by URS on the Island of O'ahu, Hawai'i. The taxonomy and nomenclature of the avian species are in accordance with the American Ornithological Union (AOU, 2005).

**Status:**

E = endemic = native only to the Hawaiian Islands.

I = indigenous= native to the Hawaiian Islands and elsewhere.

Nat =naturalized alien = all those birds brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (Cook's arrival in the islands in 1778).

Table 1: Bird species and relative abundance at the project site.

Common Name	Scientific name	Number of detections	Number of stations occupied	Relative abundance	rank	Status
Zebra dove	<i>Geopelia striata</i>	14	2	7	1	Nat
House sparrow	<i>Passer domesticus</i>	6	2	3	2	Nat
Grey francolin	<i>Francolinus pondicerianus</i>	2	1	1	3	Nat
Red-vented bulbul	<i>Pycnonotus cafer</i>	1	1	0.5	4	Nat

Table 2: Bird species and relative abundance at each of point count stations.

Site	Common Name	Scientific name	n	Rank	Status
PC1	Zebra dove	<i>Geopelia striata</i>	11	1	Nat
	House sparrow	<i>Passer domesticus</i>	4	2	Nat
	Red-vented bulbul	<i>Pycnonotus cafer</i>	1	3	Nat
PC2	Zebra dove	<i>Geopelia striata</i>	3	1	Nat
	Grey francolin	<i>Francolinus pondicerianus</i>	2	2	Nat
	House sparrow	<i>Passer domesticus</i>	2	2	Nat

**APPENDIX B**  
**ARCHAEOLOGICAL ASSESSMENT**

---

**Draft**  
**Archaeological Assessment for a**  
**Chevron Products Company, Solar Site at**  
**James Campbell Industrial Park,**  
**Honouliuli Ahupua‘a, ‘Ewa District,**  
**Island of O‘ahu**  
**[TMK (1) 9-1-031:002 por.]**

**Prepared for**  
**URS Corporation**

**Prepared by**  
**Rosanna Runyon, B.A,**  
**Hallett H. Hammatt, Ph.D.**  
**and**  
**David W. Shideler, M.A.**

**Cultural Surveys Hawai‘i, Inc.**  
**Kailua, Hawai‘i**  
**(Job Code: HONOULIULI 67)**

**August 2012**

---

O‘ahu Office  
P.O. Box 1114  
Kailua, Hawai‘i 96734  
Ph.: (808) 262-9972  
Fax: (808) 262-4950

**[www.culturalsurveys.com](http://www.culturalsurveys.com)**

Maui Office  
1860 Main Street  
Wailuku, Hawai‘i 96793  
Ph: (808) 242-9882  
Fax: (808) 244-1994

---

## Management Summary

Reference	Archaeological Assessment for a Chevron Solar Site at James Campbell Industrial Park, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu [TMK (1) 9-1-031:002 por.] (Runyon, Hammatt and Shideler 2012)
Date	August 2012
Project Number (s)	Cultural Surveys Hawai'i, Inc. (CSH) Job Code: HONOULIULI 67
Investigation Permit Number	CSH conducted the fieldwork component of this study under state archaeological fieldwork permit No. 12-04 issued by the State Historic Preservation Division (SHPD), per Hawai'i Administrative Rules (HAR) Chapter 13-282.
Project Location	The project area is within the James Campbell Industrial Park on the coast, approximately 500 m east of the Kalaeloa (Barbers Point) Lighthouse and approximately 3 kilometers south of Kalaeloa Harbor on the southwest shoreline of O'ahu. Specifically, the subject property is located at the southern terminus of Hānu'a Street. The subject property is bound to the west by Hānu'a Street, to the north and east by land owned by Ameron International, and to the south by the Pacific Ocean. The project area is depicted on the 1998 'Ewa U.S. Geological Survey 7.5- minute topographic quadrangle map.
Project Funding and Land Jurisdiction	Private; Chevron USA Inc.
Agencies	State Historic Preservation Division / Department of Land and Natural Resources (SHPD/DLNR)
Project Description and Related Ground Disturbance	The proposed project includes the installation of solar panels and related infrastructure. Relatively modest ground disturbance is indicated for the anchoring of solar panel arrays and connecting cables.
Project Acreage and Area of Potential Effect (APE)	The parcel, TMK: [1] 9-1-031:002, is approximately 10 acres in size. However, for the purposes of this project the APE is understood to be an approximately 5-acre project area (an eastern strip of the parcel will not be part of the solar project). The project area's surrounding environment is industrial and the proposed development poses no additional auditory, visual, or other environmental impacts to any surrounding known or potential historic properties.

Historic Preservation Regulatory Context	<p>This revised Archaeological Assessment addresses comments made in a Chapter 6E-42 review (August 2, 2012 (Log No 2012.1675, Doc No. 1207SL13) of an earlier draft.</p> <p>The proposed project is subject to historic preservation review under Hawai'i Revised Statutes (HRS) Chapter 6E-42 and Hawai'i Administrative Rules (HAR) Chapter 13-13-284. Because no new sites were identified or designated this study is termed an Archaeological Assessment as per HAR 13-284-5. The present archaeological assessment report was prepared per the requirements of Hawai'i Administrative Rules HAR 13-276-5 and is intended for review and approval by the SHPD.</p>
Fieldwork Effort	<p>Fieldwork was conducted on May 15 and May 24 2012 by two CSH archaeologists, David Shideler, M.A. and Rosanna Runyon, B.A. Fieldwork required approximately 1 person day to complete. All fieldwork was done under the general supervision of Hallett H. Hammatt, Ph.D. (principle investigator).</p>
Potential Historic Properties Affected by Project	<p>No historic properties were observed. Due to extensive prior grading and the development and modern commercial use of the project area as a base yard, it is unlikely undisturbed subsurface deposits will be affected by the proposed development.</p>
Recommendations	<p>No further archaeological study is recommended. However, if any sinkholes, cultural deposits, or burials are identified, all work will be stopped and SHPD will be notified and consulted on the development of an appropriate mitigation strategy. It is recommended that this caveat be written into the scope of project plans.</p> <p>Any inadvertent discovery of human skeletal remains will be dealt with according to HAR 13-300-40.</p> <p>The SHPD has pointed out that an Archaeological Inventory Survey will be required prior to any ground disturbing activities in the 5-acre section of the property outside the APE.</p>

# Table of Contents

<b>Management Summary .....</b>	<b>i</b>
<b>Section 1 Introduction .....</b>	<b>1</b>
1.1 Project Background .....	1
1.2 Environmental Setting .....	1
1.2.1 Natural Environment.....	1
1.2.2 Built Environment .....	6
<b>Section 2 Methods .....</b>	<b>7</b>
2.1 Field Methods .....	7
2.2 Laboratory Methods.....	7
2.3 Document Review .....	7
<b>Section 3 Background Research .....</b>	<b>8</b>
3.1 Traditional and Historical Background.....	8
3.1.1 Mythological and Traditional Accounts and Early Historic Period.....	8
3.1.2 Mid- to late-1800s.....	10
3.1.3 History of Shipwrecks and the Barbers Point Light House .....	11
3.1.4 1900s.....	11
3.1.5 Coastal Defenses at Battery Barbers Point (1937 to 1942).....	12
<b>Section 4 Review of Past Archaeological / Paleontological Studies in Honouliuli</b>	
<b>Ahupua‘a .....</b>	<b>18</b>
4.1 Overview of Archaeological Studies in Western Honouliuli.....	18
4.2 Background Summary and Predictive Model.....	29
<b>Section 5 Results of Fieldwork.....</b>	<b>31</b>
<b>Section 6 Summary and Recommendations .....</b>	<b>39</b>
6.1 Summary.....	39
6.2 Recommendations.....	39
<b>Section 7 References Cited .....</b>	<b>40</b>

## List of Figures

Figure 1. Portion of the 1998 U.S. Geological Survey (USGS) 7.5-minute series topographic map, ‘Ewa quadrangle, showing the Chevron property and proposed project area [Note: Barbers Point Beach Park is just west (outside) of the project area] .....	2
Figure 2. Portion of Tax Map Key (TMK) plat (1) 9-1-031 showing the Chevron property and solar project area .....	3
Figure 3. Aerial view of Chevron property and solar project area (U.S. Geological Survey 2005 Orthoimagery).....	4
Figure 4. Portion of the 1998 Ewa U.S. Geological Survey 7.5-minute series topographic quadrangle map with soil survey overlay, showing project area soils (Foote et al. 1972) ..	5
Figure 5. Map showing the location of Honouliuli Ahupua‘a in west O‘ahu (adapted from Sterling and Summers 1978).....	9
Figure 6. 1919 Fire Control map showing the location of the project area; note the unimproved road to the north and west.....	13
Figure 7. 1936 War Department Barbers Point quadrangle map, showing the project area; note the change in road alignments.....	14
Figure 8. 1943 War Department Barbers Point quadrangle map, showing the location of the project area.....	15
Figure 9. 1953 Army Map Service ‘Ewa quadrangle showing the location of the project area....	16
Figure 10. 1977 aerial photograph showing the location of the project area; notice the Chevron oil refinery just north of the project area .....	17
Figure 11. Portion of the 1998 ‘Ewa U.S. Geological Survey 7.5-minute series topographic quadrangle map, showing locations of archaeological studies in the vicinity of the project area.....	23
Figure 12. Track log of one of two archaeologists conducting the field inspection on an aerial photograph showing the project area .....	32
Figure 13. General view of project area from <i>makai</i> or south (outside of <i>makai</i> fence line of project area) view to north.....	33
Figure 14. General view of coastline of raised reef limestone south of project area ( <i>makai</i> fence line of project area at center/right), view to west.....	33
Figure 15. General view of central portion of project area, view to east.....	34
Figure 16. General view of east side of project area, view to south.....	34
Figure 17. General view of west side of project area, view to south.....	35
Figure 18. View of fence line marking east side of project area in relationship to large linear mound on east side of parcel but outside of project area.....	35
Figure 19. Slight depression possibly a vagary of grading or indicating location of a small pit cave (to the right of the clip board included for scale) .....	36
Figure 20. General view of (the larger of two) raised reef limestone rubble mounds in southwest corner of project area, view to southwest .....	36
Figure 21. Older slabs in southern west side of project area, view to northeast.....	37
Figure 22. Earthen linear mound in northeast side of project area, view to northeast.....	37

## List of Tables

Table 1. Archaeological and Related Studies in Western Honouliuli Ahupua‘a.....19

## Section 1 Introduction

---

### 1.1 Project Background

At the request of URS Corporation, Cultural Surveys Hawai'i, Inc. prepared this archaeological assessment study (Runyon, Hammatt and Shideler 2012) in support of 10-Acre, Chevron Products Company, Solar Site at James Campbell Industrial Park, 91-39 Hānu'a Street, Kapolei, Honouliuli Ahupua'a, 'Ewa District, O'ahu TMK: [1] 9-1-031:002. The project area is on private land owned by Chevron USA Inc.

The project area is within the James Campbell Industrial Park on the coast, approximately 500 m east of the Kalaeloa (Barbers Point) Lighthouse and approximately 3 kilometers south of Kalaeloa Harbor on the southwest shoreline, Honouliuli Ahupua'a, District of 'Ewa, Island of O'ahu, TMK: [1] 9-1-031:002 (Figure 1 through Figure 3). Specifically, the subject property is located at the southern terminus of Hānu'a Street. The subject property is bound to the west by Hānu'a Street, to the north and east by land owned by Ameron International, and to the south by the Pacific Ocean.

The parcel, TMK: [1] 9-1-031:002, is approximately 10 acres in size. However, for the purposes of this project the APE is understood to be an approximately 5-acre project area. The project area's surrounding environment is industrial and the proposed development poses no additional auditory, visual, or other environmental impacts to any surrounding known or potential historic properties.

The proposed project is subject to historic preservation review under Hawai'i Revised Statutes (HRS) Chapter 6E-42 and Hawai'i Administrative Rules (HAR) Chapter 13-13-284. Because no new sites were identified or designated this study is termed an Archaeological Assessment as per HAR 13-284-5. The present archaeological assessment report was prepared per the requirements of Hawai'i Administrative Rules HAR 13-276-5 and is intended for review and approval by the SHPD.

### 1.2 Environmental Setting

#### 1.2.1 Natural Environment

The project area is located on the coastal 'Ewa plain, south of the Wai'anāe Mountain Range in the southwest corner of O'ahu. The terrain is limestone and alluvial deposits, overlying flows of the Wai'anāe volcanic series (Macdonald et al. 1983:423). Lying in the lee of the Wai'anāe mountain range, the project area is one of the driest areas of O'ahu with most of the area averaging about 18 inches of rainfall annually (Juvik and Juvik 1998:56). In pre-contact Hawai'i the project vicinity would have been mostly lowland coastal dry shrub and grassland.

Based on U.S. Geological Survey soil survey data, the project area is almost entirely within the limits of coral outcrop (CR) with the exception of a thin band of beach sand (BS) in the *makai* (seaward) most portion (Foote et al. 1972) (Figure 4). This beach sand was not observed during the fieldwork and is believed to have been graded off decades ago.

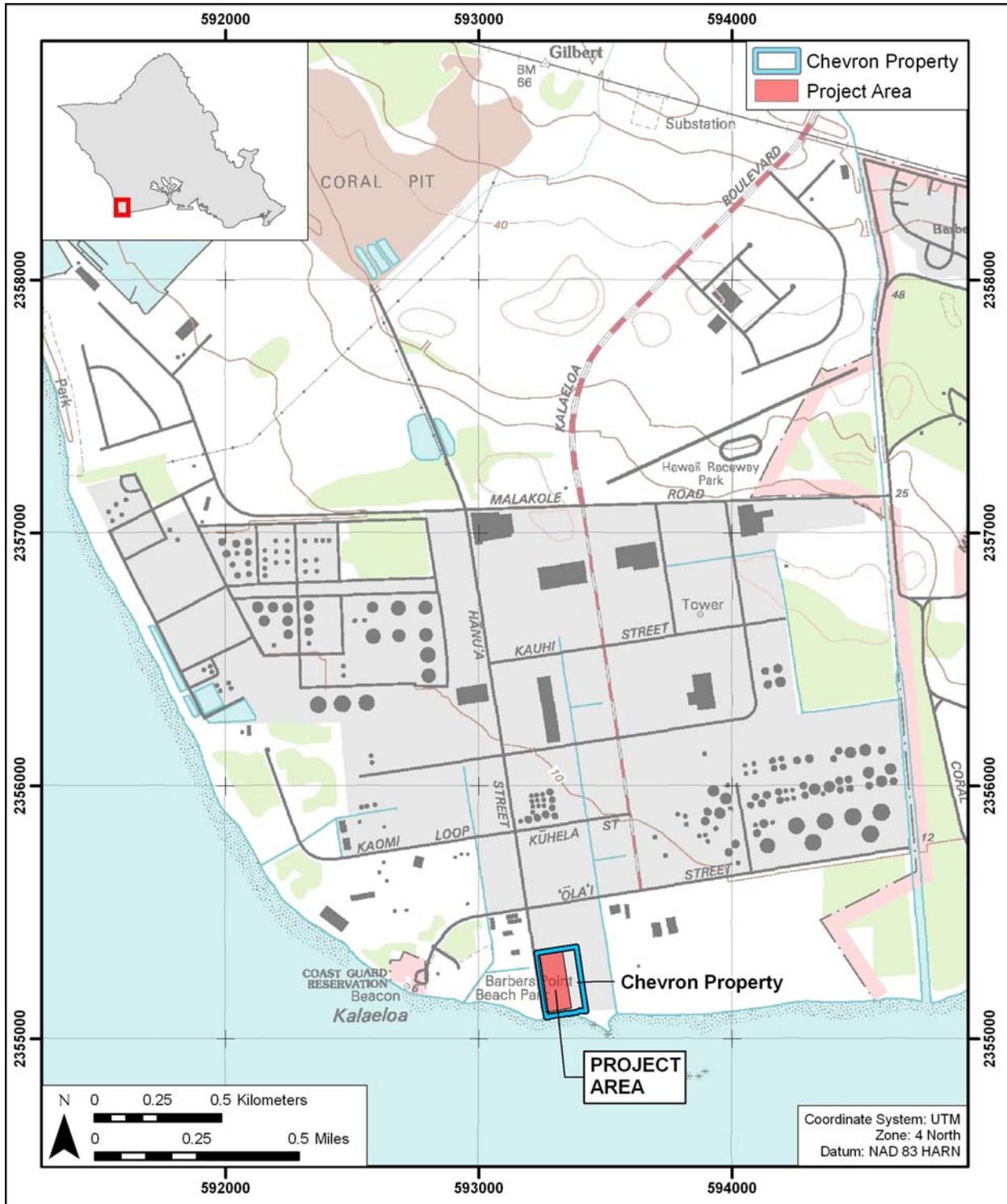


Figure 1. Portion of the 1998 U.S. Geological Survey (USGS) 7.5-minute series topographic map, 'Ewa quadrangle, showing the Chevron property and proposed project area [Note: Barbers Point Beach Park is just west (outside) of the project area]

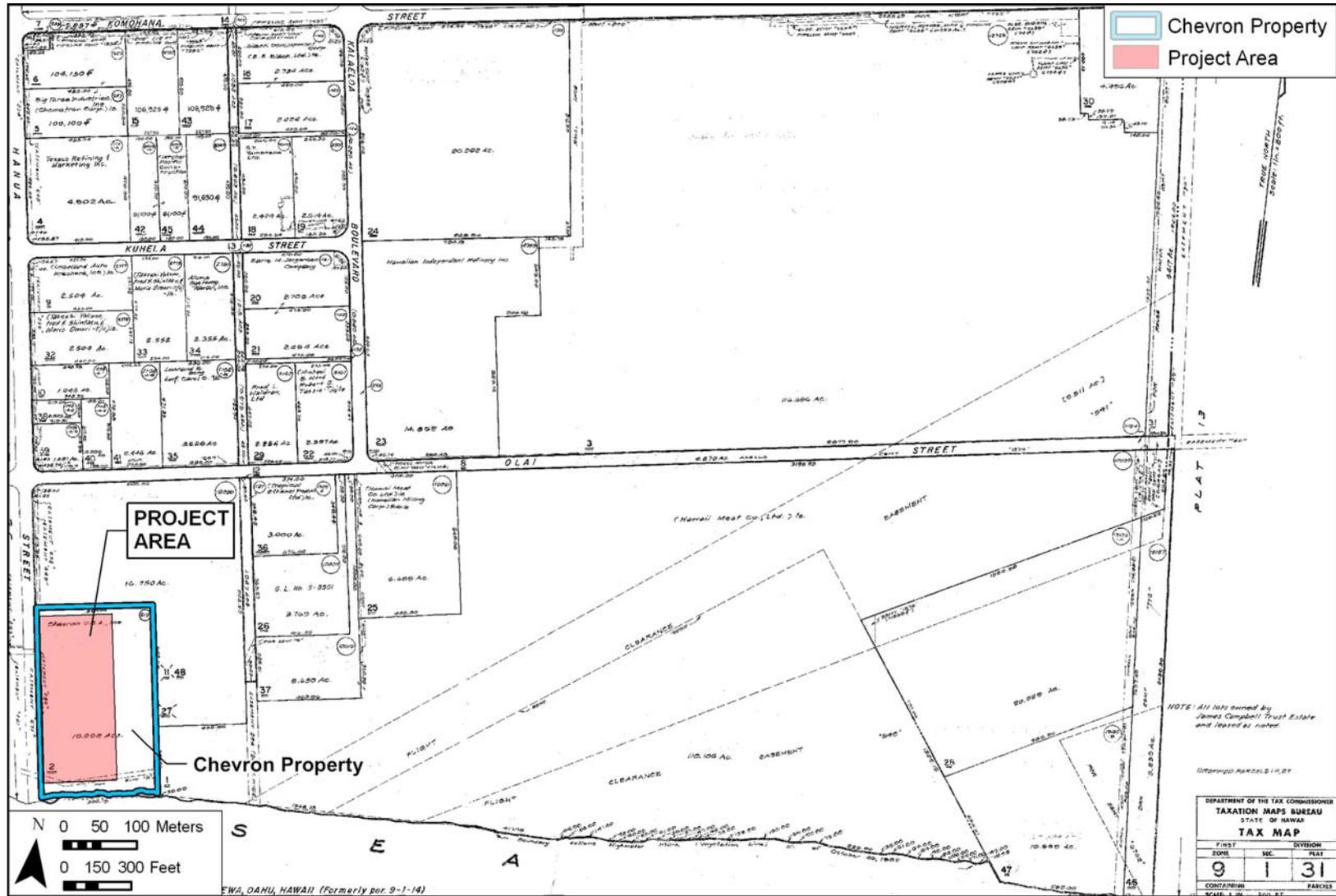


Figure 2. Portion of Tax Map Key (TMK) plat (1) 9-1-031 showing the Chevron property and solar project area

Archaeological Assessment for a Chevron Solar Site at Campbell Industrial Park, Honouliuli, O'ahu

TMK (1) 9-1-031:002 por.



Figure 3. Aerial view of Chevron property and solar project area (U.S. Geological Survey 2005 Orthoimagery)



Figure 4. Portion of the 1998 Ewa U.S. Geological Survey 7.5-minute series topographic quadrangle map with soil survey overlay, showing project area soils (Foote et al. 1972)

The surface of the Pleistocene limestone outcrop in this general vicinity, where not covered by beach sand, alluvium, or stockpiled material, often has characteristic dissolution “pit caves” (Myroie and Carew 1995), which are nearly universally, but erroneously, referred to as “sink holes” (Halliday 2005). In this study we will refer to these pit caves by their popular English name “sinkholes”. The pit caves, or sinkholes, in the vicinity vary widely in areal extent and depth, with some of the more modest features comparable in volume to five-gallon buckets, while some of the larger features, although usually irregularly shaped, are two or more meters wide and two or more meters deep.

### **1.2.2 Built Environment**

The subject property within the James Campbell Industrial Park is being utilized for industrial use by Chevron USA Inc. A large portion of the project is a gravel paved open stockyard with several modern covered sheds and materials are located. The project area and vicinity have been drastically altered by historic and modern land use including grading and importation of fill materials. It is assumed that much of this land alteration was associated with the establishment of the Barbers Point Military Reservation, established in 1921 and particularly utilized between 1937 and 1942.

Immediately to the west is the Kalaeloa City & County Beach Park (also called Barbers Point Beach Park), which includes a comfort station, picnic area, and parking stalls. Clark (1977:76) comments: “...the beach park is relatively unknown...the beach is very poor, nothing more than a rough limestone shelf at the shoreline, with a narrow strip of rough coarse sand and gravel behind it.”

The major construction in the vicinity is the Barbers Point Lighthouse just west of the present study area. The first lighthouse was built in 1888 and the present structure was built in 1933. In addition, the deep-draft barge harbor is located approximately 3 kilometers to the north of the project area, along the coast. The harbor began as a small L-shaped excavation in 1960 and has since been expanded considerably.

---

## Section 2 Methods

---

### 2.1 Field Methods

Fieldwork was conducted on May 15, 2012 by two CSH archaeologists, David Shideler, M.A. and Rosanna Runyon, B.A. Fieldwork required approximately 3 person-hours to complete. All fieldwork was done under the general supervision of Hallett H. Hammatt, Ph.D. (principle investigator). CSH conducted the fieldwork component of this study under state archaeological fieldwork permit No. 12-04 issued by the State Historic Preservation Division (SHPD), per Hawai'i Administrative Rules (HAR) Chapter 13-282.

Standard archaeological survey methods were utilized. Archaeologists walked transects, spaced approximately 5 meters apart from each other, through accessible portions of the project area. One hand-held Garmin GPS unit was used to record survey transects. Representative photographs were taken of the project area.

### 2.2 Laboratory Methods

No significant cultural materials were observed or collected, therefore no laboratory analysis was required for this project.

### 2.3 Document Review

Background research included a review of previous archaeological studies on file at the State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources (DNLR). Archaeological reports, historic maps and photographs contained within the CSH library were also consulted. In addition, Māhele records were examined from the Waihona' Aina (<http://www.waihona.com>) database.

## Section 3 Background Research

---

### 3.1 Traditional and Historical Background

#### 3.1.1 Mythological and Traditional Accounts and Early Historic Period

Various legends and early historical accounts indicate that the *ahupua'a* (traditional land division) of Honouliuli (Figure 5) was once heavily populated by pre-contact Hawaiians. Substantial settlement is attributable for the most part to the plentiful marine and estuarine resources available at the coast, as well as lowlands fronting the west loch of Pearl Harbor (Kaihuopala'ai) suitable for wetland taro cultivation. In addition, forest resources along the slopes of the Wai'anae Range, as suggested by E.S. and E.G. Handy (1972), probably acted as a viable subsistence alternative during times of famine and/or low rainfall.

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

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

The Hawaiian *ali'i* were also attracted to this region. One historical account of particular interest refers to an *ali'i* residing in Ko'olina, approximately 4 kilometers northwest of the project area:

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

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

Barber's Point is named after Captain Henry Barber, whose ship ran aground in 1796. Subsequent to western contact in the area, the landscape of the 'Ewa plains and Wai'anae slopes was adversely affected by the over-harvesting of the sandalwood forest, and particularly by the introduction of domesticated animals and exotic plant species. Domesticated animals including

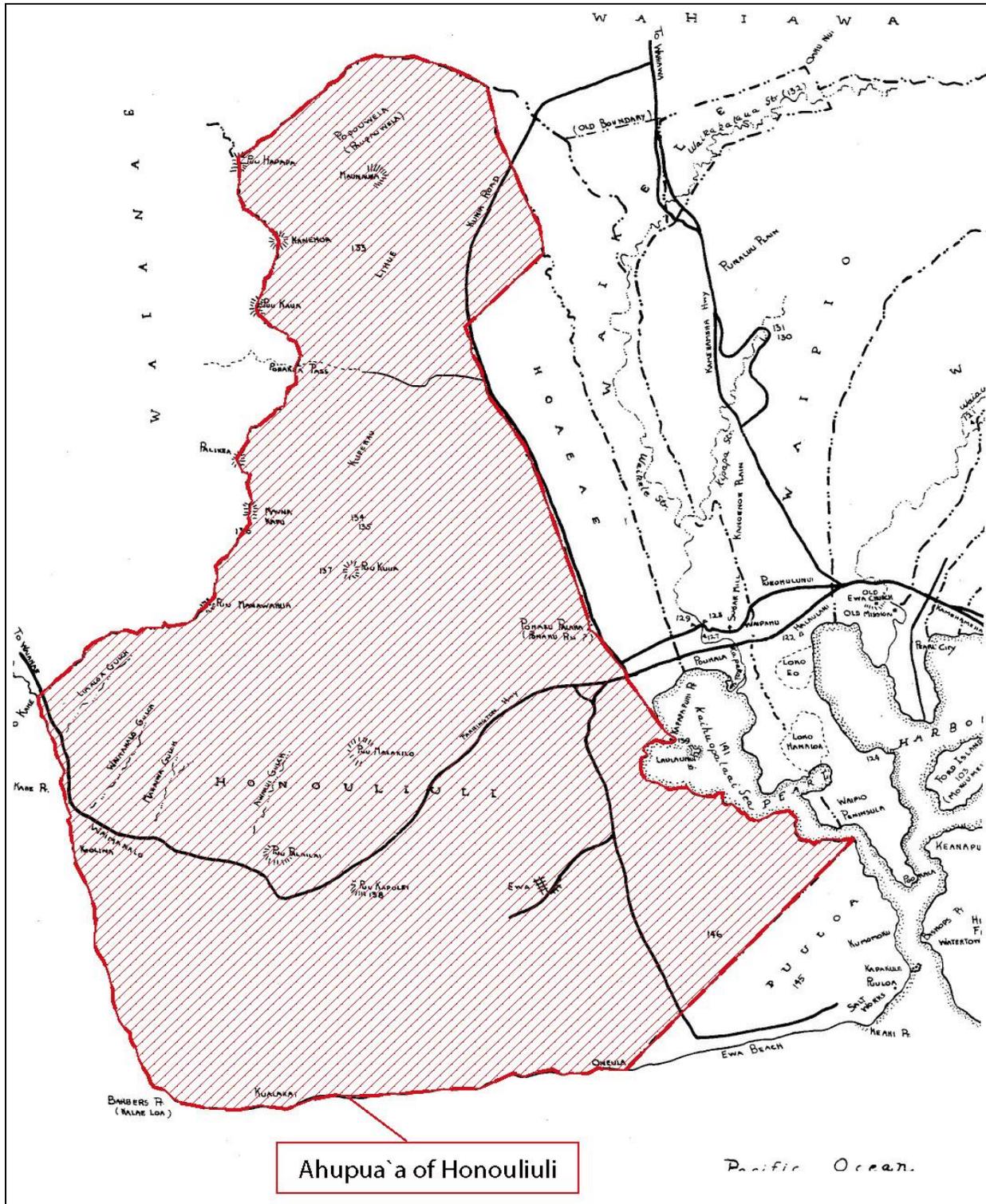


Figure 5. Map showing the location of Honouliuli Ahupua'a in west O'ahu (adapted from Sterling and Summers 1978)

goats, sheep and cattle were brought to the Hawaiian Islands by Captain George Vancouver in the early 1790s, and were allowed to graze freely about the land for some time after. L.A. Henke reports the existence of a longhorn cattle ranch in Wai'anae by circa 1840 (in Frierson 1972:10).

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

“early”, c. 1790: Prickly pear cactus (*Opuntia tuna*); *Haole koa* (*Leucaena glauca*); Guava (*Psidium guajava*)

1835-1840: Burmuda [sic] grass (*Cynodon dactylon*); Wire grass (*Eleusine indica*)

1858: Lantana (*Lantana camara*)

The *kiawe* tree was also introduced during this period, either in 1828 or 1837 [Frierson 1972:11].

### 3.1.2 Mid- to late-1800s

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

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

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

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

Ewa Plantation Co. grew quickly and continued in full operation up into modern times. As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Co. installed ditches running from the lower slopes of the mountain range to the

lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

### 3.1.3 History of Shipwrecks and the Barbers Point Light House

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

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

To address continuing navigation concerns a new 72-foot high tower (still extant) was built in 1933 adjacent to the old 40-foot tower and the old tower was toppled. The tower was automated in 1964 ending 76 years of lighthouse keeping.

### 3.1.4 1900s

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

The development of a better road system and more cars on the island began to cut into passenger totals on the O.R. & L. According to the National Register of Historic Places Inventory forms on file at SHPD/DLNR, on December 12, 1947, all operations outside of Honolulu ceased. In 1950, the U.S. Navy purchased the track and right-of-way from Pearl Harbor to the Naval Ammunition Depot (NAD) access road in Nānākuli for \$1.00 in the name of "National Defense". The NAD maintained this 25.5-mile stretch of track until the early 1950s

when a 6.5-mile stretch from Pearl Harbor to Waipahu was ceded to the state of Hawai'i. A further 6 miles was reverted to the state in 1954 after a heavy flood. The final 13-mile stretch was in use until 1968 and was ceded to the state in 1980.

The 1919 Fire Control Map (Figure 6) shows a road and architectural features in the vicinity of the present project area. The road is understood to be an unimproved loop access road extending from Gilbert Station (approximately 4 km north of the present project area) down to Barbers Point and looping back to the OR&L alignment. Similar features also appear in later maps however, by the late 1920s the loop road has been extended along the coast, passing along the east side of the project area and seemingly running through the southern or *makai* portion of the present project area (Figure 7). The maps also show the tank and pipeline installed in the 1920s to provide water to the lighthouse compound. The pipeline is shown crossing through the southern portion of the present study area. A 1943 war department map shows the same features and new unimproved roads in the vicinity (Figure 8). An improved road to the north of the project area, labeled as "213", corresponds to the modern Ōla'i Street, and was used to service the Barbers Point lighthouse (and the Barbers Point Military Reservation, which is not shown). The 1943 War Department map does not show the new Barbers Point Military Reservation infrastructure but it is perhaps not surprising that during time of war new military bases would not be shown on maps available for widespread distribution.

### **3.1.5 Coastal Defenses at Battery Barbers Point (1937 to 1942)**

It is our understanding that the Barbers Point Military Reservation was established in 1921. Between 1937 and 1942, two sets of two "Panama Mount" 155 mm guns were stationed on the point (CDSG 2012). The Panama mount included a concrete pedestal at the center of a circular, semi-circular, or three-quarters circular rail that allowed the 155 mm gun to traverse a full 360 degrees. The model M1917A1 gun used in many Coast Artillery Panama mount installations was about 19 feet long, weighed about 8,700 pounds and could fire a projectile up to about 19,000 yards (approximately 10 miles). Batteries of up to four guns on Panama mounts (as at Barbers Point Military Reservation) often served as temporary defenses while nearby permanent batteries awaited construction. One set of two Panama Mounts has been documented within an archaeological study for the Kapolei Corporation Yard, approximately 300 m to the west of the present project area (Hammatt and Shideler 2007).

The 1953 USGS map (Figure 9) shows very little post-war development in the vicinity other than the re-location of a U.S. Coast and Geodetic Survey (USC&GS) Observatory, less than a kilometer to the northeast of the current project area, and the erection of a Civil Aviation Authority (CAA) marker less than 200 m north of the project area. A 1977 aerial photograph (Figure 10) reflects the boom that accompanied statehood, with the establishment of a major cement plant and Chevron oil refinery.

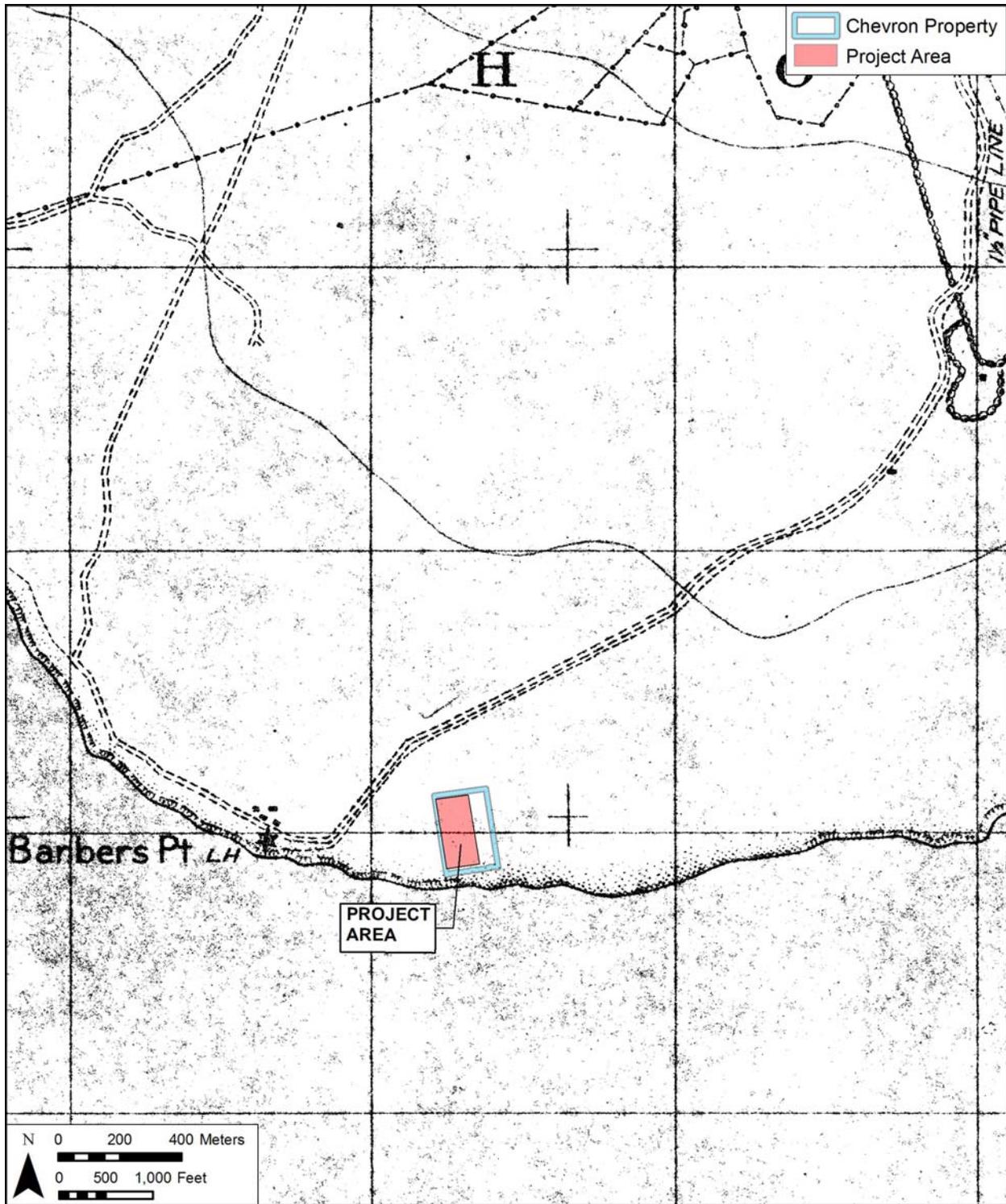


Figure 6. 1919 Fire Control map showing the location of the project area; note the unimproved road to the north and west

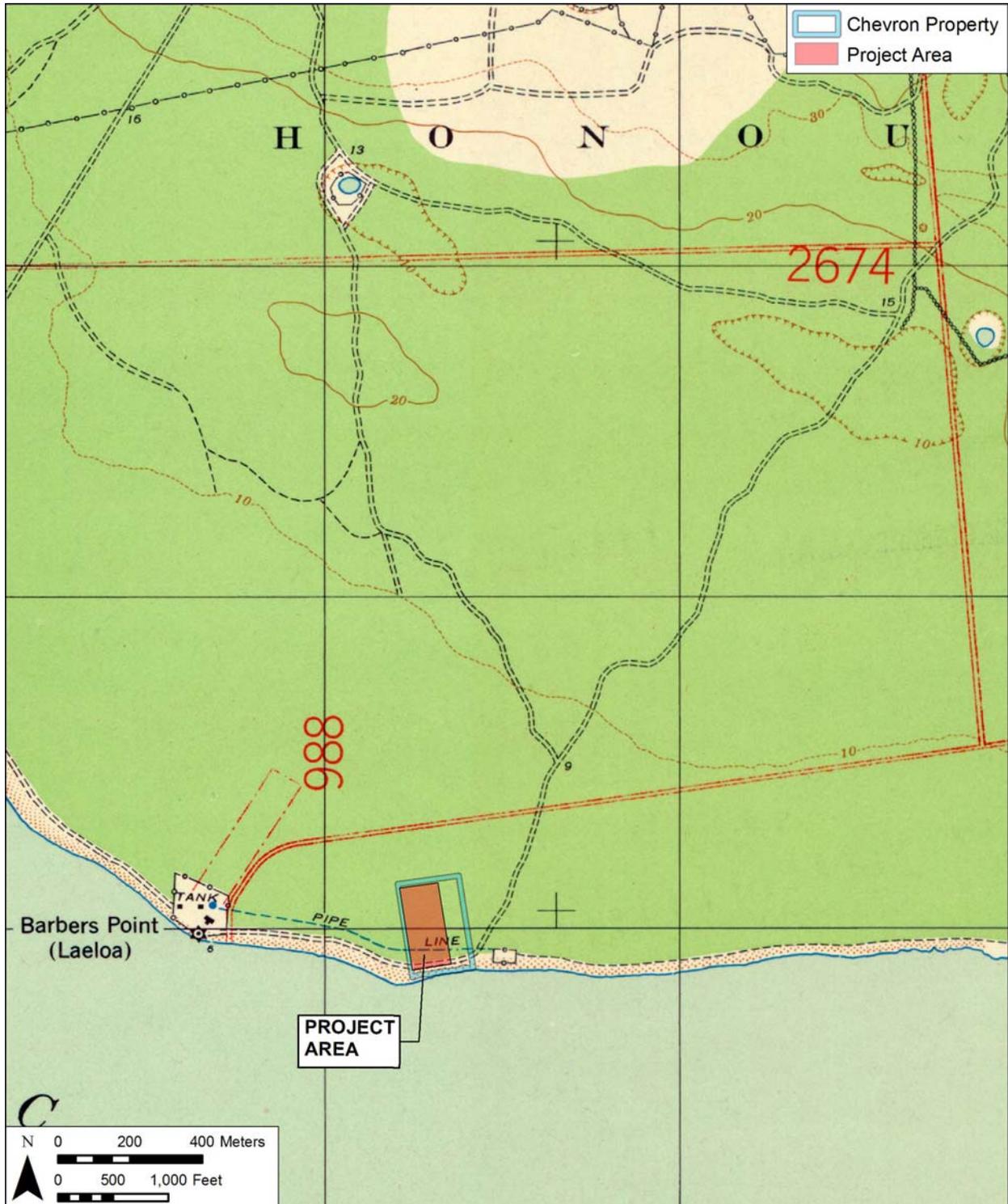


Figure 7. 1936 War Department Barbers Point quadrangle map, showing the project area; note the change in road alignments



Figure 8. 1943 War Department Barbers Point quadrangle map, showing the location of the project area

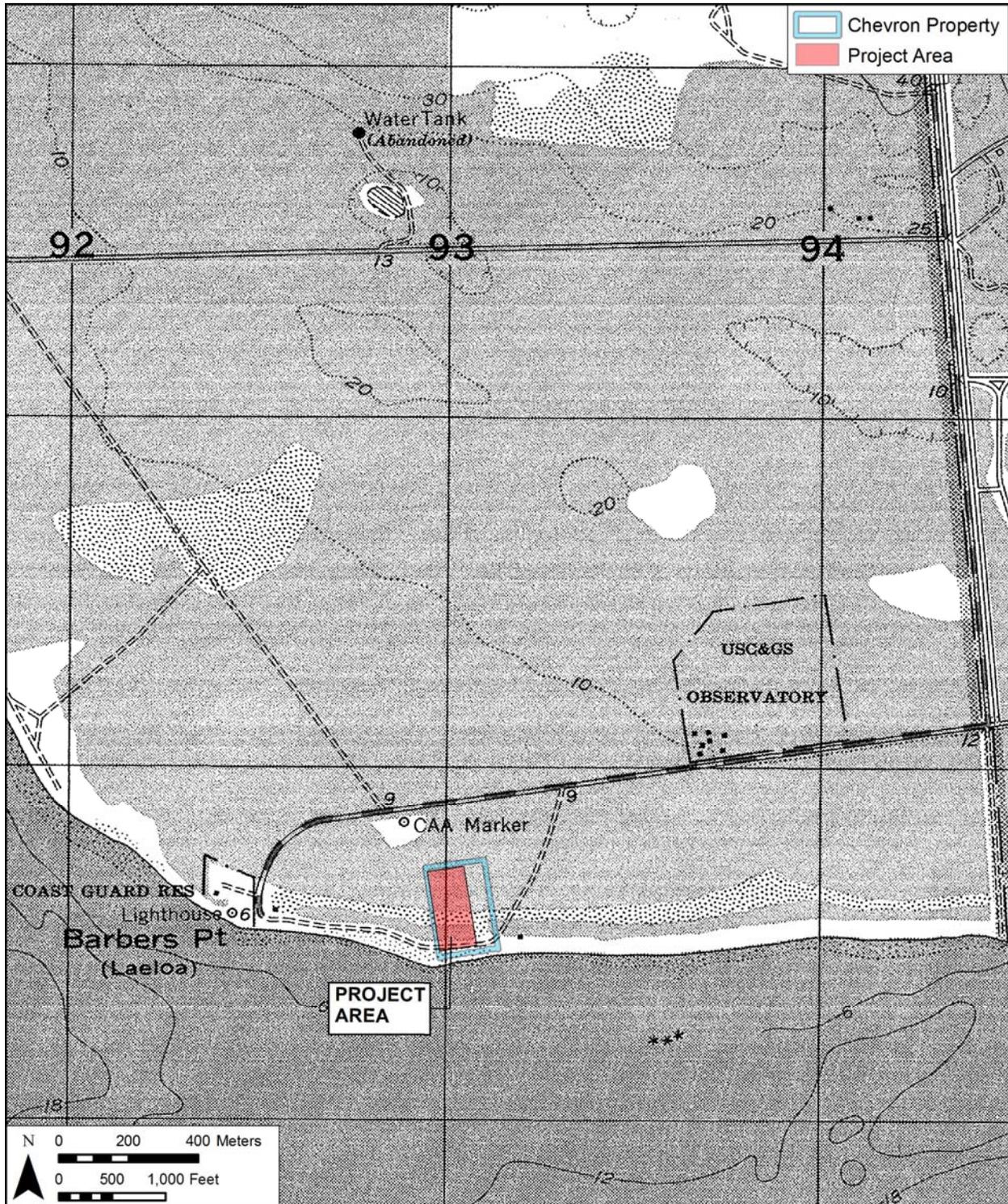


Figure 9. 1953 Army Map Service 'Ewa quadrangle showing the location of the project area



Figure 10. 1977 aerial photograph showing the location of the project area; notice the Chevron oil refinery just north of the project area

## Section 4 Review of Past Archaeological / Paleontological Studies in Honouliuli Ahupua'a

---

### 4.1 Overview of Archaeological Studies in Western Honouliuli

An overview of archaeological studies in the west half of Honouliuli Ahupua'a is presented in Table 1. The locations of archaeological studies in the vicinity of the current project area are shown in Figure 11, and a discussion of archaeological findings follows.

The first effort to record archaeological sites in Honouliuli was by Thrum (1907:46), who references "a *heiau* on Kapolei hill, 'Ewa - size and class unknown. Its walls thrown down for fencing." The former *heiau* was on Pu'u Kapolei.

In his 1930 surface survey of the island of O'ahu, archaeologist J. Gilbert McAllister recorded the specific locations of important archaeological and cultural sites, and the general locations of some sites of lesser importance. McAllister (1933:107-108) recorded seven specific sites at Honouliuli (numbered 133-139) and these became the first seven sites in the Bishop Museum's Site Numbering System (OA-B6-1 through OA-B6-7). McAllister's Site 138, includes the Pu'u Kapolei *heiau* and an adjacent rock shelter, approximately 5 kilometers to the northwest of the project area. McAllister (1933) designated Site 146 to include archaeological features covering a large but poorly defined area along the Honouliuli coast. His description of Site 146 is as follows:

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

These archaeological sites of the 'Ewa coral plains would be the subject of some 50 or so archaeological reports in the 1970s and 1980s with approximately a hundred studies to date.

From the period between McAllister's 1930 study and the flurry of work that began in 1969, there are only a few sporadic pieces of poorly documented research. "In 1933, Dr. Kenneth P. Emory examined a well-preserved house site and a possible *heiau* in the western part of the coral plain; these sites were later destroyed by sugar-cane planting" (Sinoto 1976:1). In 1959, William Kikuchi removed a number of burials from a burial cave site (Bishop Museum Site OA-B6-10) at the Standard Oil Refinery, which was subsequently destroyed (Barrera 1975:1). Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road, approximately 2 km northwest of the present project area (Kikuchi 1959; Davis 1990a:146, 147).

In 1960, Yoshi Sinoto and Elspeth Sterling made note of a house site in the area (Bishop Museum Site OA-B6-8). "In 1962, Lloyd Soehren recorded a secondary human burial in a

Table 1. Archaeological and Related Studies in Western Honouliuli Ahupua'a

<b>Reference</b>	<b>Nature of Study</b>	<b>General Location of Study</b>
Thrum 1907	<i>Heiau</i> study	Hawaiian Islands
McAllister 1933	All island survey	O'ahu Island
Kikuchi 1959	Site letter report	Barbers Point
Lewis 1970	Reconnaissance Survey	Barbers Point (harbor area)
Frierson 1972	Study of land use & vegetation change	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. 1978	Geoarchaeological reconnaissance	Barbers Point (harbor area)
Kirch 1978	Land snail study	Barbers Point (harbor area)
Sinoto 1978	Archaeological & Paleontological salvage	Barbers Point (harbor area)
Barrera 1979	Archaeological Survey	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 survey	Barbers Point (harbor area)
Davis 1980	Research design	Barbers Point
Kirch and Christensen 1980	Land snail study	Barbers Point (harbor area)
Christensen and Kirch 1981	Land snail study	Barbers Point (harbor area)
Hammatt and Folk 1981	Archaeological and Paleontological Investigation	Barbers Point (harbor area)
Davis 1982	Academic paper	Barbers Point
McCoy et al. 1982	Proposal for investigations	Barbers Point (harbor area)
Neller 1982	Scholarly study	Barbers Point
Olson 1982	Fossil avifauna study	Barbers Point
Ahlo and Hommon 1983	Reconnaissance Survey	Barbers Point
Bordner and Silva 1983	Reconnaissance Survey	Waimānalo Gulch
Ahlo and Hommon 1984	Test excavations	Barbers Point
Barrera 1984	Archaeological Status Report	West Beach
Hammatt 1984	Reconnaissance Survey	Kahe Point

<b>Reference</b>	<b>Nature of Study</b>	<b>General Location of Study</b>
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 and test excavations	West Beach
Davis et al. 1986 a and b	Research design	West Beach
Haun 1986a	Reconnaissance Survey	Kapolei Town
Haun 1986b	Reconnaissance Survey	Kapolei Town
Davis and Haun 1987 a and b	Intensive survey & test excavations	West Beach
Haun 1987	Preliminary Archaeological Reconnaissance Survey for Environmental Assessment	Ewa Town Center
Rosendahl 1987b	Reconnaissance Survey	Ko'Olina Resort, Phase II
Welch 1987	Reconnaissance Survey	Naval Air Station
Davis 1988	Reconnaissance Survey	HECO Station Barbers Point
Bath 1989a	Petroglyph study	Waimānalo Gulch
Bath 1989b	Burial documentation	Kahe
Burgett and Rosendahl 1989	Subsurface archaeological testing	North of O.R.&L.
Davis 1989	Archaeological investigations	HECO Station Barbers Point
Hammatt and Shideler 1989a	Archaeological Assessment	Barbers Point (harbor area)
Hammatt and Shideler 1989b	Reconnaissance Survey	Kahe
Kennedy 1989	Archaeological Reconnaissance Survey	TMK 9-1-26 (present project TMK plat)
Sinoto 1989	Letter report	Barbers Point
Burgett and Rosendahl 1990	Subsurface testing	Ko'Olina Resort, Phase II
Carlson and Rosendahl 1990	Inventory survey	Kaomi Loop Subdivision
Cleghorn and Davis 1990	Archaeological and Paleontological Investigation	Barbers Point (harbor area)
Davis 1990b	Archaeological and Paleontological Investigation	Barbers Point (HECO area)
Davis 1990a	Archaeological and Paleontological Study (Ph.D. dissertation)	Barbers Point (harbor area)
Kawachi 1990	SHPD Burial Recordation	Canal at east end of Ōla'i Street
Rosendahl 1990	Letter report	Kapolei Town
Kennedy 1991	Subsurface testing	Pu'u o Kapolei
Folk 1991	Reconnaissance Survey	Drainage channel
Hammatt et al. 1991	Inventory Survey	Makaīwa Hills
Hammatt and Shideler 1991	Archaeological Assessment	Barbers Point (harbor area)

<b>Reference</b>	<b>Nature of Study</b>	<b>General Location of Study</b>
Haun et al. 1991	Survey report	Naval Air Station
Burgett and Rosendahl 1992	Inventory Survey	Barbers Point (harbor area)
Erkelens 1992	Archaeological Survey	Naval Air Station
Folk and Hammatt 1992	Archaeological Subsurface Testing	Barbers Point Drainage Channel
Hammatt and Folk 1992	Subsurface testing	Barbers Point (drainage beach berm)
Glidden et al. 1993	Data Recovery	Paradise Cove
Jones 1993	Fossil coral reefs study (Ph.D. dissertation)	Hawaiian Islands
Landrum 1993	Reconnaissance and subsurface testing	Naval Air Station
Miller 1993	Data Recovery	Barbers Point (harbor area)
Hammatt and Shideler 1994	Archaeological Assessment	Barbers Point (harbor area)
Hammatt et al. 1994	Inventory Survey	Barbers Point (harbor area)
Davis 1993	Archaeological and Paleontological Investigation	Barbers Point (harbor area)
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
Athens et al. 1997	Cultural Resource Inventory, Paleoenvironmental Investigation	'Ewa Plain:Naval Air Station
Tuggle 1997a	Cultural Resource Inventory	Naval Air Station
Tuggle 1997b	Synthesis	'Ewa Plain
Tuggle and Tomonari-Tuggle 1997	Cultural Resource Inventory survey	Naval Air Station
Wickler and Tuggle 1997	Cultural Resource Inventory, Inventory Survey	Naval Air Station
Wulzen and Rosendahl 1997	Subsurface testing & Data Recovery	Naval Air Station
McIntosh and Cleghorn 1999	Archaeological Archival Research	12 mile Water Reclamation Transmission Line
McDermott et al. 2000	Data recovery	Barbers Point (harbor area)
Hammatt and Shideler 2001	Archaeological Assessment	Southern Cross Cable Station, TMK: 9-1-015
Sinoto and Titchenal 2002	Archaeological Inventory Survey	Desalination facility S of E end of Ōla'i Street
Cordy and Hammatt 2003	Archaeological Assessment	Barbers Point, North of O.R.&L.

Reference	Nature of Study	General Location of Study
Hoffman and Hammatt 2004	Field Inspection report	Approximately 124 Acres <i>mauka</i> of Barge Harbor, (TMK: 9-1-14:33 and 9-1-15:20),
O'Hare et al. 2004	Documentation of Plantation Infrastructure	North of O.R.&L.
Terry et al. 2004	Archaeological Inventory Survey of Two Sinkholes	North of O.R.&L.
O'Hare, Shideler and Hammatt 2005	Archaeological Assessment and Cultural Impact Evaluation	Palailai /Makakilo Interchange
Hoffman et al. 2005	Archaeological Inventory Survey	South of O.R.&L.
McDermott, O'Leary and Tulchin, 2006	Archaeological Inventory Survey	Proposed 345-Acre Kapolei Harborside Center
Rasmussen and Tomonari-Tuggle 2006	Archaeological Monitoring	Waiau Fuel Pipeline
Hammatt and Shideler 2007a	Archaeological Inventory Survey	Proposed Kapolei Corporation Yard, Kalaeloa, TMK: [1] 9-1-026:004
Hammatt and Shideler 2007b	Archaeological Literature Review and Field Inspection	Walt Disney Project Area at Ko'olina, TMK: [1] 9-1-057:002 & 004
Hammatt, et al. 2007	Archaeological Literature Review and Field Inspection	Proposed Chevron Refinery Fencing Project, Kalaeloa, (TMK: [1] 9-1-014:010 por.)
Tulchin et al. 2007	Archaeological Assessment	Hawai'i Raceway Park Property
Groza, Tulchin and Hammatt 2008	Archaeological Assessment	123-arce, Lots 16915 and 16916 Kalaeloa, TMK: [1] 9-1-015:020 por.
Thurman et al. 2009	Archaeological Literature Review and Field Inspection Report	I C Sunshine Solar Energy Project, TMK: [1] 9-1-032:001
Altizer and Hammatt 2010	Archaeological Literature Review and Field Inspection	I C Sunshine Solar Energy Project, TMK: [1] 9-1-032:001
Groza and Hammatt 2010	Archaeological Monitoring	Kalaeloa City and County Beach Park (Barbers Point Beach Park), TMK: [1] 9-1-026:027



sinkhole at the Barber's Point Naval Air Station" (Davis 1990a:147). In 1966 (per Sinoto 1960), Lloyd Soehren "carried out salvage excavations at BPBM Site # 50-OA-B6-13 (a possible fishing shrine.)" The site was reported as destroyed by construction (Barrera 1975:1) but Davis (1990a:148) relocated the shrine and performed additional excavations in 1982. In 1969, artifacts were recovered by Roger Green from a beach midden site (B6-14), south of the barge harbor.

These reports of numerous sites in the area resulted in a number of visits by Dr. Sinoto and student volunteers in late 1969 and early 1970. A University of Hawaii graduate student, Ernest Lewis conducted a surface survey that located some 22 archaeological sites of the types that are typical for the Kalaehoa region, including various types of enclosures and mounds, as well as walls, made of the locally available stacked limestone cobbles and boulders.

In 1975 Neal Oshima carried out an archaeological reconnaissance survey of the then proposed drainage channel (at the east end of Ōla'i Street) identifying walls, a platform, and an enclosure near the east end of Malakole Road.

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

An important aspect of this first research (1976) by Sinoto was the identification of the presence of numerous avifaunal skeletal remains within limestone sinkholes, which led to the contacting of Storrs Olson, Associate Curator of Birds at the Smithsonian Institution. After a field inspection and a brief review of the recovered material he knew that many extinct endemic species, new species, and even new genera were present. Olson stated that:

The various limestone sinks...contain probably the most extensive fossil avifauna in Hawaii with many new species endemic to the island. Such fossils have not and probably cannot be found anywhere else on the island. Furthermore, the nature of preservation is such as to insure that virtually complete skeletons can probably be assembled for most species. Thus, there is much highly significant and totally new biological and paleontological information that can be obtained at the Barbers Point site.

Destruction of any of the potential fossil sinks would result in the loss of many specimens, some possibly unique, since one sinkhole might contain species absent in another. Also, the fauna of one sinkhole might not be coetaneous with that of another, the age of a deposit being determined by when a sinkhole first formed. Therefore, an investigation of the fauna of different sinks might show changes in species composition and changes in morphology within a species through time. Finally, it would also be desirable to retain some sinks intact as fossil "banks" should some new technique or different information be desired in the future. The

fossil deposits at Barbers Point are a unique and irreplaceable resource. (Olson in Sinoto 1976:74)

In 1980, Storrs Olson extended the test pit of Aki Sinoto in the large sinkhole site # 9545 and conducted extensive excavation of this area in 1981 (Olson 1982:27).

In 1977, Aki Sinoto (1978) undertook salvage archaeological and paleontological excavations in the proposed barge harbor area. Sinoto's work for the Corps of Engineers (1978) included preliminary sampling and analytical studies of avifaunal remains and terrestrial gastropods (land snails) and a geological study of the emerged coral reef based on the excavation of one sinkhole.

In late 1977 and early 1978, archaeological survey was conducted by the Archaeological Research Center of Hawaii in the deep draft port facility area. (Davis and Griffin 1978)

In 1977, Barber's Point Archaeological District was assigned Site # 50-80-12-2888 and listed on the National Register of Historic Places (based on the SHPD's Hawai'i/National Register web site, <http://www.hawaii.gov/dlnr/hpd/hpgreeting.htm>). This district does not extend as far south as the present project area.

To complete the archaeological survey of the entire area to be affected by the harbor and support facilities, the USACE contracted for survey of the areas designated as Optional Area 1 and Study Area 1a (Davis 1978) and Area 1b (Sinoto 1978). Those surveys by Davis and Sinoto located numerous archaeological sites, as well as sinks of late Pleistocene to early Holocene age that are of considerable paleontological interest.

Sinoto's (1979) work shows that, although sinks containing remains of extinct species are dispersed throughout his study area, only 3 out of 19 sinks tested (or 16%) contained extinct species. However, this amounts to a considerable number of sinks as Sinoto estimated the total number of testable sinks in the 1979 study area as between 1,100 and 2,500 (Sinoto 1979:34). The majority of Sinoto's New Disposal Site Area has been utilized for chemical dumps and coral stockpiling. That portion which remains is the site of the proposed Sinkhole Reserve and Park, comprising approximately 7 acres located 1.5 km north of the current project area.

In 1979, Bertell Davis carried out "emergency excavations" (Davis 1979a, 1979b, 1979c) within the area he had previously designated as Area II, located east of the easternmost corner (the *mauka*, Diamond Head corner) of the present harbor open water. These excavations were carried out in advance of the quarry expansion operation (which preceded the harbor expansion) and it is believed that all sites in this area were salvaged or lost. This work was conducted approximately 350 meters to the northeast of the current project area.

Also in 1979, an archaeological reconnaissance survey was conducted of a proposed waterline route down the east side of Kalaeloa Blvd. and then east along the north side of Malakole Road. "No archaeological sites were found along the proposed waterline route," and it was noted that: "this area is either presently in sugar cane cultivation or has been used for this purpose in the past" (Cleghorn 1979:5).

Hammatt and Folk (1981) undertook archaeological testing and salvage excavations in three adjoining parcels designated Study Areas 1A, 1B and Optional Area. Of 138 archaeological sites, 88 sites were tested and 26 were excavated. Associated paleontological studies show that the limestone solution sinks and surrounding terrain were a major habitat of many fossil birds.

Appendix 1 of their report, by Storrs Olson and Helen James, lists over 30 species of extinct fossil birds identified at Barber's Point.

Hommon and Ahlo (1983, 1984) carried out two studies at a proposed solid waste processing and resource recovery facility project area 500 m north of the present study area, examining two sinkholes, three rectangular pits, and a possible cultural deposit. Finds were minimal.

The most voluminous study (Cleghorn and Davis 1990) started in 1982 and concentrated in the area just northeast of the main bend of Malakole Road. A "final draft" (Davis 1993) report documents that research as did Bertell Davis' Ph.D. dissertation (1990).

Lynn Miller (1993) produced a report on her findings in a 31-acre parcel located just to the southeast of the present Deep Draft Harbor. Her research covers some 20 features at two state sites (2710 and 2711) that included enclosures, sinkhole caves, and a single burial.

Extensive archaeological and paleontological research was conducted prior to development of West Beach (Ko'olina). It is the second area of the 'Ewa Plain in which major data recovery was accomplished. Barrera (1979, 1984, 1986) conducted preliminary surveys and Davis (1986) undertook intensive survey and data recovery. Over 600 sinkholes were identified in the area along with around 180 surface sites, many of them similar in function to those at Barbers Point.

Haun's (1986) archaeological reconnaissance survey for the 'Ewa Town Center/Secondary Urban Center study covered an area of approximately 1,400 acres 3 km north of the present project area. A study by Burgett and Rosendahl (1989) involved the excavation of seventy-two backhoe test trenches in a 360-acre portion of the Haun study area. There were no significant finds.

A preliminary reconnaissance survey conducted by Haun (1986 a) covered approximately 200 acres on the *mauka* side of Farrington Highway. Only one site was identified, an irrigation ditch that extended from the northwestern edge of his project area to a quarry at the northeastern edge. The ditch was described as "constructed of concrete and stone. Elevated flumes constructed of timbers and galvanized steel bridge the gulches" (Haun 1986a:3).

Haun's (1986 b) preliminary reconnaissance survey of a 1,400-acre parcel was conducted on both the *mauka* and *makai* side of Farrington Highway, and surrounded the 200-acre parcel surveyed earlier in 1986. One previously recorded site was known to have once been in the project area, a portion of the Oahu Railroad and Land Company right-of-way (Site 50-80-12-9714). The additional sites Haun (1986b) identified included an irrigation ditch (a portion of the same site -4341 identified during the 200-acre survey), a military structure, and a rock wall that paralleled the irrigation ditch.

In 1988 Shapiro and Rosendahl carried out sinkhole excavations at a 60-acre Camp Malakole industrial subdivision site. Some 500 sinkholes were identified and a 5% sample (25 sinkholes) was selected for testing but was later reduced to 15 sinkholes. Although some cultural use was indicated by the presence of shell midden, volcanic glass, coral abraders and a bone fishhook fragment the cultural value was suggested to be low. Although a fairly intact *Branta* species goose was recovered the and paleontological value was also suggested to be low.

Bertell Davis carried out three studies (1988, 1989, 1990) at the location of a 20-acre parcel proposed for a HECO generating station on the north side of Ōla'i Street approximately 600 m

east of the present study area. Some 15+ sinkholes were identified, 13 were recorded and tested and extensive excavation was undertaken at 4 of the sinkholes. Extinct bird bones were identified in all four of these sinkholes. A human burial was encountered in sinkhole site 4099-1 (Davis 1990:33-37). This burial was of particular interest as it was dated to AD 1422-1664 and appeared to show signs of syphilis (understood as a post-contact disease).

Between 1989 and 1994 Hammatt and Shideler produced a number of archaeological assessments of the Barbers Point area. A detailed discussion of the creation of the preserve area that is centrally located along the north side of Malakole Road is included in the report (Hammatt and Shideler 1989:33-36).

To the northwest of the project area, Paradise Cove, Lanikūhonua, and West Beach have been the subject of numerous archaeological studies (Barrera 1979, 1984, 1986; Komori and Dye 1979; Neller 1985; Davis & Haun 1986, 1987; Glidden et al. 1993; and Jourdan 1995).

In 1989 Archaeological Consultants of Hawaii (Joseph Kennedy) carried out a brief Archaeological Reconnaissance Survey in the near vicinity of the present parcel (the project area was identified as TMK plat 9-1-026 with no map provided) recommending no further archaeological work. It is unclear where within the rather extensive plat 9-1-026 the reconnaissance took place.

In 1990 Carol Kawachi documented a burial in a sinkhole near the east end of Ōla'i Street approximately 1.2 km east of the present study area on the side of the large canal "in a sinkhole which was probably exposed and cross-sectioned during excavation for the storm drain" (Kawachi 1990:2).

In 1991, Hammatt et al. conducted an archaeological inventory survey on a 1,915-acre Mākāiwa Hills project area *mauka* of Farrington Highway. A total of 34 sites were documented. Site types identified include pre-Contact habitation structure, agricultural features, rock shelters, petroglyphs, as well as structures and features related to plantation era sugar cane production. An extensive program of data recovery and preservation was recommended for that area.

In 1993 Lynn Miller produced a report on her findings in a 31-acre parcel located just to the southeast of the present Deep Draft Harbor. Her research covers some 20 features at two state sites (-2710 and -2711) that included enclosures, sinkhole caves, and a single burial from historic property 50-80-12-2711 Feature 28 an unmodified sinkhole.

Hammatt et al. (1994) and McDermott et al. (2000) conducted an archaeological inventory survey and a large archaeological data recovery project respectively in lands just south of the OR&L alignment. This work resulted in the creation of two archaeological preserve areas. SIHP site 50-80-12-9633 is a cave that was found to contain human remains and part of a wooden canoe (described in Hammatt et al. 1994:93-94). Because of its function as a burial site, the cave was not excavated and the remains were protected in the state in which they were discovered. Another sinkhole burial 50-80-12-4907D was identified during the McDermott et al. 2000 study. Just east of that fenced preserve is another smaller preserve area surrounding the very large sinkhole SIHP site 50-80-12-9545.

Bertell Davis carried out three studies (1988, 1989, 1990) at the location of a 20-acre parcel proposed for a HECO generating station on the north side of Ōla'i Street approximately 400 m northeast of the present project area. Some 15+ sinkholes were identified, 13 were recorded and

tested and extensive excavation was undertaken at 4 of the sinkholes. Extinct bird bones were identified in all four of these sinkholes. A human burial was encountered in sinkhole site 4099-1 (Davis 1990:33-37). This burial was of particular interest as it was dated to AD 1422-1664 and appeared to show signs of syphilis (understood as a post-contact disease).

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

In 2002 Sinoto and Titchenal carried out an archaeological inventory survey of a 30-acre area south of the east end of Ōla‘i Street identifying three sites two cultural and one paleontological. Cultural features included a circular enclosure, a capped sinkhole, a cist-like structure and a lime kiln. A curious bone toggle artifact believed to be “probably human” was the only *iwi* recovered (Sinoto and Titchenal 2002:58). Thirteen species of birds including many extinct species were identified.

Cordy and Hammatt (2003) made a study of a land parcel north of the current project area, across the O.R.&L. Several sinkholes were noted as of potential archaeological interest. The study also documented the presence of a historic chicken farm as well as other twentieth century architectural remains, including a Quonset hut. Two follow-up studies of plantation infrastructure (O’Hare et al. 2004) and two of these sinkholes (Terry et al. 2004) further addressed cultural resources north across the O.R.&L. alignment.

Hoffman et al. (2005) identified several archaeological and historic sites as part of an 124-acre archaeological inventory survey at Kapolei that extended to within two kilometers of the present project area. This investigation noted that though the project area had been greatly affected by past land use; particularly the limestone quarry operation; however, there were still remnant archaeological features preserved within the less disturbed *kiawe* thickets. The types of features documented included sinkholes and stacked limestone wall segments and enclosures.

McDermott et al. (2006) conducted an archaeological inventory survey investigation on an approximately 345-acre parcel west of Kalaeloa Road. Extensive land modification associated with commercial agricultural, quarrying, green waste processing, and materials stockpiling activities was observed throughout the study area. A total of six historic properties were identified within the less-disturbed portions of the study area, including an improved drainage channel, a portion of the OR&L right-of-way, a portion of the Barbers Point Archaeological District, a previously designated sinkhole preserve area (Hammatt and Shideler 1989a), and two pre-contact enclosures.

In 2007, during an archaeological inventory survey for the proposed Kapolei Corporation Yard within TMK [1] 9-1-026:004, Hammatt and Shideler (2007a) identified SIHP # 50-80-12-6866, consisting of remnants of the Barbers Point Military Reservation. Three designated features including two 155 mm “Panama Mount” artillery bases and an associated cement slab were found. Preservation of one of the Panama Mount 155 mm gun emplacements (in the central portion of their project area) was recommended with no further work or preservation at the northeastern Panama Mount 155 mm gun emplacement or at the support facility cement slab.

Additionally, 27 sinkholes of varying sizes were found. Twenty-five (25) of the sink holes are located in an undisturbed *kiawe* forest. Recommendations developed in consultation with SHPD included: 1) Preservation to be formalized within a Preservation Plan or 2) subsurface testing of the sinkholes. A monitoring program including on-site and on-call monitoring was also recommended.

In 2007, CSH conducted an archaeological assessment of the 65.8-acre former Hawai'i Raceway Park Property (Tulchin et al. 2007). Extensive land modification associated with the previous development of the property into an automotive racing complex was observed throughout the study area. A single intact sinkhole was identified within that project area. The sinkhole was thoroughly investigated and was found to lack any cultural or paleoenvironmental deposits.

In 2008, CSH conducted an archaeological assessment (Groza et al. 2008) of a 123-acre parcel on the west side of Kalaeloa Road in support of re-development of the former Hawai'i Raceway Park property, adjacent to the McDermott et al. study conducted in 2006. No historic properties were identified and extensive land modification was observed throughout the project area.

In 2009, CSH conducted a literature review and field inspection of a 25-acre parcel for the IC Sunshine Solar Energy project (Thurman et al. 2009). Approximately thirty sinkholes were identified. Some of the sinkholes had been filled with limestone cobbles and small boulders, vegetation, and debris. Additionally, two potential historic properties were documented within the project area: a canal or drainage ditch located in the south central portion of their project area, and a limestone alignment located in the eastern portion of the project area. Thurman et al. recommended an inventory survey to fully assess and document the sinkholes and potential historic properties (Thurman et al. 2009:ii) prior to development of that area.

In 2010, CSH conducted a literature review and field inspection for a separate portion of the IC Sunshine Solar Energy project (Altizer and Hammatt 2010). Three sinkholes and two bridges likely built circa 1970 were identified.

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

## 4.2 Background Summary and Predictive Model

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

Prior to extensive historic and modern land alteration, this area of Honouliuli would be expected to yield the remnants of traditional Hawaiian temporary habitations used during forays for marine resources and/or evidence of opportunistic seasonal agriculture and possibly burials. Based on ethnographic accounts and past archaeological investigations in the vicinity, limestone sinkholes on the 'Ewa Plain were used for agriculture and burial interment, with the largest

overhangs used for temporary shelter. With the spread of Western land use in the 19<sup>th</sup> century, the project area may have been used for ranching, then for intensive military use as part of the Barbers Point Military Reservation that was established in 1921. Related activities would have destroyed or buried portions of the project area's traditional Hawaiian archaeological record, including surface features and sinkholes. Some sinkholes at Barbers Point have been shown to be a storehouse of data on more than a score of previously unknown, extinct, bird species.

Human burials, bones of extinct birds, unique Hawaiian artifacts, and remnants of circa WWII military defenses have been reported from study areas quite close to the present project area (Davis 1988, 1989, 1990, Kawachi 1990, Sinoto & Tichenal 2002, Hammatt and Shideler 2007a).

## Section 5 Results of Fieldwork

---

Fieldwork was conducted on May 15, 2012 by two CSH archaeologists, David Shideler, M.A. and Rosanna Runyon, B.A. Fieldwork required approximately 3 person-hours to complete. All fieldwork was done under the general supervision of Hallett H. Hammatt, Ph.D. (principle investigator). A track log of one of two archaeologists conducting the field inspection is depicted on an aerial photograph showing the project area (Figure 12).

The project area has been previously graded flat and is surrounded by a perimeter fence (Figure 13). A significant berm lies between the east/west trending *makai* fence line (demarcating the *makai* extent of the project area) and the coastline of raised reef limestone (Figure 14). To at least some extent, this coastal berm seaward (outside) of the project area is believed to have been the result of mechanical push from within the project area at the time of grading. It may be the case that 50 cm or more of the former ground surface of the project area was pushed to form the east/west linear berm (outside the project area) on the *makai* side and (the base of) the north/south linear berm (outside the project area) on the east side. The project area has been graded quite flat and ground visibility was excellent (Figure 15 to Figure 17).

A major land form in the vicinity is a north/south trending linear mound, approximately 8 m high, covered with mature *kiawe* trees that lies outside the project area on the east side of the parcel (Figure 18). Our understanding is that in the mid 1950s when an offshore oil pipeline was being developed to facilitate off-loading of petroleum from tanker ships, that a temporary pier was constructed extending as much as 500 feet off-shore. Once the oil pipeline was in place on the sea floor the temporary pier was dismantled with the construction material (largely basalt boulders) effectively stockpiled forming the linear berm.

In the course of the fieldwork particular attention was given to searching for any evidence of pit cave or “sinkhole” features which are much associated with historic properties in the greater Kalaeloa/Barbers Point area. Previous experience has shown that even when these pit caves have been filled in there is often evidence in the form of fill cobbles and boulders or a slight depression visible on the surface. Evidence of pit caves was notably absent. Only one small, slight depression was observed (Figure 19) but this could easily have been a small vagary in the raised reef limestone surface or a divot from a former tree or variation in the grading.

While the project area is almost entirely extraordinarily flat (as a result of prior grading) there are two significant piles of raised reef limestone boulder and cobble rubble in the southwest (Figure 20) and northeast corners of the project area. These appear to have been piled after mass grading of the lot. While it appears nearly certain these reflect a later phase of grading of the lot it is unclear whether this limestone rubble originated within the project area. It seems highly probable that there are no cultural resources under these rubble piles.

There are several concrete slabs and concrete pylons lying on the ground. Most of these appear to be quite modern and many appear to have been moved. On the west side of the south portion of the project area were certain thick concrete slabs that appeared older (Figure 21). These were evaluated as possible historic properties. It was noted that no foundations are shown anywhere in the project area on a 1953 map (see Figure 9). It was concluded that there is no



Figure 12. Track log of one of two archaeologists conducting the field inspection on an aerial photograph showing the project area



Figure 13. General view of project area from *makai* or south (outside of *makai* fence line of project area) view to north



Figure 14. General view of coastline of raised reef limestone south of project area (*makai* fence line of project area at center/right), view to west



Figure 15. General view of central portion of project area, view to east



Figure 16. General view of east side of project area, view to south



Figure 17. General view of west side of project area, view to south



Figure 18. View of fence line marking east side of project area in relationship to large linear mound on east side of parcel but outside of project area



Figure 19. Slight depression possibly a vagary of grading or indicating location of a small pit cave (to the right of the clip board included for scale)



Figure 20. General view of (the larger of two) raised reef limestone rubble mounds in southwest corner of project area, view to southwest



Figure 21. Older slabs in southern west side of project area, view to northeast



Figure 22. Earthen linear mound in northeast side of project area, view to northeast

certainty these slabs are older than fifty years old, it is uncertain whether they are in their original position and that these slabs lack sufficient integrity to be regarded as a historic property.

In the northeast portion of the project area is a north/south trending 40 cm high berm of soil and raised reef limestone pebbles. There is remnant landscaping here of *lauhala*, coconut and plumeria. The west side has a concave edge indicating that it was constructed to provide protection for a pipe that was once on the west side.

## Section 6 Summary and Recommendations

---

### 6.1 Summary

Background research indicates that no historic properties have been identified in the present project area or in the immediate vicinity. To the best of our knowledge no sites have been formally reported in the immediate vicinity of the proposed solar project area studied.

The Groza and Hammatt 2010 archaeological monitoring for wastewater improvements at Kalaeloa City and County Beach Park (also known as Barbers Point Beach Park; 2000 m to the west) identified no subsurface deposits, cultural material or sinkholes.

Bertell Davis carried out three studies (1988, 1989, 1990) at the location of a 20-acre parcel proposed for a HECO generating station on the north side of Ōla'i Street approximately 400 m northeast of the present project area. Some 15+ sinkholes were identified, 13 were recorded and tested and extensive excavation was undertaken at 4 of the sinkholes. Extinct bird bones were identified in all four of these sinkholes. A human burial was encountered in sinkhole site 4099-1 (Davis 1990:33-37). This burial was of particular interest as it was dated to AD 1422-1664 and appeared to show signs of syphilis (understood as a post-contact disease). All of the Davis finds were within pit caves.

During the present fieldwork particular attention was given to consideration of whether the pit cave (popularly called sinkholes") formations (and their attendant cultural resources) identified in several other Kalaeloa projects might be present. The project area has been graded entirely previously down to raised reef limestone hard pan. The potential for pit caves which could possibly include burials and or other cultural deposits, was evaluated. Because of previous grading no pit caves were observed in the project area and none are believed to be present. No soft sediments were observed within the present solar project study area.

### 6.2 Recommendations

In our professional opinion given the absence of indications of any surface structures, soft sediments or substantial pit caves in the immediate vicinity of the present solar project study area no further archaeological work is warranted.

No further archaeological work is recommended for the proposed off-site Chevron Refinery solar project study area.

As a general precaution we recommend a sentence be included on project plans that if, in the unlikely event that, intact cultural resources, including but not limited to limestone sinkholes of three feet in diameter or greater or other significant cultural deposits, are encountered during the course of development activities, all work in the immediate area should stop and the State Historic Preservation Division should be promptly notified.

If any sinkholes, cultural deposits, or burials are identified, all work will be stopped and SHPD will be notified and consulted on the development of an appropriate mitigation strategy. Any inadvertent discovery of human skeletal remains will be dealt with according to HAR 13-300-40.

## Section 7 References Cited

---

### **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.* Prepared for: Belt Collins and Associates by 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.* Prepared for: Belt Collins and Associates by Science Management, Inc., Honolulu.

### **Altizer, Kendy and Hallett, H. Hammatt**

- 2010 *Archaeological Literature Review and Field Inspection Report for the I C Sunshine Solar Energy Project, Honouliuli Ahupua'a, 'Ewa District, O'ahu TMK: [1] 9-1-032:001* Cultural Surveys Hawai'i, Kailua, HI.

### **Athens, J. Stephen, Jerome V. Ward, H. D. Tuggle and David J. Welch**

- 1997 *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.* IARII, Honolulu.

### **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 by BPBM Department of Anthropology, Honolulu. November.
- 1979 *West Beach, Oahu: An Archaeological Survey.* Prepared for West Beach Associates by Chiniago Inc., Honolulu.
- 1984 *West Beach, Oahu: Archaeological Status Report. TMK: 9-1-14:2, 9-2-13:3,7,2 0-1-15:3,6,7,10,4.* Prepared for West Beach Authority by Chiniago Inc., Honolulu.
- 1986 *West Beach, O'ahu Archaeological Investigations.* Prepared for West Beach Estates by Chiniago Inc., Honolulu.

### **Bath, Joyce**

- 1989a *Waimānalo Gulch Petroglyphs 80-12-4110, Waimānalo Gulch, Honouliuli, 'Ewa, O'ahu.* SHPD File # O-561.
- 1989b Site File for State Site 50-80-12-4061, State Historic Preservation Division.

### **Bordner, Richard M.**

- 1977 *Archaeological Reconnaissance of the Proposed Kalo'i Gulch Landfill Site, 'Ewa, O'ahu Island.* Archaeological Research Center Hawai'i, Inc., Honolulu.

### **Bordner, Richard M. and Carol Silva**

- 1983 *Archaeological Reconnaissance and Historical Documentation: Waimanalo Gulch, Oahu, TMK:9-2-03:2,40,13 (por).*

**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*. PHRI, Hilo, HI.
- 1990 *Subsurface Archaeological Testing, Ko Olina Resort Phase II Development Site, Land of Honouliuli, Ewa District, Island of Oahu*, Paul H Rosendahl, Inc., Hilo, HI
- 1992 *Archaeological Inventory Survey, Contaminated Soil Stockpile/ Remediation Facility*. PHRI, Hilo, HI.

**Carlson, Arne K. and Paul H. Rosendahl**

- 1990 *Archaeological Inventory Survey, Campbell Industrial Park - Kami Loop Subdivision*. PHRI, Hilo, HI.

**Clark, Stephan D.**

- 1977 *An Archaeological Reconnaissance Survey at Puu O Kapolei, Honouliuli, Oahu, Department of Land and Natural Resources (TMK: 9-1-16: 02, 21, 22)*, Unknown publisher

**Coastal Defense Study Group, Inc. (CDSG)**

- 2012 List of American Military Reservations and Concrete Gun Batteries, Hawaii. Accessed on May 16, 2012 at <<http://www.cdsg.org/hawaii.htm>>.

**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)*. Prepared for: City and County of Honolulu, Department of Parks and Recreation by 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*. Prepared for: City and County of Honolulu, Department of Public Works by Kualoa Archaeological Research Project, Honolulu, February.

**Cleghorn, Paul L.**

- 1979 *Archaeological Reconnaissance Survey of Water Systems Improvement Area, Park I, James Campbell Industrial Park, Oahu, Hawaii (TMK: 9-1-18)*. Prepared for M & E Pacific Inc. by BPBM Department of Anthropology., Honolulu, June.

**Cleghorn, Paul L. and Bertell D. Davis**

- 1990 *Archaeological Paleontological Investigations at the Barbers Point Deep Draft Harbor, 'Ewa, O'ahu*. Applied Research Group 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, Kailua, HI.

**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, UH Mānoa and National Park Service, Honolulu.
- 1979a *Progress Report on Emergency Excavations at Barbers Point, O'ahu: First Quarter (January-March), 1979*. UH Mānoa, Department of Anthropology, Honolulu, March.
- 1979b *Progress Report on Emergency Excavations at Barbers Point, O'ahu: Second Quarter (April- June) 1979*. UH Mānoa, Department of Anthropology, Honolulu.
- 1979c *Progress Report on Emergency Excavations at Barbers Point, O'ahu: Third Quarter (July-August) 1979*. UH 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, UH Mānoa and National Park Service.
- 1982 "Horticultural Adaption 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 Mānoa and National Park Resources Study Unit, UH Mānoa and National Park Service.
- 1988 *Report on Archaeological Reconnaissance at the Proposed HECO Generating Station, Barbers Point, Honouliuli 'Ewa, O'ahu TMK 9-1-31*. IARII, Honolulu.
- 1989 *Report on Archaeological Investigations at the Proposed HECO Generating Station, Barbers Point, Honouliuli 'Ewa, O'ahu. TMK 9-1-31 IARII*, Honolulu.
- 1990a *Human Settlement in Pristine Insular Environments: A Hawaiian Case Study from Barbers Point, Southwestern O'ahu*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Hawaii, Honolulu.
- 1990b *Archaeological and Paleontological Investigations at the Proposed HECO Barbers Point Generating Station, Honouliuli, 'Ewa, O'ahu*. Applied Research Group, Bishop Museum, Honolulu.
- 1993 *Archaeological and Paleontological investigations at Barbers Point at the Deep Draft Harbor*. B.P. Bishop Museum, Honolulu.

**Davis, Bertell D. and Bion Griffin**

- 1978 *Studies in Natural History and Human Settlement at Barbers Point, Oahu, "Interim Report I: (eds)*. Archaeological Research Center Hawaii, Lāwa'i, Kaua'i, HI.

**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, HI.

1987b *Phase 2 — Intensive Survey and Test Excavations, West Beach Data Recovery Program, West Beach Resort, Honouliuli, Ewa, Island of Oahu.* PHRI Inc., Hilo, HI.

1987a *Interim Report: Phase 2) Intensive Survey and Test Excavations West Beach Data Recovery Program, Honouliuli, Ewa, Island of Oahu.* PHRI Inc., Hilo, HI

**Davis, Bertell D., A.E. Haun and P.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, HI.

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, HI.

**Dean, Love**

1991 *The Lighthouses of Hawai'i.* University of Hawaii Press, Honolulu.

**Erkelens, Conrad**

1992 *Interpretive Trail Development Study, Naval Air Station Barbers Point, Archaeological Survey of Site 1719, Draft.* IARII, Honolulu.

**Folk, William**

1991 *Archaeological Reconnaissance of a Proposed Drainage Channel: Supplement to An Archaeological Assessment For the Proposed Kapolei Business/Industrial Park, Honouliuli, 'Ewa, O'ahu.* Cultural Surveys Hawai'i, Kailua, HI.

**Folk, William H. and Hallett H. Hammatt**

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, Kailua, HI

**Foote, Donald 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. Dept. of Agriculture, U.S. Government Printing Office, Washington, D.C.

**Frierson, Barbara**

1972 *A Study of Land Use and Vegetation Change: Honouliuli, 1790-1925.* Manuscript prepared for Graduate Seminar in Geography (750), University of Hawaii, 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, Bishop Museum, Honolulu.

**Groza, Randy and Hallett H. Hammatt**

2010 *Archaeological Monitoring Report For Wastewater Improvements at Kalaeloa City and County Beach Park (also known as Barbers Point Beach Park), Honouliuli Ahupua'a, 'Ewa District, O'ahu, TMK: [1] 9-1-026:027,* Cultural Surveys Hawai'i, Kailua, HI.

**Halliday, William R.**

- 2005 Current Status of the 'Ewa Karst, Honolulu County, Hawai'i. *The Cave Conservationist*. February 1998. Electronic File maintained at <http://www.caves.org/section/ccms/wrh/>, accessed December 22, 2005.

**Hammatt, Hallett H.**

- 1984 *Archaeological Reconnaissance at HECO Kahe Point Power Plant* (Letter Report to Dames & Moore). Cultural Surveys Hawai'i, Kailua, HI.

**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 I*. ARCH 14-115.
- 1992 *Archaeological Subsurface Testing of a Beach Berm Within the Proposed Barbers Point Drainage Channel*. Cultural Surveys Hawai'i, Inc., 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, Kailua, HI.

**Hammatt, Hallett H. and David W. Shideler**

- 1989a *An Archaeological Assessment for the Proposed Kapolei Business/Industrial Park, Honouliuli, 'Ewa, O'ahu*. Cultural Surveys Hawaii, Kailua, HI.
- 1989b *Archaeological Reconnaissance of the Six-Acre Proposed HECO Kahe raining Facility (T.M.K. 9-1-3:27), Honouliuli, 'Ewa, O'ahu*. Prepared for M and E Pacific, Inc. Cultural Surveys Hawaii, Kailua, HI.
- 1991 *An Archaeological Assessment for the Proposed Barbers Point Harbor Expansion, (140.4 acres), Honouliuli, 'Ewa, O'ahu, Draft*. Cultural Surveys Hawaii, Kailua, HI.
- 1994 *An Archaeological Assessment for the Proposed Barber's Point Harbor Expansion (84 acres), Honouliuli, 'Ewa, O'ahu, (revised)*. Cultural Surveys Hawaii, Kailua, HI.
- 1995 *Data Recovery Plan for Archaeological Sites in the Proposed Barber's Point Expansion Area (TMK 9-1-14:2)*. Cultural Surveys Hawai'i, Kailua, HI.
- 2001 *Archaeological Assessment for the Southern Cross Cable Station Rock Fall Mitigation Plan, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu, (TMK: 9-1-15 & 15)*, Cultural Surveys Hawai'i, Kailua, HI
- 2007a *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.
- 2007b *Archaeological Literature Review and Field Inspection For an Approximately 21.2-Acre Project Area at Ko'olina, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu TMK: [1] 9-1-057:002 & 004* Cultural Surveys Hawai'i, Kailua, HI.

**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)*, Revised Sept. 1994. Cultural Surveys Hawaii, Kailua, HI.

**Hammatt, Hallett H., Todd Tulchin and David Shideler.**

2007 *Archaeological Literature Review and Field Inspection For the Proposed Chevron Refinery Fencing Project, Kalaeloa, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island (TMK: [1] 9-1-014:010 por.)* Cultural Surveys Hawaii, Kailua, HI.

**Handy, E.S. Craighill and Elizabeth G. Handy**

1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum Bulletin 233, Honolulu.

**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. PHRI, Hilo, HI.

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. PHRI, Hilo, HI.

1987 *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:Por.4,6,16,18,24,30;9-2-19, por 1)*, Paul H Rosendahl, Inc., Hilo, HI

**Haun, Alan E., Scott Williams, Marion Kelly and Maurice Major**

1991 *An Archaeological Survey of the Naval Magazine and Communications Area Transmission Facility, Lualualei, O'ahu, HI*. Department of Anthropology B. P. 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, Hawaii*. Dept. of Anthropology, 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 BPBM Department of Anthropology. Honolulu.

**Hoffman, Tracy, Sallee D.M. Freeman, David W. Shideler, and Hallett H. Hammatt**

2005 *Archaeological Inventory Survey of Approximately 124 Acres at Kapolei, Honouliuli Ahupua'a, 'Ewa District, O'ahu, TMK: 9-1-14:33 & 9-1-15:20*. Cultural Surveys Hawai'i, Kailua, HI. Cultural Surveys Hawai'i, Kailua, HI.

**Hoffman, Tracy and Hallett H. Hammatt**

- 2004 *Field Inspection of Approximately 124 Acres at Kapolei, Honouliuli Ahupua'a, 'Ewa District, O'ahu (TMK: 9-1-14:33 and 9-1-15:20)*, Cultural Surveys Hawai'i, Kailua, HI

**Hunkin, Nifae and Hallett H. Hammatt**

- 2009 *Archaeological Inventory Survey for the Approximately 62-acre Makakilo Drive Extension Project, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu (TMK: [1] 9-2-002:006, 9-2-003:079)* Cultural Surveys Hawai'i, Kailua, HI.

**Ī'i, John Papa**

- 1959 *Fragments of Hawaiian History* (Pukui translation). Bishop Museum Press, Honolulu.

**Jones, Anthony**

- 1993 *Elevated Fossil Coral Deposits in the Hawaiian Islands: A Measure of Island Uplift in the Quaternary*. Unpublished 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, SHPD, Honolulu.

**Juvik, Sonia P. and James O. Juvik, Editors, Chief Cartographer, Thomas R. Paradise**

- 1998 *Atlas of Hawai'i*, 3<sup>rd</sup> Edition. University of Hawaii Press, Honolulu.

**Kawachi, Carol T.**

- 1990 *Recordation of Campbell Industrial Park burial, Honouliuli, Ewa, O'ahu, State Site No. 80-12-4209*. Manuscript, SHPD/DLNR, Honolulu.

**Kennedy, Joseph**

- 1989 *Archaeological Reconnaissance Survey TMK 9-1-26 located at Campbell Industrial Park, Oahu*. Archaeological Consultants of Hawaii, Pupukeya, Hawaii.
- 1991 *Subsurface Testing at the Proposed Kapolei Park/Fort Barrette, Puu Kapolei, Island of O'ahu, TMK:9-1-16:2*. Archaeological Consultants of Hawaii, Inc., Haleiwa, HI.

**Kikuchi, William K.**

- 1959 *Standard Oil Refinery Site Letter Report*. B.P. Bishop Museum, Honolulu.

**Kirch, Patrick V.**

- 1978 "Appendix II, Report on Recent and Subfossil Land Mollusca From Barbers Point, Oahu," in Akihiko Sinoto (March, 1978), *Archaeological and Paleontological Salvage at Barbers Point, O'ahu*, Prepared for U.S. Army Engineer District, Pacific Ocean Division by BPBM Department of Anthropology, Honolulu, March.

**Kirch, Patrick V. and Carl C. Christensen**

- 1980 *Nonmarine Molluscs and Paleoecology at Barbers Point, O'ahu*. Prepared for: Archaeological Research Center Hawaii by BPBM Department of Anthropology, Honolulu.

**Komori, Eric K. and Thomas Dye**

1979 *Archaeological Testing at Lanikuhonua, West Beach, Ewa, Oahu, Hawaii, (TMK 9-1-13:por.10)*. Bishop Museum, 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 Hawaii, Honolulu.

**Macdonald, G.A., A. T. Abbott and Frank L. Peterson**

1983 *Volcanoes in the Sea*, Second Edition. University of Hawaii Press, Honolulu.

**Masa Fujioka and Associates**

2008 *Final Environmental Assessment for the Hanua Street Containment Cap and Barrier at James Campbell Industrial Park, 91-008 Hanua Street, Kapolei*,

**McAllister, J.G.**

1933 *Archaeology of O'ahu*. 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, Pending*. Honolulu.

**McDermott Matthew, Owen O'Leary and Todd Tulchin**

2006 *Archaeological Inventory Survey for the Proposed 345-Acre Kapolei Harborside Center, Honouliuli Ahupua'a, 'Ewa District. O'ahu Island Cultural Surveys Hawai'i, Kailua, HI.*

**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, HI.

**McIntosh, James and Paul Cleghorn**

1999 *Report of Archaeological Archival Research for the Honouliuli Wastewater Treatment Plant Water Reclamation Project, Island of O'ahu*. Pacific Legacy, Inc., Kailua, HI.

**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 Pauahi Bishop Museum, Honolulu.

**Myloie, John E and James L. Carew**

1995 *Karst Development on Carbonate Islands*. Chapter 3 in D. A. Budd and A. Saller, eds. *Unconformities and Porosity in Carbonate Strata*. American Association of Petroleum Geologists Memoir 63.

**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.* State Historic Preservation Office, Honolulu.

**O'Hare, Constance R., Shideler, David W. and Hallett H. Hammatt**

- 2005 *An Archaeological Assessment and Cultural Impact Evaluation for the Proposed I-HI Addition and Modification of Highway Accesses, Palailai Interchange/Makakilo Interchanges, Honouliuli Ahupua'a, 'Ewa District, O'ahu,* Cultural Surveys Hawai'i, Kailua, HI

**O'Hare, Constance R., Todd Tulchin and Hallett H. Hammatt**

- 2004 *Documentation of Plantation Infrastructure at Kapolei, Honouliuli Ahupua'a, District of 'Ewa O'ahu TMK: (1) 9-1-015:004.* Cultural Surveys Hawai'i, Kailua, HI.

**O'Hare, Constance R., Thomas R. Wolforth, and Paul H. Rosendahl**

- 1996 *(Pre-final) Phase II Intensive Survey and Testing, Naval Air Station, Barbers Point.* PHRI, Inc. Hilo, HI.

**Olson, Storrs L., and Helen F. James**

- 1981 *Prodromus of the Fossil Avifauna of the Hawaiian Islands.* Smithsonian Institution Press, Washington, D.C.
- 1991 *Ornithological Monographs No 45* "Descriptions of Thirty-two New Species of Birds from the Hawaiian Islands Part I. Non-Passeriformes". The American Ornithologist's Union, Washington, D.C.

**Oshima, Neal**

- 1975 *Archaeological Reconnaissance Survey of Proposed Drainage Channel at the Campbell Industrial Park Complex, Ewa, Island of O'ahu.* Prepared for R.M. Towill Corporation by BPBM Department of Anthropology, Honolulu, June.

**Rasmussen, Coral and M. J. Tomonari-Tuggle**

- 2006 *Archaeological Monitoring of Waiau Fuel Pipeline, 'Ewa District, Island of O'ahu (TMK Zone 9 with parcels in Sections 1, 3, 4, 6, 7, and 8),* International Archaeological Research Institute, Inc., Honolulu, HI.

**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, Inc., Hilo, HI.
- 1987b *Archaeological Reconnaissance Survey Ko Olina Resort Phase II Development Site, Honouliuli, Ewa, District, Island of O'ahu.* PHRI, Hilo, HI.
- 1990 *Archaeological Survey Kapolei Golf Course Addition Honouliuli, 'Ewa District Island of O'ahu.* PHRI, Hilo, HI.

**Shapiro, William A. and Paul H. Rosendahl**

- 1988 *Interim Report: Summary of Findings Sinkhole Test Excavations Camp Malakole Industrial subdivision Site, Land of Honouliuli, 'Ewa District, Island of O'ahu (TMK: 9-1-14: Por. 4 & 5).* Paul H Rosendahl, Inc., Hilo, HI.

**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 by BPBM Department of Anthropology, Honolulu
- 1978 *Archaeological and Paleontological Salvage at Barbers Point, O'ahu.* Prepared for U.S. Army Corps of Engineers, Pacific Ocean Division by BPBM Department of Anthropology, Honolulu.
- 1979 *Cultural Resources Survey at New Dredged Material Disposal Sites at Barbers Point, O'ahu.* Prepared for Prepared for U.S. Army Corps of Engineers, Pacific Ocean Division by BPBM Department of Anthropology, Honolulu.
- 1989 *Letter to Mr. Walter Yoshimitsu, Administrator, Estate of James Campbell.* Dated March 8, 1989.

**Sinoto, Akihiko and Paul Titchenal**

- 2002 *An Archaeological Inventory Survey of the Proposed Desalination Facility Barbers Point, Honouliuli, 'Ewa, O'ahu (TMK: 9-1-31:28).* Aki Sinoto Consulting, Honolulu.

**Sterling, Elspeth P. and Catherine C. Summers (compilers)**

- 1978 *Sites of O'ahu.* Dept. of Anthropology, B.P. Bishop Museum, Honolulu.

**Terry, Daniel, Dominique Cordy, Tracy Hoffman and Hallett H. Hammatt**

- 2004 *Archaeological Inventory Survey of Two Sinkholes at Kapolei, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island.* Cultural Surveys Hawai'i, Kailua, HI.

**Thrum, Thomas G.**

- 1907 *Hawaiian Folk Tales, A Collection of Native Legends.* A.C. McClurg & Co., Chicago, IL.

**Thurman, Doug, Trevor Yucha and Hallett H. Hammatt**

- 2009 *Archaeological Literature Review and Field Inspection Report for the I C Sunshine Solar Energy Project, Honouliuli Ahupua'a, 'Ewa District, O'ahu TMK: [1] 9-1-032:001* Cultural Surveys Hawai'i, Kailua, HI.

**Tuggle, H. David**

- 1984 *Report to File on Outlease Survey.* Pacific Division, Naval Facilities Engineering Command, Honolulu.
- 1997a *Archaeological Inventory Survey for Construction Projects at Naval Air Station Barbers Point, O'ahu, Hawai'i.* IARII, Honolulu.
- 1997b "The 'Ewa Plain," *Hawaiian Archaeology*, Volume 6:8-36, Journal of the Society for Hawaiian Archeology. Honolulu.

**Tuggle, H. David and M. J. Tomonari-Tuggle**

1997 *A Cultural Resource Inventory of Naval Air Station Barbers Point, O'ahu, Hawai'i, Part I: Phase I Survey and Inventory Summary*. IARII, Honolulu.

**Tulchin, Jon & Hallett H. Hammatt**

2009 *Archaeological Assessment for The Villas at Malu'ohai, a 2-acre Parcel in Kapolei, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu, TMK: [1] 9-1-016:064 por.* Cultural Surveys Hawai'i Inc., Kailua, HI.

**Tulchin, Todd, Constance R. O'Hare and 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 (TMK: (1) 9-1-075: 044 and 050)*, Cultural Surveys Hawai'i Inc., Kailua, HI.

**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, HI.

**Wickler, Stephen and H. David Tuggle**

1997 *A Cultural Resource Inventory of Naval Air Station Barbers Point, O'ahu, Hawai'i Part II: Phase II Inventory Survey of Selected Sites*. IARI, Honolulu, HI.

**Wilford, Glen and Terrance McGovern**

2003 *Defenses of Pearl Harbor and O'ahu 1907-50*. Osprey Publishing, Oxford, UK.

**Wulzen, Warren and Paul H. Rosendahl**

1997 *Subsurface Testing and Data Recovery Excavations, Site 50-80-12-2220, Nimitz Beach, Naval Air Station Barbers Point*. PHRI, Hilo, HI.

**APPENDIX C**  
**SHPD CONCURRENCE LETTER**  
**FOR**  
**THE COMPLIANCE**  
**WITH SECTION 106 OF THE NHPA**

NEIL ABERCROMBIE  
GOVERNOR OF HAWAII



WILLIAM J. AILA  
CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT

PAUL J. CONRY  
INTERIM FIRST DEPUTY

WILLIAM M. TAM  
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES  
BOATING AND OCEAN RECREATION  
BUREAU OF CONVEYANCES  
COMMISSION ON WATER RESOURCE MANAGEMENT  
CONSERVATION AND COASTAL LANDS  
CONSERVATION AND RESOURCES ENFORCEMENT  
ENGINEERING

FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
KAHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS

**HISTORIC PRESERVATION DIVISION  
DEPARTMENT OF LAND AND NATURAL RESOURCES**

601 Kamokila Boulevard, Suite 555  
Kapolei, HI 96806

September 4, 2012

Dr. Hallett H. Hammatt, Principal Investigator  
Cultural Surveys Hawai'i, Inc.  
P.O. Box 1114  
Kailua, Hawaii 96734

LOG NO: 2012.2464  
DOC NO: 1208SL21  
Archaeology

Dear Dr. Hammatt:

**SUBJECT: Chapter 6E-42 Historic Preservation Review –  
Archaeological Assessment for Chevron Solar Site at Campbell Industrial Park  
Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu  
TMK: (1) 9-1-031:002 por.**

Thank you for the opportunity to review this revised draft report titled *Archaeological Assessment for a Chevron Solar Site at James Campbell Industrial Park, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu [TMK: (1) 9-1-031:002 por.]*, (Runyon, Hammatt, and Shideler, August 2012). The submittal was received by the Kapolei office of SHPD on August 14, 2012, in response to our recent review of a June 2012 draft (Log 2012.1675, Doc. 1207SL13). The proposed project includes installation of solar panels and related infrastructure, with anticipated ground disturbance involving primarily anchoring of solar panel arrays and connecting cables. The solar site area of potential effect (APE) is defined as about 5-acres on the western side of the 10-acre property. The APE will not include the eastern strip of the property.

A 100% pedestrian survey was conducted only in the 5-acre APE, which is characterized by extensive prior grading and development, including the present commercial use of the area as a base yard. No beach sand (BS) was observed within the property during the pedestrian survey and was assumed to have been removed by previous grading. Correlation of the project area with an USGS 7.5 minute series topographic quadrangle map and soil survey data from Foote et al. (1972) indicates the potential of beach sands only along the very southern edge of the project area.

The archaeological assessment report provides a thorough discussion of the environment, background research, and previous archaeological investigations. The report indicates that no historic properties have been identified within the 10-acre property or the immediate vicinity and that the 5-acre APE "has been graded entirely previously down to raised reef limestone hard pan" within the planned solar project area. SHPD concurs with no further work within the APE, but stipulates that an inventory survey will be required prior to any future ground-disturbing activities within the section of the property outside the APE. Should any sinkholes, cultural deposits, or burials be identified, all work shall be stopped and SHPD shall be notified and consulted on the development of an appropriate mitigation strategy. Also, any inadvertent discovery of human skeletal remains will be dealt with according to HAR §13-300-40.

The revisions made to this report adequately address the concerns raised in our prior correspondence. The revised report meets the standards set forth in Hawaii Administrative Rule §13-276 and is accepted by SHPD. Please send one hardcopy of the document, clearly marked FINAL, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office, attention SHPD Library. Please contact Susan A. Lebo at (808) 692-8019 or [Susan.A.Lebo@hawaii.gov](mailto:Susan.A.Lebo@hawaii.gov) if you have any questions or concerns regarding this letter.

Aloha,

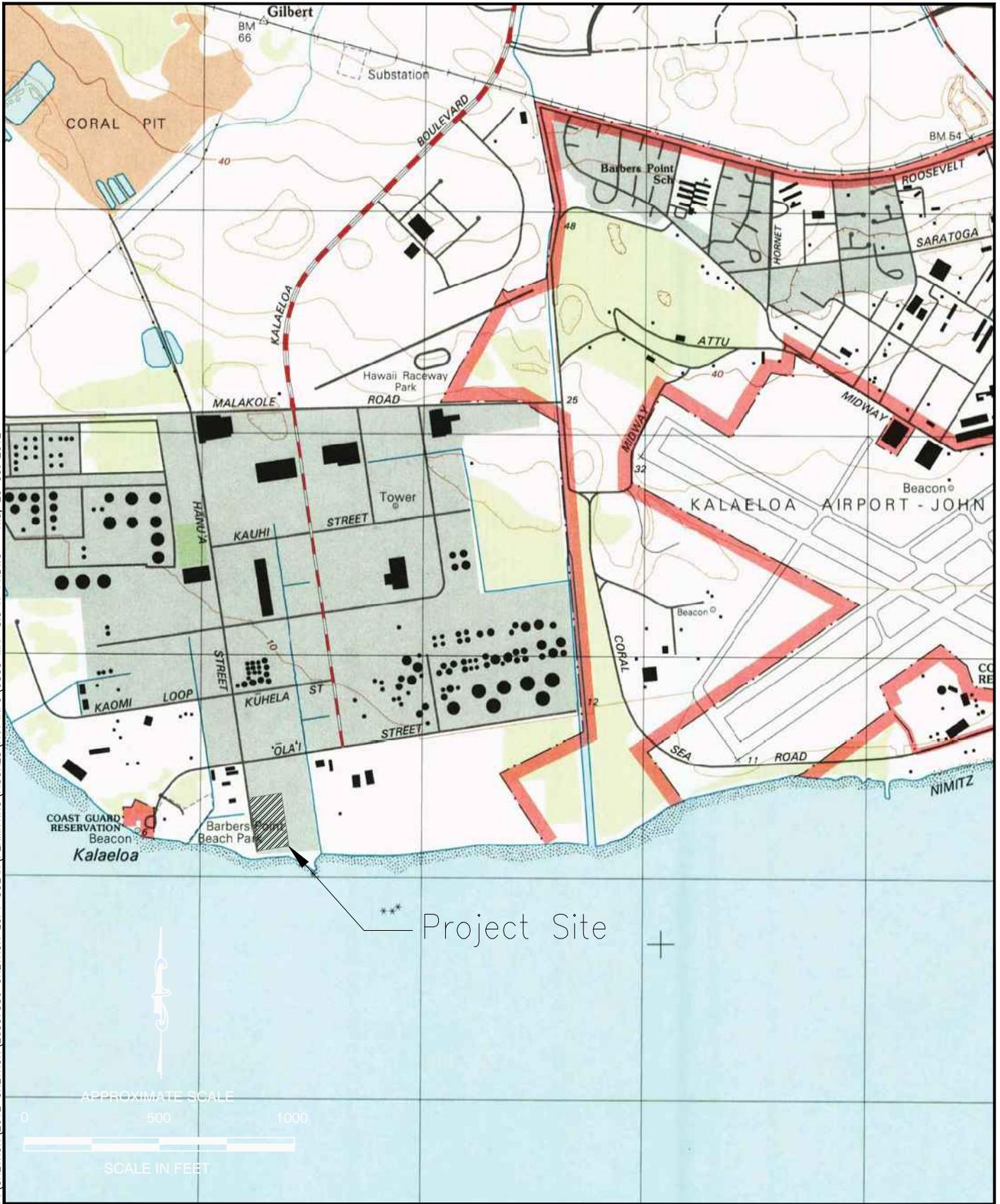
A handwritten signature in black ink, appearing to read "Theresa K. Donham".

Theresa K. Donham, Archaeology Branch Chief

**APPENDIX D**  
**NOTICE OF PROPOSED**  
**CONSTRUCTION OR ALTERATION (FAA)**



P:\CHEVRON\2012\CHEVRON\26537586\CHEVRON\_LCPV\_SOLAR\_PERMITTING\FIGURES\FAA\_INFO\USGS\_MAP\_8.5\_X\_11.DWG - Thu, 25 Oct 2012

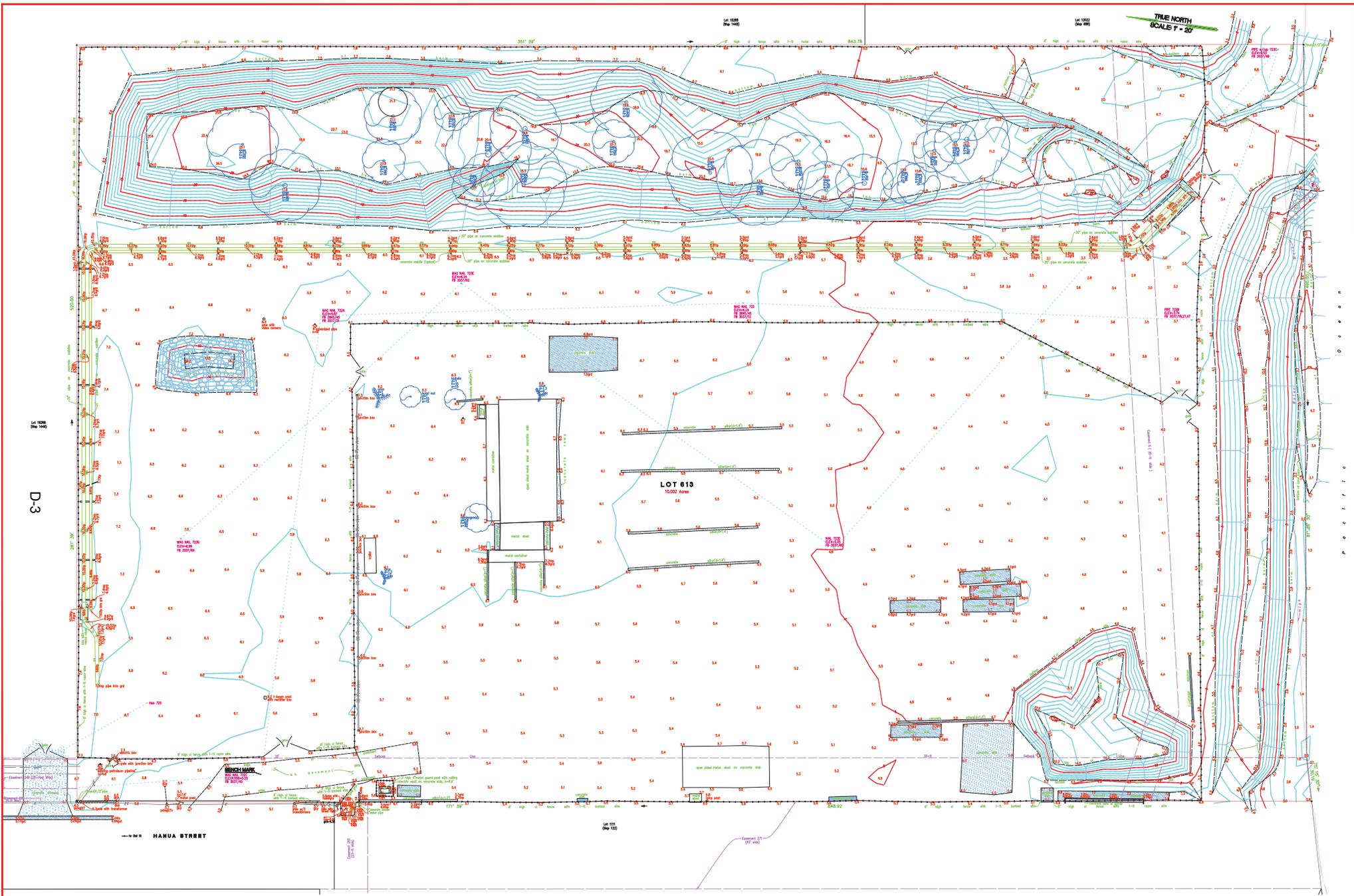


USGS  
 U.S. DEPARTMENT OF THE INTERIOR  
 U.S. GEOLOGICAL SURVEY  
 U.S. DEPARTMENT OF DEFENSE  
 NATIONAL IMAGERY AND MAPPING AGENCY

### USGS 7.5 MINUTE QUADRANGLE MAP

EWA QUADRANGLE  
 Chevron Hawaii PV (10 acre Site)  
 TMK: (1)9-1-031-002  
 Kapolei, Oahu, Hawaii





**TOPOGRAPHIC SURVEY MAP**  
**LOT 613**  
**OF LAND COURT APPLICATION 1069 (MAP 95)**  
**CHEVRON 10 ACRE SITE**  
**AT HONOLULU, EWA, OAHU, HAWAII**

- NOTES:
1. UNDERGROUND PUBLIC UTILITIES SHOWN HEREON ARE FOR INFORMATION ONLY. NO GUARANTEE IS MADE ON THE ACCURACY OR COMPLETENESS OF SAID INFORMATION.
  2. ORIGIN OF BENCH MARKS: BENCH MARK REFERRED TO EXISTING STREET MONUMENT AT THE INTERSECTION OF HANUA STREET AND OAHU STREET. TSP OF BRASS PIN ELEVATION = 7.74 AS SHOWN ON CASI AS-BUILT NO. 21-1-2-3-1 PLAN & PROFILE OAHU STREET STATION-00 TO STATION-00 SHEET 3 OF 16, DEPARTMENT OF PLANNING & PERMITTING, CITY & COUNTY OF HONOLULU, HAWAII.

DATE: JULY 12, 2012  
 FIELD BOOK NO. 2845,3037

TAX MAP KEY: 9-1-31: 2