FINAL
ENVIRONMENTAL ASSESSMENT

HAWAI‘I JOINT SERVICES
SOLAR POWER GENERATION

May 2013

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Final Environmental Assessment
Hawai‘i Joint Services Solar Power Generation

O‘ahu and Kaua‘i Installations

Prepared for:

Commander Navy Region Hawaii

Marine Corps Base Hawaii

United States Army Garrison-Hawaii

Prepared By:

Naval Facilities Engineering Command Pacific

May 2013

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COVER SHEET

Proposed Action: Provide suitable sites on Department of Defense (DoD) installations in Hawai‘i for the installation and operation of photovoltaic (PV) systems

Type of Document: Environmental Assessment (EA)

Co-Agencies: United States Army Garrison Hawaii
Commander Navy Region Hawaii
Marine Corps Base Hawaii

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This Environmental Assessment (EA) has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969, 42 US Code, Section 4321 et seq.; the Council on Environmental Quality regulations for implementing NEPA; 40 Code of Federal Regulations (CFR), Parts1500-1508, DoD Directive 6050.1, entitled “Environmental Effects in the United States of Environmental Actions;” and DoD Instruction 4715.9, entitled “Environmental Planning and Analysis,” and procedures for implementing NEPA for the Army codified at 32 CFR Part 651, and for Navy/Marine Corps codified at 32 CFR Part 775.

The Proposed Action is to provide suitable sites on DoD installations in Hawai‘i to a private entity for the installation and operation of PV systems in order to reduce the installations’ reliance on non-renewable energy. The proposed PV systems would be located on eighty-five (85) sites, including sixty-eight (68) on rooftops of existing DoD buildings, twelve (12) on structures above existing parking lots, and five (5) mounted on the ground. The PV systems would generate between seven (7) and fifty-six (56) megawatts of alternate current power. The proposed sites are located at multiple DoD installations, including, on the island of O‘ahu: Schofield Barracks Military Reservation, including the East Range and Wheeler Army Airfield; Joint Base Pearl Harbor-Hickam including Waipi‘o Peninsula and the Wahiawa Annex; Marine Corps Base Hawaii including Kaneohe Bay, Camp Smith, Puuloa Range Training Facility, and Pearl City Annex; and on the island of Kaua‘i: Pacific Missile Range Facility.

The Proposed Action would not significantly impact the following resources: land use compatibility, visual resources, air quality, water resources, biological resources (terrestrial and marine), cultural resources, geology and soils, hazardous materials and wastes, and socioeconomics, environmental justice, and protection of children. The Proposed Action is considered a de minimis activity as agreed upon between the Navy and the State of Hawai‘i Coastal Zone Management (CZM) Program. Consultations under the National Historic Preservation Act have been conducted, and the Hawai‘i State Historic Preservation Officer concurred with the effects determinations for the proposed sites.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AC	alternating current
APE	Area of Potential Effect
Bldg	building
BMPs	Best Management Practices
CAA	Clean Air Act
CDF	Confined Disposal Facility
CEQ	U.S. Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNRH	Commander, Navy Region Hawaii
CONUS	Continental U.S.
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBA	Decibels
DBEDT	Hawai'i Department of Business, Economic Development & Tourism
DC	direct current
DDESB	U.S. Department of Defense Explosive Safety Board
DoD	U.S. Department of Defense
DSA	International Dark Sky Association
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
ESQD	Explosive Safety Quantity Distance
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
ha	hectares
HAMP	Historic Asset Management Process
HAPC	Habitat of Particular Concern
HDD	Horizontal Directional Drilling
HECO	Hawaiian Electric Company
HIANG	Hawaii Air National Guard
HMMP	Hazardous Materials Management Plan
HRS	Hawai'i Revised Statutes
HWMP	Hazardous Waste Management Plan
IBD	Inhabited Building Distance

IDA	International Dark-Sky Association
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
JBPHH	Joint Base Pearl Harbor-Hickam
KIUC	Kaua'i Island Utility Cooperative
cm/m/km	Centimeters/meters/kilometers
kW/mW/gW	kilowatts/megawatts/gigawatts
LED	Light-emitting diode
MBTA	Migratory Bird Treaty Act
MCB	Marine Corps Base
MHHW	Mean higher high water
MILCON	military construction
$MMTCO_2$	Million metric tons of carbon dioxide equivalent
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MWH	megawatt hour
NAAQS	National Ambient Air Quality Standard
NAVFAC	Naval Facilities Engineering Command
NCTAMSPAC	Naval Computer Telecommunications Area Master Station Pacific
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NMC EAD DET PH	Navy Munitions Command East Asia Division Detachment Pearl Harbor
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	National Resource Conservation Service
NRH	Navy Region Hawaii
NTHP	National Trust for Historic Preservation
NWR	National Wildlife Refuge
OPNAVINST	Office of the Chief of Naval Operations Instructions
PA	Programmatic Agreement
PACNAVFACENGCOM	Naval Facilities Engineering Command Pacific
PAHs	Polynuclear aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PHNSY & IMF	Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility
PHNWR	Pearl Harbor National Wildlife Refuge

P.L.	Public Law
PMRF	Pacific Missile Range Facility
PTRD	Public Traffic Route Distance
PV	photovoltaic
RVR	Removal Verification Report
SBMR	Schofield Barracks Military Reservation
SECNAV	Secretary of the Navy
SEF	Solar Energy Farm
sf	square feet or square foot
SHPO	State Historic Preservation Officer
TAL	Target Analyte List
TCRA	Time Critical Removal Action
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USAG-HI	United States Army Garrison Hawaii
USC	U.S. Code
USDASCS	U.S. Department of Agriculture, Soil Conservation Service
WAAF	Wheeler Army Airfield
WEC	Wave Energy Conversion
WWII	World War II

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CHAPTER 1.0
PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Assessment (EA) evaluates the potential environmental impacts of providing suitable sites on Department of Defense (DoD) military installations in Hawai'i to a private entity for installation and operation of photovoltaic (PV) systems. The PV systems would generate between seven (7) and fifty-six (56) megawatts (mW) of alternating current (AC) power, representing approximately two (2) to sixteen (16) percent of the total energy consumption of the installations. The PV systems would include light construction during installation followed by necessary maintenance activities performed by a solar energy contractor (herein Contractor). The DoD installations would purchase 100 percent of the power produced by the PV system(s) from the Contractor.

This EA has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969 codified in Title 42 of the United States Code (USC), Section 4321 et seq.; the Council on Environmental Quality (CEQ) procedures for implementing NEPA codified at Title 40 of the Code of Federal Regulations (CFR), Parts1500-1508, DoD Directive 6050.1, entitled "Environmental Effects in the United States of Environmental Actions," DoD Instruction 4715.9, entitled "Environmental Planning and Analysis," and procedures for implementing NEPA for the Army codified at 32 CFR Part 651, and Navy/Marine Corps codified at 32 CFR Part 775.

The Action Proponents are: Commander, United States Army Garrison Hawaii (USAG-HI); Commander, Navy Region Hawaii (CNRH); and Commanding Officer, Marine Corps Base (MCB) Hawaii. The Action Proponents are responsible for the operation of certain military installations located on DoD owned land on the islands of O'ahu and Kaua'i in the State of Hawai'i. The DoD land on O'ahu is Schofield Barracks Military Reservation (SBMR) including East Range and Wheeler Army Airfield (WAAF), which are operated by USAG-HI; Joint Base Pearl Harbor-Hickam (JBPHH) including Ford Island, Waipi'o Peninsula, West Loch Annex, Naval Computer and Telecommunications Area Master Station Pacific, and Wahiawa Annex, which are operated by CNRH; and MCB Hawaii-Kaneohe Bay, Camp Smith, Puuloa Range Training Facility and the Pearl City Annex, which are operated by MCB Hawaii (see Figure 1-1). On Kaua'i, the DoD land is located at Pacific Missile Range Facility (PMRF), which is operated by CNRH (see Figure 1-2).

1.2 PURPOSE AND NEED

1.2.1 Purpose of the Proposed Action

The purpose of the Proposed Action is to achieve the renewable energy mandates identified in section 1.2.2 with sufficient speed to meet the specified timelines while minimizing the cost and impacts on the environment. The sites may remain available for the production of renewable energy for up to 20 years. The PV systems that will be installed and operated on the sites produce clean renewable energy and reduce the amount of electricity DoD has to purchase from the public utility provider.

1.2.2 Need for the Proposed Action

The need for the Proposed Action is to decrease energy costs, stabilize future energy costs, reduce demand for energy produced from non-renewable resources, and to meet Congressional and DoD requirements, coupled with meeting long-term goals for renewable energy use set by the Department of the Army and the Department of the Navy. Recent Congressional and DoD mandates require the use of renewable energy to supply electric power to DoD installations and a reduction in dependence on foreign oil and fossil fuels. The term renewable energy is defined by the Energy Policy Act (EPAct; 42 USC 15852) as "electric energy generated from solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project." Given Hawai‘i's location in the tropics and general weather patterns, solar energy is a readily-available renewable source for power generation that DoD installations on O‘ahu and Kaua‘i could utilize. Currently, in Hawai‘i, the Hawaiian Electric Company (HECO) on O‘ahu and the Kaua‘i Island Utility Cooperative on Kaua‘i (KIUC) generate more than 90% of the electricity sold to DoD from burning fossil fuels.

The requirement for using renewable energy in the Federal government started with the 2005 EPAct (P.L. 109-58), which directed the federal government to utilize more renewable energy; specifically 7.5% or more shall be renewable energy by fiscal year 2013.

Additional requirements for using renewable energy are spelled out in:

- Energy Independence Security Act (EISA) of 2007 requiring the Federal government to improve its overall energy performance.
- Section 2852 in the National Defense Authorization Act of Fiscal Year 2007, which amended 10 USC §2911 (DoD’s energy performance goals and plans) to require that by

2025 and thereafter, DoD produce or procure at least 25% of the total electric energy it consumes from renewable sources.

- Executive Order 13423, mandating that 50% of all renewable energy required under the EPAct must come from "new" renewable energy.
- 2009 Secretary of the Navy Energy Policy to produce at least half of our shore-based energy requirements from alternative sources by 2020.
- Office of the Chief of Naval Operations Instruction (OPNAVINST) 4100.5E, "Shore Energy Management," which requires Navy region and installation commanders to meet or exceed the renewable energy goals set forth in the statutory and regulatory mandates listed above in a cost-effective manner.
- Army Installation Management Campaign Plan 2010-2017, which establishes goals for use of at least 5% renewable energy in 2010-2012, 7.5% in 2013, and 25% in 2025, to be met by each Army installation command.

To implement these requirements, 10 USC §2922a allows for the DoD components to enter into long term contracts (up to thirty (30) years) for the purchase of renewable energy that is produced on Federal and/or private property.

1.3 REGULATORY OVERVIEW

This EA has been prepared in accordance with applicable federal regulations and instructions, as well as with other applicable laws, ordinances, rules and policies. These include, but are not limited to the following:

- NEPA as amended by Public Law 94-52, July 3, 1975 (42 U.S.C. 4321 *et seq.*), which requires environmental analysis for major federal actions significantly affecting the quality of the environment;
- Council on Environmental Quality (CEQ) regulations, as contained in 40 CFR Parts 1500 to 1508, which direct federal agencies on how to implement the provisions of NEPA;
- DoD Directive 6050.1, Environmental Effects in the United States of Environmental Actions;
- DoD Instruction 4715.9 Environmental Planning and Analysis; and,
- NEPA procedures specifically for the Army (32 CFR Part 651), and Navy/Marine Corps (32 CFR Part 775).

1.3.1 Agency Coordination and Permit Requirements

As part of the NEPA compliance process, DoD has engaged in coordination/consultation and permitting with regulatory agencies to ensure that all applicable laws, rules, regulations, and policies have been satisfied with respect to the Proposed Action. Coordination and consultation includes obtaining:

- Permit from the U.S. Army Corps of Engineers, Honolulu District in accordance with Section 10 of the Rivers and Harbors Appropriation Act of 1899 related to proposed horizontal direction drilling under Pearl Harbor.
- Concurrence from the Hawai'i State Historic Preservation Officer (SHPO) and other consulting parties on potential effects to historic properties in accordance with National Historic Preservation Act (NHPA) of 1966 (16 USC 470 (1994); 36 CFR 800, Regulations for the Protection of Historic Properties).

In addition, DoD installations are required to comply with specific instructions designed to implement environmental management and protection measures, safety policies and procedures, and other orders and directives intended to guide practices and activities potentially affecting environmental conditions at each installation or training area. These practices and activities include management of hazardous materials and wastes, minimizing disturbance to any known populations of sensitive species, and avoiding or minimizing impacts to cultural resources.

1.4 PUBLIC NOTIFICATION AND REVIEW

In accordance with DoD and the various Services' policies and/or instructions for implementing NEPA, comments were solicited from the public on this Final EA and a Draft Finding of No Significant Impact (FONSI). Copies of the Final EA and Draft FONSI were placed in local libraries in the State of Hawai'i and will be available over the internet. Appendix A lists the agencies and libraries that received a copy of the Final EA and Draft FONSI. A Notice of Availability (NOA) was published in local newspapers of general distribution on O'ahu and Kaua'i, as well as in the State of Hawai'i Office of Environmental Quality Control's bulletin, *The Environmental Notice*. The Services will fully consider all comments received prior to making a decision regarding the Proposed Action. No comments were received during the public review period. Interested parties may obtain a copy of the EA and FONSI from Naval Facilities Engineering Command Pacific, 258 Makalapa Drive, Suite 100, JBPHH, HI 96860-3134, Attention: EV21 EA Project Manager; Telephone (808) 472-1395.

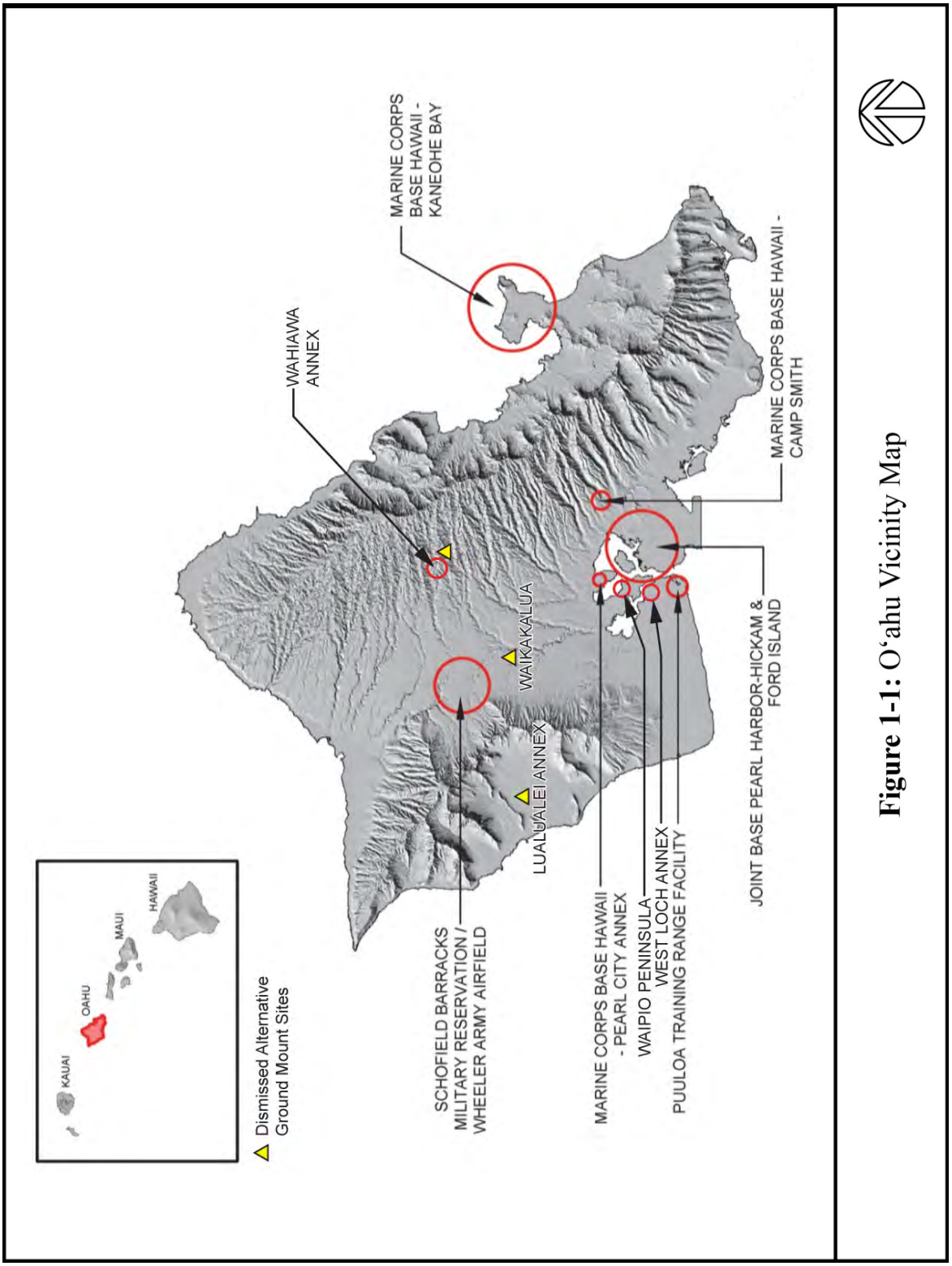


Figure 1-1: O'ahu Vicinity Map

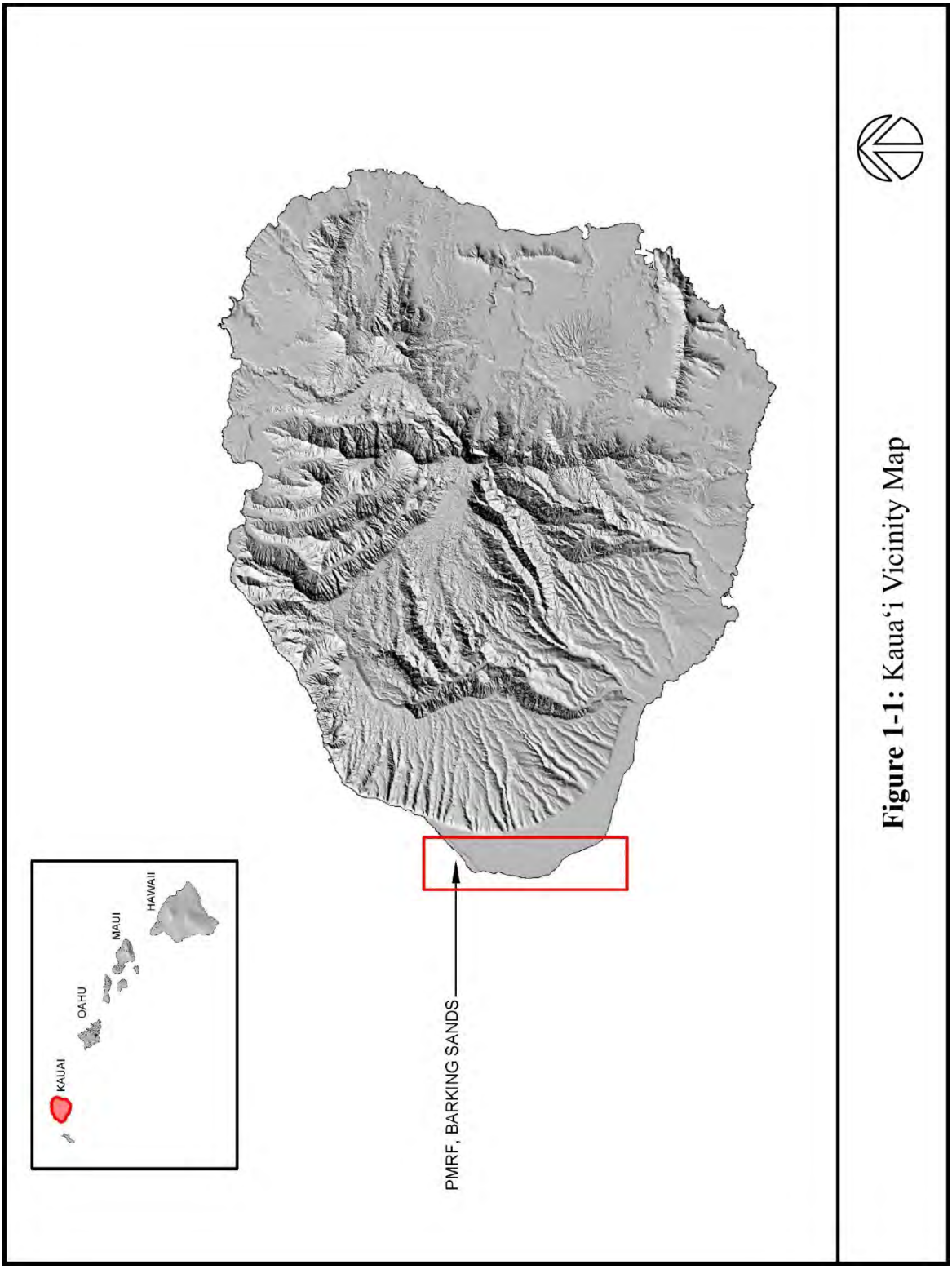


Figure 1-1: Kaua'i Vicinity Map

CHAPTER 2.0
PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Commander USAG-HI, Commander Navy Region Hawaii (CNRH), and Commanding Officer MCB Hawaii, each responsible for a portion of the military installation property in Hawai'i, propose to make eighty-five (85) sites on various DoD installations in Hawai'i available to a solar energy contractor(s) for the construction, installation, monitoring, operation and maintenance of PV systems. Sixty-eight (68) proposed sites are on rooftops of existing buildings. Twelve (12) sites are proposed for structures above existing parking lots and the remaining five (5) proposed sites are on parcels of land at other appropriate locations. Each DoD installation on which a site is located would purchase 100 percent of the renewable energy generated on the site to reduce energy purchased from the public utility provider (HECO on O'ahu and KIUC on Kaua'i). The combined estimated electrical power generated as a result of the Proposed Action would range between seven (7) and fifty-six (56) mW of AC power, representing approximately 2 to 16 percent of the total energy consumption of the installations.

2.1.1 Location of Proposed Action and Alternative Sites

The following generally describes the DoD installations and number of sites for each installation. The land is described in terms of the installations operated by each of the Action Proponents starting with the Army, followed by the Navy and then by the Marine Corps.

2.1.1.1 Schofield Barracks Military Reservation

SBMR is a United States Army post encompassing an area of 15,034 acres (6,084 hectares [ha]) located adjacent to the town of Wahiawā and Lake Wilson on the island of O'ahu. SBMR consists of the Main Post and the East Range. The Main Post includes the cantonment area, which contains housing, operational facilities, warehouses, training areas, and community services and facilities. The East Range is located to the east of the Main Post and is primarily used for infantry training and maneuvers. Other facilities at the East Range include education facilities, the U.S. Army Non-Commissioned Officers Academy, warehouses, and maintenance facilities. There are a total of twenty (20) proposed rooftop sites: twelve (12) located in the Main Post cantonment area and eight (8) at the East Range. Three (3) PV structures would be in the Main Post cantonment area (see Figures 2-2 and 2-3).

2.1.1.2 Wheeler Army Airfield

WAAF is located in north-central O‘ahu and is bordered on the northwest by the SBMR Main Post and on the northeast by the East Range and Kamehameha Highway. WAAF encompasses 1,370 acres (554 ha) and has administration, housing, maintenance, training flight, security and law enforcement facilities. There is one (1) proposed rooftop site located on Building 1052, which is on the south side of the airfield (see Figure 2-4).

2.1.1.3 Joint Base Pearl Harbor-Hickam

In 2010, Naval Station Pearl Harbor joined with Hickam Air Force Base to become JBPHH combining the two bases into a single joint installation to support both Air Force and Navy missions in the Pacific. JBPHH is the largest of CNRH's bases with significant land holdings at the main base, Wahiawa Annex, West Loch Annex, Lualualei Annex, Pearl City Peninsula and Waipi‘o Peninsula, and other outlying areas. The JBPHH serves as the home base for U.S. Air Force air wings and Navy surface ship and submarine squadrons, and is a regional maintenance center for ships and submarines. The main base is host to Commander U.S. Pacific Fleet and the Headquarters Pacific Air Forces. In addition there are over 100 tenant commands that support the Navy, Air Force, and other missions in Hawai‘i and the Pacific. A summary of the JBPHH subareas that encompass the Proposed Action and alternative sites is provided below.

- Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF) is located adjacent to the main channel entrance to Pearl Harbor, and encompasses Pearl Harbor's main industrial area, ship repair basins and drydocks. The IMF facility is located at the end of Kūāhua Peninsula, immediately across Southeast Loch from the PHNSY Repair Basins. There are four (4) rooftop sites proposed here; three (3) at PHNSY and one (1) at IMF (Figure 2-5).

- There are eight (8) rooftop sites proposed at the Pearl Harbor Main Base and three (3) on Ford Island (Figures 2-5 and 2-6). Ford Island is also analyzed as an alternative to the ground mount arrays proposed for Waipi‘o Peninsula (Figure 2-15).

- The former Hickam Air Force Base (now part of JBPHH) is located south of Nimitz Highway and the H-1 Freeway Viaduct, west of Honolulu International Airport and east of the Pearl Harbor Main Base area. Primary land uses consist of airfield operations and support. There are four (4) proposed rooftop sites and one (1) proposed PV structure at the former Hickam Air Force Base (Figure 2-5).

- Navy Munitions Command East Asia Division Detachment Pearl Harbor (NMC EAD DET PH) is a tenant at West Loch Annex, which provides ammunition handling wharves,

torpedo and missile intermediate maintenance operations, and landing area for helicopters capable of transporting ordnance. The approximately 4,000-acre (1,600 ha) annex is located on the eastern edge of the 'Ewa Plain adjacent to the West Loch of Pearl Harbor. Primary vehicular access is via Iroquois Point Road and North Road via Fort Weaver Road. The Annex is split into two general areas: the ammunition wharves, magazines and operational areas located east of West Loch Drive, and a large buffer zone between West Loch Drive and the civilian residential communities within the fast growing 'Ewa Plain region of O'ahu. There is one (1) proposed rooftop site (Bldg 562) in the central Administration area, adjacent to the main harbor entrance channel (Figure 2-5 inset). West Loch is also analyzed as an alternative site for the ground mount array proposed for Waipi'o Peninsula (Figure 2-16).

- Waipi'o Peninsula is also part of JBPHH. The 1,412-acre (571-ha) peninsula separates the Middle and West Lochs of Pearl Harbor. It is accessed via the Navy-owned Waipi'o Point Access Road. The peninsula lies within the Explosive Safety Quantity Distance (ESQD) arcs associated with the West Loch Annex ammunition wharves, and is therefore largely undeveloped. Current uses include a Confined Disposal Facility (CDF) to manage Pearl Harbor dredged materials; the Naval Inactive Ships Maintenance Office, Pearl Harbor; the Beckoning Point Magnetic Silencing Facility for submarines; and the City and County of Honolulu's Waipi'o Soccer Park and Ted Makalena municipal golf course. A 42-acre (17-ha) area between the Waipi'o Point Access Road and the Middle Loch shoreline is the proposed JBPHH ground mount site. The site would be linked to the JBPHH utility grid via underground transmission lines (Figure 2-7).

- Pearl City Peninsula. The approximately 644-acre (261-ha) peninsula separates the East and Middle Lochs of Pearl Harbor and is accessed by Lehua Avenue that intersects with Farrington Highway. The peninsula supports Navy family housing and operational areas along the south and east waterfronts. The northeast quadrant of the peninsula includes several Marine Corps warehouses ("Pearl City Annex" – Figure 2-12) and one adjacent proposed ground mount site (Figure 2-14). The northwest quadrant of the peninsula (where an alternative site for the ground mount array proposed for Waipi'o Peninsula was analyzed) is largely vacant consisting of a closed wastewater treatment plant and landfill and a former fuel tank farm. The Waiawa Unit of the Pearl Harbor National Wildlife Refuge (PHNWR) lies along the Middle Loch shore of this quadrant.

- Wahiawa Annex is also referred to as the Naval Computer Telecommunications Area Master Station Pacific (NCTAMSPAC), located several miles north of Wahiawā in Central O'ahu. The 700-acre (283-ha) annex is accessed from Whitmore Avenue via Kamehameha Highway and lies approximately 20 miles (32 km) north of Pearl Harbor. The annex manages, operates and maintains DoD telecommunication assets. Major uses

include communications facilities and supporting administrative and housing uses. Three (3) proposed rooftop sites are located in the "downtown" area of the annex (Figure 2-6).

2.1.1.4 Pacific Missile Range Facility

PMRF, Barking Sands, is a U.S. Naval facility located five (5) miles (8 km) northwest of Kekaha in the Waimea district on the island of Kaua'i. The base covers approximately 2,385 acres (965 ha) and includes a 6,000-foot (1829-m) runway with operations and maintenance facilities. One (1) proposed ground mount site is located near an existing roadway (Nohili Road), north of the existing dog kennels (Figure 2-8).

2.1.1.5 Marine Corps Base Hawaii

In April 1994, the Marine Corps consolidated all of its bases and facilities in Hawai'i under a single command – MCB Hawaii, headquartered on the base at Kāne'ohe Bay. MCB Hawaii consists of MCB Hawaii-Kaneohe Bay on the Mōkapu Peninsula, Camp Smith in Hālawa Heights, Pearl City Annex on the Pearl City Peninsula, Puuloa Range Training Facility near 'Ewa Beach, and Marine Corps Training Area Bellows in Waimānalo (not part of this EA).

- MCB Hawaii-Kaneohe Bay encompasses 2,951 acres (1194 ha) and is located on O'ahu's northeastern shore, on Mōkapu Peninsula. Mōkapu Peninsula is bounded by the waters of Kāne'ohe Bay on the west, the Pacific Ocean to the north, Kailua Bay on the east, and a residential development to the south. Kailua and Kāne'ohe are the communities nearest to MCB Hawaii-Kaneohe Bay. There are twenty-six (26) proposed rooftop sites, seven (7) proposed sites on existing parking lots, and one (1) proposed ground mount site on available land at Ulupa'u foothill (Figures 2-9 and 2-13).

- MCB Hawaii-Camp Smith encompasses 200 acres (81 ha) in the town of ʻAiea on the island of O'ahu, near the community of Hālawa Heights. It is the headquarters of Marine Forces Pacific as well as the United States Pacific Command and Special Operations Command Pacific. Two (2) proposed sites are at Camp Smith; one (1) on an existing parking lot and one (1) on a building rooftop. Both sites are located in the southeastern portion of the base (Figure 2-10).

- MCB Hawaii-Puuloa Range Training Facility is located near Pearl Harbor in an area commonly referred to as Iroquois Point. Iroquois Point encompasses approximately 0.5 square miles (1.3 km^2) which includes the Puuloa Range Training Facility, a Navy Exchange store, a gas station and an elementary school. One (1) ground mount site is proposed for the Puuloa Range Training Facility on available land, adjacent to the main gate near the administration area (Figure 2-11).

- MCB Hawaii-Pearl City Annex is located on the Pearl City peninsula; northwest of JBPHH. One (1) ground mount site is proposed for the Pearl City Peninsula on available land at the north end of the peninsula, near the warehouse area (Figure 2-12).

2.1.2 Description of PV Systems

The major components for PV systems are:

- **PV module**s **(panels)** – convert sunlight into electricity; also commonly referred to as "solar panels".
- **Solar charge controller**s – regulate the voltage and current coming from the PV panels as well as the amount of current sent to a battery system if one has been incorporated into the system.
- **Inverters** – convert DC produced by the PV panels into Alternating Current (AC) which is sent to the building(s) or electrical grid that will consume the electricity.
- **Cables** – transmit electricity to consumers; similar to the cables commonly used by utility companies.

PV panels can be installed either horizontally or tilted at an angle to maximize their ability to capture direct solar rays and to permit rainwater runoff. The PV panels are connected in series or parallel and generate DC electricity which is converted to AC by the inverter. The particular requirements for each installed system would be determined by the Contractor. The Contractor would be responsible for the installation and periodic on-site maintenance of the PV systems. Since the PV system has no moving parts, very little maintenance is required. Periodic cleaning of the panels using water (no chemical agents) and removal of dust and debris would be sufficient. Periodic checks of the system/inverter, panel housing, wiring and roof mounts would be necessary. The Contractor is also responsible for negotiating interconnection agreements with the local utility company and complying with State of Hawai'i Public Utility Commission notice requirements.

Currently, it is not anticipated that excess power would be generated by the PV systems, and the sale of excess power is not allowed. In the future, if regulations allow, DoD may consider requests for the sale of excess power on a Task Order basis.

2.1.3 Installation Methods

DoD proposes to use three types of PV installations (Figure 2-1) on the sites covered by this EA as described below.

2.1.3.1 Rooftop

A PV rooftop installation is arranged such that the footprint of the PV systems conforms to the relative size of the roof, or a portion of the roof, and affixes to the roof such that the roof continues to perform its intended function. Since 1997, DoD has installed similar rooftop PV systems at various bases in the Southwestern United States and in Hawai'i. All rooftop PV systems will lay on racks, mostly flush with the roof surface. Depending on the roof characteristics, the racks will be ballasted, bolted, or clipped onto the roof, with no more than a five degree tilt relative to the plane of the roof. When possible, the PV panels are located several feet away from the edge of the roof to reduce or eliminate visibility from ground level and to provide safe maintenance access to the PV panels.

A DC cable will be enclosed in conduit that will run to the combiner boxes on the roof. From the combiner boxes, cable will run to DC-to-AC inverters on the ground. Inverters may be housed inside the building, or outside on small concrete pads located close to the building. Three-phase AC cable output from the inverter may tie to the building transformer, building switchgear, or require a new transformer mounted on a pad outside the building. Rigid underground conduit will typically enclose the AC cable when it exits the building. When building power demand meets or exceeds PV power production, no power will flow to the electrical distribution external to the building. When building power demand is below PV power production, power will flow into the electrical distribution system external to the building.

2.1.3.2 PV Structure

A PV structure performs the dual functions of producing electricity while also providing shade and weather protection for vehicles parked beneath. Since 1997 the DoD has been installing carport-style PV structures on its bases. Examples of these PV structures include a 924-kilowatt system at Naval Base Coronado, and a 471-kilowatt system at MCB-Hawaii Kaneohe Bay. The proposed PV structures would be built on existing parking areas. The size of footings for the structure will depend on soil samples and geotechnical analysis. Combiner boxes will be mounted on the PV structure and will supply DC power to the nearby concrete pad-mounted inverters. Power from the inverters will tie into the distribution system via buried conduit at existing transformers. Cables traversing the space between the PV structure and a building would be run in a trench or through existing below ground conduit pipes. Burying cable typically requires digging a 12-inch (30.5 cm) wide trench to a depth of two feet (70 cm).

Photo: Smartenergyhawaii.com 2013. 21 Feb. 2013

Rooftop

Photo: esolarenergynews.com 28 Apr 2011. 21 Feb. 2013

PV Structure

Photo: Bizbuddi.com 2012. 21 Feb. 2013

Ground Mount

Figure 2-1: Example of PV Systems

2.1.3.3 Ground Mount

Ground mount installations place PV panels in groups in a variety of configurations on available land to best utilize the dimensions of the space. Similar ground mount systems are used at DoD and commercial sites throughout the United States. Ground-mounted PV panels are aligned and angled up to twenty-five degrees from horizontal to maximize sun exposure. Optimal tilt in Hawai'i is twenty-one degrees. Ballast or piles will anchor the ground-mounted PV panel racking system. Piles are installed in the ground to a depth that depends on soil samples and geotechnical analysis.

The PV fields are typically protected by a 7-foot (2.1 m) high chain link fence.[1] Approximate height of the rack-mounted PV panels is 5 feet (1.5 m). Other standard fixtures include inverter enclosures (10 feet/3 m high) and lighting structures (10 feet/3 m high). The PV panels have an anti-reflective coating that improves light absorption while reducing glare. A DC cable from the panels to the combiner boxes on the ground will either run on suspended cable trays, or inside buried conduit. DC cable from the combiner boxes will run to inverter boxes which will feed nearby transformers (referred to as inverter-transformer blocks). The AC power cables from the inverter-transformer blocks would tie into the electrical distribution system using existing underground conduit when available, or existing or new overhead lines or underground conduit, when necessary. Burying cable typically requires digging a 2-foot (0.6 m) wide trench to a depth of 3.5 feet (1.1 m). New utility poles (to support overhead lines) require excavation to roughly 7 feet (by 1.5-foot diameter/2.1m by 0.5 m diameter), spaced approximately 200 feet (61 m) apart. The transmission line poles are approximately 40 feet (12.2 m) high (above ground level).

2.1.4 Proposed Sites for Each Type of PV System

2.1.4.1 Rooftop Installation

The locations of the sixty-eight (68) rooftop sites are described generally below and listed in Table 2-1.

- USAG-HI
  The Army has identified twenty (20) warehouse rooftop sites at SBMR and one (1) warehouse rooftop site at Wheeler Army Airfield. Three (3) buildings are two-story buildings that are mainly equipment and maintenance facilities. The remaining buildings are one-story warehouses or storage facilities with metal roofs with gutters (Figures 2-2, 2-3 and 2-4).

[1]. The National Electrical Safety Code requires a 7-foot high perimeter chain-link fence around energy-producing equipment to protect from electrocution hazards and also to protect the equipment.

- CNRH
  The Navy has identified twenty (20) rooftop sites at JBPHH; four (4) within PHNSY & IMF, eight (8) within Naval Station, including three (3) on Ford Island, four (4) within Hickam, one (1) at the West Loch Annex and three (3) at the Wahiawa Annex. Twelve (12) are one-story buildings, five (5) are two-story buildings and three (3) are three-story buildings. All of the buildings have flat roofs with a slight slope to allow for drainage (Figures 2-5 and 2-6).

- MCB Hawaii
  The Marine Corps has identified twenty-seven (27) rooftop sites on MCB Hawaii-Kaneohe Bay and one (1) rooftop site at MCB Hawaii-Camp Smith (Figures 2-9 and 2-10). Most of the buildings are single story with low slope, metal roofs.

Table 2-1: Proposed Sites for PV Systems on Building Rooftops

Installation	Site	Size (kW)	Square Foot (SF)
SBMR	Bldg 694*	TBD	15,000
	Bldg 1500*	TBD	22,795
	Bldg 1503*	TBD	80,000
	Bldg 1611	TBD	21,964
	Bldg 1650	TBD	40,000
	Bldg 1670	TBD	23,040
	Bldg 1700*	TBD	67,900
	Bldg 2069*	95**	29,700
	Bldg 2070*	TBD	63,988
	Bldg 2071*	213**	48,624
	Bldg 2623/24/25*	156**	25,898
	Bldg 2626*	121**	14,972
	Bldg 6027*	TBD	18,000
	Bldg 6039*	TBD	45,298
	Bldg 6037*	196**	40,000
	Bldg 6038/36*	236**	40,500
	Bldg 6040*	TBD	35,154
	Bldg 6041*	TBD	44,400
	Bldg 6042/43*	236**	~9,000
	Bldg 6065*	TBD	34,912
WAAF	Bldg 1052*	282**	40,000
	Bldg 327 (PHNSY&IMF)	69	11,600
	Bldg 393 (PHNSY&IMF)	368	62,380
	Bldg 1456 (PHNSY&IMF)	242**	44,332
	Bldg 1770 (PHNSY&IMF)	369**	100,783
	Bldg 1335H Youth Center (Hickam)	42	7,200

Installation	Site	Size (kW)	Square Foot (SF)
JBPHH	Bldg 1235H (Base Exchange) (Hickam)	424	72,000
	Bldg 1766H Theater (Hickam)	50	8480
	Bldg 2115H (Hickam)	360**	50,000
	Bldg 1786 Fleet Store	136	23,300
	Bldg 1631	88	14,700
	Bldg 1262	86	14,650
	Bldg 1378	68	11475
	Bldg 1407 Medical Clinic	352	60,000
	Bldg 77 (FI)	268	45,260
	Bldg 55 (FI)	296	50,100
	Bldg 187 (FI)	104	17,800
West Loch Annex	Bldg 562	58	9,820
Wahiawa Annex	Bldg 229 BEQ	38	6,470
	Bldg 230 BEQ	38	6.600
	Bldg 321 BEQ	40	6,840
MCB Hawaii-Kaneohe Bay	Bldgs 101-104 Aircraft Maintenance Hangars*	2,976	37,500
	Bldg 208 Data Center/ Warehouse*	240	31,000
	Bldg 209 Admin/Warehouse *	400	54,000
	Bldg 219 Theater/Library	112	14,400
	Bldg 242*	147**	24,866
	Bldg 271*	115**	16,000
	Bldg 373*	147**	TBD
	Bldg 375 Aircraft Maintenance Hangar*	240	32,700
	Bldg 388*	86	~9,000
	Bldg 503 BOQ	136	18,000
	Bldg 1088 Regimental HQ	66	8,500
	Bldg 1090 Exchange Retail/ Service Outlets	253**	34,300
	Bldg 1092*	179**	22,000
	Bldg 1304 Missile Maintenance	134	17,000
	Bldg 1404 Exchange Warehouse/ Office	200	27,600
	Bldg 1629 Enlisted Club	192	25,500
	Bldg 1666 Bowling Alley	128	17,300
	Bldg 3037*	55**	10,000
	Bldg 4088 Medical Warehouse	248	33,60
	Bldg 6002 Communications	78	10,000
	Bldg 6039 Communications/ Electronics Maintenance	134	17,000
	Bldg 6088 Commissary	388	49,200
	Bldg 6109/6477 Exchange Retail/ Service Outlets	800	103,207

Installation	Site	Size (kW)	Square Foot (SF)
MCB Hawaii-Camp Smith	Bldg 600*	152**	~20,000
TOTAL PROPOSED SITES FOR PV SYSTEMS ON ROOFTOPS = 68			

* Photographs provided in SHPO Consultation letter, Appendix B
** Sites in contract Task Order #2

2.1.4.2 PV Structure Installation

The twelve (12) PV structures are described generally below and would be located in the parking area adjacent to the buildings listed in Table 2-2. The proposed PV structures would be single-story structures with a minimally sloped roof to ensure rainwater runoff.

- USAG–HI
  The Army has proposed three (3) sites for PV structures at SBMR (Figure 2-2).

- CNRH
  The Navy has proposed one (1) site for PV structure on a parking lot at JBPHH (Figure 2-5).

- MCB Hawaii
  The Marine Corps has proposed eight (8) total sites for PV structures. Seven of the sites would be located at existing parking lots at Kaneohe Bay, and one at Camp Smith within an existing parking area (Figures 2-9 and 2-10).

Table 2-2: Proposed Sites for PV Systems on Structures

Facility	Site	Size (kW)	Square Foot (SF)
SBMR	Bldg 2074 BEQ Parking	TBD	16,000
	Bldg 2085 BEQ Parking	TBD	36,000
	Bldg 2094 BEQ Parking	TBD	60,200
JBPHH	Bldg 1335H Parking	TBD	11,340
MCB Hawaii – Kaneohe Bay	Bldg 1090	232	97,200
	Bldg 1604/1632 BEQ Parking	59	24,600
	Bldg 1634.1635 BEQ Parking	43	18,000
	Bldg 1655/1656 BEQ Parking	112	46,800
	Bldg 3037	104**	20,000
	Bldg 3088 SNCO/Golf Clubhouse	81	10,000

	Bldg 6088/6109/6477 Mokapu Mall Parking Lot	364	151,800
MCB Hawaii-Camp Smith	Bldg 450	46**	15,000
TOTAL PROPOSED SITES FOR PV SYSTEMS ON STRUCTURES = 12			

** Sites in contract Task Order #2

2.1.4.3 Ground Mount Installation

The five (5) proposed PV ground mount sites are described generally below and listed in Table 2-3.

- USAG-HI
  The Army has not proposed any sites for PV ground mount systems.

- CNRH
  At this time, CNRH's proposed action involves the selection of only one site for a large ground mount solar PV array on O'ahu. Combined with the smaller rooftop and PV structure sites, this will allow CNRH to meet its most immediate renewable energy goals. However, unless other technologies become viable in the near future, attainment of mid- and long-term goals will require selection of additional site(s) for large ground mount arrays. Waipi'o Peninsula is the Preferred Alternative for the current site, but the sites discussed in Section 2.2 are also reasonable alternatives and are thus fully analyzed in this EA. Should any of the alternative sites be selected for use in the future, NHPA Section 106 consultations would be undertaken at that time. Additional NEPA analysis and/or other associated consultations would also be undertaken at that time if/as necessary.

  Waipi'o Peninsula. The proposed 42-acre (17 ha) site is on Navy-owned land at Waipi'o Peninsula, along the western shore of Middle Loch, just north of the Confined Disposal Facility (CDF) and Beckoning Point and south of the Naval Inactive Ship Maintenance Facility (Figure 2-7). The site was previously farmed by the Oahu Sugar Company which ceased operations in 1995, and the site has been fallow since then. The entire site lies within the West Loch Annex ESQD arc, in a zone that restricts placement of any inhabited buildings. The adjacent CDF also generates an ESQD arc associated with ordnance removed during Pearl Harbor dredging operations.

  The site would need to be cleared and leveled prior to installing the racking system and PV panels. A 20-foot (6-m) setback from the shoreline escarpment will be imposed during the term to prevent any damage to shoreline vegetation. As noted in Section 2.1.3.3, proposed construction would likely include a 7-foot (2.1-m) high security perimeter fence, a modular racking system, and above ground or buried cables carrying

DC power from the panels to inverter boxes that would be arranged at roughly equal intervals within the site.

The closest point of connection to the JBPHH electrical grid for the PV system would be Stations C or D at the PHNSY&IMF. Electricity generated by the Waipi'o Peninsula PV panels would be distributed to the existing power grid at PHNSY & IMF via a new transmission corridor consisting of three segments (Figure 2-7):

- A new underground transmission line extending approximately 9,000 feet (2,750 m) along existing roads from the ground mount site to a point near the southern tip of the peninsula near the Whiskey 22 wharf.
- A new underground conduit extending approximately 1,300 feet (400 m) across (under) the main entrance channel bottom to a point near the western terminus of Kean Road at Hospital Point, constructed by Horizontal Directional Drilling (HDD) technology (Figure 2-7).[2]
- New underground concrete encased duct bank (approximately 750 feet [229 m] long, 2 feet [0.6 m] wide and 4 feet [1.2 m] deep) terminating at Station D, within Building 177 (within PHNSY & IMF).

Technical studies to identify specific equipment requirements and interconnections to support the integration of power into the existing electrical distribution systems may be required. These studies may identify upgrades to the existing electrical distribution system such as, but not limited to, replacing relays, increasing the size of a panel board, and installing switches or a new transformer. The Contractor would be responsible for obtaining the required U.S. Army Corps of Engineers permit associated with constructing the HDD conduit under the main entrance channel.

PMRF, Kaua'i. The proposed site is located adjacent to the housing area of the main base (Figure 2-8). The site is 90,000 square feet (2.0 acres/0.8 ha) located near an existing roadway (Nohili Road) and just north of the existing Navy Exchange Gas Station. The site primarily contains non-native kiawe-koa hoale (*Prosopis pallida* and *Leucaena leucocephala*) second-growth forest.

[2] HDD is a trenchless directional boring technique utilizing a computer controlled drill head that would pass through the substrate underlying the harbor (approximately 30-100 feet [9-30 m] under the harbor mudline), avoiding contact with the marine environment (e.g., harbor benthos or water column). Actual depth is contingent on findings from vertical coring findings and subsequent design. The HDD technology was used on several recent Pearl Harbor projects, including new sewer line projects between Ford Island and Main Base. Vertical coring will likely be needed to ascertain geotechnical conditions that will determine depth and HDD design. If vertical coring is needed, the contractor must follow explosive safety procedures. Sediment from vertical coring in this area has the potential to contain PCBs, heavy metals, and pesticides (dieldrin) in elevated concentrations. Though the risk is from consuming fish and shellfish from the harbor, workers who come in contact with sediment should use proper health and safety precautions, such as washing hands before eating and drinking to reduce ingestion of sediments.

The proposed ground mount PV system would have an inverter located on the ground near the PV panels. The power generated by the panels would be distributed via cables to the on-base housing area to supply power to a future electric vehicle charging station and to Building 112, located in the industrial area in the north of PMRF. At Building 112 the electricity will tie into the installation's existing electrical distribution system.

The proposed cable to Building 112 would take the following path: Electricity from the PV system inverter would travel through cables tied into a feed switch located on Nohili Road. From there, the electricity would travel in overhead cables to a 4-way vacuum switch located approximately 500 feet (150 m) to the north. From the vacuum switch power would travel through new overhead power cables to existing Pole 86, located near the beach cottage entrance and Majors Bay Road. At Pole 86, the electricity would travel northward in underground conduits through a new 12 kV power line extension that crosses Kawaiele Ditch and connects to the existing hand hole, adjacent to the north end of the bridge. From the bridge, cables would run in an existing underground conduit to the hand hole south of Building 113. At Building 113, a new underground conduit would be trenched to Building 112.

- MCB Hawaii

  The Marine Corps has proposed three (3) sites for ground mount systems. The proposed ground mount sites are Ulupa'u foothill at Kāne'ohe Bay, Puuloa Range Training Facility in 'Ewa, and at the Pearl City Annex in Pearl City.

  Ulupa'u. The proposed site is located in the foothill below the magazines (southwest of Magazine Tunnels) and above the landfill (northwest of the Sanitary Landfill) (Figure 2-9). The site is 240,000 square feet (5.5 acres/2.2 ha) within an undeveloped part of the base (Figure 2-13). The site is encumbered by Explosive Safety Quantity Distance (ESQD) arcs and is sparsely covered with trees, grasses, and weeds.

  Puuloa Range Training Facility. The proposed site is located near the main gate of the facility near the administration building and is not used as part of the rifle range (Figure 2-11). Only a portion of the 4-acre (1.6-ha) site would be used for the proposed ground mount system. The site is located within the Puuloa Range Training Facility that occupies approximately 137 acres (55 ha) in 'Ewa, O'ahu. The site is sparsely covered with grasses and weeds.

  Pearl City Annex. The proposed site is located on an existing concrete slab near the north end of the warehouse area, but is separated from the nearest warehouses currently in use by the Marine Corps (Figure 2-12). There is 5,000 square feet (465 m^2) available

for installation of the PV system on the concrete slab. The concrete slab is surrounded by grassy areas with weeds and other non-native vegetation.

Table 2-3: Proposed Sites for PV Ground Mount Systems

Installation	Site	Size (kW)	Square Foot (SF)
Waipi'o Peninsula	Former Sugarcane Field	11,800	1,830,000
PMRF	Available Land in Housing Area	1,000	90,000
MCB Hawaii - Kaneohe Bay	Available Land in Ulupa'u foothill*	1,760	~240,000
MCB Hawaii – Puuloa Range Training Facility	Available Land near Main Gate*	81	~174,300
MCB Hawaii – Pearl City Annex	Available Land in Warehouse Area	30	~5,000
TOTAL PROPOSED SITES FOR PV GROUND MOUNT SYSTEMS = 5			

* Photograph provided in SHPO Consultation letter, Appendix B-3

2.2 ALTERNATIVES TO THE PROPOSED ACTION

As required by NEPA, reasonable alternatives must also be considered. However, only those alternatives determined to be reasonable relative to their ability to fulfill the purpose and need for the Proposed Action will be analyzed in the EA. The Proposed Action was developed giving due consideration to the purpose and need. Reasonable alternatives include those that are practical and feasible from the technical and economic standpoint. For the reasons discussed in Section 2.4, the Preferred Alternative is the only alternative that meets the purpose and need for action for the MCB Hawaii and USAG-HI projects, and most of the CNRH projects. Several alternatives were evaluated for CNRH ground mount sites as discussed below; three were dismissed as infeasible and three were fully analyzed along with the Preferred Alternative (Waipi'o Peninsula) site and the No-Action Alternative.

The three alternative sites carried through the analysis encompass approximately 853 acres (345 ha) and are summarized in the table below and in the accompanying narrative.

CNRH Ground Mount Alternative Sites	Acres
1. **Pearl City Peninsula**	140
2. **Ford Island Runway**	28
3. **West Loch Annex**	685
Total	853

2.2.1 Pearl City Peninsula Site

Pearl City Peninsula separates the East and Middle Lochs of Pearl Harbor and is comprised of a variety of operational and Navy family housing uses, and includes the PHNWR. A 140-acre (57-ha) area at the north (inland) end of the peninsula was evaluated as a potential site for ground mount PV system (Figure 2-14). The site consists of three subareas: the former Pearl City Peninsula Fuel Annex along the west side of Lehua Avenue, an existing agricultural unit between Lehua Avenue and Waimalu Stream, and an interior site bordered by Waiawa Stream on the east, the Pearl Harbor Bike Path/State Energy Corridor on the north, the Waiawa Unit of the PHNWR and Middle Loch on the west, and an abandoned City and County of Honolulu Wastewater Treatment Plant on the south. Much of this latter area has been filled and used as a former landfill site.

Electricity generated by the Pearl City Peninsula PV panels would be distributed to the existing power grid at PHNSY & IMF and Hickam via a new transmission corridor consisting of several segments (Figure 2-14):

- A new overhead line (supported by wooden poles spaced approximately 200 feet [60 m] apart) extending approximately 7,500 feet (2,300 m) generally along existing roads from the ground mount site to a point at the southern tip of the peninsula between the Victor 2 and 3 wharves (the contractor will be given the option to construct an underground duct line following the same alignment, in lieu of the overhead line),
- A new underground conduit extending approximately 2,500 feet (762 m) across (under) the North Channel to the northwestern shoreline of Ford Island, west of Foxtrot 9 Pier, using HDD technology,
- Across Ford Island via an existing underground transmission line to the southwest shoreline near Foxtrot 1 wharf,
- A new underground conduit extending approximately 2,000 feet (610 m) across (under) the Main Channel to the Bravo 1 wharf within PHNSY & IMF, using HDD technology,
- Approximately 10,000 feet (3,050 m) of new concrete encased duct bank terminating at Station C in PHNSY & IMF and the Māmala Back Station at Hickam.

As with the Waipi'o Peninsula Preferred Alternative, technical studies to identify specific equipment requirements and interconnections to support the integration of power into the existing electrical distribution systems may be required. These studies may identify upgrades to the existing electrical distribution system such as, but not limited to, replacing relays, increasing the size of a panel board, and installing switches or a new transformer. The Contractor would be responsible for obtaining the required U.S. Army Corps of Engineers permit associated with any HDD construction activities.

2.2.2 Ford Island

The site is the former airfield runway on Ford Island (Figure 2-15). The former runway is 300 ft (91 m) wide by 4,100 ft (1,250 m) long for a total area of 1,230,000 square feet (27.5 acres/11.1 ha) and occupies the center of Ford Island. It is presently an unused open area covered with asphalt, concrete, grasses and weeds. There is a two-lane, two-way road running parallel to the runway lengthwise that encircles the runway site. Military housing, the Pacific Aviation Museum, the U.S.S. Oklahoma Memorial, the U.S.S. Utah Memorial, the Battleship Missouri Memorial, and various administrative, military business and recreational facilities are located on Ford Island.

The design of the facility would be similar to the Proposed Action described in Section 2.1.4.3. The ground mount PV system would use PV panels installed on a ballasted racking system so as not to penetrate or damage the historic runway asphalt. No grading or clearing is anticipated. Weeds and grass would be removed with a string trimmer. Power from the panels would be carried in cables to eleven inverter units arranged at roughly equal intervals along the length of the runway. The electricity would be distributed to the power grid on Ford Island and the Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF).

It is anticipated that about one-third of the power generated would be used on Ford Island with the remaining power being sent to the power grid at PHNSY & IMF and Hickam via a new transmission corridor consisting of several segments (Figure 2-15):

- From the Ground Mount site to the southwest shoreline near Foxtrot 1 wharf via an existing underground transmission line,
- A new underground conduit extending approximately 2,000 feet (610 m) across (under) the Main Channel to the Bravo 1 wharf within PHNSY & IMF, using HDD technology,
- Approximately 10,000 feet (3,050 m) of new concrete encased duct bank terminating at Station C in PHNSY & IMF and the Māmala Back Station at Hickam.

As with the Waipi'o Peninsula Preferred Alternative, technical studies to support the integration of power into the existing electrical distribution systems may be required, and the Contractor would be responsible for obtaining any required permit from the U.S. Army Corps of Engineers associated with HDD construction activities.

2.2.3 West Loch Annex Site

A 685-acre (277-ha) site at West Loch Annex was evaluated as an alternative ground mount site (Figure 2-16). The site lies within the West Loch Annex ESQD arc, in a zone that restricts placement of any inhabited buildings. It is the largest of the alternative sites – approximately 2.7 miles (4.3 km) long by 0.5 miles (0.8 km) wide. The Ewa by Gentry residential development is located to the west of the site, and the ammunition magazines are located to the east of the site (and east of West Loch Drive). The Honouliuli Unit of the PHNWR is located at the north end of the site, and the south end terminates about 0.3 miles (0.5 km) north of North Road. The site is bisected by Iroquois Point Road. West Loch Drive, North Road and Iroquois Point Roads are owned by the Navy and open to the public. The buffer zone was formerly farmed for sugar cane by the Oahu Sugar Company and has been fallow since 1995, except for an agricultural outlease parcel that is currently under cultivation. With the exception of the outlease parcel, the site currently contains non-native xeric (dry habitat) vegetation.

Electricity generated by the West Loch PV panels would be distributed to the existing power grid at PHNSY & IMF via a new transmission corridor consisting of several segments (Figure 2-16):

- New overhead lines on existing poles extending approximately 10,000 feet (3,050 m) generally along existing roads from the south end of the ground mount site to the West Loch Channel shoreline at the extension of 10th Street,
- A new underground conduit extending approximately 1,500 feet (457 m) across (under) the West Loch Channel to the southwest tip of Waipi'o Peninsula using HDD technology,
- Approximately 2,000 feet (610 m) across the tip of Waipi'o Peninsula via a new overhead utility line to the southeast shoreline,
- A new underground conduit extending approximately 1,500 feet (457 m) across (under) the Main Channel to a point near the western terminus of Kean Road at Hospital Point (in PHNSY & IMF) using HDD technology,
- A new concrete encased duct bank (approximately 750 feet [230 m] long, two feet [0.6 m] wide and four feet [1.2 m] deep) terminating at Station D, within Bldg 177.

As with the Waipi'o Peninsula Preferred Alternative, technical studies to support the integration of power into the existing electrical distribution systems may be required, and the Contractor would be responsible for obtaining any required permit from the U.S. Army Corps of Engineers associated with HDD construction activities.

2.3 SITE SELECTION

The Action Proponents' goal was to identify sites that would maximize electricity generation and meet the requirements for construction, installation, monitoring, operation and maintenance of the PV systems while minimizing impacts to the environment. DoD developed key criteria to identify suitable sites. The criteria considered are as follows:

- Placement. PV panels could be located to receive at least 5 hours of unobstructed sunlight per day. Additionally, the PV panels would not obstruct or interfere with the use of existing buildings or adjacent property.

- Structure. The site, if a roof, would support the added weight of the PV panels. For PV structures, the site would be an existing paved parking area over which the PV structure would be constructed.

- Availability. To maximize payback and to ensure that the project is economically feasible, the site would be available for at least 20 years (e.g., building is not scheduled for demolition), its use would be compatible with existing/planned operational and training requirements, and it would not be encumbered by restricted security and safety zones.

- Natural Resources. The site has no known threatened, endangered, or rare plant or animal species or the proposed project will have no effect on threatened, endangered, or rare species; the site is not within designated critical habitat, and the site is not in an area with environmentally sensitive concerns.

- Cultural Resources. DoD would be able to obtain State Historic Preservation Officer's concurrence with the DoD's "no historic properties affected" or "no adverse effect" determinations. An "Adverse Affect" determination can be mitigated through negotiation through Section 106 consultation and the implementation of an agreement: Programmatic Agreement (PA) or Memorandum of Agreement (MOA).

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED

2.4.1 Other Renewable Energy Sources

The Military Services evaluated other sources of renewable energy such as wind, ocean currents and waves, and geothermal resources, as alternatives to the Proposed Action. However, this evaluation determined that no other sources of renewable energy could provide sufficient energy quickly enough to put the respective Services' installations on course to meet the renewable energy mandates discussed in Section 1.2.2, Need for the Proposed Action. Because of this and

the additional constraints discussed below, other sources of renewable energy are not reasonable alternatives to solar power. Wind turbines can interfere with military and/or commercial flight operations and military radar systems. Geothermal as a renewable energy source is not currently feasible due to geologic constraints on O'ahu and Kaua'i, which no longer have magma reservoirs located directly beneath them. Technological advances may allow for lower intensity geothermal resources to become viable options for energy generation, and studies are currently being conducted to assess resource potential on O'ahu and Kaua'i. However, there is no definitive evidence that suggests this resource will become a viable source of energy generation. Data from the DoD-operated wave energy buoy test site in the waters off MCB Hawaii Kaneohe Bay shows that ocean energy technology is currently insufficiently developed to produce the targeted energy capacity. On the other hand, Hawai'i is located in the North Pacific Ocean just south of the Tropic of Cancer between 23 degrees and 18 degrees south latitude. As a result of this location and mid-ocean climate, O'ahu experiences an average of 270 days of full or partial sun and Kaua'i experiences an average of 240 days of full or partial sun, thus making energy from the sun the reasonable choice. As a result of the foregoing considerations, solar power is the only feasible alternative to satisfy the purpose and need at this time.

2.4.2 Alternative Sites for Navy Region Hawaii PV Ground Mount System

The three sites considered but dismissed from further EA analysis are summarized in the table below and in the accompanying narrative.

CNRH Ground Mount Sites Considered but Eliminated	Acres
Lualualaei Annex	440
Waikakalaua	34
Wahiawa Annex	13

The Lualualei Annex, Waikakalaua and the Wahiawa Annex ground mount sites (Figure 1-1) were dismissed from further consideration in the preliminary stages of the evaluation because of their remoteness from the JBPHH main base area (24 miles [39 km], 15 miles [24 km], and 20 miles [32 km], respectively), and associated challenges and uncertainty of acquiring power line easements and permits to transmit the power to the JBPHH main base area. A major limiting factor in the feasibility of developing remote Navy-owned ground mount sites is HECO's restriction on "wheeling" of power. "Wheeling" is a term used in the electric utility industry. It refers to the ability to transmit electrical power from one site to another utilizing the utility company's distribution lines. In this case, excess electrical power generated at any of the Navy Region Hawaii sites would not be allowed to connect to HECO's distribution lines for the sole purpose of transmitting electrical power for use at another Navy installation. Having to acquire power line easements, obtain necessary permits and construct new transmission lines over these long distances would not meet the purpose and need for this action, which is to meet renewable

energy mandates in a cost effective manner within established timelines. The Preferred Alternative (Waipi'o Peninsula) site and the other three alternatives sites carried through the EA analysis (Pearl City Peninsula, Ford Island and West Loch Annex) are all adjacent to the Pearl Harbor Estuary, which is controlled by the Navy; and therefore power can be transmitted from these sites, across Navy controlled property, to where it is needed at JBPHH, without the need to acquire power line easements.

2.4.3 Other Potential Sites

Each Service identified potential sites at their installations that would support proposed PV systems. The Services reviewed each site against the site selection criteria and submitted only those sites that would be suitable for the Proposed Action. All of the sites identified as part of the Proposed Action will need to be utilized in order to achieve the renewable energy mandates discussed in Chapter 1 above. As stated earlier, future innovations to PV technology may allow for greater flexibility in siting determinations and/or changes to current screening criteria, potentially increasing the number of available sites. Also, as new facilities are built and/or repaired/reroofed or operational requirements change at various installations, additional PV locations may be considered as suitable. Appropriate NEPA analysis will be conducted if additional sites are proposed for installation of PV systems.

2.5 NO-ACTION ALTERNATIVE

A No-Action Alternative is required under NEPA regulations. Under the No-Action Alternative, the Services would not select any sites for the installation of PV panels at this time. Although the No-Action Alternative would not meet the purpose and need for the project, as required by CEQ guidelines, it was carried forward in the environmental analysis as a benchmark against which the environmental effects of the Proposed Action could be compared. If the No-Action Alternative is implemented, the renewable energy mandates and goals discussed in Section 1.2.2 would not be achieved through these PV projects.

2.6 COMPARISON OF ENVIRONMENTAL EFFECTS OF THE ALTERNATIVES

Table 2-3 compares the environmental effects of the alternatives based on the analysis provided in Chapter 4.

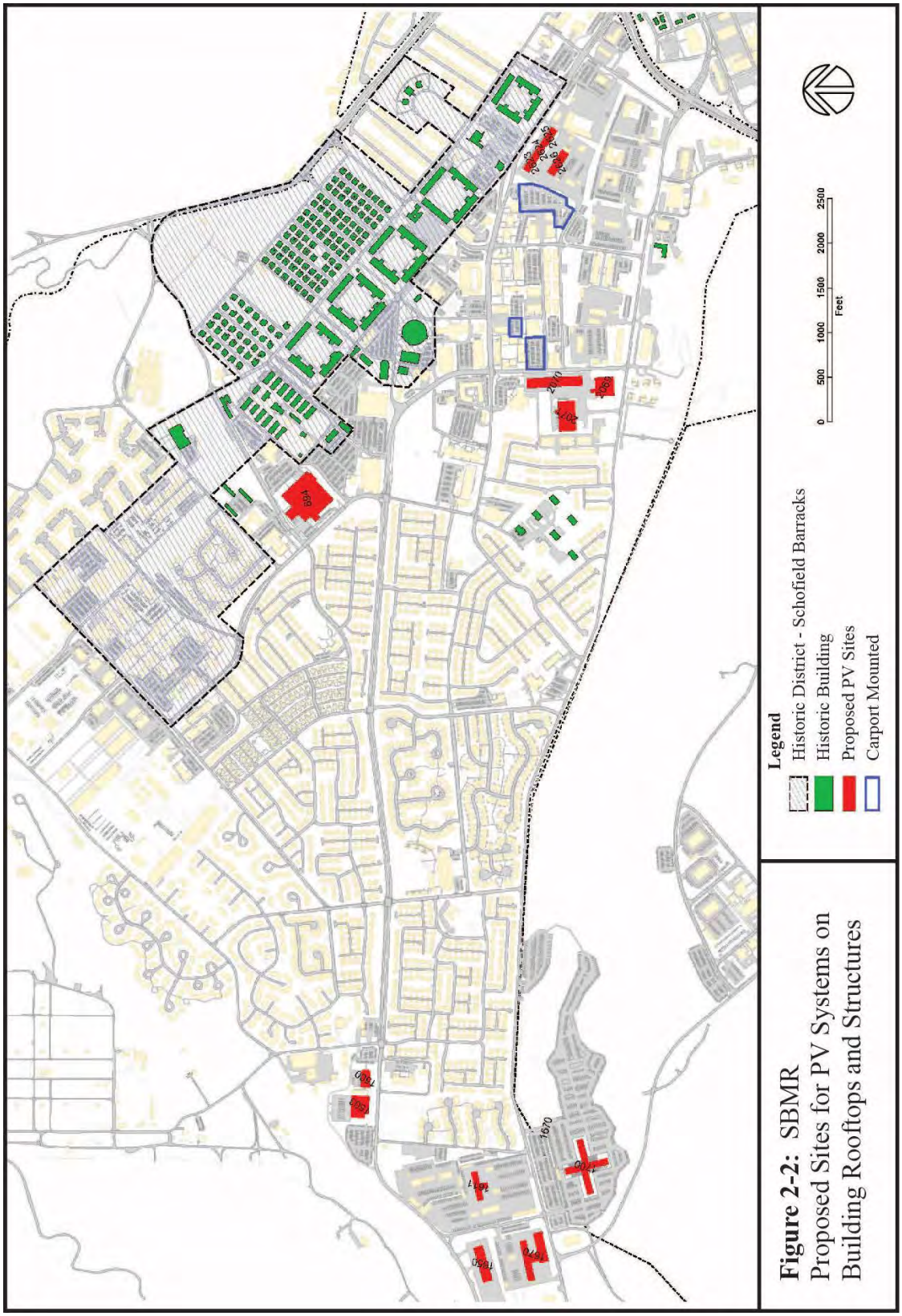
Table 2-4: Comparison of Environmental Effects of the Alternatives

Resource	Proposed Action	Alternatives	No-Action Alternative
Land Use	PV systems on building rooftops and structures: • no change to use of buildings or parking areas • temporary disruption of use of parking areas during construction PV ground mount systems: • proposed use remains compatible with adjacent land uses, as no impacts are expected on surrounding areas or uses. • ESQD arc precautions at the Waipi'o Peninsula and Ulupa'u site would be taken.	NA Same as Proposed Action for ground mount sites	No impact No Impact
Visual Resources	• no significant impacts to public due to limited viewing opportunities, • no significant impacts to on-base personnel and visitors.	No significant impacts for ground mount sites except for Ford Island which would be visible by the general public visiting museums and displays.	No impact
Air Quality	• short-term and minor dust and vehicle emissions during construction • long-term beneficial effect on air quality and greenhouse gas (GHG) emissions	Same as Proposed Action for ground mount sites	No impact
Water Resources	Drainage: • rooftops and structures would not cause any increase in rainwater runoff • ground mount systems at Waipi'o Peninsula, PMRF, Ulupa'u and Puuloa Range Training Facility would result in minor increase in rainwater runoff due to increase in impervious surface. BMPs would be implemented as appropriate • ground mount system at Pearl City Annex would be on an existing concrete slab; therefore, there would be no additional runoff	Same as Proposed Action for ground mount sites	No impact
Water Resources	Groundwater: • no long-term impacts • BMPs for handling and storage of hazardous materials to prevent contamination of groundwater resources would be implemented	Same as Proposed Action for ground mount sites	No impact

Resource	Proposed Action	Alternatives	No-Action Alternative
Biological Resources	Terrestrial Resources PV systems on building rooftops and structures: • no federally listed endangered or threatened species exist at the site, or the project will have no effect on listed species. No designated critical habitat exists at any of the proposed sites • federally-protected migratory birds may be temporarily displaced during placement and maintenance of PV arrays and would relocate to other available habitats • system installations do not include any guy wires that would create a strike hazard for birds • if the nests of any MBTA protected species are found on building rooftops on which PV array placement is planned, installation of equipment will be delayed in that location until after the nest fledges or naturally falls.	N/A	No Impact
	PV ground mount systems: • no federally-listed endangered or threatened species exist at the site, or the project will have no effect on listed species. No designated critical habitat exists at any of the proposed sites • no known large numbers of Migratory Bird Treaty Act (MBTA) protected waterbirds at the proposed sites • federally-protected migratory birds may be temporarily displaced during placement and maintenance of PV arrays and would relocate to other available habitats • system installations do not include any guy wires that would create a strike hazard for birds • if nests of any MBTA protected species are found on the sites on which PV array placement is planned, installation of equipment will be delayed in that location until after the nest fledges or naturally falls	Same as Proposed Action for ground mount sites	No impact

Resource	Proposed Action	Alternatives	No-Action Alternative
Biological Resources (cont'd)	Marine Resources: • transmission line from Waipi'o Peninsula to PHNSY & IMF constructed using HDD technology would have no impacts to protected marine species including humpback whales, Hawaiian monk seals, hawksbill sea turtle and green sea turtle • no impacts to EFH and coral and coral reefs • construction crew for under harbor transmission lines would follow the Army Corps of Engineers' BMPs for boat operations and diving activities during all marine related activities	Same as Proposed Action for ground mount sites	No impact
Cultural Resources	PV systems on building rooftops and structures: • SHPO concurred with no historic properties affected at proposed sites at SBMR and WAAF (no impact) • CNRH Programmatic Agreement applied (no impact) • SHPO concurred with no adverse effects determination at MCB Hawaii proposed sites, with archaeological monitoring for ground disturbing activities. MV-22 Programmatic Agreement addresses use of Hangar 101. No significant impact.	N/A	No impact
	Ground Mount PV systems: No significant impact. • SHPO concurred with the determination of no historic properties affected and the Navy's approach to carrying out archaeological monitoring at the proposed PMRF PV ground mount site. • SHPO concurred with the determination of no adverse effect at the proposed PV ground mount site at Waipi'o Peninsula, associated transmission line, and related work at Building 177. • SHPO concurred with the determination of no adverse effect at MCB Hawaii proposed ground mount sites. The PV ground mount systems	There would be an adverse effect to historic properties for the Ford Island alternative (potentially significant impact).	No impact

Resource	Proposed Action	Alternatives	No-Action Alternative
	would be mounted on concrete bases at the Ulupa'u and Puuloa Range Training Facility sites and installed on an existing concrete pad at the Pearl City Annex		
Geology and Soils	• No significant impact • most of the sites are on previously disturbed land • minimal ground disturbance for PV on building rooftops • trenching for cables may be required for PV structures and ground mounts • BMPs will be implemented to minimize soil erosion during construction	Same as Proposed Action for ground mount sites	No impact
Hazardous Materials and Wastes	• Contractor responsible for proper containment of hazardous materials and disposal of wastes during construction. Special precautions needed for excavation and dewatering activities with the Pearl Harbor NPL site. • no impact from proposed PV systems on buildings containing hazardous materials and waste as the installation's Hazardous Materials and Waste Management Plan and Emergency Planning and Response Plan will be followed • Contractor responsible for disposal of the PV panels at the end of the contract	Same as Proposed Action for ground mount sites	No impact
Socioeconomics/ Environmental Justice, and Protection of Children	• small positive impact to local economy during construction • reduced energy costs to DoD • no significant impacts to environmental justice as the proposed PV systems would be located on DoD property short-term, minor, temporary impacts to children from construction noise near their residences; no impacts to children's exposure to electrocution or other safety and health hazards due to use of fences and locked gates.	Same as Proposed Action	No impact


Legend
Historic District - Schofield Barracks
Historic Building
Proposed PV Sites
Carport Mounted
0
500
1000
1500
2000
2500
Feet
Figure 2-2: SBMR
Proposed Sites for PV Systems on
Building Rooftops and Structures

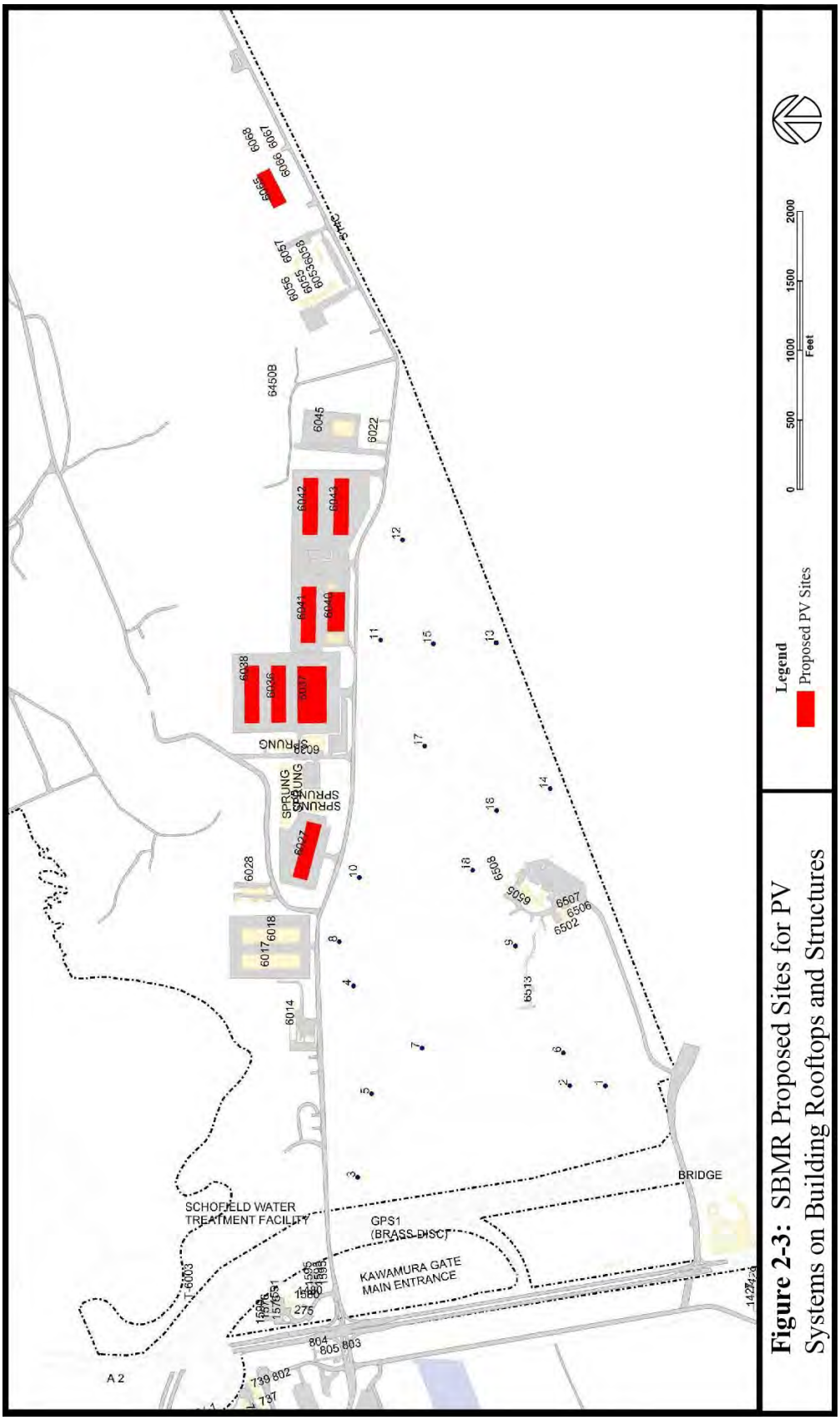


Figure 2-3: SBMR Proposed Sites for PV Systems on Building Rooftops and Structures

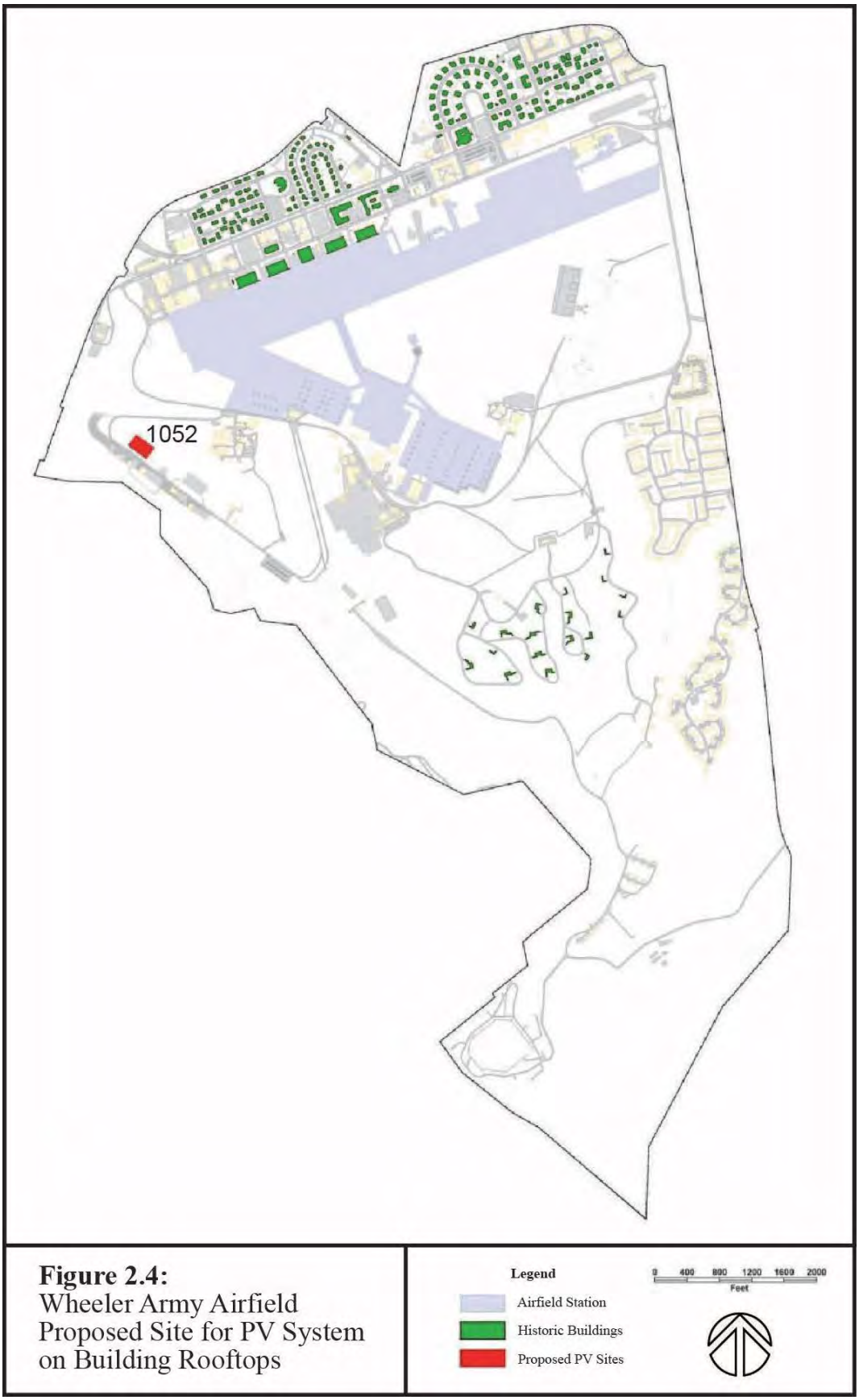


Figure 2.4:
Wheeler Army Airfield
Proposed Site for PV System
on Building Rooftops

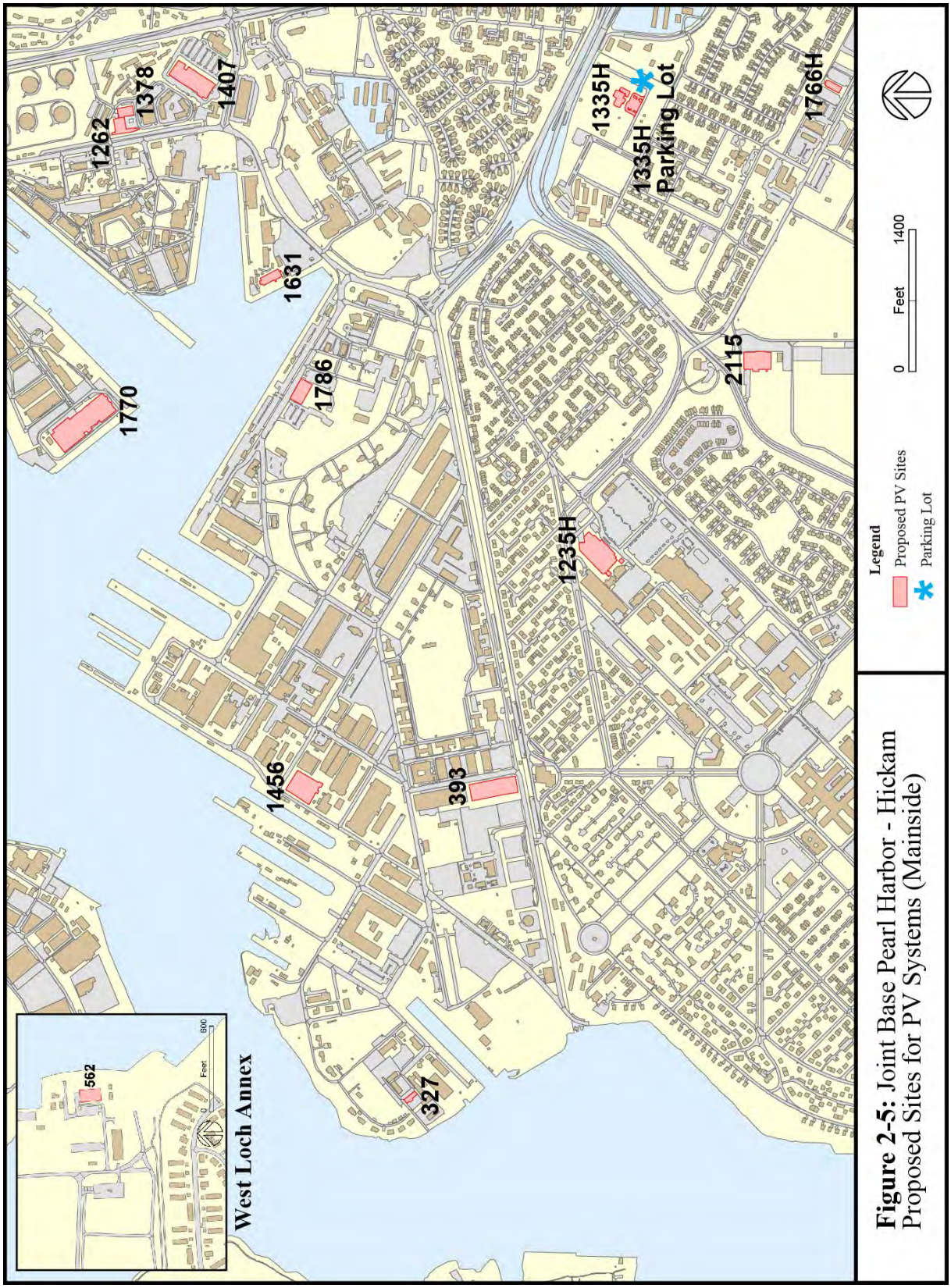
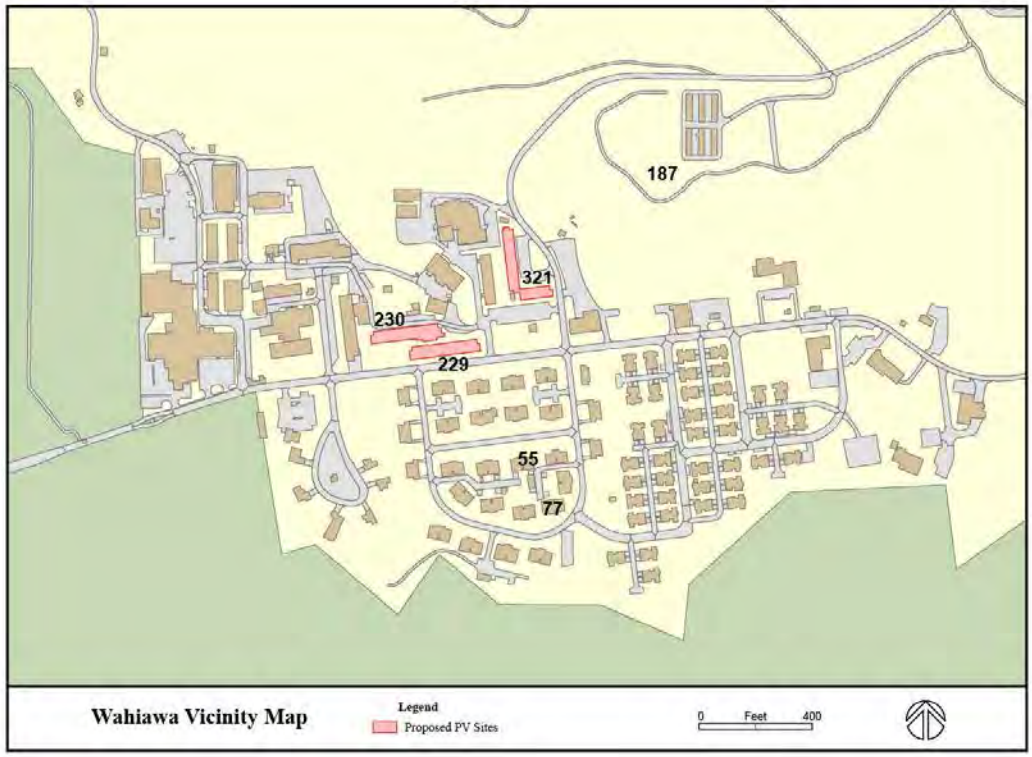


Figure 2-5: Joint Base Pearl Harbor - Hickam
Proposed Sites for PV Systems (Mainside)



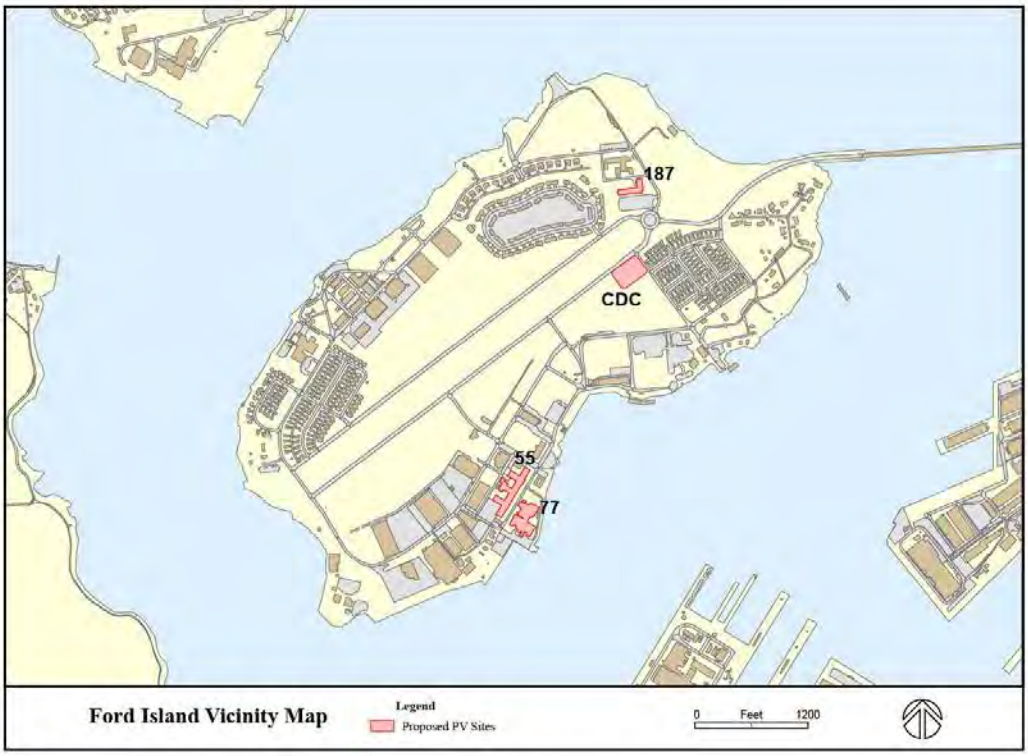


Figure 2.6 : Joint Base Pearl Harbor - Hickam
Proposed Sites for PV Systems on Building Rooftops

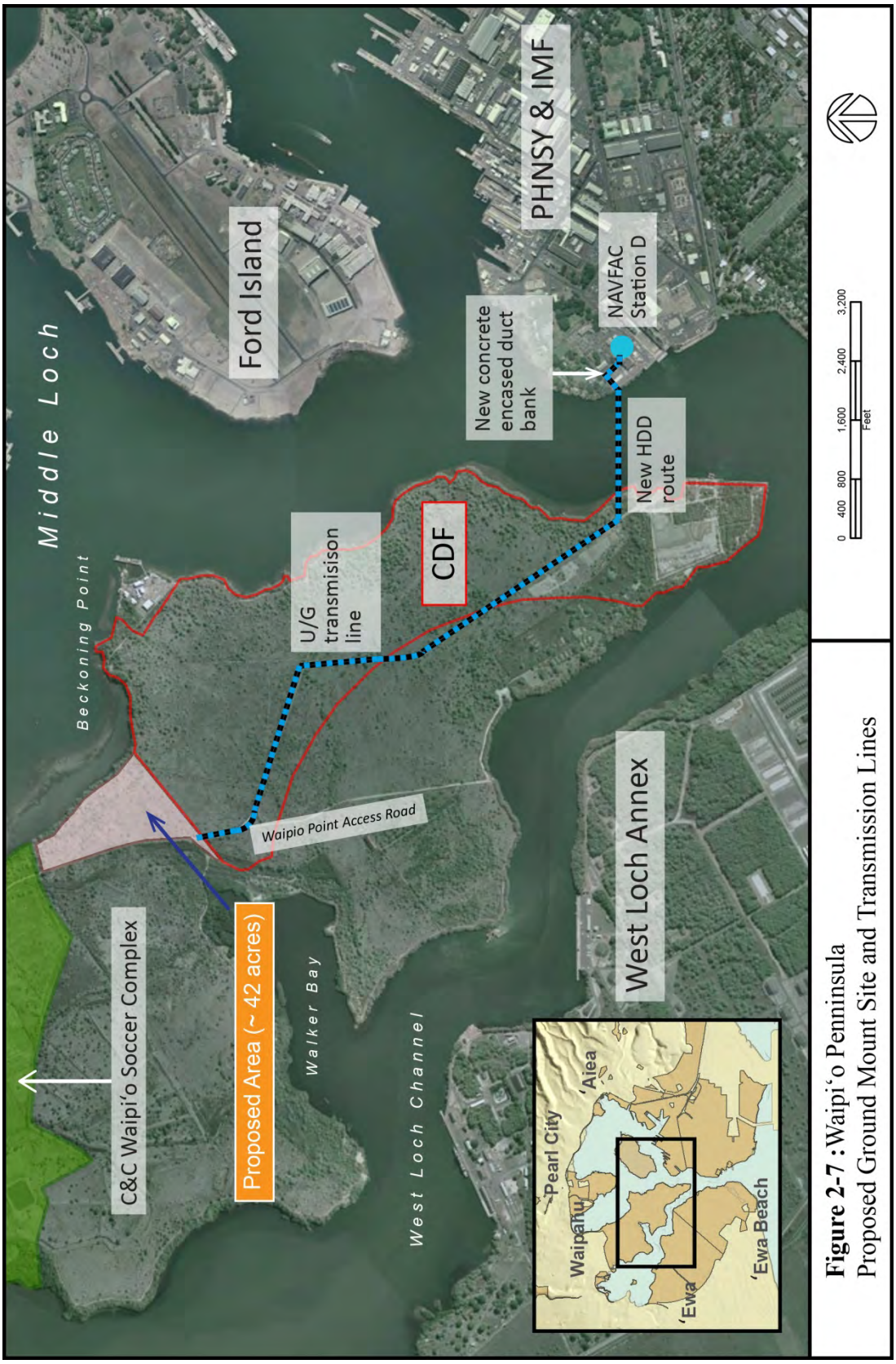


Figure 2-7 : Waipi'o Penninsula
Proposed Ground Mount Site and Transmission Lines

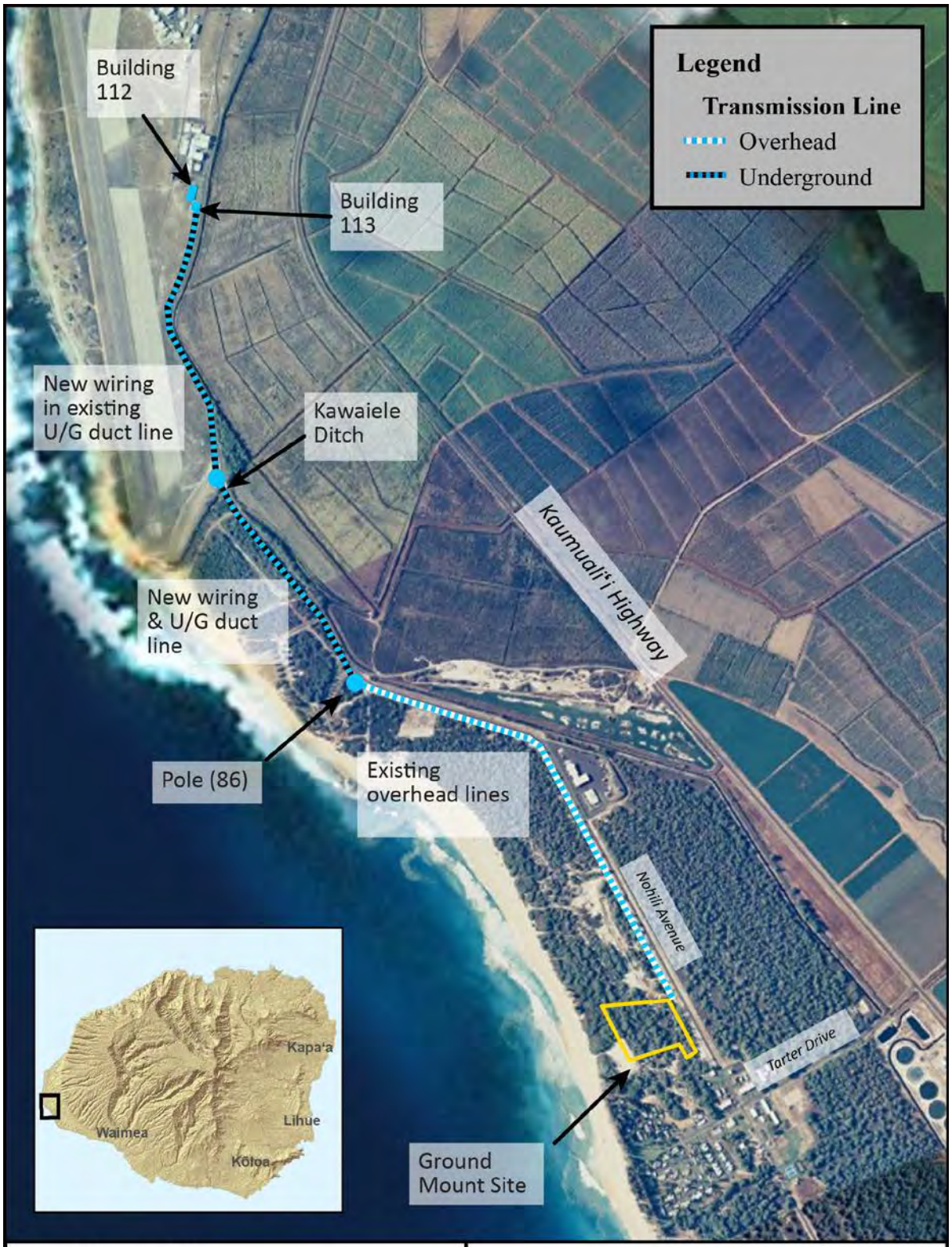


Figure 2-8:
Pacific Missile Range Facility
Ground Mount Site

Figure 2-9:
Marine Corps Base Hawaii - Kaneohe Bay
Proposed Sites for PV Systems

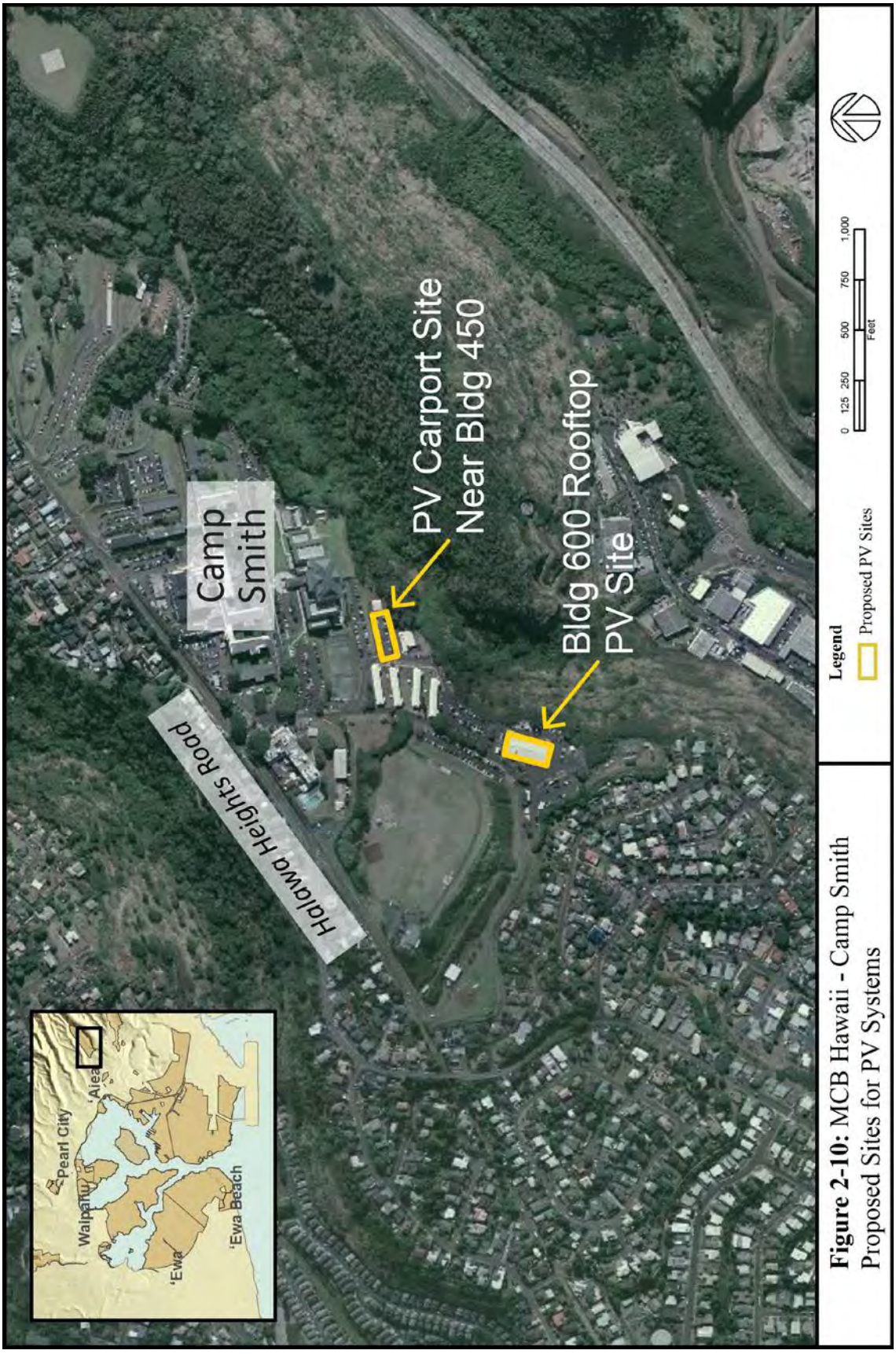
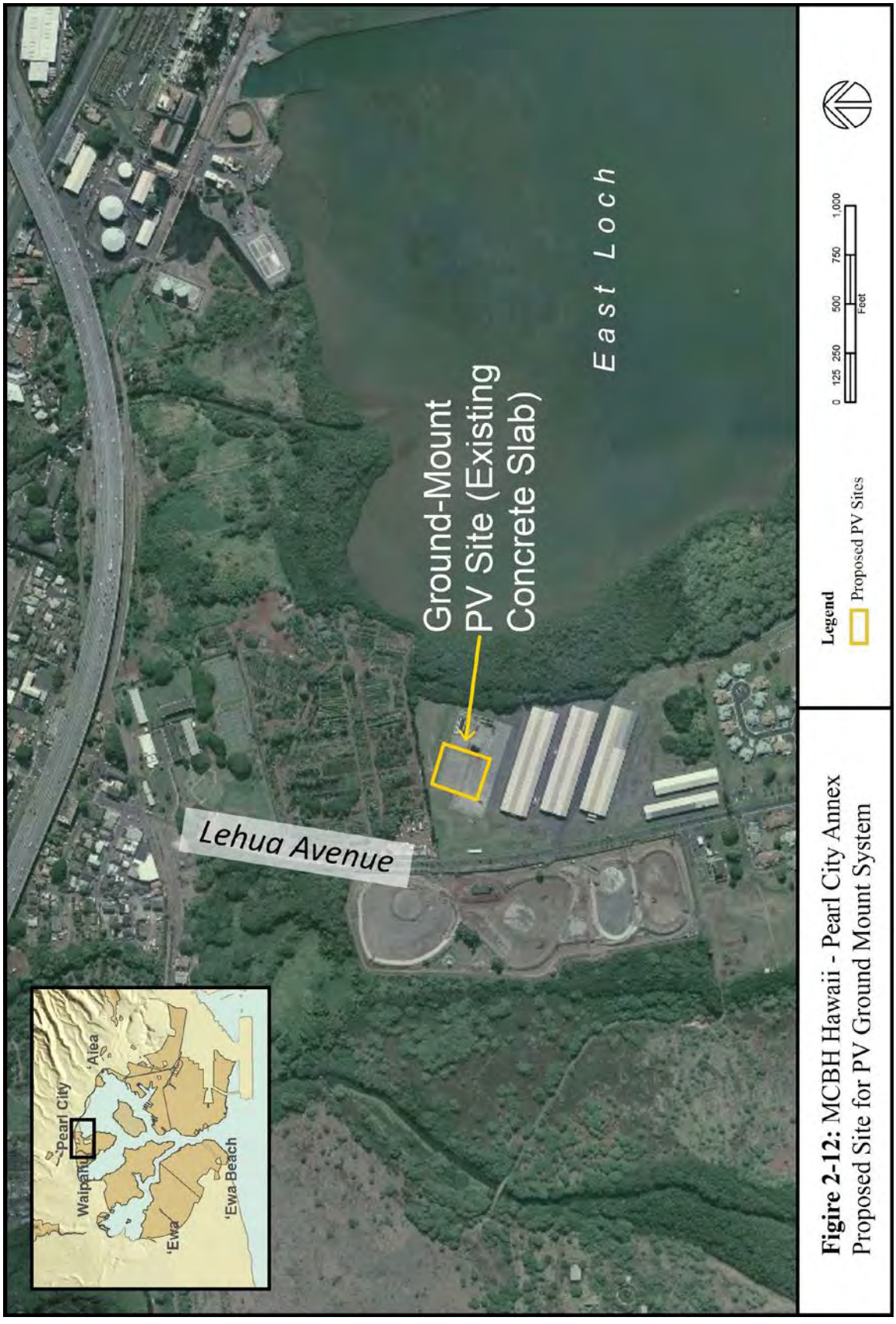


Figure 2-10: MCB Hawaii - Camp Smith Proposed Sites for PV Systems

Figure 2-11: MCB Hawaii Puuloa Range Training Facility
Proposed Site for PV Ground Mount System



Figire 2-12: MCBH Hawaii - Pearl City Annex
Proposed Site for PV Ground Mount System

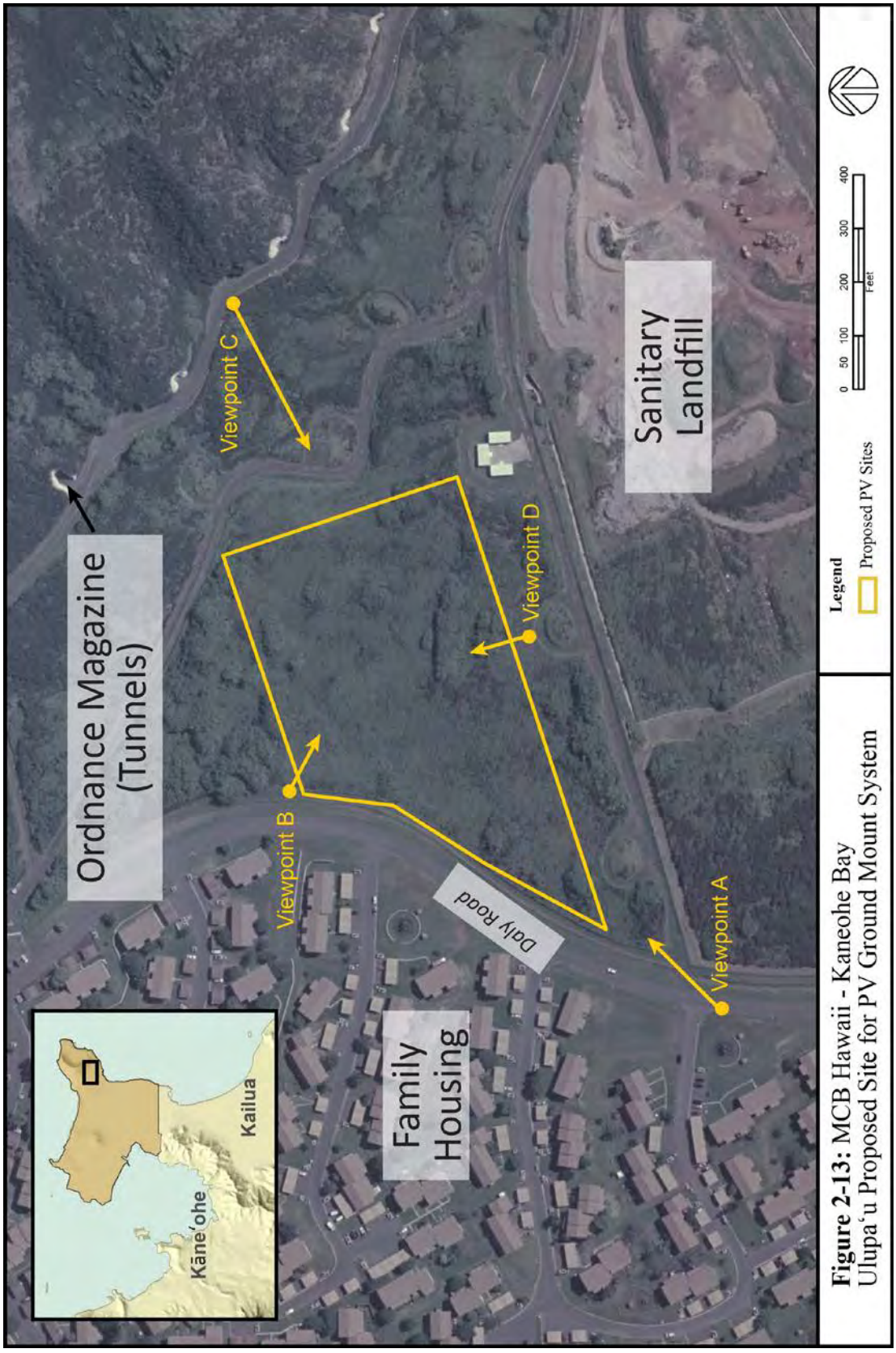


Figure 2-13: MCB Hawaii - Kaneohe Bay
Ulupa'u Proposed Site for PV Ground Mount System

Figure 2-14: Pearl City Peninsula Alternative Site for PV Ground Mount System

Figure 2-15: Ford Island Runway Alternative PV Ground Mount Site and Transmission Lines

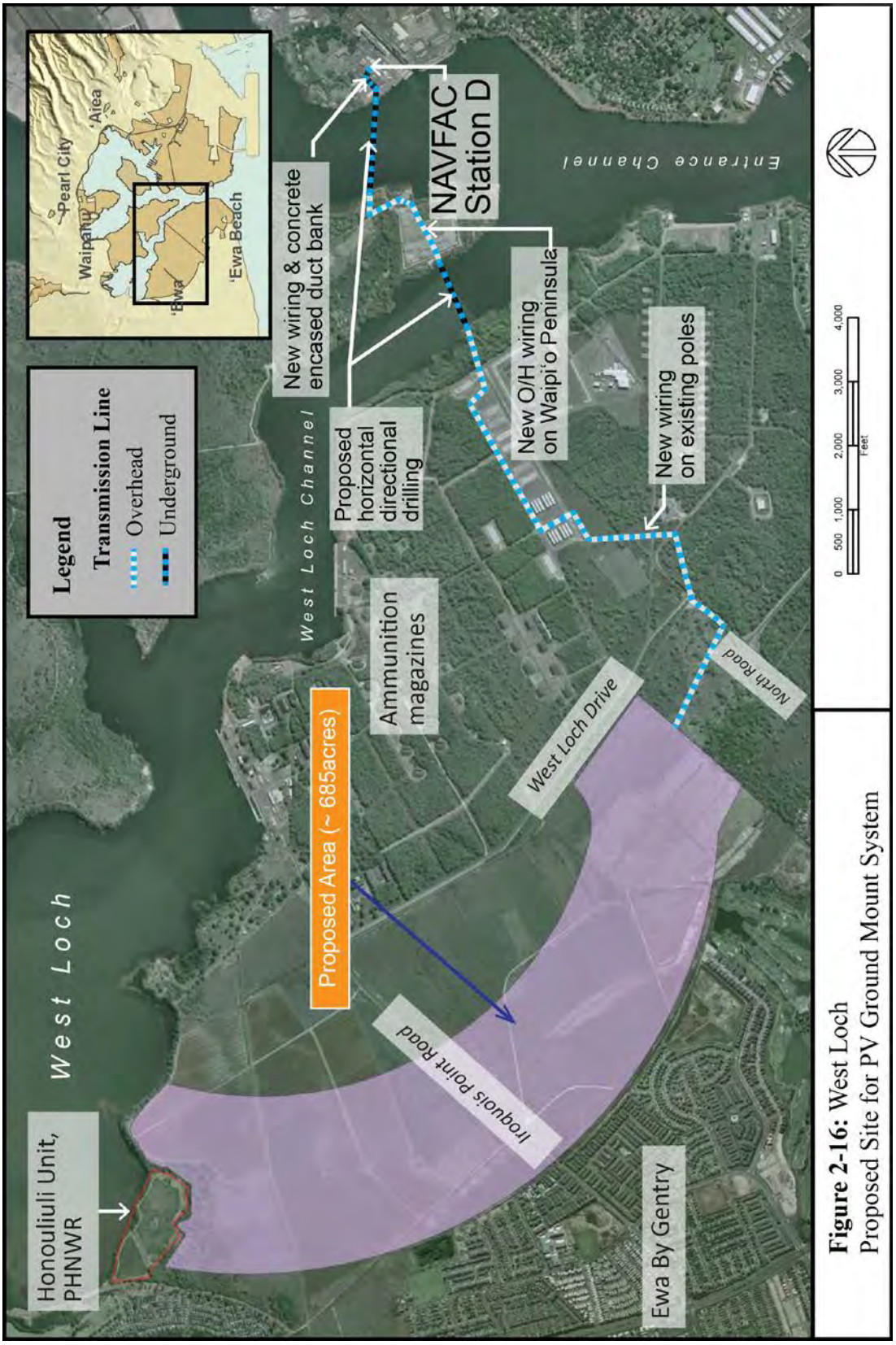


Figure 2-16: West Loch
Proposed Site for PV Ground Mount System

CHAPTER 3.0
AFFECTED ENVIRONMENT

This chapter discusses the environmental setting of the proposed sites. It provides a baseline from which to identify and evaluate environmental impacts resulting from the Proposed Action of providing suitable sites on DoD installations in Hawai'i for PV systems installations and operations in order to reduce the Federal government's reliance on non-renewable energy. There are sixty-eight (68) sites for proposed PV systems on rooftops, twelve (12) sites for proposed PV systems on structures, and five (5) sites for proposed PV ground mount systems (in addition to three (3) alternative ground mount sites at Ford Island, Pearl City Peninsula and West Loch Annex carried through the analysis). All eighty-five (85) proposed PV system sites and alternatives are located at various Army, Navy, and Marine Corps installations and outlying properties (generally referred to as DoD property) on O'ahu and Kaua'i (see Tables 2-1, 2-2, and 2-3 for a complete list of the proposed sites).

Only those resources that have a potential to be affected are discussed, as per CEQ guidance (40 CFR 1501.7[3]). Therefore, the following resources will not be discussed for the following reasons:

- Floodplain. The project sites are not located within a floodplain and would not affect other floodplain designations.
- Noise. The Proposed Action would not have construction-related and on-site operational noise levels that exceed the Hawai'i State Department of Health limits.

Based upon the nature of the Proposed Action, the following resources may be affected: land use, visual resources, air quality, water resources, biological resources, cultural resources, geology and soils, hazardous materials and waste, and socioeconomics (cumulative effects of the Proposed Action on climate change are addressed in the Chapter 4 cumulative impacts section). Due to similarities in the affected environment, the discussion provided for visual resources, air quality, water resources, geology and soils, and socioeconomics covers all three types of PV systems. Remaining resources are discussed in two categories: (a) PV systems on building rooftops and structures; and (b) PV ground mount systems. Discussions for PV systems on building rooftops and structures have been grouped together because the proposed sites are located in built-up areas with similar affected environments, whereas the PV ground mount systems are located in low building density areas and/or former agricultural areas with different affected environments. Where additional details are warranted, site-specific resource discussions are provided by installation/property for each Service.

3.1 LAND USE COMPATIBILITY

3.1.1 PV Systems on Building Rooftops and Structures

All proposed and alternative sites for PV systems on building rooftops and structures are located on DoD property. The buildings are currently used for administrative, operational, warehouse and other support functions. The proposed PV systems on structures would be located on existing paved parking lots that serve adjacent buildings.

3.1.2 PV Ground Mount Systems

All proposed and alternative sites for PV ground mount systems and associated transmission lines are located on DoD property, adjacent to other buildings and facilities, on former agricultural land or under Navy-controlled waters of Pearl Harbor.

Proposed sites for PV ground mount system at Ulupa'u at MCB Hawaii-Kaneohe Bay and Waipi'o Peninsula at JBPHH are encumbered by Explosive Safety Quantity Distance (ESQD) arcs from nearby ordnance magazines. The proposed site at Waipi'o Peninsula is also constrained by the nearby CDF (Figure 2-7).The Alternative JBPHH ground mount site at West Loch Annex is also encumbered by ESQD arcs. ESQD are essentially land use hazard zones regulated by DoD Explosives Safety Board (DDESB) guidelines for various quantities and types of ammunition and explosives. The subject ground mount sites and transmission lines are located within the ESQD arcs and would need to be approved by DDESB.

3.2 VISUAL RESOURCES

All proposed and alternative sites for PV systems are located on DoD property, not readily accessible to the general public. PV systems on building rooftops and structures would be located adjacent to other on-base facilities in an urban built-up environment. Low profile (approx. 5 feet [1.5 m] high) PV ground mount systems enclosed by a 7-foot (2.1-m) high chain link fence are proposed on available land in low building density areas or former agricultural lands, and are not generally visible from public roadways or other public viewing areas. New overhead transmission lines at the Pearl City Peninsula alternative site (West Loch would use existing pole lines) would be visible within the installation, but the poles are widely spaced (approximately 200 feet [61 m] apart), about 40 feet (12.2 m) tall (above ground level) and are screened by shoreline vegetation along the West Loch shoreline. The transmission line conduit is approximately 1-inch (2.5-cm) in diameter. See Section 2.1.4.3 for a more detailed description of the proposed PV ground mount system.

Dense vegetation exists along the east shoreline of Waipi'o Peninsula which obscures views of the interior areas of the Peninsula. Like the Pearl Harbor shoretline in general, the shoreline vegetation of Waipi'o Peninsula is dominated by mangrove (*Rhizophora mangle*). The typical height of the vegetation is at least 15 feet (4.5 m) high from the ground and at least 30 feet (10.4 m) from the bottom of the escarpment.

3.3 AIR QUALITY

The U.S. Environmental Protection Agency (EPA) characterizes air quality by comparing concentrations of criteria pollutants to established National Ambient Air Quality Standards (NAAQS). The Hawai'i Department of Health has established ambient air quality standards similar to the NAAQS. Criteria pollutants at the national level include carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter less than ten microns in aerodynamic diameter, ozone, and lead. Based on ambient air monitoring data, EPA has classified the State of Hawai'i as being in attainment of the Federal standards. In addition, pollutant concentrations within the state comply with State standards, which are more stringent than NAAQS. All of the proposed PV sites are located in attainment areas.

3.4 WATER RESOURCES

Drainage. The proposed and alternative PV systems on building rooftops, structures, and ground mounts are on sites located in areas that have rainwater directed to existing manmade drainage systems and/or the ground surface. This drainage empties into nearby streams and/or rivers and eventually to coastal waters.

In the northern portions of SBMR, rainwater runoff from proposed sites for PV systems would drain into Kaukonahua Stream which eventually leads to Waialua Bay. Runoff from the southern portions of SBMR and WAAF would drain into Waikele Stream which flows southward, eventually draining into the West Loch of Pearl Harbor.

Rainwater runoff from JBPHH sites, including Ford Island, Pearl City and Waipi'o Peninsulas, and West Loch Annex, drains into the Pearl Harbor Estuary. Pearl Harbor is classified as a Class 2 Inland Estuary by the State Department of Health. Surface runoff at PMRF on Kaua'i is absorbed by the surrounding ground area due to the low building density and vegetated areas absorbing surface runoff.

At MCB Hawaii-Kaneohe Bay, rainwater runoff from buildings and surrounding areas including Ulupa'u eventually drains into either Kāne'ohe Bay, Kailua Bay, or Nu'upia Ponds. Kāne'ohe Bay is Class AA waters, Kailua Bay is Class A waters, and Nu'upia Ponds are Class 1 Inland waters according to the Hawai'i Department of Health.

At Camp Smith, runoff from the built-up area on the western ridge flows into drainage intakes that lead to the ravine feeding North Hālawa Stream to the east, and drainage going to the west feeds into ‘Aiea Stream. Runoff eventually drains to Pearl Harbor Estuary.

At Puuloa Range Training Facility, rainwater runoff from the area eventually drains to Māmala Bay.

Groundwater. The proposed and alternative sites are in developed and previously farmed areas of O‘ahu and Kaua‘i. These sites are not located within watershed areas that are protected as conservation districts in Hawai‘i. The USGS publication, “Ground Water in Hawai‘i,” stated, “Total ground water pumped in Hawai‘i was about 500 million gallons per day during 1995, which is less than three percent of the average total rainfall [about 21 billion gallons per day] in Hawai‘i. From this perspective, the ground-water resource appears ample; however, much of the rainfall runs off to the ocean in streams or returns to the atmosphere by evapotranspiration.”

Water resources within the Hawaiian Islands include three main types of aquifer systems: (1) basal lens; (2) dike water; and (3) perched. The basal lens consists of fresh coastal groundwater that floats on the denser underlying salt water. Dike water systems are generally located at high elevations and comprise groundwater that is impounded between impermeable basaltic dikes. Perched groundwater systems are formed as isolated lenses of groundwater resting on a geologic layer such as clay (Juvik and Juvik, 1989).

SBMR and WAAF proposed PV systems are on sites that lie over the Wahiawā groundwater aquifer system of the Central sector. Groundwater under these sites is unconfined high level water in rift zones characterized by dikes. The Wahiawā groundwater aquifer system is classified as fresh, currently used for drinking purposes, irreplaceable and highly vulnerable to contamination (Mink and Lau, 1990).

Proposed PV systems at JBPHH, including Ford Island, Pearl City and Waipi‘o Peninsulas, and West Loch Annex, are located within the Pearl Harbor aquifer sector. These sites generally lie along the shoreline areas of the estuary where unconfined near-surface caprock groundwater resides in sediments that overlie and confine groundwater at lower levels within the basaltic bedrock that underlies the Pearl Harbor area (INRMP 2011).

The PMRF proposed PV system is on a site that lies over a sedimentary caprock aquifer that rests on a primary basalt aquifer within the Kekaha aquifer system of the Waimea sector. The upper aquifer is unconfined basal water in sedimentary caprock. It is moderate in salinity, has potential for use, irreplaceable and highly vulnerable to contamination. The lower aquifer is

confined basal water in rift zones characterized by dikes. It is low in salinity, a potential drinking water source, replaceable and slightly vulnerable to contamination (Mink and Lau, 1990).

MCB Hawaii-Kaneohe Bay proposed PV systems are on sites that lie over the Waimānalo groundwater aquifer system of the Windward sector. Groundwater under this site is unconfined basal water in sedimentary caprock. The Waimānalo groundwater aquifer system is low in salinity, currently developed, ecologically important, irreplaceable and highly vulnerable to contamination (Mink and Lau, 1990).

The Camp Smith proposed PV systems are on sites that lie over the Waimalu groundwater aquifer system of the Pearl Harbor sector. Groundwater under this site is unconfined basal water on the flank of the Koʻolau Range. The Waimalu groundwater aquifer system is classified as fresh, currently used for drinking purposes, irreplaceable and highly vulnerable to contamination (Mink and Lau, 1990).

3.5 BIOLOGICAL RESOURCES

3.5.1 PV Systems on Building Rooftops and Structures

All proposed PV systems on rooftops and structures are located within developed areas that have no significant natural resources present. The proposed sites and surrounding areas have been previously disturbed by past development and landscaping activities. Vegetation and wildlife within these project sites are dominated by non-native flora and fauna. There are no sensitive plants or animal species known to inhabit the sites, and no designated critical habitats within these sites.

3.5.2 PV Ground Mount Systems

Terrestrial Resources

Proposed Action:

Commander Navy Region Hawaii

Waipiʻo Peninsula. The 42-acre (17-ha) Waipiʻo Peninsula site (Figure 2-7) was previously cultivated in sugar cane by the Oahu Sugar Company and is now fallow and overgrown with xeric plant species (i.e., adapted to extremely dry habitats). Some of the plants commonly observed in the area include Castor bean (*Rininus communis*), California grass (*Brachiaria mutica*), Buffle grass (*Cenchrus ciliaris*) and Guinea grass (*Panicum maximum*) (Navy 1990). The site is adjacent to approximately 2,000 feet (610 m) of the Middle Loch shoreline. The

proposed site does not contain any threatened or endangered species or associated critical habitat (Navy 2011).

The proposed electrical transmission corridor linking the ground mount site to Station D at PHNSY & IMF follows an existing road through formerly disturbed land on Waipi‘o Peninsula, crosses under the Pearl Harbor Entrance Channel to the Hospital Point area of PHSY & IMF (the latter segments within underground duct lines). Terrestrial resources along the Waipi‘o Peninsula transmission line are similar to the ground mount site. Terrestrial resources along the JBPHH main base transmission line are consistent with a highly developed and industrialized landscape.

Pearl Harbor provides known habitats for four endemic and endangered wading birds and waterfowl: the Hawaiian Black-necked Stilt (*Himantopus mexicanus knudseni*) or *ae‘o*; the Common Moorhen (*Gallinula chloropus sandvicensis*) or *‘alae ‘ula*; the Hawaiian Coot (*Fulica alai*) or *‘alae ke ‘oke‘o* and Hawaiian Duck (*Anas wyvilliana*) or *Koloa* (Navy 2011). Two additional bird species (listed by the State of Hawai‘i but not by the Federal government) are occasionally found in the Pearl Harbor area: the threatened white tern (*Gygis alba rothschildi*) or *manu o ku* has been seen, and the endangered Hawaiian short-eared owl (*Asio flammeus sandwichensis*) or *pueo*. There are no critical habitats or jurisdictional wetlands within or adjacent to the project area (USACE 1999). Primary protected wetland habitats for the threatened and endangered waterbirds are provided by two units of the Pearl Harbor National Wildlife Refuge: the Honouliuli Unit about 3 miles (4.8 km) to the west on the opposite shore of West Loch, and the Waiawa Unit about 1.0 mile (1,6 km) north-northwest of the Proposed Action, on the northwestern shore of Pearl City Peninsula. Additional undeveloped shoreline and wetland area of the Waipi‘o and Pearl City Peninsulas may provide additional habitat for these species (Earth Tech 1999), but the inland, xeric area of the Proposed Action does not.

PMRF (Kaua‘i). The proposed 2-acre (0.8-ha) site is currently covered in kiawe-koa haole scrub, a mix of non-native vegetation, and some a‘ali‘i-nama scrub that consists of native vegetation. There are no known threatened or endangered plants or terrestrial fauna within the proposed site. The area extending from the proposed PV ground mount site to Building 112 (to which power cables will be run from the PV system) may support the following federally endangered species: Hawaiian goose (*Brandta sandvicensis*), Hawaiian duck (*Anas wyvilliana*), Hawaiian common moorhen (Gallinula chloropus sandvicensis), Hawaiian coot (*Fulica alai*), Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*), and Hawaiian hoary bat (*Lasiurus cinereus semotus*). In addition, Newell’s shearwaters (*puffinus auricularis newelli*) and Hawaiian petrels (*Pterodroma sandwichensis*) may make overflights of the area during their breeding seasons.

Marine Corps Base Hawaii

Kāne'ohe Bay. Vegetation and wildlife in the proposed Ulupa'u foothill site (Figure 2-13) are dominated by non-native flora and fauna species. There are no sensitive flora or fauna species nor critical habitat at the site (MCB Hawaii INRMP 2011).

Puuloa Range Training Facility. The proposed site (Figure 2-11) is sparsely covered with grasses and other non-native vegetation. The surrounding areas were previously disturbed by past development and landscaping activities. Vegetation and wildlife within the project site are dominated by non-native plant and animal species. There are no sensitive plants or animal species known to inhabit the area, and there are no critical habitats at the project site.

Pearl City Annex. The proposed site (Figure 2-12) is covered by a concrete slab. It is not used by migratory birds or other protected species (MCB Hawaii INRMP 2011).

Alternative ground mount sites:

Pearl City Peninsula. The 140-acre (57-ha) Pearl City Peninsula site is located in previously disturbed areas: a former tank farm site and a former Navy sanitary landfill site (Figure 2-14). The former landfill site is adjacent to the PHNWR Waiawa Unit and like the Proposed Action (Waipi'o Peninsula), includes about 1,500 feet (457 m) of Middle Loch shoreline. These areas are habitat for Pearl Harbor's four endemic and endangered wading birds and waterfowl described above. Aside from the Middle Loch shoreline area and the adjacent Waiawa Unit, the alternative site does not contain any threatened or endangered species or associated critical habitat.

Ford Island. The 28-acre (11-ha) Ford Island runway is an upland site covered with non-native grasses and vegetation over or adjacent to exposed portions of asphalt concrete and the island is sparsely covered with grasses and other non-native vegetation (Figure 2-15). The Final Integrated Natural Resource Management Plan for Joint Base Pearl Harbor-Hickam (Navy 2011) describes Ford Island as being a highly developed and industrialized area.

West Loch Annex. The 685-acre (277-ha) site (Figure 2-16) is located in previously farmed areas (a portion of which is currently being farmed). The north end of the site abuts the PHNWR Honouliuli Unit (about 2,000 feet [610 m] of common frontage), and includes approximately 2,600 feet (792 m) of West Loch shoreline. These areas are habitat for Pearl Harbor's four endemic and endangered wading birds and waterfowl described above. There are no known resident listed threatened or endangered plants and terrestrial fauna inhabiting areas expected to be disturbed by developing this site. The West Loch Annex site is not considered to be biologically sensitive, and does not include any critical habitats or wetlands (with the exception of the aforementioned, adjacent, NWR).

Marine Resources

The proposed and alternative ground mount sites are in upland locations with no direct or indirect marine components. The proposed CNRH Waipi'o Peninsula ground mount site and the three CNRH alternative ground mount sites have transmission lines that will pass under the Pearl Harbor estuary bottom using HDD technology (approximately 30-100 feet (9-30 m) below the harbor bottom mudline), entirely avoiding contact with the marine environment.

Proposed Action (CNRH): Waipi'o Peninsula. The 42-acre (17-ha) site is adjacent to approximately 2,000 feet (610 m) of Middle Loch shoreline (Figure 2-6). The project would also include constructing a HDD bore hole/transmission cable under the Main Entrance Channel bottom, connecting the Waipi'o site to Station D at PHNSY & IMF.

Alternative ground mounts sites:

Pearl City Peninsula. The 140-acre (57-ha) Pearl City Peninsula site is adjacent to approximately 1,500 feet (457 m) of Middle Loch shoreline (Figure 2-14). Site development would include constructing an HDD bore hole/transmission cable under the North Channel bottom (between Pearl City Peninsula and Ford Island) and under the Main Entrance Channel bottom (between Ford Island and PHNSY & IMF).

Ford Island. The 28-acre (11-ha) Ford Island runway has no shoreline frontage (Figure 2-15). Site development would include constructing an HDD bore hole/transmission cable under the Main Entrance Channel bottom (between Ford Island and PHNSY & IMF).

West Loch Annex. The 685-acre (277-ha) site includes approximately 2,600 feet (792 m) adjacent to the Middle Loch shoreline (Figure 2-16). Site development would include constructing an HDD bore hole/transmission cable under the West Loch Channel bottom (between West Loch Annex and Waipi'o Peninsula) and under the Main Entrance Channel bottom (between Waipi'o Peninsula and PHNSY & IMF).

3.6 CULTURAL RESOURCES

3.6.1 PV Systems on Building Rooftops and Structures

United States Army Garrison-Hawaii

SBMR. PV panels are proposed on twenty-four (24) rooftops and structures. None of the buildings on these sites is of the age to be considered potentially eligible for the National Register nor are they located in a historic district, although buildings 694 and 2623/2624/2625 are located near the National Register District boundary. All of the buildings are located in the

cantonment area which is largely characterized by urban development. The surface and shallow subsurface ground conditions have been significantly altered through development. There are no known archaeological resources located near any of the buildings proposed for PV panel installation, where minor trenching may be needed to connect to the transformer outside the building.

WAAF. Rooftop PV panels are proposed on Building 1052. The building is not eligible for inclusion on the National Register of Historic Places and is not located within the National Historic Landmark District at WAAF. The area in which Building 1052 is located is considered to have a low probability of encountering archaeological sites. Archaeological surveys at the building site prior to its construction did not reveal any cultural resources.

Commander Navy Region Hawaii

JBPHH. Thirteen (13) of the twenty (20) rooftops and structures are located within the Pearl Harbor National Historic Landmark (NHL) (Navy 2008). The four (4) rooftops and one (1) structure are located within the Hickam area (1235H, 2115H 1766H and 1335H and its adjacent parking lot); and the one (1) West Loch and three (3) Wahiawa Annex sites are outside the NHL boundary. All twenty (20) proposed JBPHH rooftops and structure sites are located in areas with no to low archaeological probability (Navy 2008).

A summary of each property proposed for PV panel rooftop installation is provided below and summarized in Table 3-1. References to Historic Management and Community Zones are from the O'ahu Integrated Cultural Resources Management Plan (ICRMP) (CNRH 2008). The CNRH ICRMP provides guidance for managing historic Navy properties on O'ahu. It describes the historic resources, assigns categories[1] (ranging from the highest preservation priority to the least) to each facility, and establishes procedures for regulatory compliance. The ICRMP uses the cultural landscape approach to analyze the spatial relationships among natural and man-made features over time. The result is a designation of areas as historic management zones and creation of corresponding planning guidelines to protect and preserve contributing features

Building 327 is located in the Shipyard Historic Management Zone. It is a historic category II structure and is considered eligible for the National Register based on criteria 'A – association with events.'

[1] The 2008 ICRMP defines historic categories as follows: I = aspects of the built environment that possess major historic significance and are worthy of long-term preservation; II = possess sufficient historic significance to merit consideration for long-term preservation, but do not meet the criteria for assignment to Category I; II = possess sufficient historic significance to merit consideration in planning and decision making, but are not assignable to Category III; IV = do not possess sufficient significance or are lacking in importance and are not eligible for the NRHP.

Building 393 is located in the Shipyard Historic Management Zone. It is a historic category III structure and is considered eligible for the National Register based on criteria 'A – association with events' and 'C – distinctive characteristics/design.'

Building 1456, though not eligible on its own, is in the Shipyard Historic Management Zone. Both of these facilities are within the Pearl Harbor NHL.

Building 1770, though not eligible on its own, is adjacent to the Kuahua Naval Ammunition Depot Historic Management Zone.

Building 1335H (Hickam Youth Center & Parking Lot), Building 1235H (Hickam Base Exchange), Building 1766H (Hickam Theater), and Building 2115H (Hickam) are within former Hickam Air Force Base but not within the historic district. Each structure is not considered eligible for the National Register.

Buildings 1786 (Fleet Store), 1631, 1378, and 1407 are all located in the Naval Station and are structures under 50 years of age, not eligible for the National Register and are not listed as Cold War significant.

Building 1262 is located in the Naval Station and is not eligible for the National Register and is not listed as Cold War significant.

Building 77 is located in the Ford Island Historic Management Zone. It is a historic category III structure and is considered eligible for the National Register based on criteria 'A – association with events' and 'C – distinctive characteristics/design.'

Building 55 is located in the Ford Island Historic Management Zone. It is a historic category I structure and is considered eligible for the National Register based on criteria 'A – association with events' and 'C – distinctive characteristics/design.'

Building 187 is located in the Ford Island Historic Management Zone. This new addition to the Navy Lodge was built in 2003, is not eligible for the National Register and is not listed as Cold War significant.

Building 562 is located in West Loch within the Pearl Harbor National Historic Landmark but outside of the West Loch Historic Management Zone. It is not eligible for the National Register and is not listed as Cold War significant.

Buildings 229, 230, and 321 are located in NCTAMS PAC Wahiawa within the Community Center Zone. These buildings are not eligible for the National Register and are not listed as Cold War significant.

Table 3-1: JBPHH NRHP Eligible Properties:

Installation	Site	National Register of Historic Places Eligibility
JBPHH	Bldg 327 (NSY&IMF)	Yes
	Bldg 393 (NSY&IMF)	Yes
	Bldg 1456 (NSY&IMF)	No
	Bldg 1770 (NSY&IMF)	No
	Bldg 1335H Youth Center (Hickam)	No
	Bldg 1335H Youth Center Parking Lot (Hickam)	No
	Bldg 1235H (Base Exchange) (Hickam)	No
	Bldg 1766H Theater (Hickam)	No
	Bldg 2115H (Hickam)	No
	Bldg 1786 Fleet Store	No
	Bldg 1631	No
	Bldg 1262	No
	Bldg 1378	No
	Bldg 1407 Medical Clinic	No
	Bldg 77 (FI)	Yes
	Bldg 55 (FI)	Yes
	Bldg 187 (FI)	No
West Loch Annex	Bldg 562	No
Wahiawa Annex	Bldg 229 BEQ	No
	Bldg 230 BEQ	No
	Bldg 321 BEQ	No

PMRF (Kaua'i). There are no proposed PV systems on rooftops or structures at PMRF.

Marine Corps Base Hawaii

Kāne'ohe Bay. Rooftop PV panels are proposed on thirty four (34) sites involving twenty-seven (27) buildings and seven (7) structures. Sixteen (16) of the buildings proposed for rooftop PV panels are not eligible for inclusion on the National Register of Historic Places, and are not within or adjacent to a historic district (Buildings 242, 373, 1088, 1090, 1092, 1304, 1404, 1629, 1666, 3037, 4088, 6002, 6039, 6109, 6088 and 6477). Eleven (11) of the buildings are eligible for inclusion on the National Register of Historic Places and/or are within a Historic District (Buildings 101, 102, 103, 104, 208, 209, 219, 271, 375, 388, and 503). Building 219 falls within the historic Administrative District. Hangar 101 falls within the Kaneohe Naval Air Station

NHL. The Area of Potential Effect (APE) for the Proposed Action includes the main base of MCB Hawaii that is largely characterized by World War II structures, administrative buildings, runways, hanger facilities, maintenance and storage facilities, and residential areas.

Camp Smith. One (1) PV system on rooftop is proposed on Building 600 and one (1) PV system on structure is proposed at Building 450 parking lot. Buildings 600 and 450 are not eligible for inclusion on the National Register of Historic Places, and are not within or adjacent to a historic district. The APE for the Proposed Action is largely an urban area which includes administrative buildings, maintenance and storage facilities, and recreational facilities. According to the draft 2005 MCB Hawaii ICRMP, with the exception of one area removed from the planned PV structures, it is evident that there is a lack of archaeological resources at Camp Smith. Historic activities (cattle grazing, sugar cultivation and military actions) appear to have destroyed any pre-Contact archaeological sites that may have once been present.

3.6.2 PV Ground Mount Systems

Proposed Action:

Commander Navy Region Hawaii

Waipi'o Peninsula. The 42-acre (17-ha) Waipi'o Peninsula site is vacant with no existing structures. The site was formerly used for sugar cane cultivation. The CNRH ICRMP (page 4-22) and the 2012 CNRH Programmatic Agreement Stipulation IX.A.1, indicate the proposed project area is located in an area with no and/or low potential for archaeological sites. The proposed site is located within the Pearl Harbor NHL.

The Area of Potential Effect (APE) is shown in the Navy's response to the State Historic Preservation Officer's letter (Appendix B-2, May 2, 2013, Enclosures 3 and 4). The direct APE is limited to the ground disturbance necessary for installation of the PV array, the perimeter fence of the PV array, and trenching and directional drilling for the underground transmission line to Building 177 in PHNSY&IMF.

Waipi'o Peninsula is a part of the historic Pearl Harbor Naval Base. The activities that took place on the peninsula played a strategic role to the overall success of the war in the Pacific. The most notable activity was the Amphibious Operation Base, which assisted the Pacific island-hopping campaigns that helped win the war. Almost all of the structures built on Waipi'o Peninsula during the early 1940's were temporary structures, such as tents, Quonset huts, and wooden warehouses. The vast majority of these buildings

and structures were demolished long ago. The few facilities that remain are the only physical evidence of Waipi‘o Peninsula's role during WWII. None of the remaining facilities are located within the project APE.

Loko Hanaloa (State Inventory of Historic Properties #50-50-80-125), a pre-Contact era fishpond, was once located immediately to the west of the project's direct APE. No surface remnants of the fishpond are visible. An archaeological and paleoenvironmental study of the fishponds of Pearl Harbor (Athens 2000) revealed that fishpond deposits from Loko Hanaloa are no longer extant in the southern half of the fishpond and is likely for the northern half as well. Results of archaeological and paleoenvironmental analysis of sediment core sample extending to a depth of almost 45 feet (13.5 m) below ground surface and seven radiocarbon dates showed inverted stratigraphic layers and dates. This data indicates that the deposits within the fishpond were greatly disturbed (destroyed) during the infilling of the fishpond for sugarcane production. The area where the southern boundary wall of the fishpond wall may have once been located is still considered a high probability area, but is located outside of any of the project’s APEs.

The majority of Waipi‘o Peninsula, including the project APE, was the subject of an archaeological reconnaissance survey (Jensen and Head 1997). The survey found no historic properties within the project APE and noted extensive disturbance from bulldozing activity and large-scale sugar cane agriculture. This survey was confirmed by another later study (Goodman and Cleghorn 1998), which concluded that previous landfill activities had effectively covered the peninsula with at least 10 feet (3 m) of fill.

The associated underground transmission line extends from the ground mount site to its terminus in PHNSY & IMF at Station D within Building 177, a National Register of Historic Places eligible building. The transmission line follows the existing Waipi‘o Point Access Road to the vicinity of the Whiskey 22 wharf where it enters an HDD borehole to cross under the Main Entrance Channel and then into PHNSY&IMF.

The ICRMP discusses a “Historic railroad corridor” on Waipi‘o Peninsula. This corridor would be within the APE as well as the construction zone for the underground transmission line. Currently, the corridor is preserved and maintained as an existing unpaved roadway. The Waipi‘o Point Access Road follows the path that historically contained rails and ties, but there are no longer any rails, ties, or associated berm(s) along the historic railroad corridor. The historic railway corridor will continue to act as an access road to the area, and construction traffic related to the PV panels would use the historic corridor during construction. However, the project would not change the historic route and thus would have no impact on the corridor.

Mature shoreline vegetation along the east facing coast of Waipi'o Peninsula helps to provide visual screening of the existing 50-foot (15-m) Hawaiian Electric Company power poles located within the proposed project area from major views within the Shipyard and Ford Island Historic Management Zones.

Under the 2011 Historic Assets Management Process[2] (HAMP), Waipi'o Peninsula was designated as a tertiary zone, which is identified as an area of lower sensitivity within the NHL. The tertiary zone designation reflects the HAMP's analysis of cultural landscape data, historic inventory data, period of significance data (not involved in December 7, 1941 attack on Pearl Harbor, acquired after the attack), and the very low concentration of historic resources on Waipi'o Peninsula. Furthermore, the siting of a PV ground mount facility within Waipi'o Peninsula was constrained by an assortment of restricted security and safety arcs related to ordnance storage functions at West Loch, environmental restoration sites, and the buried/disturbed Hanaloa fishpond. Therefore, the siting of the proposed PV ground mount at Waipi'o Peninsula represents an effort to minimize harm to the NHL to the maximum extent possible.

Building 177, Power Plant, is a Historic Category II structure located within the Shipyard Historic Management Zone as described in the ICRMP (Navy 2008). Building 177 is of a distinctive type and period of construction with bombproof design reflecting the Navy's need for unfailing power supply and represents the need for increased power due to expansion of the base in WWII. The structure is eligible for the National Register under Criteria 'A' – events and 'C' – distinctive type, period, and method of construction.

PMRF (Kaua'i). The proposed PV ground mount system is located in the housing area, in an area of low archaeological probability. The areas designated as low probability on PMRF for encountering archaeological sites (historic properties) were determined based upon negative results of previous archaeological testing, known settlement and cultural practices for this particular area, and through background research of the history of the area, *mo'olelo* (oral history), written documents and records. The closest known cultural sites are comprised of various WWII era military sites (Sites 2000, 2001, 2002) at the south end of the runway, approximately 4,500 feet (1.4 km) north. For a detailed description of the cultural sites, see Appendix B-2.

[2] The 2011 HAMP provides tools to assess cumulative impacts to the Pearl Harbor NHL (Volume II, Chapters 1, 2 and 9). It is JBPHH's method for analyzing potential adverse effects to the NHL to minimize harm to the maximum extent possible during the planning process as required by Section 110(f) of the NHPA, 16 U.S.C. §470h-2(f).

Marine Corps Base Hawai'i

Kāne'ohe Bay. The proposed Ulupa'u site is not within or adjacent to a historic district. Based on the draft MCB Hawaii ICRMP (June 2005), the proposed site is located in an area of low archaeological probability.

Puuloa Range Training Facility. The proposed site is in an outlying area that is not contained within or adjacent to a historic district or landmark. The APE for the Proposed Action is the Puuloa Range Training Facility. Based on site characteristics and other project information, the proposed site is located in an area of sandy soil and with little to no ground disturbance, hence it is considered an area of high archaeological probability (MCBH 2005).

Pearl City Annex. The proposed ground mount site is adjacent to the boundaries of the Pearl Harbor NHL. The APE for the Proposed Action is the Pearl City Annex. The APE is located in an area designated as having no and/or low archaeological probability and well outside of the Pearl City Peninsula Historic Management Zone (Navy 2008).

Alternative Sites:

Commander Navy Region Hawaii

Pearl City Peninsula. The Pearl Harbor NHL boundary bisects the 140-acre (57 ha) site; the former Navy sanitary landfill subarea to the west is inside of the NHL, the former Fuel Farm Annex and agricultural unit to the east is outside the NHL boundary. Both sites are outside of the Pearl City Peninsula Historic Management Zone. The entire site is currently vacant except for a privately owned, above ground tank that is in the process of being removed. According to the ICRMP (Navy 2008), the former fuel farm annex and nearby agricultural unit are identified as areas with no and/or low archeological probability and the former sanitary landfill sub area is identified as "former Taro and Rice fields" and is considered an area with known and/or high archeological probability.

Ford Island. The proposed PV ground mount system on the historic Luke Field runway is within the boundaries of the Pearl Harbor NHL and the Ford Island Historic Management Zone identified in the ICRMP (Navy 2008). An early nineteenth century historical account (Corney 1965:212) indicates that Ford Island (Moku'ume'ume) may have traditionally been used as a burial site, yet to date no human remains have been encountered on the island. Based on the ICRMP (Navy 2008), the site is in an area of known and/or high archaeological probability. Although no longer in use, the historic Luke Field runway dominates the cultural landscape on Ford Island and provides openness and a visual relief between the housing and neighboring business districts on the island. Ford Island has a low overall development density, with concentrations of operational areas in the southeast and northwest.

West Loch Annex. The 685-acre (277-ha) site lies outside of the West Loch Naval Magazine Historic Management Zone and adjacent to the Pearl Harbor NHL boundary – with the exception of the northern most area adjacent to the Honouliuli Unit of the PHNWR. The area was under sugar cane cultivation until 1995 and includes no structures, and is identified as an area with no and/or low archeological probability (Navy 2008).

3.7 GEOLOGY AND SOILS

3.7.1 PV Systems on Building Rooftops and Structures

United States Army Garrison-Hawaii

SBMR and WAAF. Soils underlying buildings at SBMR and WAAF are predominantly Wahiawa Silty Clay Loam. This soil is characterized by moderate erodability, and moderate infiltration and permeability.

Commander Navy Region Hawaii

JBPHH. The general soil associations found in the Pearl Harbor area include Lualualei-Fill Land-Ewa associations. This soil association makes up about 14 percent of the Island of O'ahu, and is described as deep, nearly level to moderately sloping, well-drained soils that have fine textured or moderately fine textured subsoil or underlying material and areas of fill land on coastal plains (U.S. Department of Agriculture, Soil Conservation Service, 1972).

Ford Island. Ford Island has well-drained soils overlying coralline limestone deposits and dredged fill material from the harbor. Approximately 80 percent of the island is composed of coral and cemented calcareous sand outcroppings. The remaining areas are comprised of thin layers of friable red soil, similar to the Mamala series (USDASCS, 1972 as reported in Navy, 2000a). The northern and eastern shorelines are made up mostly of dredged fill material from the harbor.

West Loch Annex. Soils in the vicinity of Building 562 are classified as Fill Land (Navy 2011).

Wahiawa Annex. Soils in the vicinity of Buildings 229, 230 and 321 are classified as Leilehua Silty Clay, 2 to 6 percent slopes. Soils in this series consist of well drained upland soils developed in material weathered from igneous rock (Navy 2011).

Marine Corps Base Hawaii

Kāne‘ohe Bay. Soils underlying the majority of the buildings and structures are classified as Mamala Stony Silty Clay Loam. Mamala Stony Silty Clay Loam is a dark reddish-brown soil that is neutral to mildly alkaline. This soil is characterized as moderately permeable and has a slight to moderate erosion potential. Soils underlying Buildings 219, 271, and 3088 are ‘Ewa Silty Clay Loam. This soil is characterized as moderately permeable and has a slight erosion potential. Soils underlying Buildings 1304 and 6039 are Jaucas Sand, which is characterized by a high permeability and runoff is very slow to slow. The water erosion hazard is slight while the wind erosion hazard is severe where vegetation has been removed. Soil underlying Building 503 is Molokai Silty Clay Loam, which is characterized as moderately permeable, runoff is medium, and the erosion hazard is moderate. Buildings 101, 102, 103, 104, 373, 375, 388, and 3037 are on fill land.

Camp Smith. Soils underlying Buildings 450 and 600 are Manana Silty Clay. This soil is characterized as highly permeable, runoff is slow, and erosion hazard is slight.

3.7.2 PV Ground Mount Systems

Proposed Action

Commander Navy Region Hawaii

Waipi‘o Peninsula. The 42-acre site is primarily comprised of Pearl Harbor clay soils that occur on coastal plans, including portions of Waipi‘o Peninsula. These soils are developed in alluvium overlying organic material (Navy 2011). Mamala Stony Silty Clay Loam soils are present on the inland side of the site. This soil was formed in alluvium deposited over coral limestone and consolidated calcerous sand. The Waipi‘o Peninsula shoreline is characterized by a pronounced shoreline escarpment that rises approximately 15 ft (4.6m) above sea level.

PMRF (Kaua‘i). The dominant soil within PMRF is Jaucas loamy fine sand, from zero to eight percent slopes. This type of soil is permeable and infiltration is rapid. Wind erosion is severe where vegetation is removed (PMRF 2007).

Marine Corps Base Hawaii

Kāne‘ohe Bay. At the Ulupa‘u foothills PV site, the soil underlying the project site is classified as Makalapa Clay (NRCS 2007). The Makalapa Series consists of well-drained soils on uplands. They are gently sloping to moderately steep with slow permeability. Runoff is slow and the erosion hazard is slight. The shrink-swell potential is high.

Puuloa Range Training Facility**.** The Puuloa Training Facility sits on the limestone of an emerged reef, formed during a period of high sea stands. Soils at the facility consist of coral ore cemented calcareous sand, with 10 to 20 percent of a thin layer of friable red soil material in crevices and depressions in the coral (NRCS 2007). The soil type identified at Puuloa Training Facility is coral outcrop.

Pearl City Annex. The majority of the soils at Pearl City Annex are classified as mixed fill land, which is typically used for urban development and occurs adjacent to the ocean. Mixed fill land consists of areas filled with material dredged from the ocean or hauled from nearby areas, and general material from other sources, resulting in variable soil characteristics. Small areas of poorly to very poorly drained clays are found in the southwestern corner and along the northern edge of the Annex. These clays are characterized by slow to very slow permeability and slow to ponded runoff, and they present not more than a slight erosion hazard. In addition, the soils occupying the southwestern corner of the Annex have a high shrink-swell potential (NRCS 2007).

Alternative Sites

Commander Navy Region Hawaii

Pearl City Peninsula. The former fuel annex portion of the site is classified as predominately Fill Land, mixed with margins of Pearl Harbor Clay. The former sanitary land fill site is classified as Pearl Harbor Clay. Fill Land is widespread around Pearl Harbor and consists of material from dredging, excavation from adjacent uplands, garbage and bagasse and slurry from sugar mills (Navy 2011). Pearl Harbor clay soils occur on coastal plans including portions of Pearl City Peninsula. These soils are developed in alluvium overlying organic material (Navy 2011).

Ford Island. See description under Section 3.7.1.

West Loch Annex. The West Loch Annex site is predominately classified as Mamala Stony Silty Clay Loam. This soil was formed in alluvium deposited over coral limestone and consolidated calcerous sand. The area also contains areas of Fill Land, 'Ewa Silty Clay Loam (soils developed in alluvium derived from basic igneous rock) and Waipahu Silty Clay (soils developed in old alluvium derived from basic igneous rock) and Coral Outcrop (Navy 2008).

3.8 HAZARDOUS MATERIALS AND WASTES

3.8.1 PV Systems on Building Rooftops and Structures

No significant quantities of hazardous materials or wastes are stored or handled at the proposed sites except at Building 6040 at SBMR, and Buildings 209, 373, and 4088 at MCB Hawaii. The component Services manage hazardous wastes and materials in accordance with applicable laws, regulations and Service specific requirements. No hazardous materials or wastes are present at the proposed and alternative PV installation locations (i.e., the rooftops). PV installation, operation and maintenance are not anticipated to affect the hazardous materials or waste operations.

3.8.2 PV Ground Mount Systems

There are no hazardous materials or waste stored or handled at the proposed and alternative PV ground mount sites. It is noted that the Ulupa'u and Waipi'o Peninsula ground mount sites are adjacent to ammunition storage areas and encumbered by ESQD arcs (as is the alternative site at West Loch Annex).

Portions of JBPHH, including the proposed Waipi'o Peninsula ground mount site and the alternative sites at Pearl City Peninsula, West Loch Annex and Ford Island, and the PHSY & IMF have been placed on the National Priorities List, regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly referred to as Superfund. Petroleum contaminated soil and groundwater is likely to be encountered in these areas and excavation in these areas must be handled in accordance with procedures established by the Commander Naval Base Pearl Harbor (January 1996). Pearl City Peninsula and Ford Island have CERCLA sites that have contaminants in addition to petroleum in soil and/or groundwater.

The proposed Waipi'o Peninsula transmission line passes near the former Oahu Sugar Company Herbicide/Fertilizer Mixing Area near Walker Bay. This is a Potentially Responsible Party (PRP) site where a 3rd party is responsible for the investigation and clean up. The transmission line also passes within 400 feet (122 m) of two non-contiguous sandblast grit disposal areas (referred to as Site 29-Sandblast Grit). A Time Critical Removal Action (TCRA) was completed on May 3, 2012 and a Removal Verification Report (RVR) for the TCRA was submitted in December 2012. The RVR reported results above screening criteria for Arsenic and Lead. A planned Remedial Investigation/Feasibility Study will be testing for Target Analyte List (TAL) metals, Tributyltin, TCLP Lead, and Arsenic at these two sites (Navy May 2012).

It is unlikely that the HDD segments under Pearl Harbor have the potential to encounter contaminated sediments because the power transmission cable tunnel(s) will be drilled through

solid substrate, approximately 30 – 100 feet (9-30 m) below the unconsolidated sediment that covers most of the harbor bottom (mudline). Vertical coring along the HDD route will likely be needed to determine depth and design, requiring the contractor to observe safety procedures and proper health and safety precautions around sediments associated with the vertical coring.

The PHNSY & IMF segment of the proposed Waipi'o Peninsula transmission line (same segment as the alternative West Loch Annex transmission line) transits over a subsurface fuel plume (Navy January 2012) originating from the Oscar 2 Pier.[3] The plume (at 10-12 feet [3-3.6 m] depth) has decreased in extent over time. Currently Building 177, the terminus of the transmission line, appears to be outside the plume. In any event, it is very possible that petroleum contaminated soil will be encountered in this segment and procedures outlined in PACNAVFACENGCOM 1996 letter shall be followed. Two transformer sites with known PCB contamination are located near the proposed underground duct, although the planned route does not appear to intersect the two sites. If any ground disturbance is required at these sites, the soil will need to be handled and disposed of in accordance with CERCLA and TSCA requirements. Asbestos-containing materials and lead based paint are present within Building 177.

The western portion of the Pearl City Peninsula alternative is located on the Pearl City Peninsula Landfill site (area on the west side of Waiawa Stream). Chemicals of concern in soil include metals, PCBs, dioxins/furans, and polynuclear aromatic hydrocarbons (PAHs). The Ford Island alternative is not directly on any contaminated sites; however, there is a groundwater monitoring well located on the southeast side of the runway. This monitoring well would need to be preserved, since it is used for groundwater sampling.

3.9 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PROTECTION OF CHILDREN

3.9.1 Socioeconomics

Hawai'i had an estimated resident population of 1,283,388 persons in 2007, of which 34,895 were military and 59,606 were dependents representing a military population of 94,495 or 7.4% of the State's total population. The State's estimate of the total population in 2011 was 1,374,810; however, updated information of the military population was not available. Over 99% of the military population is on O'ahu (DBEDT 2007).

[3] Polychlorinated biphenyls (PCB), at low levels (<2 ppm) have been detected in the oil and petroleum-contaminated soil associated with the Oscar 2 subsurface fuel plume. The PCBs are not ubiquitous in the petroleum-contaminated soil or oil, but the boundaries of the PCB contamination within the larger fuel plume is unknown. If any petroleum contaminated fuel or soil within the area of the Oscar 2 Pier are encountered, they may contain low levels of PCBs.

SBMR. Located 17 miles (27 km) from Honolulu, Schofield Barracks is home to the 25th Infantry Division and Army Garrison, Hawaii. SBMR employs approximately 19,000 personnel of which about 13,400 are military and 5,600 are civilian. Housing at the installation includes about 4,190 officer family units, 6,500 enlisted family units, and 5,897 unaccompanied units.

WAAF. WAAF comprises approximately 1,370 acres (554 ha) of land adjacent to Schofield Barracks and is home to a variety of DoD activities. It employs approximately 3,700 personnel of which about 2,250 are military and 1,450 are civilian. There are 644 family units and 277 unaccompanied personnel housing units at WAAF.

JBPHH. On October 1, 2010, Naval Station Pearl Harbor combined with Hickam Air Force Base to become JBPHH. The base has a total population of 84,000 of which 35,000 are combined military/civilian and 49,000 are combined family members/retired military personnel. Total land area is 27,694 acres (11,200 ha).

PMRF, Kaua'i. The County of Kaua'i (includes the islands of Kaua'i and Ni'ihau) has an estimated 2011 population of 67,091. This is less than five percent of the total population of the State of Hawai'i. The County of Kaua'i is about 620 square miles (1,600 square kilometers [km^2]) and has a population density of about 108 persons/square mile versus (174 persons/km^2) the State's population density of about 212 persons/square mile (342 persons/km^3). PMRF is relatively isolated and is the only military installation on the island. The population served by the installation is approximately 80 active duty and 180 civilian personnel and their families.

MCB Hawaii-Kaneohe Bay. The base occupies the entire Mōkapu Peninsula, of 2,951 acres (1,194 ha), and is home for the 3rd Marine Regiment, Marine Aircraft Group 24, Combat Logistics Battalion 3 and 3rd Radio Battalion. The Kāne'ohe base has a population of nearly 20,000 Marines, dependents and civilian employees, making it the largest employer in Windward O'ahu.

Camp Smith. Camp Smith is the headquarters of Marine Forces Pacific as well as the United States Pacific Command and Special Operations Command Pacific. Camp Smith consists of 220 acres (89 ha) with an estimated population of 1,100.

3.9.2 Environmental Justice

EO 12898, Environmental Justice, was issued by the President on February 11, 1994. Objectives of the EO, as it pertains to this EA, include development of Federal agency implementation strategies and the identification of low-income and minority populations potentially affected by proposed Federal actions. Accompanying EO 12898 was a Presidential Transmittal Memorandum referencing existing Federal statutes and regulations to be used in conjunction with EO 12898. One of the items in this memorandum was the use of the policies and

procedures of NEPA when such analysis is required by the NEPA 42 U.S.C. Section 4321 et. seq. Specifically, the memorandum indicates that: “each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of federal actions, including effects on minority communities and low-income communities.” Although an environmental justice analysis is not mandated by NEPA, DoD has directed that NEPA will be used as the primary mechanism to implement the provision of the EO.

Low-income populations exist in both the City and County of Honolulu and the County of Kaua‘i, as well as certain census tracts (CT) and census designated places (CDP) adjacent to the proposed and alternative project sites. According to the 2011 American Community Survey (ACS), approximately 9.3 percent of individuals, and 6.5 percent of families were living below the poverty level in the City and County of Honolulu. In the Waipahu CDP (adjacent to the Waipi‘o Ground Mount Site), poverty rates are higher than the county average at 14.4 percent for individuals and 11.3 percent for families (ACS 2011). Similarly, in the Kaneohe Station CDP approximately 15.1 percent of individuals, and 14.1 percent of families were living below the poverty level (ibid). In the County of Kaua‘i, approximately 10 percent of individuals, and 7.2 percent of families were living below the poverty level. The percentage of individuals (10.3 %) and families (11.3%) living below the poverty level in CT 409, which includes the PMRF proposed ground mount site and most of Western Kaua‘i, was meaningfully higher than the county average in 2011 (ibid).

The State of Hawai‘i is home to a tremendously diverse population, where no single race constitutes a majority of residents. The areas adjacent to the proposed sites are generally indicative of this diverse cultural make up. However, it may be important to note that certain communities around these proposed sites are home to proportions of Native Hawaiians that are significantly greater than the corresponding county average. The ‘Ewa Beach CDP, adjacent to the Puuloa Range Training Facility Site for example, is comprised of a population that is 32.7 percent Native Hawaiian, compared with a City and County of Honolulu average of 24.5 percent (US Census 2010). Also, on Kaua‘i, Native Hawaiians in CT 409 make up 39.3 percent of the population, compared with a county average of 25.9 percent (ibid).

3.9.3 Protection of Children

3.9.3.1 EO 13045, Protection of Children

This Executive Order requires each Federal agency to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. This EO was prompted by the recognition that

children, still undergoing physiological growth and development, are more sensitive to adverse environmental health and safety risks than adults.

3.9.3.2 PV Systems on Building Rooftops and Structures

With the exception of construction activities, PV systems on building rooftops and PV structures pose no routine or special health or safety risks to children since they will be inaccessible. Inverters and other related electrical equipment will be isolated by fences or within electrical cabinets and other facilities designed to prevent unauthorized access.

3.9.3.3 PV Ground Mount Systems

Because these PV systems will be mounted on the ground, they could be accessible to children who live in the area. Residential areas and schools are located near some of the proposed ground mount sites. The MCB Hawaii Kaneohe Bay family housing is located across Daly Rd. from the proposed Ulupa'u ground mount site (Figure 2-13). Also, the Ewa by Gentry neighborhood and Holomua Elementary School are located to the west of the proposed West Loch Annex alternative ground mount Site (Figure 2-16). Similarly, Iroquois Point and the Iroquois Point Elementary School are located across Cormorant Avenue and to the East of the Puuloa Range Training Facility proposed ground mount site (Figure 2-11). The proposed Pearl City Peninsula alternative ground mount site would share a boundary with Lehua Elementary School's athletic facilities in the south and east directions (Figure 2-14).

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CHAPTER 4.0
ENVIRONMENTAL CONSEQUENCES

This chapter evaluates the probable environmental consequences of the Proposed Action. The probable direct, indirect, short-term, long-term and cumulative impacts of the Proposed Action on relevant environmental resources are discussed.

This chapter generally follows the same structure as Chapter 3. The discussion of impacts for visual resources, air quality, water resources, geology and soils, and socioeconomics and environmental justice covers all three types of PV systems due to the insignificant difference in impacts from the different systems. Remaining resources are discussed in two categories: (a) PV systems on building rooftops and structures; and (b) PV ground mount systems. Impact discussions for PV systems on building rooftops and structures have been grouped together because of similarities of their impacts. Where additional details are warranted, site-specific resource discussions are provided by installation/property for each Service.

A summary of the impacts are provided in Table 4-2 at the end of the chapter.

4.1 LAND USE COMPATIBILITY

4.1.1 PV Systems on Building Rooftops and Structures

There would be no impacts to existing land use from the proposed PV systems on building rooftops and structures. Installing PV systems on existing building rooftops would not change the current or future use of these buildings. The proposed PV systems on structures would be built on existing paved parking lots. Temporary disruption of use of the parking areas would occur during construction of the PV systems on structures, but use would remain the same once installations are completed. The PV systems on structures would serve a dual purpose: provide the support structure needed for mounting PV panels and protect parked cars from the weather.

4.1.2 PV Ground Mount Systems

The proposed use of PV ground mount systems at all proposed and alternative sites would remain compatible with the adjacent land uses, as activities associated with the PV ground mount systems are not expected to have any impacts on surrounding areas or uses. The proposed sites at Waipi'o Peninsula and Ulupa'u (and the West Loch Annex alternative site) are encumbered by ESQD arcs; therefore, use is restricted to activities that do not have full-time personnel since installation, operation, maintenance, and repair of PV ground mount systems would not introduce additional full-time personnel working inside the ESQD arcs. Maintenance requirements are expected to require monthly visits to the site and PV operation will be monitored remotely. Appropriate precautions for working within the ESQD arcs would be taken

during both construction and maintenance. Given their locations within ESQD arcs, both the Waipi‘o Peninsula and Ulupa‘u proposed sites will need to be reviewed and approved by DDESB to ensure land use compatibility. The proposed site at Waipi‘o Peninsula is also constrained by the adjacent CDF. However, the proposed site lies entirely outside of the CDF, and the use of the PV ground mount system represents a compatible land use.

Neither the Pearl City Peninsula nor Ford Island alternatives are constrained by ESQD arcs.

No-Action Alternative: PV systems would not be installed; therefore, there would be no change in land use.

4.2 VISUAL RESOURCES

There would be no significant visual impacts to the public since all the proposed PV sites (building rooftops, structures and ground mounts and associated transmission lines) are located on DoD property affording very limited viewing opportunities to the public, which has restricted access to military installations.

For on-base personnel and visitors, the sight of PV panels on existing rooftops and new structures in existing parking areas should have minimal visual impacts since these sites are located in urbanized and developed areas and lack sensitive visual features and PV panels are becoming increasing common and generally accepted as part of Hawai‘i’s landscape.

The ground mount systems would be more noticeable than the rooftop or structure systems due to their size. However, since most of these systems are typically located in less frequented areas of the military installations, visual impacts to on-base personnel are expected to be insignificant. The proposed ground mount systems have a relatively low visual profile (panels are approximately 5 feet [1.5 m] high, and secured within a 7-foot [2.1-m] high chain link fence), Other appurtenances such as the inverters and permanent outdoor lighting would be approximately 10 feet (3 m) high. The PV panels have an anti-reflective coating that improves light absorption and reduces glare, and would not be prominent in views from adjacent areas outside of DoD property. Any permanent outdoor lighting shall be full cut-off (full-shielded) and compliant with the International Dark Sky Association (IDA) Standards. The 20-foot (6-m) setback from the shoreline escarpment would preserve the existing vegetation buffer that would visually screen the facility from adjacent areas. There are no overhead transmission lines associated with the Waipi‘o Peninsula ground mount site, resulting in no related visual effects.

Two of the alternative JBPHH ground mount sites (Pearl City Peninsula and West Loch Annex) are visible from public roads and vantage points (i.e., public vehicle traffic is permitted along Navy-owned roads that traverse through the two sites [Lehua Avenue and Iroquois Point Road]

and therefore would be visible to those motorists). Overhead transmission lines associated with these two facilities may include overhead segments running along existing roadways (the Contractor will have the choice of constructing overhead or underground transmission lines for the Pearl City Peninsula alternative). The overhead transmission lines would typically be suspended on 40-foot (12-m) tall utility poles spaced at 200-foot (60-m) intervals, a low enough density to avoid visual impacts when viewed from the few public viewing places within the Pearl Harbor area. The alternative ground mount system on Ford Island runway is subject to public viewing by visitors to the adjacent Pacific Aviation Museum, USS Oklahoma Memorial, USS Utah Memorial, and the Battleship Missouri Memorial as well as visitors to the on-base housing located at both ends of the runway. Visual impacts to the historic Ford Island runway could be minimized by using design and installation methods that when removed, will allow for substantial restoration of the site to its current condition. Transmission lines on Ford Island and the JBPHH main base associated with this alternative would be fed through existing underground ducts, resulting in no visual effect. See Section 4.6.2 Cultural Resources, PV Ground Mount Systems, for detailed discussions.

No-Action Alternative: PV systems would not be installed; therefore, there would be no impact to visual resources.

4.3 AIR QUALITY

The ambient air quality at all PV project sites is within the Hawai'i and National air quality standards. The construction and operation of the PV systems would have minimal impact on air quality. Construction emissions would result from construction vehicles and equipment, and their associated fugitive dust. However, construction activities associated with this project would be limited because the majority of PV systems would be mounted on existing building rooftops. In addition, limited ground disturbance during site grading and placement of structure support posts and cables would not generate a significant amount of fugitive dust. Dust suppression methods such as wetting will be implemented to minimize the emissions of fugitive dust.

A slight increase in greenhouse gas (GHG) emissions is anticipated during construction. This increase would be attributed primarily to diesel-powered equipment and trucks, along with fossil fuel-powered delivery trucks and vehicles of workers and visitors commuting to and from the project sites. However, the increase in GHG emissions during construction would be compensated by the generation of electricity from solar energy once the PV systems are in operation. The Proposed Action provides long-term beneficial effects on air quality and GHG emissions, since the use of fossil fuels would be reduced. The use of PV systems to generate electricity reduces dependence on fossil fuels that emit GHG. (See cumulative impact discussion of GHG and climate change in Section 4.12.)

No-Action Alternative: No construction activities would occur; therefore, there would be no impacts to air quality.

4.4 WATER RESOURCES

Section 438 of the Energy Independence and Security Act of 2007 established strict stormwater runoff requirements for federal development and redevelopment projects. The provision requires that "The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet (465 m^2) shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow." These requirements will be followed for all ground mount systems.

Drainage. PV systems placed on rooftops and existing paved parking lots would not result in any increase in rainwater runoff. Proposed ground mount sites at Waipi'o Peninsula in Pearl Harbor, PMRF on Kaua'i, Ulupa'u foothills at MCB Hawaii-Kaneohe Bay and Puuloa Range Training Facility are currently covered with vegetation. Installation of PV ground mount systems on these sites would increase the amount of impervious surface. However, the increase in runoff would be minor as the increase in impervious surface would be limited to the footing, estimated at less than 10% of the total ground mount area. As appropriate, the project would implement best management practices (BMPs) to capture and retain stormwater on site and allow it to infiltrate into the soil or to be discharged at a rate that would not exceed the predevelopment hydrology to adjacent surface waters. A National Pollutant Discharge Elimination System (NPDES) permit would be obtained for sites with construction exceeding one acre (0.4 ha).

The proposed PV ground mount system at Pearl City Annex would not create any additional impervious surface as the PV system would be installed on an existing concrete slab, and rainwater runoff would drain into Pearl Harbor estuary.

The alternative ground mount sites at Pearl City Peninsula and West Loch Annex are also covered in vegetation – similar to the proposed sites discussed above, and therefore, development of any of these sites would also need to implement BMPs and would be subject to the NPDES requirements. The Ford Island runway site is generally impervious and accordingly, construction of the ground mount site would not be expected to increase in rainwater runoff.

Groundwater. No long-term use of groundwater would occur for operation and maintenance of the PV systems; therefore, no long-term impact on groundwater or supply is expected for the proposed action or alternatives. The proposed PV systems do not contain materials that would

contaminate groundwater quality and are not located within watershed areas that are protected as conservation districts in Hawai'i. Building rooftops and structures would continue to discharge storm water in the same manner as existing rooftops and parking lots. Some storm water flows that are retained on site from ground mounted PV systems could be used to recharge groundwater aquifers. During construction, BMPs such as proper storage of hazardous materials and immediate cleanup of any leaks or spills will be implemented to prevent contamination of groundwater resources.

No-Action Alternative: No construction activities would occur; therefore, there would be no impacts to water resources.

4.5 BIOLOGICAL RESOURCES

4.5.1 PV on Building Rooftops and Structures

The proposed PV installation on these structures would have no significant impact on biological resources. As described in Section 3.5.1, sites for PV systems on building rooftops and structures are located within developed areas and on existing buildings and parking areas that have no sensitive natural resources present. There are no federally-listed threatened or endangered species or critical habitat within the proposed PV sites; therefore there would be no impacts associated with the proposed PV installation to those resources.

Federally-protected migratory birds that may pass through or use a certain area for perching or roosting may be temporarily displaced during the placement and maintenance of PV arrays. This would be temporary and would not cause significant impacts to these species as the birds would relocate to other available habitats. The panels have an anti-reflective coating that improves light absorption and reduces glare. The current design for these types of installations does not include any guy wires that would create a strike hazard for birds. If the nests of any Migratory Bird Treaty Act (MBTA) protected species are found on building rooftops on which PV array placement is planned, installation of equipment will be delayed in that location until after the nest fledges or naturally falls.

4.5.2 PV Ground Mount Systems

Terrestrial Resources

Installing PV ground mount systems at the proposed and alternative sites would have no significant impact on biological resources.

As described in Section 3.5.2, sites proposed for PV ground mount systems at PMRF and the Puuloa Range Training Facility are landscaped and/or contain primarily non-native flora/fauna.

At PMRF, the power cables to be run from the PV ground mount site to Building 112 will be placed along existing power lines on existing poles or will be run underground, such that the project would not create collision hazards for listed bird species. Any construction occurring during the nocturnal seabird fledging period (October 15 through December 15) would be carried out during daylight hours, such that night lighting would not be required. Finally, clearing of vegetation prior to installation of the PV system would occur outside of the Hawaiian hoary bat pupping period (June 1 through September 15). For these reasons, the proposed project would have no effect on endangered or threatened species at PMRF.

Most of the Pearl City Annex site is a concrete slab and has non-native flora and fauna species present. The Ulupa'u foothill site has only non-native flora and fauna species present. The Waipi'o Peninsula site is on former sugar cane lands. The Pearl City Peninsula and West Loch Annex alternative sites are adjacent to the Waiawa and Honouliuli Units of the PHNWR, respectively, and BMPs will need to be implemented to assure the ground mount sites are effectively buffered from the adjacent refuges. The formerly developed Ford Island ground mount site would have no effect on terrestrial resources.

There are no federally-listed threatened or endangered species or critical habitat that would be affected by the Proposed Action or alternatives. Skirting around the panels for the PV ground mount systems would help to prevent shaded area underneath the PV panels from becoming a habitat for feral animals.

None of the PV arrays are located in areas where large numbers of federally-protected waterbirds are known to congregate. It is unlikely, therefore, that that the issue of birds attempting to land on the panels would be a problem. In addition, many of the arrays would consist of panels that are angled, rather than flat on the ground or on a roof top, making it even less likely that they would be mistaken for a body of water. The current design for installation of ground mount systems does not include any guy wires that would create a strike hazard for birds.

Permanent outdoor lighting, if installed on Waipi'o Peninsula or at PMRF, shall be full cut-off (full shielded), light-emitting diode (LED) type and compliant with the International Dark-Sky Association (IDA).

Federally-protected migratory birds that may pass through or use the area for foraging or loafing may be displaced as a result of installation of the PV arrays. This will not cause significant impacts to these species as they will relocate to adjacent areas with suitable habitat. If nests of any MBTA protected species are found on the sites on which PV array placement is planned, installation of equipment will be delayed in that location until after the nest fledges or naturally falls.

No Action Alternative. No construction activities would occur; therefore, there would be no impacts to terrestrial resources.

Marine Resources

Installing PV ground mount systems at the proposed and alternative sites involve upland activities with generally no marine effects, with the exception of JBPHH proposed and alternative ground mount sites, which all require some degree of in-water construction activities to transmit power, and are discussed below.

HDD technology is proposed to construct underground bore holes *under Pearl Harbor* (as opposed to harbor bottom-laid cables), to transmit power from the proposed Waipi'o Peninsula ground mount site (as well as from the Pearl City Peninsula, Ford Island and West Loch Annex alternative sites). The use of HDD technology would eliminate potential impacts to marine natural resources, including the elimination of potential impacts to Threatened and Endangered Species, Essential Fish Habitat and corals. The elimination of these potential impacts is based on the following assumptions:

1. All drilling will be performed in such a manner that there are no discharges of drilling mud or cuttings into the harbor;
2. Drill cuttings will be stored and removed so that none of these materials can enter the harbor;
3. There will be no temporary or permanent structures placed in harbor waters; and
4. The power transmission cable tunnel(s) will be drilled through solid substrate, approximately 30-100 feet (9-30 m) below the unconsolidated sediment that covers most of the harbor bottom.
5. Any material generated by the HDD/vertical coring process will be evaluated and disposed of in an appropriate manner, in accordance with Federal and State regulations.

No-Action Alternative: PV systems and associated electrical cables would not be installed; therefore, there would be no impacts to marine biological resources.

4.6 CULTURAL RESOURCES

4.6.1 PV Systems on Buildings and Structures

United States Army Garrison-Hawaii

SBMR/WAAF**.** There would be no impacts to cultural resources. None of the proposed buildings for PV installation are eligible for the National Register of Historic Places, nor are they located within a historic district at either SBMR or WAAF. Buildings 694, 2623/2624/2625 lie adjacent to the National Historic Register District at SBMR. The PV panels on Building 694 would be mounted on the flat portion of the roof surface, lying below the parapet walls and will not be visible from the National Historic Register District. PV panels on Buildings 2623/25624/2625 would be mounted on the south side of the roof and will not be visible from the National Register District. Based on the proposed design, USAG-HI has determined that the proposed installation of PV systems on building rooftops would have no impacts on cultural resources and the SHPO concurred with the "no historic properties affected" determination of effect (see Appendix B-1).

Commander Navy Region Hawaii

JBPHH. There would be no significant impacts to cultural resources. The Navy has determined that the proposed installation and operation of PV systems on building rooftops and structure as listed in Table 2-1 and 2-2 is an action covered under the CNRH Programmatic Agreement (PA) (October 2012) with the following stipulations:

- Navy shall have the opportunity to provide comment on the Contractor's milestone design submittal of the PV mounting method and layout for each structure.
- PV panels shall not be mounted higher than the height of the roof parapet on buildings that have parapets.
- For low slope, gable roofs, PV panels shall be mounted low to the roof and follow the same slope. A setback distance from the eave shall be established to ensure that the panels are not visible from the adjacent thoroughfare roads.
- No modification or addition to the exterior elevations of the proposed structures is allowed.

Considering the information currently available, that there will be no substantive change from the current conditions, and pursuant to the October 2012 PA, the Navy has determined that the proposed undertaking to install PV on various buildings and structures as listed in Table 2-1 and 2-2 is stipulated in Appendix 'A' Article I.A (1) of the PA as not requiring further review.

However, as this is a design-build project, the full scope of the project has not been finalized. Consequently the Navy's determination is contingent upon further review by Navy of the Contractor design submittals at the 35% and 100% design milestones. If significant changes from the current scope occur, or if there are unanticipated effects to historic properties, consultation with the Hawai'i SHPO may be necessary. The SHPO has a 30-day review period for project submittals.

PMRF (Kaua'i). No PV systems on rooftops or structures are proposed; therefore, there would be no impact.

Marine Corps Base Hawaii

There would be no significant impacts to cultural resources. MCB Hawaii has determined that the proposed PV systems on rooftops and structures at existing parking lots would result in no adverse effect to historic properties based on the following: (1) the proposed PV panels on historic buildings would be flush with the roof; (2) the PV panels would be able to be easily removed without damaging the roof; (3) the PV structures would be constructed in existing parking lots; and (4) a qualified archaeologist would monitor ground disturbing activities since existing subsurface sand deposits used during early base development as fill material may contain human remains. If human remains are discovered, all work in the vicinity would stop and the remains will be stabilized and protected. Treatment would proceed under the authority of the Native American Graves Protection and Repatriation Act.

The Hawai'i SHPO concurrence was sought via two letters. The first letter (March 14, 2012) covered all proposed MCB Hawaii facilities with the exception of MCB Hawaii Kaneohe Bay Hangars 101, 102, 103 and 104, with a determination of "no adverse effect." The Hawai'i SHPO concurred with this determination by letter dated April 5, 2012. A second letter (March 11, 2013) covered the four hangars with a similar "no adverse effect" determination. It was determined subsequent to that letter that PV panel installation on the Hangar 101 rooftop had been previously approved as part of the Programmatic Agreement (PA) executed on July 28, 2012 among the Marine Corps, SHPO, and the Advisory Council on Historic Preservation for the Basing of MV-22 and H-1 Aircraft in support of III Marine Expeditionary Force Elements in Hawai'i. Mitigations stipulated in the PA for Hangar 101 will be followed. Pursuant to 36 CFR 800.4(d)(1)(i), MCB Hawaii's responsibilities under Section 106 covered in its March 11, 2013 letter were fulfilled as of 13 April 2013, because it received no objection from the Hawai'i SHPO regarding its determination that the proposed project to install PV panels on the roofs of the hangars would result in no adverse effect to historic properties (see Appendix B-3 for Section 106-related correspondence).

4.6.2 PV Ground Mount Systems

Commander Navy Region Hawaii

Waipi'o Peninsula. There would be no significant impacts to cultural resources. The Navy has determined that the proposed PV ground mount system would result in "no adverse effect" upon the Pearl Harbor National Historic Landmark or any identified historic properties based on the following factors:

- The proposed site is located within the Historic Asset Management Plan "tertiary" zone (CNRH 2011) which is identified as an area of lower sensitivity.

- The Waipi'o Peninsula ground mount site is in line with significant views indicated on the Ford Island Historic Boundary Map and the Pearl City Peninsula Historic Boundary Map of the CNRH ICRMP (Navy 2008). The associated power transmission line will be placed underground, eliminating any effects on historic view planes. The shoreline vegetation along the eastern shore of Waipi'o Peninsula fronting the ground mount site is high and dense enough to buffer the views of the proposed facility from Ford Island and Pearl City Peninsula. To preserve this vegetation buffer through the operational period, the Contractor is required to maintain a 20-foot (6-m) setback from the shoreline escarpment to protect the vegetation buffer from project-related activities. As an added precaution, the Contractor shall install temporary fencing- parallel to the shore line escarpment adjacent to the required vegetation buffer zone during construction activities to make sure no inadvertent or accidental damage occurs to the vegetation within the 20-foot (6-m) buffer zone (e.g., this protection could consist of bright orange construction snow fencing, or other agreed-upon, preferred method, which could be easily removed to preserve the environment in its pre-construction condition).

- The absence of known surface or subsurface archaeological sites within the direct APE and its location within a low/no probability zone according to the CNRH ICRMP (Navy 2008). If historic properties or a previously unidentified property eligible for listing on the National Register are discovered during the performance of an undertaking by the Contractor, the Navy will take all reasonable measures to avoid or minimize harm to the property until it concludes post-review discovery consultations.

- The proposed ground mount facility would not alter the historic railroad route serving Waipi'o Peninsula and thus would have no impact on the route. The former railway route will continue to be preserved as an access road serving the

area. The placement of the underground transmission line would be within the historic railroad corridor, but since the physical remains of the railroad are no longer in existence, any digging along the corridor would be backfilled to restore the environment to its preconstruction condition. Thus, the placement of the transmission lines also would have no long-term impact on the corridor.

- No modifications to Building 177 (PHNSY terminus of the transmission line) will occur because the electrical distribution line connection to the building will be achieved by using existing underground conduit. This requirement is stipulated in the Contractor's statement of work

- SHPO will be afforded the opportunity to review the Contractor's design milestone submittals.

The National Trust for Historic Preservation (NTHP) provided comments on the Navy's determination of effect dated April 1, 2013 and the Navy provided its response dated April 30, 2013. The Hawai'i SHPO concurred with Navy's no adverse effect determination by letter dated April 17, 2013 (and amended by the June 26, 2013 letter). NTHP provided a follow-up letter on May 6, 2013, outlining several conditions they believed would reasonably ensure that the effects of the Proposed Action would not adversely affect the NHL. The Navy will follow these conditions in implementing the Proposed Action. (See Appendix B-2 for related correspondence.)

PMRF (Kaua'i). There would be no impacts to cultural resources. The Navy has determined that the proposed PV ground mount system would result in "no historic properties" affected. However, as a precaution and in accordance with the PMRF Archaeological Monitoring Plan (see Appendix B-2), the Navy would carry out spot monitoring for the proposed PV ground mount site (site A-5) where previous studies in the general vicinity have resulted in negative findings.[1] The Hawai'i SHPO concurred with the Navy's determination of effect (see Appendix B-2).

Alternative sites

Pearl City Peninsula. There would be no significant impacts to cultural resources. The Navy has determined that this alternative PV ground mount facility would not have an adverse effect to historic properties based on the following: (1) it is located in an area formerly impacted by ground disturbance and is designated in the CNRH ICRMP (Navy 2008) as having no and/or low

[1] The PMRF Section 106 consultation letter (Appendix B-2) described five sites (A-1 through A-5). The only site proposed in the EA is Site A-5.

archeological potential; and (2) construction and operation would not adversely affect any National Register-eligible properties.

JBPHH-Ford Island. There may be significant impacts to cultural resources. The Navy has determined that this alternative PV ground mount site would have an adverse effect on the Pearl Harbor National Historic Landmark District. Potential mitigations could include design modifications and installation methods that when removed, will allow for substantial restoration of the site to its current condition.

In accordance with 36 CFR Part 800 of the NHPA, the Navy initiated consultation with the Hawai‘i SHPO, the Advisory Council on Historic Preservation, and other Consulting Parties to develop a PA for this alternative. Measures to avoid, minimize, and mitigate adverse effects to historic resources were consulted upon and documented in a draft PA; however, objections to the draft PA were raised by several of the consulted parties. The Navy subsequently identified the Waipi‘o Peninsula site as its preferred site and has discontinued Section 106 consultations regarding the Ford Island site.

West Loch Annex. There would be no significant impacts to cultural resources. The Navy has determined that this alternative PV ground mount facility would not have an adverse effect to historic properties based on the following: (1) it is located in an area extensively disturbed by former agricultural land uses, designated by the CNRH ICRMP (Navy 2008) as having no and/or low archeological potential; (2) it is outside of (adjacent to) the West Loch Historic Management Zone, and (3) construction and operation would not affect any National Register-eligible properties. The majority of the proposed site is outside of the Pearl Harbor NHL boundaries and would not have an adverse effect on the NHL.

Marine Corps Base Hawaii

There would be no significant impacts to cultural resources. MCB Hawaii has determined that the proposed PV ground mount systems at Ulupa‘u at Kāne‘ohe Bay, Puuloa Range Training Facility, and Pearl City Annex would have no adverse effects on historic properties. The PV ground mount systems would be surface mounted on concrete bases at the Ulupa‘u and Puuloa Range Training Facility sites. At Pearl City Annex, the ground mount would be installed on an existing concrete pad. Hawai‘i SHPO concurred with MCB Hawaii’s “no adverse effect” determination (see Appendix B-3).

No-Action Alternative: PV systems would not be installed; therefore, there would be no impacts to cultural resources.

4.7 GEOLOGY AND SOILS

No significant impacts to geology and soils would occur on any of the proposed PV sites or action alternatives. There would be minimal ground disturbance for PV systems on existing building rooftops, and ground disturbance would occur for PV systems on carports and ground mounts, or where cables would be placed on the ground in trenches. However, as stated in Section 3.7, most of the PV sites are on land that is developed or has been developed in the past. To avoid potential structural problems, appropriate foundation systems would need to be designed for areas with high shrink-swell potential.

The Contractor is required to implement BMPs to minimize soil erosion from rain, runoff, and wind. For instance, to minimize wind erosion, ground area that is disturbed would be planted and/or resurfaced. If vegetation is planted for groundcover, a temporary irrigation system would be installed during grow-in and native plant species would be used in replanting. Soil from trenching activities would be re-used to close the trench, and any debris resulting from construction activities would be disposed of by the Contractor in accordance with applicable regulations. Excavated soil from project sites shall not be taken off base for use on non-DOD properties.

No-Action Alternative: No impacts to geology, topography, or soils would occur as there would be no construction activities.

4.8 HAZARDOUS MATERIALS AND WASTES

During construction of the PV systems on rooftop, carport, and ground mount, construction personnel would ensure that temporary secondary containment equipment is used, where practicable, to ensure accidental releases of hazardous substances (i.e. anti-freeze, petroleum, oils, and lubricants) are prevented or limited in scope. Portable catch basins, portable containment berms, and other similar equipment would be used for refueling equipment where feasible. Personnel overseeing construction would have spill kits on-site to provide expeditious response and cleanup should a spill occur. Personnel would be trained on spill notification procedures and would be cognizant of the installation and Hawai'i pollution prevention requirements to reduce the potential for accidental spills. No hazardous and toxic substances would be used or generated during operation of the various PV arrays. Therefore, there would be no significant impacts on the proposed sites or surrounding area from hazardous and toxic substances.

4.8.1 PV Systems on Building Rooftops and Structures

Building 6040 at Schofield Barracks and Buildings 209, 373 and 4088 at MCB Hawaii-Kaneohe Bay are used to handle, receive, pack and ship hazardous waste. While these buildings contain hazardous materials and waste, it is not expected that the proposed PV systems would have any adverse impacts on the current activities in these buildings. Activities at these buildings as well as installation of the PV systems would follow the installation's Hazardous Materials and Waste Management Plan outlining the storage of hazardous materials and disposal of hazardous waste generated, and follow the spill prevention and response requirements specified in the Installation Emergency Planning and Response Plan.

4.8.2 PV Ground Mount Systems

There would be no impacts to hazardous materials and wastes at the proposed and action alternative sites for PV ground mount systems. ESQD arc requirements will be followed when work is done inside the ESQD arcs at the proposed Waipi'o Peninsula and Ulupa'u sites (or at the West Loch Annex alternative ground mount site). At the end of the contract duration, the Contractor, if not instructed otherwise, will remove the PV panels from DoD property.

The Waipi'o Peninsula ground mount site and associated transmission line, and the alternative ground mount sites and transmission lines (Pearl City Peninsula, Ford Island and West Loch Annex) are within the Pearl Harbor NPL and construction activities would likely encounter petroleum contaminated soils and groundwater and hazardous materials discussed in Chapter 3. Special precautions will likely be required for trenching and dewatering activities and the requirements associated with CERCLA, TSCA and Navy (e.g., Commander Naval Base Pearl Harbor (January 1996)) shall be followed. Any excavated soil shall be placed back into the trench. Excavated soil from JBPHH sites shall not be taken off base for use on non-DoD properties. Should there be no use for the soil on DoD property, the soil shall be disposed of at an approved landfill.

Due to the depth at which the HDD process will occur below the bottom of the harbor channel sediments (i.e., 30-100 feet/9-30 m), no contaminated material is expected to be encountered. Vertical coring will likely be needed to ascertain geotechnical conditions that will determine depth and design. If vertical coring is needed, the Contractor must follow explosive safety procedures. Sediment from vertical coring in this area has the potential to contain PCBs, heavy metals, and pesticides (dieldrin) in elevated concentrations. Though the risk is from consuming fish and shellfish from the harbor, workers who come in contact with sediment should use proper

health and safety precautions, such as washing hands before eating and drinking to reduce ingestion of sediments. Any material generated by the HDD/vertical coring process will be evaluated and disposed of in an appropriate manner, in accordance with Federal and State regulations.

No-Action Alternative: PV systems would not be installed; therefore, there would be no impacts to hazardous materials or wastes.

4.9 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

The proposed and action alternative sites PV systems would not result in significant impacts to socioeconomics. More employment would be generated in the private sector resulting from the purchase of PV panels and other materials for the installation of the PV systems. However, this positive impact from procurement and installation/construction work is temporary, as no permanent workers are anticipated to be onsite. Given the limited project scope, these benefits would not significantly affect the State's overall socioeconomic status. It is expected that the use of sustainable green energy would result in savings compared to the cost to obtain electricity from the utility company over the expected life of the system.

The proposed PV systems are located on DoD property with restricted access, which limits the impact to the general public. Since no significant impacts on environmental resources are expected, the Proposed Action would not create environmental health and safety risks that would disproportionately affect minority or disadvantaged populations. The construction and operation of the project would not disrupt the community structure or alter community cohesion because all of the activities would take place on existing Navy, Army and Marine Corps lands. Environmental justice impacts would not be significant because there would be no significant changes in land use or aesthetics and no disproportionate human health or environmental impacts on low income or minority populations.

During construction of all PV systems, access to each construction site would be restricted to authorized personnel using temporary fences and other access control methods to prevent accidental entry by children and other personnel who reside or work on each installation. Short-term minor impacts to children would occur from construction noise near their residences, but the construction-related noise levels would be less than 75 dBA and temporary. Therefore, safety precautions during construction and noise levels would not be hazardous to the safety and health of children. Once completed, the PV systems on building rooftops and structures would not be accessible to children due to their locations. The proposed and alternative ground mounted PV sites at Waipi'o Peninsula, Pearl City Peninsula, West Loch Annex, Ford Island, PMRF, Ulupa'u

foothill, and Puuloa Range Training Facility would be isolated from children living in residences nearby by fences and locked gates to prevent accidental entry and exposure to electrocution or other safety and health hazards. No long-term adverse impacts on children living near the project sites are anticipated.

No-Action Alternative: PV systems would not be installed; therefore, there would be no impacts to socioeconomics, environmental justice and protection of children.

4.10 COASTAL ZONE MANAGEMENT ACT (CZMA)

The Navy/Marine Corps and the State of Hawai'i's Department of Business, Economic Development and Tourism (DBEDT), Office of Planning have come to an agreement that certain activities listed on the "Navy/Marine Corps De Minimis Activities under CZMA" (De Minimis Activity List) were not subject to further review by the Hawai'i CZM Program when such an activity was conducted in compliance with the corresponding "Project Mitigation/General Conditions." (DBEDT, July 9, 2009).

The Proposed Action to install PV systems at various DoD property on O'ahu and Kaua'i falls within Items 1 and 2 on the De Minimis Activity List. The relevant mitigation/conditions are as follows:

(1) All activities will occur on DoD property.
(6) No project-related materials will be stockpiled in the water.
(8) Adjacent marine/aquatic environments will be protected from contamination by project-related activities.
(9) Fueling of project-related vehicles and equipment will take place away from the water. A contingency plan will be established to control accidental petroleum releases during project construction.
(10) All fill material will be protected from erosion as soon as practicable.
(11) All exposed soil will be protected from erosion and stabilized as soon as practicable.
(12) Consultation pursuant to Section 106 of the NHPA will be completed.
(13) No species or habitats protected under ESA will be affected by the Proposed Action.
(14) NEPA EA process will be completed.
(16) State CZM office notified on use of De Minimis List for an EA.

The State CZM office acknowledged receipt of notification on May 23, 2012 of usage of the De Minimis Activity List and the preparation of this environmental assessment.

No-Action Alternative: PV systems would not be installed; therefore, there would be no impacts to coastal resources.

4.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable resource commitments are defined as the use of non-renewable resources and the effects the use of these resources have on future generations. Irreversible effects result from the use or destruction of a specific resource, such as fossil fuels or minerals that cannot be replaced within a reasonable period. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action, such as an archaeological site.

Irreversible resources that would be consumed by the Proposed Action include energy needed to manufacture the PV system components (including PV panels, cables, batteries, and inverters), transport the components from the manufacturer to the project site, and operate the construction equipment to install the PV systems. Other irreversible resources include materials needed to manufacture the PV components. Construction and operation of these PV arrays and the placement of associated electrical equipment and cables would be an irretrievable commitment of various resources, including labor, capital, energy, and land resources, by the Contractor. Use of the rooftops, parking lots, and land for the ground mounted systems is not an irreversible or irretrievable resource commitment because the systems can be removed at the end of the project period.

No-Action Alternative: There would be no irreversible and irretrievable resource commitments. However, DoD installations in Hawai'i would continue to use non-renewable energy and in the long term, would consume a greater amount of irreversible resources by using energy produced by fossil fuels.

4.12 CUMULATIVE IMPACTS

Cumulative impacts are defined as the incremental impact of actions when added to other past, present and reasonably foreseeable future actions, regardless of which agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7).

By Memorandum dated June 24, 2005, from the Chairman of the CEQ to the Heads of Federal Agencies, entitled "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis", CEQ made clear its interpretation that "generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions", and that the "CEQ regulations do not require agencies to catalogue or exhaustively list and analyze all individual past actions" (CEQ 2005).

Guidance for implementing NEPA recommends that federal agencies identify the temporal and geographic boundaries of the potential cumulative effects of a proposed action (CEQ 1997). For the purposes of this EA, the temporal boundary of analysis is between 1990 and 2030. This boundary encompasses a range in which solar power has become ubiquitous in Hawai‘i and also the time period in which federal and state energy policies have started to focus on climate change and energy independence. The Persian Gulf War (1990-1991) was an important reminder to Americans about the vulnerability of its Middle East energy pipeline. The 9/11 event and the ensuing wars in Iraq and Afghanistan (Operation Iraqi Freedom/Operation Enduring Freedom) (2001 – ongoing) continue to drive a national movement towards energy independence. The 2030 date is the planning horizon for the Hawai‘i Clean Energy Initiative that establishes goals and a roadmap for Hawai‘i to achieve 70% clean energy by 2030 with 30% from efficiency measures, and 40% coming from locally generated renewable sources [like the Proposed Action] (HDBEDT 2011).

It is important to remember that PV installations (rooftop, structure and ground mount) have a relatively short economic life (20+ years) and can be considered temporary uses, unlike a highway or port facility.

The geographic boundaries of analysis vary within installation boundaries, depending on the resource and potential effects. For most resources, the analysis area is characterized by areas in close proximity to the proposed PV facility (e.g., a roof, a structure or a ground mount site). Indirect geographic areas include local and global facilities dedicated to supporting fossil fuel and PV industries (e.g., ports, distribution systems, power plants, etc.). An indirect geographic area would consist of local and global climate that is influenced by fossil fuel emissions.

The analysis area is described under each resource. Some resources would be affected by several or all of the described activities, while others would be affected very little or not at all.

As described below, the Proposed Action and alternatives would not add substantially to any already significant impact and would not result in an impact caused by other past, present, and reasonably foreseeable future actions becoming cumulatively significant.

The proposed PV sites are all located on DoD property. There would be no significant cumulative impact with other proposed projects because these proposed PV projects would not be in conflict with other current or future use on these properties. It is highly likely that as buildings are modernized or new buildings are built, energy efficient measures such as PV systems would become integral parts of these projects.

The Proposed Action is part of a wide-ranging shift to renewable energy sources in the commercial and residential sectors of the country and Hawai'i in particular, stimulated by the historical events summarized above.

There has been substantial growth in PV projects in Hawai'i over the last two decades. The growth is part of a market reaction to rising fossil fuel cost, growing awareness about the consequences of fossil fuel and energy independence, increased energy conversion efficiency in the PV panels (i.e., increased kWh/SF) and to a great extent, to federal and state tax credits and policies.

Hawai'i is somewhat unique from other continental U.S. (CONUS) locations due to its extreme reliance on fossil fuel. The State is 95% reliant on fossil fuel with the remaining 5% considered renewable (Hawai'i Sustainability Task Force January 2008). Its energy market is relatively small; the wide ocean channels that surround each island prevent achieving significant economies of energy production scale common in CONUS locations. Hawai'i is unlike many CONUS locations that benefit from redundant and oftentimes competitive power grids, access to natural gas and other more abundant fuel sources (e.g., coal, hydro, large scale geothermal, etc.).

Hawai'i has an average energy cost in the range of 35 cents/kWh, almost three times the National average of 12.7 cents/kWh (Bureau of Labor Statistics February 2013) and is recognized as having the highest electricity rates in the country (e.g., IREC 2012). O'ahu and Kaua'i rates per kWh are 32 cents and 41.6 cents, respectively (Hawai'i Energy January 2013) and these rates have been growing by about 6% per year over the past two decades (UHERO 2013).

Table 4-1 provides a summary of past, present and reasonably foreseeable future projects near the proposed PV sites within relevant USAG, CNRH and MCB Hawaii installations (not including the Proposed Action):

Table 4-1: Past, Present and Reasonably Foreseeable Projects Near Proposed PV Sites

Service/ Location	Name	Description
USAG-HI SBMR/WAAF	Sewer line upgrades	Replace sewer lines running from the wastewater treatment plant on WAAF and along Lyman Road and other roads at SBMR. Construction is currently underway.
	Stryker Brigade basing at SBMR (2008)	Involved the transformation of a light infantry brigade at Schofield into a Stryker brigade, a unit of 4,000 soldiers and 310 eight-wheeled Stryker vehicles.
	Lyman Road Complex Phases 1 & 2	Construct standard design unit facilities including a barracks, brigade headquarters, battalion headquarters, company operations facilities,

Service/ Location	Name	Description
		tactical equipment maintenance facilities, unit storage, parking structures, and site work. Construction projected to start in late FY13.
	Central Vehicle Wash Facility	Construct a centralized vehicle wash facility near training areas at Lyman and Trimble Roads to replace inefficient individual motorpool wash racks. Facility will include a tank to use recycled water. Facility is projected to be completed in early FY14.
	Warrior in Transition Complex	Complex consists of barracks, administration and operations space, Soldier, Family Assistance Center, and a parking structure to provide facilities for focused medical care and support for wounded and injured Soldiers. Facility is projected to be completed in early FY14.
	Non-Potable Water Transmission System to Leilehua Golf Course	Construct water lines and a one million-gallon nonpotable water storage tank to provide R-1 effluent from the SBMR Wastewater Treatment Plant to the golf course for irrigation. Phase 1 completed in Aug 2012. Phase 2 is subject to availability of funds.
WAAF	Construct a Combat Aviation Brigade Complex	The new complex will include infrastructure, aircraft aprons, taxiway, hangars, barracks, unaccompanied enlisted personnel housing, operational and headquarters facilities, dining facilities, organizational parking, vehicle maintenance facilities, storage and support facilities, oil and hazardous materials storage facilities, and a new access gate. Construction started in late FY12.
CNRH JBPHH	Ford Island Bridge (1998)	Admiral Clarey Bridge connects main base (Kamehameha Highway) with Ford Island, initiating significant redevelopment and infill of the island
	Waterfront recapitalization projects (ongoing)	Ongoing repairs and recapitalization of waterfront berths throughout Pearl Harbor
	Joint Base Pearl Harbor-Hickam (2009)	Naval Station Pearl Harbor and Hickam AFB are combined into a single, joint installation to support both Air Force and Navy missions (FY 2005 BRAC recommendation).
	National Oceanic and Atmospheric Administration (NOAA) Pacific Regional Center	Consolidate NOAA offices and facilities scattered on O'ahu by constructing a new 30-acre (12-ha) facility on Ford Island. Project expected to be completed in FY13.
	Production Services Support Facility	Consolidate PHNSY & IMF production shops and engineering teams in one building on the waterfront for better working efficiency and cost savings. Completion estimated by FY15.
	Hawaii Air National Guard (HIANG) Munitions Storage Area	Construct a munitions storage area adjacent to the existing 647th Air Base Group munitions storage area south of the hot cargo loading area. After the new F-22A aircraft parking apron is constructed, munitions cannot be stored at the existing HIANG munitions area due to the ESQD arcs around the loaded aircraft. Estimated completion date is FY14.
	Building 177 Enhanced Use Lease	The Navy is in negotiations with third parties for operation and maintenance of two peaking multi-fuel power plants on O'ahu:

Service/ Location	Name	Description
		Building 177 at JBPHH (former power plant and proposed terminus of the Waipi'o Peninsula ground mount power transmission line) and a 2.3-acre (0.9-ha) site at MCB Hawaii-Kaneohe Bay.
	Forest City Military Community PV Project	Forest City is entering into a Power Purchase Agreement with Solar City, a nationwide PV power developer, to install PV systems on rooftop real estate across the Navy and Marine Corps privatized family housing portfolio. PV panels will be installed on Forest City-owned military housing at JBPHH and MCBH Hawaii-Kaneohe Bay.
PMRF (Kaua'i)	AEGIS Ashore Missile Defense Test Complex	The facility will be a test and evaluation center that would provide flexible, adaptable ballistic missile defense training for deployed troops and allies. Completion date is estimated in FY14.
MCB Hawaii Kaneohe Bay	FY 1997 BRAC Projects	Closure of the Navy's Barbers Point Naval Air Station and realignment to MCB Hawaii Kaneohe Bay. Total of nine major projects valued at $88 million
	Wave Energy Technology Shallow Water Berths (2004)	Research and Development project to install and test up to six Wave Energy Conversion (WEC) buoys in waters approximately 3,900 feet (1,189 m) offshore of MCB Hawaii-Kaneohe Bay.
	Wave Energy Test Site	Construction and operation of two deep-water berths for testing WEC devices in waters approximately 8,200 feet (2,500 m) offshore of MCB Hawaii. Completion estimated in FY14.
	Grow The Force	Additional aviation support squadron to phase-in starting FY12; Construct Command Headquarters, parking structure, and Bachelor Enlisted Quarters.
	Basing of MV-22 and H-1 aircraft	Construct two hangars for MV-22 aircrafts; parking apron; MALS-24 warehouse and headquarters; three Bachelor Enlisted Quarters; and landing pad. Completion dates for these projects are estimated in FY13/14.
	Replacement of P-3C aircraft with P-8A Multi-Mission Maritime Aircraft	Construct hangar and training facilities. Completion date is estimated in FY14.
	VMU-3 Squadron Relocation	Relocation of an existing Unmanned Aerial Vehicle Squadron (VMU)-3, including 274 active-duty USMC and Navy personnel, from the Marine Corps Air Ground Combat Center Twentynine Palms, California to MCB Hawaii Kaneohe Bay in FY14.
	Peaking Power Plant Enhanced Use Lease	The Navy is in negotiations with third parties for construction, operation and maintenance of two peaking multi-fuel power plants on a 2.3 acre (0.9-ha) site at MCB Hawaii-Kaneohe Bay and Building 177 at JBPHH.
	Forest City Military Community PV Project	Forest City is entering into a Power Purchase Agreement with Solar City, a nationwide PV power developer, to install PV systems on rooftop real estate across the Navy and Marine Corps privatized family housing portfolio. PV panels would be installed on Forest City built military housing at JBPHH and MCBH Hawaii-Kaneohe Bay.

The Proposed Action includes approximately 50 acres (20 ha) of ground mount systems producing approximately 20.6 mW, mostly on O‘ahu. The Hawai‘i State Energy Office’s “Top 40 Projects” list tracks 11 planned ground mount projects in addition to the proposed action and alternatives (HDBEDT 2013). From a cumulative perspective, the total foreseeable acreage for ground mount systems on O‘ahu and Kaua‘i using the “Top 40” list would be approximately 400 acres (162 ha) (148.1 mW total or 0.37 mW/acre [0.91 mW/ha]). The Proposed Action’s share of the foreseeable growth is approximately 14% of total energy production and 13% of total acreage. If all three Pearl Harbor area alternative ground mount sites were also utilized, another 843 acres (341 ha) would be added, almost tripling the foreseeable ground mount acreage.

A review of cumulative effects by each of the resource areas is provided below. This section complements the direct and indirect effects discussed earlier in the Chapter.

4.12.1 LAND USE COMPATIBILITY

Rooftop PV systems are generally retrofitted onto existing rooftops and therefore, the proposed PV systems on rooftops in conjunction with other past, present, and reasonably foreseeable future rooftop PV systems would not affect land use. Parking lots are increasingly being covered with PV structures, but that is not changing the underlying land use. To a limited extent, the PV structures increase the quality of the parking space by adding shade.

Ground mount PV systems, on the contrary, are land intensive and are seen by some as competing with agricultural uses in that they require the same high insolation, flat, open areas suitable for many types of agriculture. Another potential land use incompatibility arises from the general loss of open space. The combination of Proposed Action along with past, present, and reasonably foreseeable future ground mount systems could have an adverse effect on open space and agricultural resources. The estimated 400 acres (162 ha) of ground mount sites foreseen from a cumulative impact perspective (including the 50 acres [20 ha] of Proposed Action sites) is very small relative to the 382,000 acres (154,590 ha) of the O‘ahu land mass. Development of all the alternative ground mount sites (843 acres/341 ha), should it ever occur, would triple the amount of ground mount acreage, but would still represent a very small fraction of the island land mass. The State of Hawai‘i has balanced the need to preserve agriculture lands and increase its energy security by restricting so-called “solar energy farms” (SEFs) from lands with the highest productivity soils classified by the University of Hawai‘i’s Land Study Bureau as “A” lands (UH 1967). SEFs are permitted on all other types of land and for the most part, are regulated under administrative permits by each of the Counties. The Proposed Action and alternative sites are on DoD lands, and are not subject to State or County land use regulatory authority. However, if they were subject to state and local land use authority, the Proposed Action would be consistent with these policies. Accordingly, there would be minimal change in

land use and therefore no incremental addition to land use impacts caused by the Proposed Action and alternatives in conjunction with other past, present, and reasonably foreseeable future actions.

As noted earlier, several of the Proposed Action ground mount sites are encumbered by ESQD constraints subject to strict land use controls administered by the DDESB, to ensure land use compatibility with nearby DoD ordnance storage facilities.

4.12.2 VISUAL RESOURCES

Rooftop and structure-mounted PV systems are becoming a new design aesthetic and follow the adage of "form follows function." In addition to providing shelter from the elements, the horizontal surfaces of buildings have become money-making platforms for energy generating technology. Most of the crystalline PV panels have an anti-glare component designed to maximize insolation and minimize reflection so they do not produce the "glint" that some reflective window treatments cast. PV panels are very visible on pitched roofs but are essentially invisible on flat roofs, which comprise most of the large floor plate commercial and institutional buildings (e.g., DoD warehouses and operational facilities). A new generation of buildings designed to support PV panels are being constructed, with broad, south-facing roofs sloped towards the sun for maximum solar exposure. The market penetration of roof top PV into the residential, commercial and public sectors of Hawai‘i is still very small (1.5 percent for HECO's electric grids on O‘ahu, Maui and the Big Island (Civil Beat 2013)) and would take many years to become routine or pervasive. Accordingly, there would be negligible incremental impact to visual resources associated with rooftop or structure mounted PV systems with the Proposed Action and other past, present, and reasonably foreseeable future actions.

Ground mount installations such as the proposed and alternative sites addressed in this EA have a much lower profile than rooftop PV systems and may be less visually intrusive. The estimated 400 acres (162 ha) of ground mount sites foreseen from a cumulative impact perspective (including the 50 acres [20 ha] of Proposed Action sites) is also very small relative to the 382,000 acres (154,590 ha) of the O‘ahu land mass. Development of all the alterative ground mount sites (843 acres/341 ha), should it ever occur, would triple the amount of ground mount acreage, but would still represent a very small fraction of the island land mass. As noted earlier, the Proposed Action (Waipi‘o Peninsula) would not be visible from public vantage points (i.e., vantage points accessible to the general public, other than from aircraft landings and departures associated with Honolulu International Airport). Two of the three alternative sites would be visible from nearby public roads (Pearl City Peninsula and West Loch Annex) but would not block any important views. The Ford Island runway alternative site would be very visible to authorized personnel and visitors to Ford Island and would represent a cumulative impact to Ford Island view planes. Overall, cumulative impacts on visual resources from the proposed and

alternative PV ground mount systems in conjunction with other past, present, and reasonably foreseeable future actions would be less than significant.

4.12.3 AIR QUALITY

Renewable energy technologies, by definition, replace fossil-fuel generated power. These technologies require fossil fuels to support the manufacture, transport, construction and servicing of the equipment, but during the operational period, the technologies generate clean power. According to researchers at the Brookhaven National Laboratory, regardless of the specific technology, PV generates significantly fewer harmful air emissions (at least 89% less per kW) than conventional fossil fuel fired technologies (Good Company ND).

Long term, cumulative impacts on climate change are expected to be slightly positive as a result of implementing this renewable energy project. The earth's climate is affected by energy entering and leaving its atmosphere, which can be affected by both natural and human factors, including variations in the sun's energy reaching the planet, changes in the reflectivity of its atmosphere and surface, and changes in the amount of heat retained by its atmosphere. When energy from the sun reaches the earth's surface, it can either be reflected back into space or absorbed by the earth. After it is absorbed, the energy can be released back into the atmosphere as heat (i.e., infrared radiation) (EPA 28 June 2012). Greenhouse gas (GHG) emissions absorb energy, resulting in the slowing or prevention of heat loss back into space. The key GHGs emitted by human activities include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. In 2004, energy supply (i.e., the burning of coal, natural gas, and oil for electricity and heat) was the largest source of global GHG emissions (26%), followed by industry (19%), land use change and forestry (17%), agriculture (14%), transportation (13%), commercial and residential buildings (8%), and waste/wastewater (3%) (EPA 13 June 2012). For each GHG, a global warming potential (GWP) has been calculated to represent the average length of time it remains in the atmosphere, along with how well it absorbs energy, relative to CO_2. A higher GWP indicates greater ability to absorb energy per pound. The unit of measure is expressed as million metric tons of carbon dioxide equivalent ($MMTCO_2Eq$).

Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance (5 October 2009), makes reductions of GHG emissions a priority of the Federal government by requiring Federal agencies to develop sustainability plans focused on cost-effective projects and programs. The EO's goal is to establish an integrated strategy towards sustainability in the Federal Government and to make reduction of greenhouse gas emissions a priority for Federal agencies. Under this EO, agencies are required to measure, manage, and reduce greenhouse gas emissions toward agency-defined targets, and meet a number of energy, water, and waste reduction targets and sustainability requirements.

Though individual projects are unlikely to have significant impacts on global climate change, they collectively may have cumulative effects when their individual GHG emissions are combined over time. The Proposed Action would generate GHG emissions in the manufacturing, assembly, transportation and deployment/installation of the PV panels and ancillary equipment and energy transmission networks. However, most of the GHG emissions associated with the Proposed Action and alternatives would be temporary in nature. Once they are installed, the operation of the PV sites is not expected to generate levels of GHGs that would significantly impact global, regional or local climate conditions when considered together with other local or regional projects (operations and maintenance activities will involve the use of fossil-fueled vehicles and equipment).

As noted, the PV systems would generate between 7 and 56 mW of AC power, representing about 2 to 16 percent of the total energy consumption of the installations. This translates to between 0.1 and 1 percent of O'ahu's annual electrical production, replacing approximately 6,000 to 48,000 barrels of oil per year and providing enough renewable energy to power the equivalent of between 1,300 and 10,600 homes.

The Proposed Action and alternatives have the potential to ultimately contribute to the reduction of regional and overall GHG emissions in the future. Although the reduction of between 6,000 to 48,000 barrels/year doesn't represent a significant diversion of fossil fuel, the Proposed Action and alternatives represent an important step towards reaching national and local renewable energy goals that, from a cumulative impact perspective, represent a modest, positive impact on the environment in conjunction with other past, present, and reasonably foreseeable future actions.

4.12.4 WATER RESOURCES

The combination of past, present, and reasonably foreseeable future actions with the proposed action would increase the potential for soil erosion and sedimentation. Rooftop and structure mounted PV systems have little potential for cumulative effects on water resources since they typically would not increase impervious surface. As noted earlier, ground mount PV systems have the potential to impact water resources by altering site drainage and impeding groundwater recharge. Civilian ground mount systems in Hawai'i are regulated by County construction codes and federal systems are required to follow Section 428 of the Energy Independence and Security Act of 2007 to maintain predevelopment site hydrology conditions to the maximum extent possible. Given the foreseeable acreage estimated at between 400 to 1,243 acres (162 to 503 ha) (upper range includes all alternative ground mount sites) and the controls in place to minimize impact to water resources, no significant cumulative impact on water resources is expected.

There would be a negligible cumulative effect on groundwater supplies or recharge from the Proposed Action and alternatives in conjunction with other past, present and reasonably foreseeable future actions. There would also not be a significant cumulative impact on public water supplies.

Global sea levels are expected to rise over the coming century due to the effects of global warming. In Hawai'i, areas within one-foot (0.3 m) of modern mean higher high water (MHHW) are especially vulnerable to impacts by mid-century (University of Hawai'i 2008) – approximately the end of the service life of the PV systems. All Proposed Action and alternative sites are well above one-foot (0.3 m) MHHW and would thus not be affected by sea level rise. There would be no significant cumulative impact to global sea levels from the Proposed Action and alternatives in conjunction with other past, present and reasonably foreseeable future actions.

4.12.5 BIOLOGICAL RESOURCES

Rooftop and structure mounted PV systems have little potential for cumulative effects on biological resources since they typically are already in developed settings. Potential biological impacts associated with the Proposed Action and alternatives on biological resources were discussed earlier with a finding that the impacts would not be significant as they are all located in previously disturbed areas and are subject to oversight from military natural resource managers. From a cumulative perspective, looking at the larger footprint associated with 400 to 1,200 acres (162 to 486 ha) of foreseeable ground mount systems generally located in formerly disturbed agricultural fields, there would be no significant impact on biological resources from the Proposed Action and alternatives in conjunction with other past, present and reasonably foreseeable future actions.

4.12.6 CULTURAL RESOURCES

The increasing use of sustainable PV systems has the potential to have cumulative impacts on cultural resources; however, the review processes required under NHPA Section 106 incorporate broad consideration of effects. The siting criteria described below is complemented by technical support provided by cultural resource professionals on staff at the respective military services and consultations with stakeholders to incorporate their views, this process creates a mitigative filter that substantially reduces the potential for cumulative impacts.

Historic preservation experts agree that preserving, reusing, and maintaining historic structures is a key sustainable design strategy while they generally also recognize the importance of accommodating compatible renewable energy technologies where they are appropriate. Kandt et al. identify a hierarchy of siting considerations to minimize effects on historic properties including: favoring ground mount installations over building installations, favoring the

incorporation of PV panels in new construction and non-historic buildings over historic buildings, placing panels in areas that minimize visibility, avoiding the installation of PV systems that would result in the permanent loss of significant, character-defining features of historic properties, requiring low equipment profiles, and placing PV panels back from the edge of flat roofs (Kandt et al., 2011).

Collaboration between the historic preservation community and developers of solar PV projects is imperative given the growing prominence of sustainable operations and the large number of buildings and districts designated, or that qualify to be designated, as historically significant on O‘ahu. Criteria for successful identification and installation of solar PV are necessary, as is consideration of the technical, cultural, and institutional values that exist (ibid).

Section 106 consultations for the Proposed Action are provided in Appendix B. Should CNRH choose to proceed with installation and operation of alternative ground mount sites at JBPHH, Section 106 consultation would be undertaken to resolve any potential effects. Overall, cumulative impacts on cultural resources from the Proposed Action and alternatives in conjunction with other past, present and reasonably foreseeable future actions would be less than significant.

4.12.7 GEOLOGY AND SOILS

Rooftop and structure mounted systems would have no cumulative effect on geology and soil resources, assuming designed drainage systems are not altered. Ground mount systems could have the potential to alter storm drainage and cause erosion if the panels are not properly spaced and the added impervious surfaces are not mitigated by engineered drainage improvements. Ground mount sites typically require flat or low sloped areas for operational efficiency and thus avoid the more steeply sloped and more erosion prone areas. The total foreseeable ground mount area (400-1,200 acres/162-486 ha) is still very small relative to the Kaua‘i and O‘ahu land masses.

4.12.8 HAZARDOUS MATERIALS AND WASTES

The combination of past, present, and reasonably foreseeable future actions with the Proposed Action could affect hazardous materials and wastes conditions. As noted, JBPHH projects take place within the context of a Superfund site, with required protocols and processes designed to mitigate any adverse effects on the environment. Accordingly, potential cumulative effects on this resource area are not likely. As discussed above, the raw material extraction process in developing the PV panels, use of hazardous chemicals in the manufacturing phase and improper disposal of solar panels at the end of their useful life present the greatest risk. Neither extraction or manufacturing occur in Hawai‘i, the US-based industries are regulated to ensure health and

safety, and a number of PV panel manufacturers have established recycling programs to properly dispose of obsolete equipment. As an alternative, the Services may choose to participate in an established recycling program. Overall, any cumulative impacts on hazardous materials and wastes from the Proposed Action and alternatives in conjunction with other past, present and reasonably foreseeable future actions would be less than significant.

From a cumulative, lifecycle perspective, there are some potential biological impacts associated with the use of hazardous chemicals in the manufacturing phase of the PV panels. Improper disposal of PV panels at the end of their useful life also presents an environmental, health and safety concern (a number of PV panel manufactures have established recycling programs). These potential effects would occur at the manufacturing site in CONUS or overseas. The extraction of raw material inputs, especially the mining of crystalline silica, can also pose an environmental, health and safety hazard. Neither extraction nor manufacturing occurs in Hawai‘i. Potential biological effects during the operational phase are minimal and limited to rare and infrequent events. With effective regulation, enforcement, and vigilance by manufacturers and operators, any danger to workers, the public and the environment can be minimized. Further, the benefits of PV systems tend to far outweigh risks especially when compared to conventional fossil fuel technologies (Good Company ND).

4.12.9 SOCIOECONOMICS

The literature is in the early stages of evaluating the effect of the proliferation of PV systems. In Hawai‘i, residential PV systems require a significant up-front investment that takes a number of years to pay back, limiting it to industries and households that can afford the upfront cost. Legislation is being proposed that would require the electrical utility (HECO/O‘ahu and KIUC/Kaua‘i) to offer rate payers the ability to install PV systems and finance them through the monthly utility bills (referred to as “on-bill financing”). If adopted, this would reduce the social inequity currently faced by many households and businesses in Hawai‘i that cannot afford the up-front cost and open it up to a wider segment of the economy. In the commercial and institutional sectors (including DoD and other types ranging from public facilities uses to low income housing) there are a variety of arrangements where third parties will design, install, operate and maintain the system for a fixed period (usually 20 years), and rebate the owner through a discounted energy cost (similar to what Forest City is doing for Navy Family Housing mentioned in Table 4-3).

The PV industry has improved business for the roofing and PV contractor industry in Hawai‘i. The Hawai‘i Department of Business, Economic Development, and Tourism, reports that solar accounts for 15% of all construction expenditures in Hawai‘i and employs more than 2,000 people locally (Loudat 2013), a welcome stimulus given the flatness of the construction industry since the start of the Great Recession in 2007. Continued growth in Hawai‘i’s PV industry,

including Proposed Action projects, would result in continued job growth and increased disposable income due to attendant energy savings. Thus, the Proposed Action and alternatives, in conjunction with other past, present, and reasonably foreseeable future actions, would result in a small cumulative benefit to the economy.

4.12.10 CUMULATIVE IMPACTS SUMMARY

There would be no significant short-term or long-term cumulative impacts on land use compatibility, visual resources, air quality, water resources, biological resources, cultural resources, geology and soils, hazardous materials and waste, and socioeconomics during construction and operation of these PV systems on rooftops, structures, and ground mount arrays. There would be minor short-term cumulative impacts on air quality during construction from construction equipment and activities. Long-term cumulative air quality benefits would also be realized as more renewable energy projects are constructed and operated on O'ahu and Kaua'i.

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CHAPTER 5.0
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This Environmental Assessment was prepared by Naval Facilities Engineering Command (NAVFAC) Pacific.

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APPENDICES

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APPENDIX A

PUBLIC AVAILABILITY/ AGENCY COORDINATION

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AGENCY COORDINATION/PUBLIC AVAILABILITY

LIBRARIES

Hawaii State Library
478 South King Street
Honolulu, HI 96813

United States Army Garrison Hawaii
Wahiawā Public Library
820 California Avenue
Wahiawā, HI 96786

Marine Corps Base Hawai'i
Kailua Public Library
239 Ku'ulei Road
Kailua, HI 96734

Kāne'ohe Public Library
45-829 Kamehameha Highway
Kāne'ohe, HI 96744

'Ewa Beach Public and School Library
91-950 North Rd
'Ewa Beach, HI 96706

Navy Region Hawaii
Salt Lake/Moanalua Public Library
3225 Salt Lake Boulevard
Honolulu, HI 96818

'Aiea Public Library
99-143 Moanalua Road
'Aiea, HI 96701

Pearl City Public Library
1138 Waimano Home Road
Pearl City, HI 96782

Waimea Public Library
9750 Kaumualii Highway
Waimea, HI 96796

AGENCIES

State of Hawai'i Office of Environmental
Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

State of Hawai'i, Department of Land and
Natural Resources
State Historic Preservation Officer
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601 Kamokila Boulevard
Kapolei, HI 96707

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B-1 US Army Garrison Hawaii

SBMR & WAAF Consultation Letters

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DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND, PACIFIC REGION
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
851 WRIGHT AVENUE, WHEELER ARMY AIRFIELD
SCHOFIELD BARRACKS, HAWAII 96857-5000

REPLY TO
ATTENTION OF:

MAR 15 2012

Directorate of Public Works

Mr. William Aila
State Historic Preservation Officer
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Mr. Aila:

On behalf of the Garrison Commander, the Directorate of Public Works, United States Army Garrison, Hawaii is writing to open consultation with your office pursuant to Section 106 of The National Historic Preservation Act of 1966, as amended (16 USC 470f), on the proposed installation of solar panels on various buildings at Schofield Barracks and Wheeler Army Airfield (WAAF) on the Island of Oahu, Hawaii. This undertaking is in association with the Department of Defense (DoD), Hawaii solar project that will involve multiple branches of the DoD and their installations in Hawaii. Each branch of the DoD is initiating their own Section 106 consultations to cover their properties. The Tax Map Key (TMK) designation for Schofield Barracks is 1-7-7-01; the TMK designation for WAAF is 1-7-7-01. The Area of Potential Effect encompasses the combined square footage of the properties shown on the enclosed chart (Enclosure 1) which is approximately 254,000 square feet.

The undertaking and its impacts will be evaluated under the National Environmental Policy Act of 1969 through an Environmental Assessment (EA) that is under the purvue of the Naval Facilities Engineering Command. The evaluation and potential impacts to all the various DoD installations will be included in this document.

None of the Army properties affected by this undertaking are of the age to be considered eligible for the National Register nor are they located within a historic district at either Schofield Barracks or WAAF. None of the buildings affected by the proposal are eligible under any other criteria considerations nor are they listed on the National Register of Historic Places. Three of the buildings that are part of the proposed project are located near the National Register District boundary at Schofield Barracks as the enclosed maps show (Enclosure 2). These buildings are 2626, 2624 and 694. The proposed panels, however, will be installed on these 3 buildings in a manner as to not be visible from the historic district.

Based upon the fact that the properties affected by this undertaking are not historic and that there will be no visual impacts to the historic districts as a result of the action, the Army has determined that the DoD solar panel project in Hawaii can be carried out at WAAF and Schofield Barracks with a determination of *no historic properties affected*. We ask for your concurrence with the project and the determination of effects. If you have any further questions, please contact Kenneth Hays at 808-656-6790 or Dr. Laurie Lucking at 808-655-9707.

Sincerely,

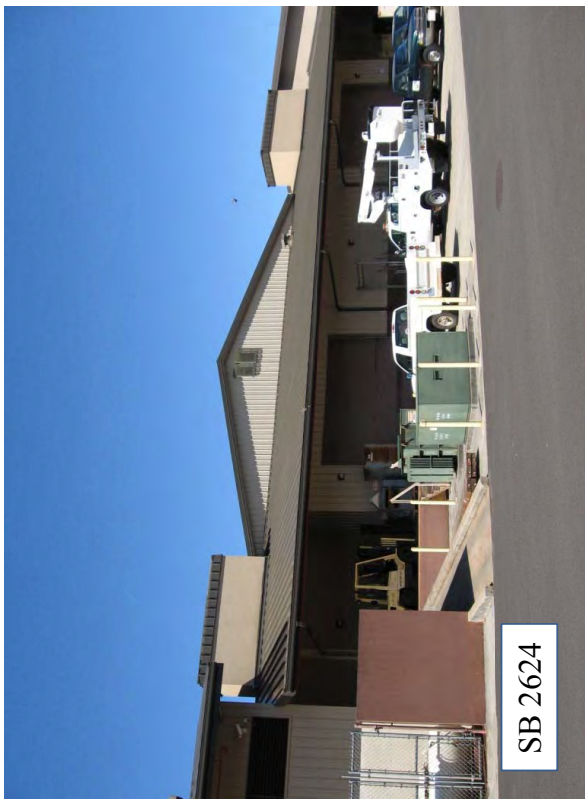
Robert Eastwood

Robert Eastwood
Director of Public Works

Enclosures

Building List

Installation	Facility No.	Year Built	Description
Schofield Barracks	2626	2002	SB DPW Shop Bldg
Schofield Barracks	2623/2624/2625	2002	SB DPW Shop Bldg
Schofield Barracks	1503	2006	Battle Simulator
Schofield Barracks	780	2005	DFAC
Schofield Barracks	1611	1985	Motorpool
Schofield Barracks	1500	2006	Data Ctr
Schofield Barracks	2070	1986	Warehouse
Schofield Barracks	2071	1990	Warehouse
Schofield Barracks	2069	1974	Warehouse
Schofield Barracks	694	2006	PX
Schofield Barracks	1700	2008	Warehouse East Wing
Schofield Barracks	1700	2008	Warehouse West Wing
Schofield Barracks	1700	2008	Warehouse South Wing
Schofield Barracks	1700	2008	Warehouse North Wing
SB East Range	6037	1989	Warehouse
SB East Range	6027	1989	Warehouse
SB East Range	6036	1989	Warehouse
SB East Range	6038	1989	Warehouse
SB East Range	6041	1993	Warehouse
SB East Range	6042	1993	Warehouse
SB East Range	6043	1993	Warehouse
SB East Range	6065	1993	Warehouse
SB East Range	6040	1993	Warehouse
Wheeler Army Airfield	1052	2007	Deployment Facility
Wheeler Army Airfield	1020	1983	Hangar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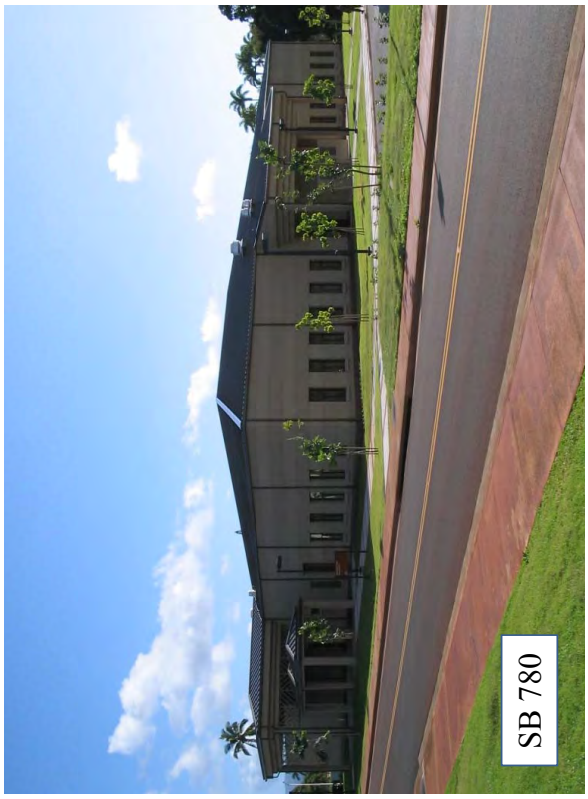
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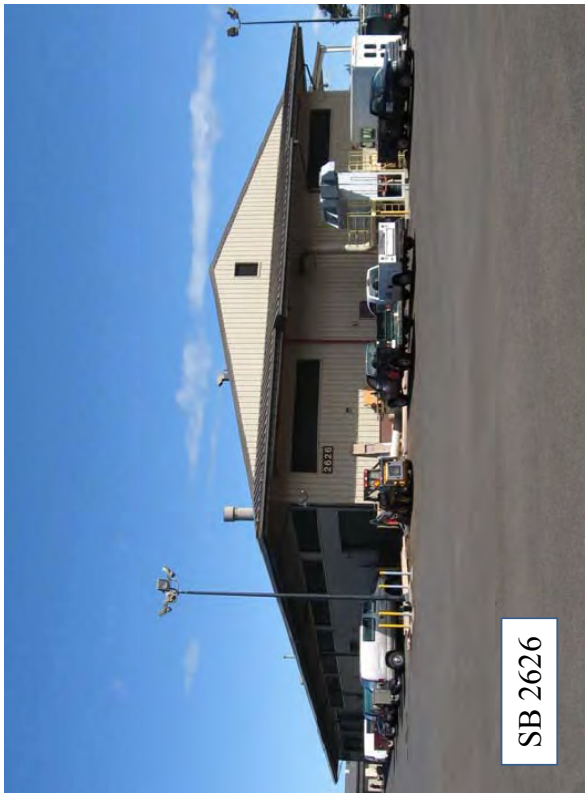
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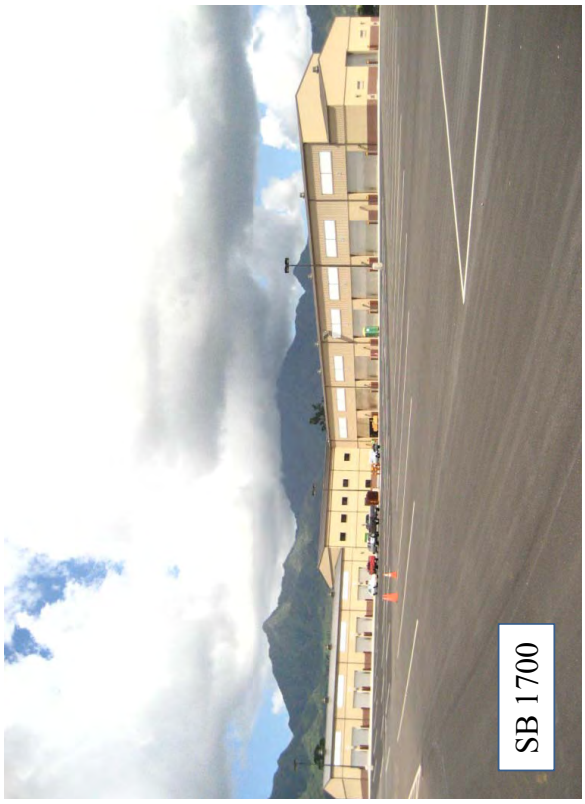
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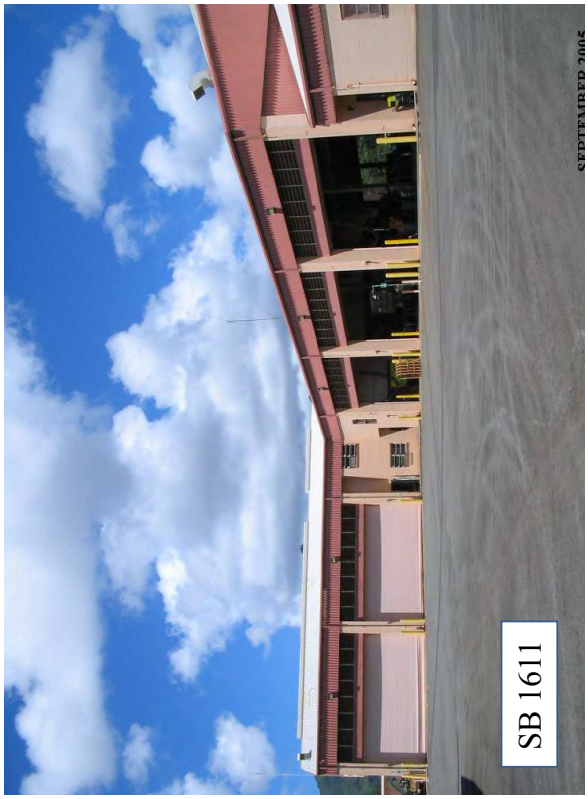
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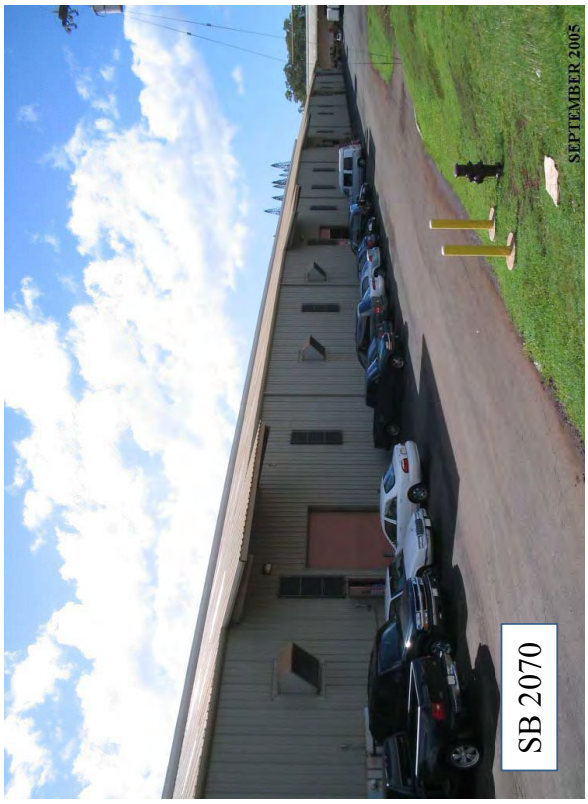
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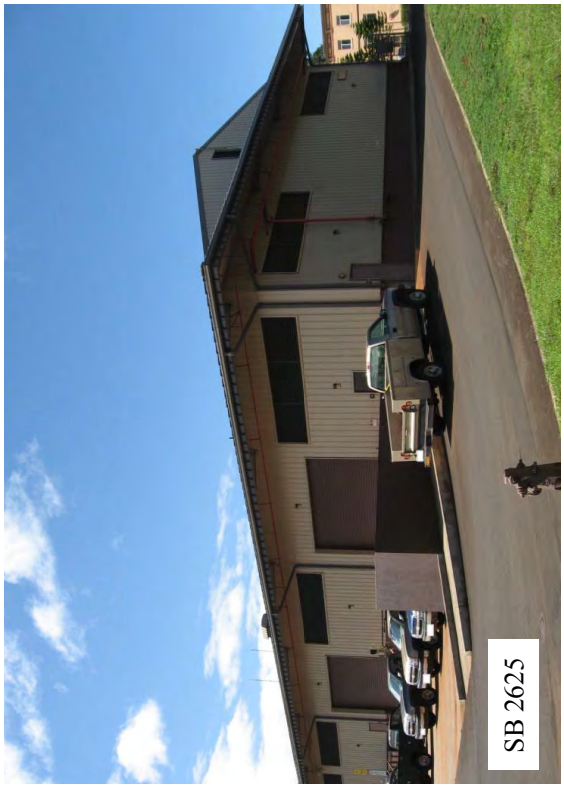
SB 2070


SB 2069


SB 2071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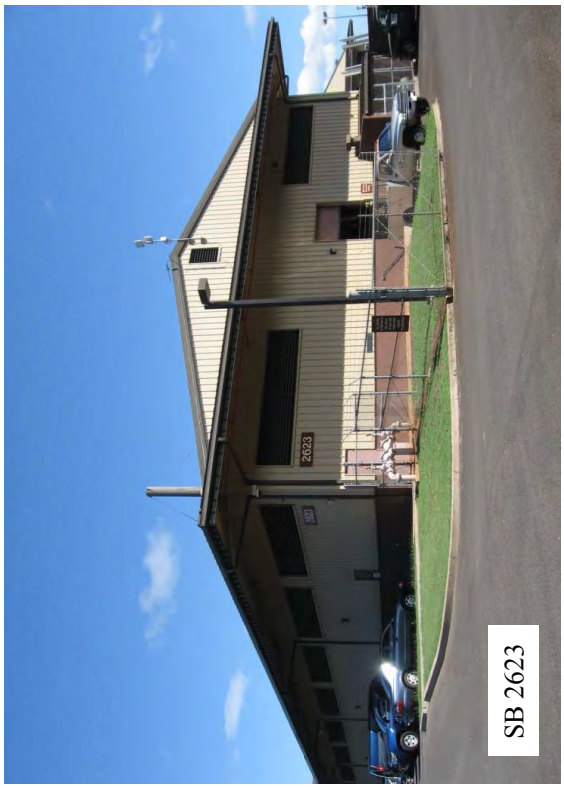
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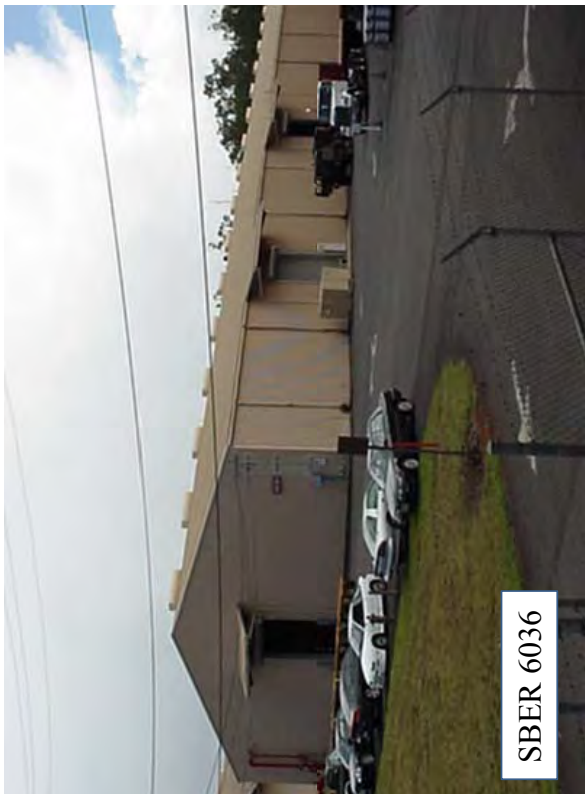
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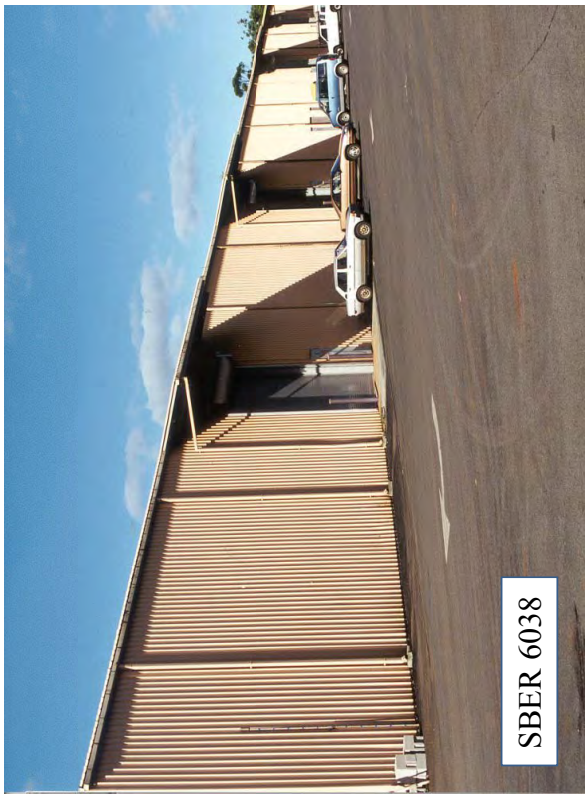
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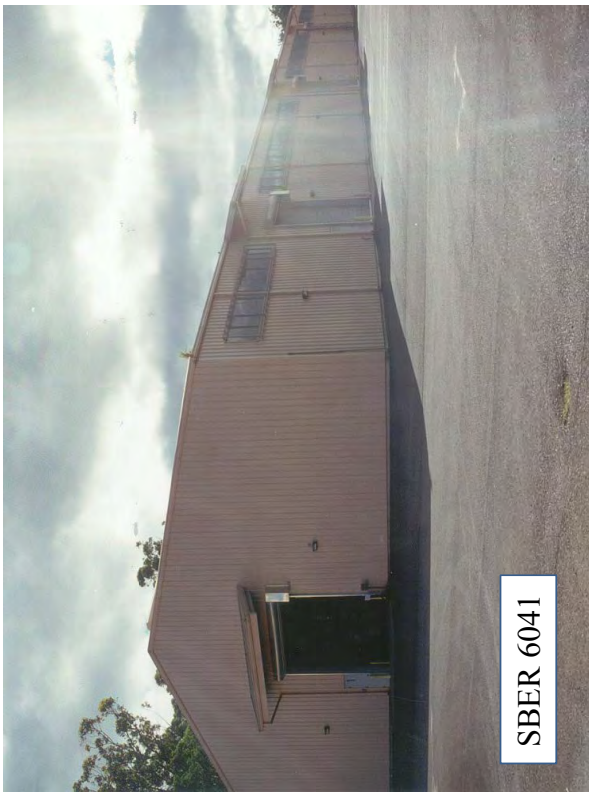
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SBER 6043


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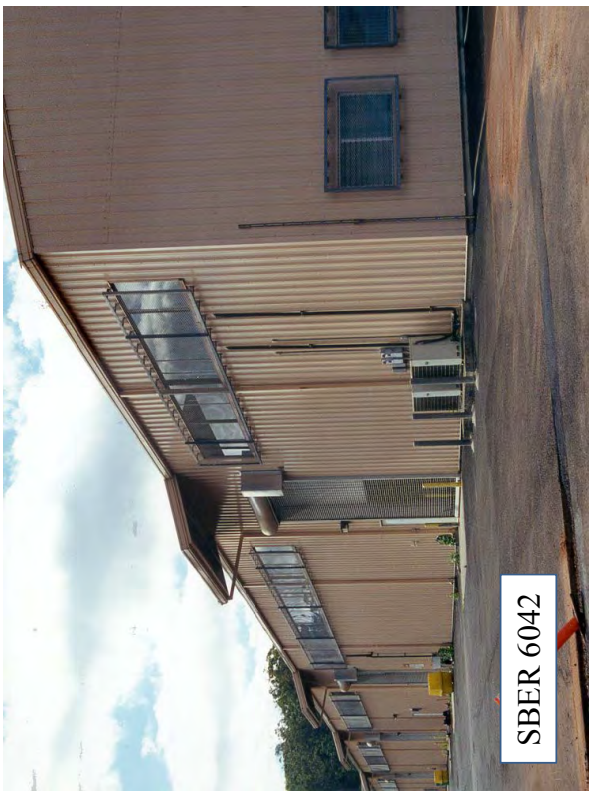
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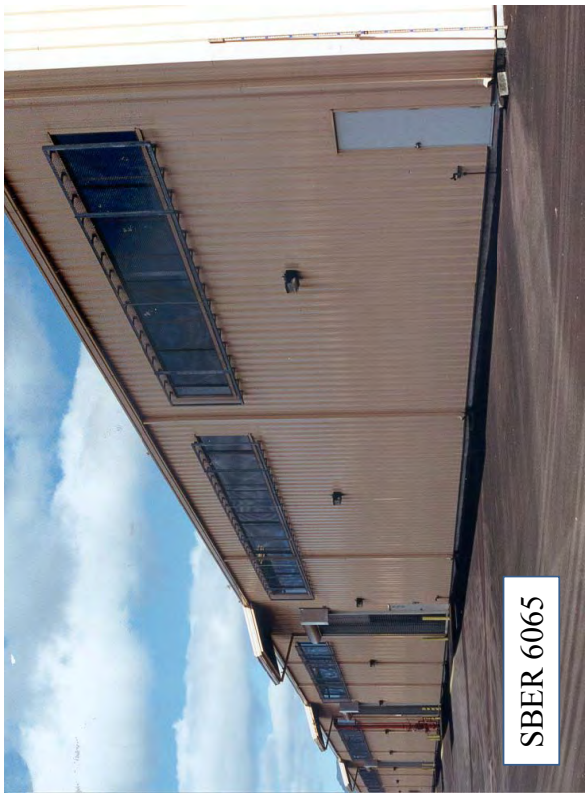
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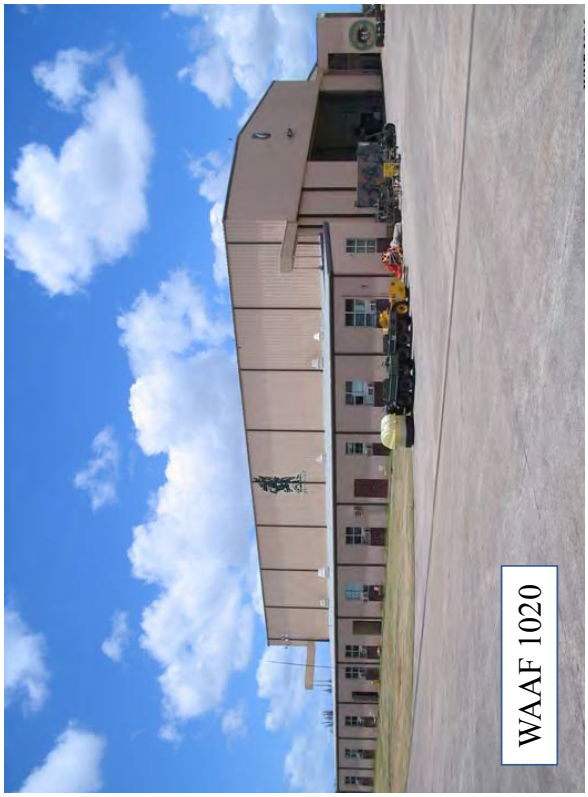
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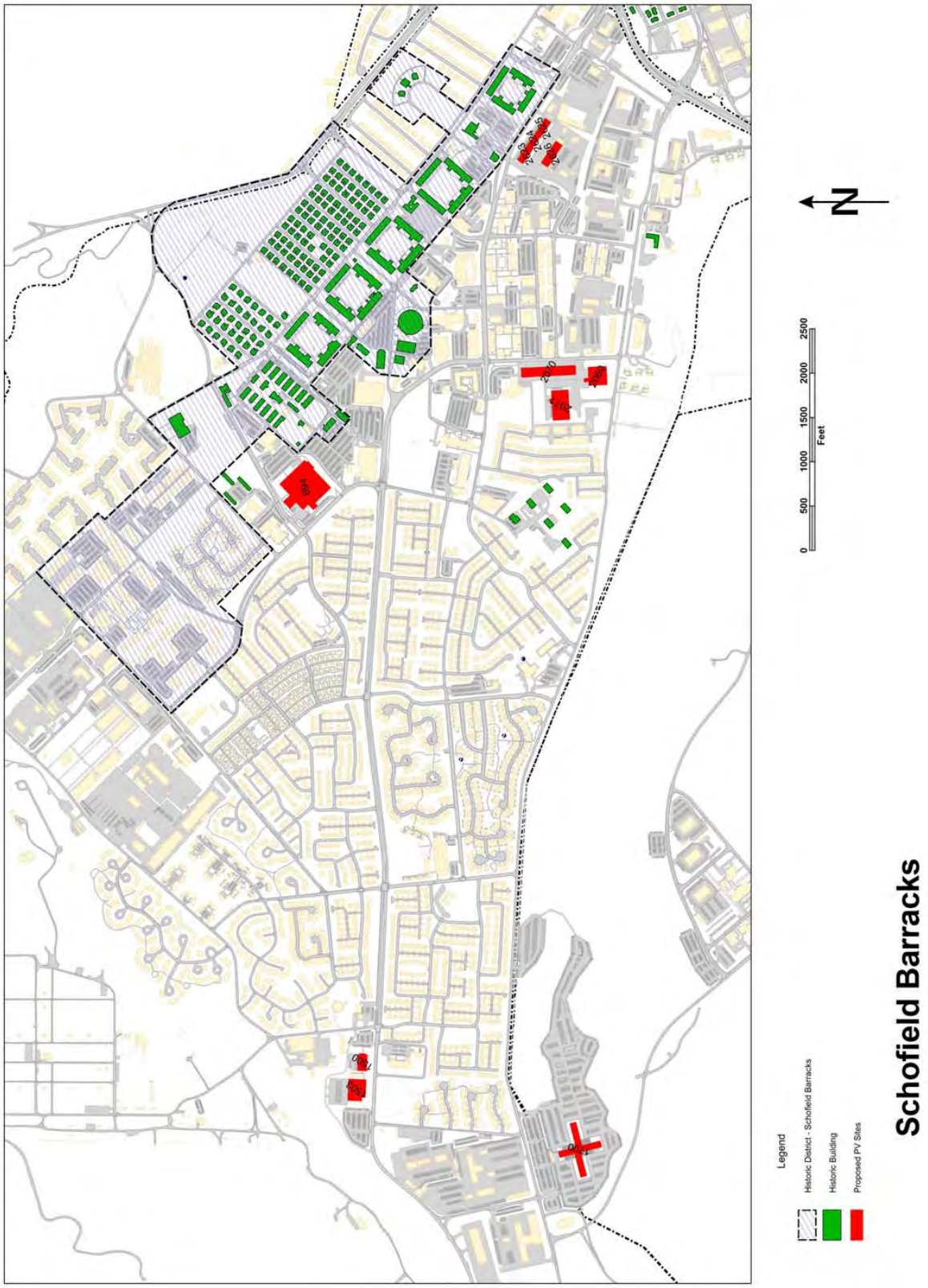
N
0
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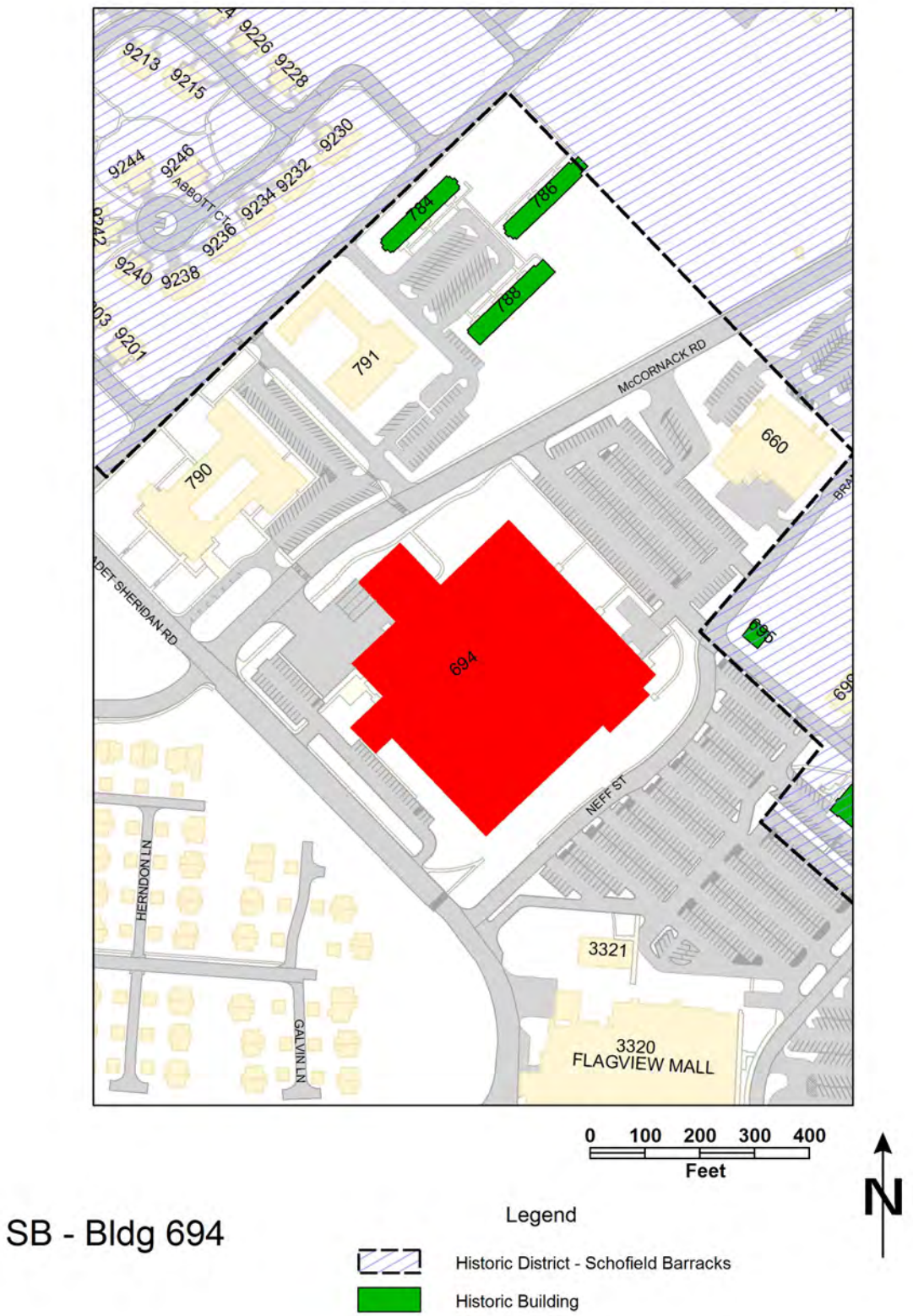
1500
2000
2500
Feet
Legend
Historic District - Schofield Barracks
Historic Building
Proposed PV Sites
Schofield Barracks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9234
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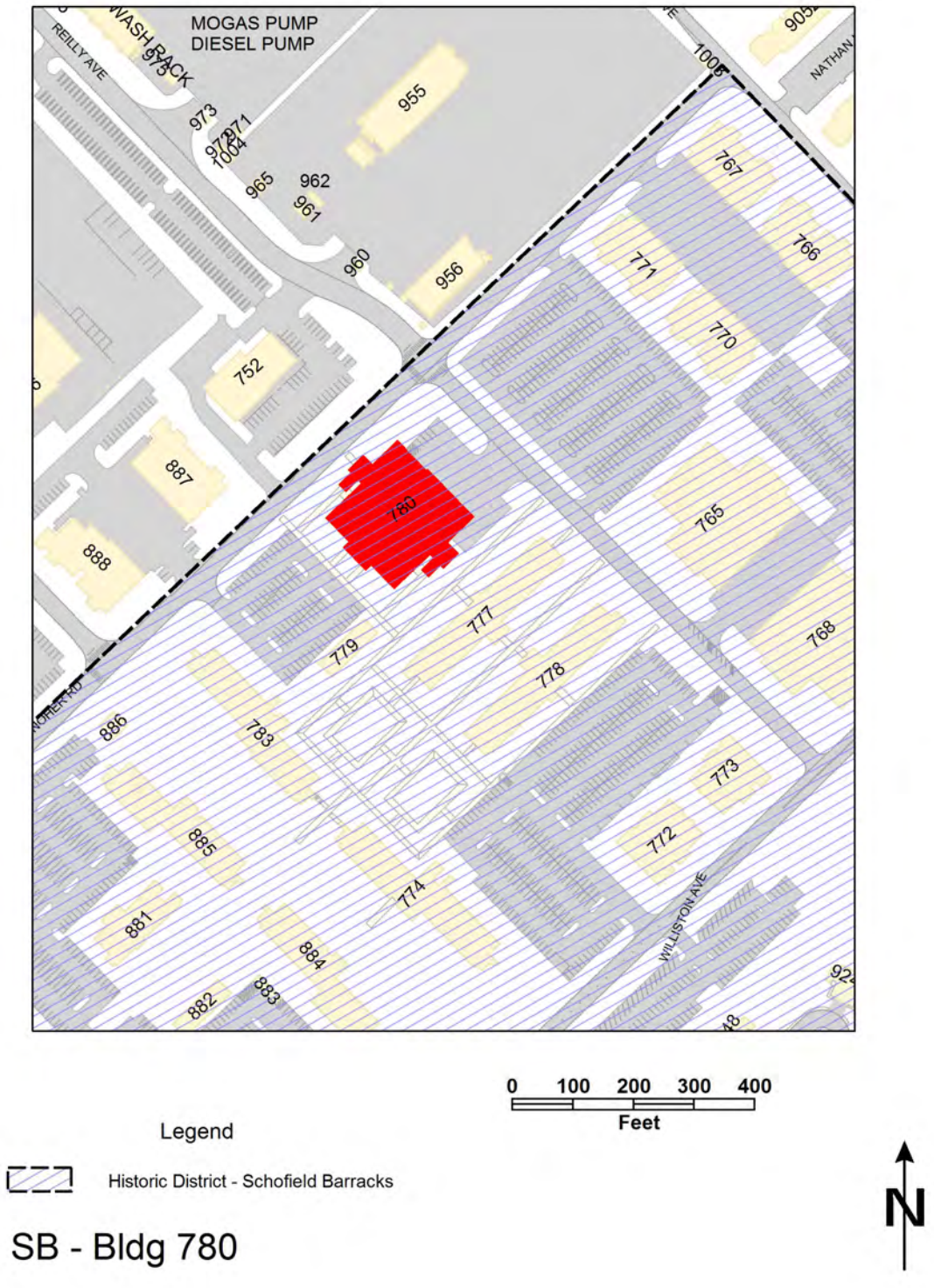
9201
784
785
785
791
McCORNACK RD
660
790
694
DET SHERIDAN RD
NEFF ST
HERNDON LN
GALVIN LN
3321
3320
FLAGVIEW MALL
0 100 200 300 400
Feet
N
SB - Bldg 694
Legend
Historic District - Schofield Barracks
Historic Building


MOGAS PUMP
DIESEL PUMP
REILLY AVE
WASH RACK
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971
1004
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962
961
960
956
1006
905
NATHAN
767
766
771
770
752
887
780
765
888
777
768
779
778
886
783
773
885
772
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882
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WILLISTON AVE
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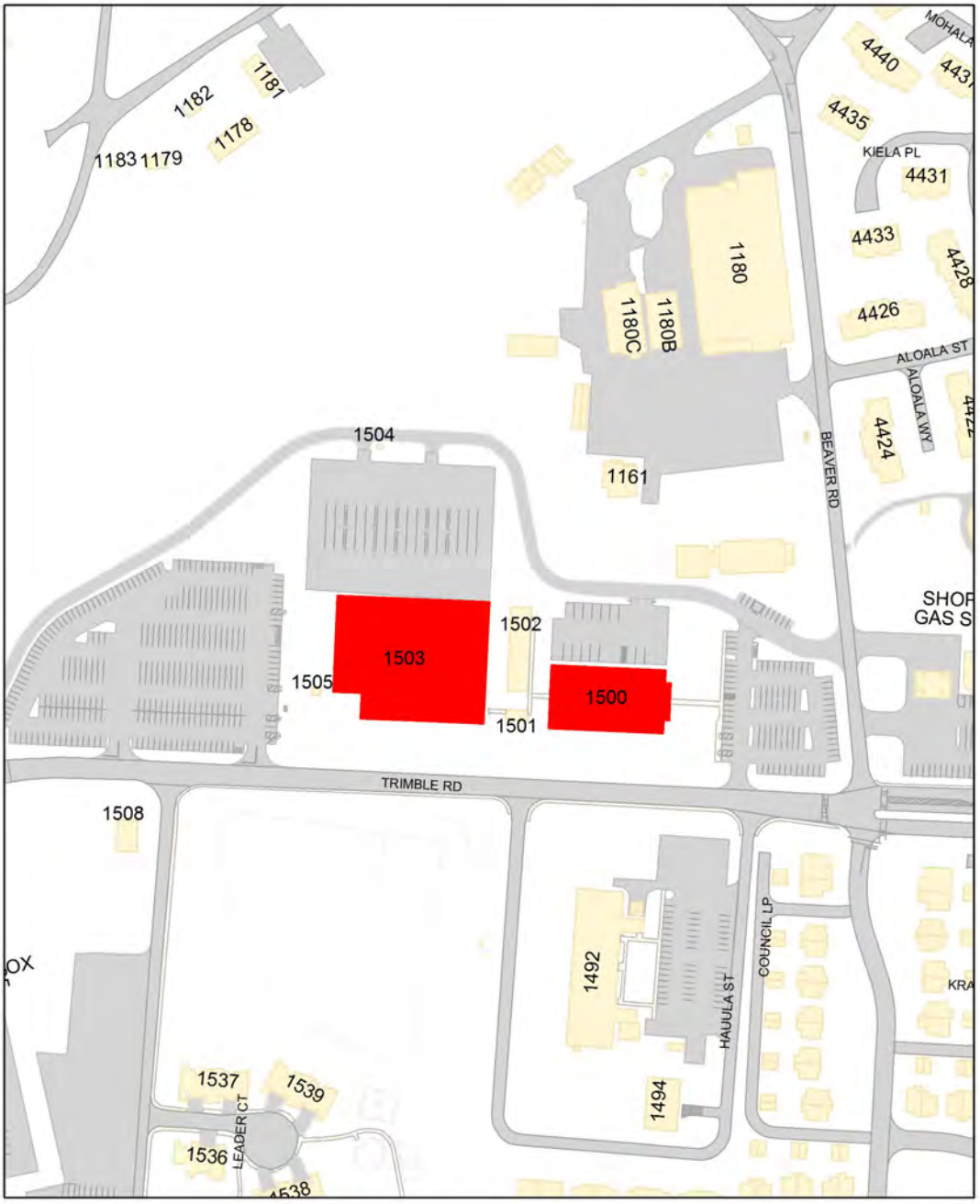
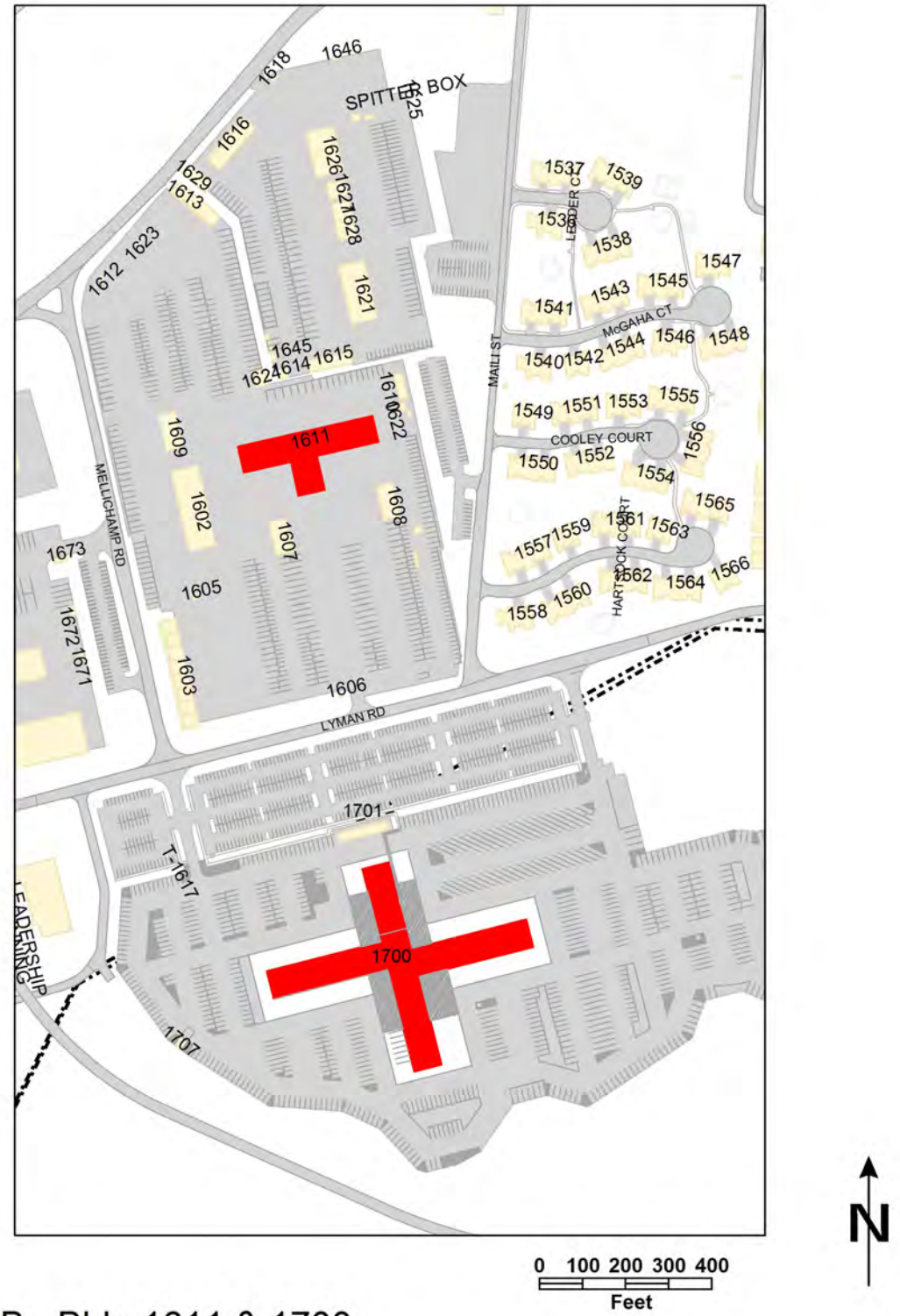
Feet
Legend
Historic District - Schofield Barracks
SB - Bldg 780
N



SB - Bldg 1500 & 1503



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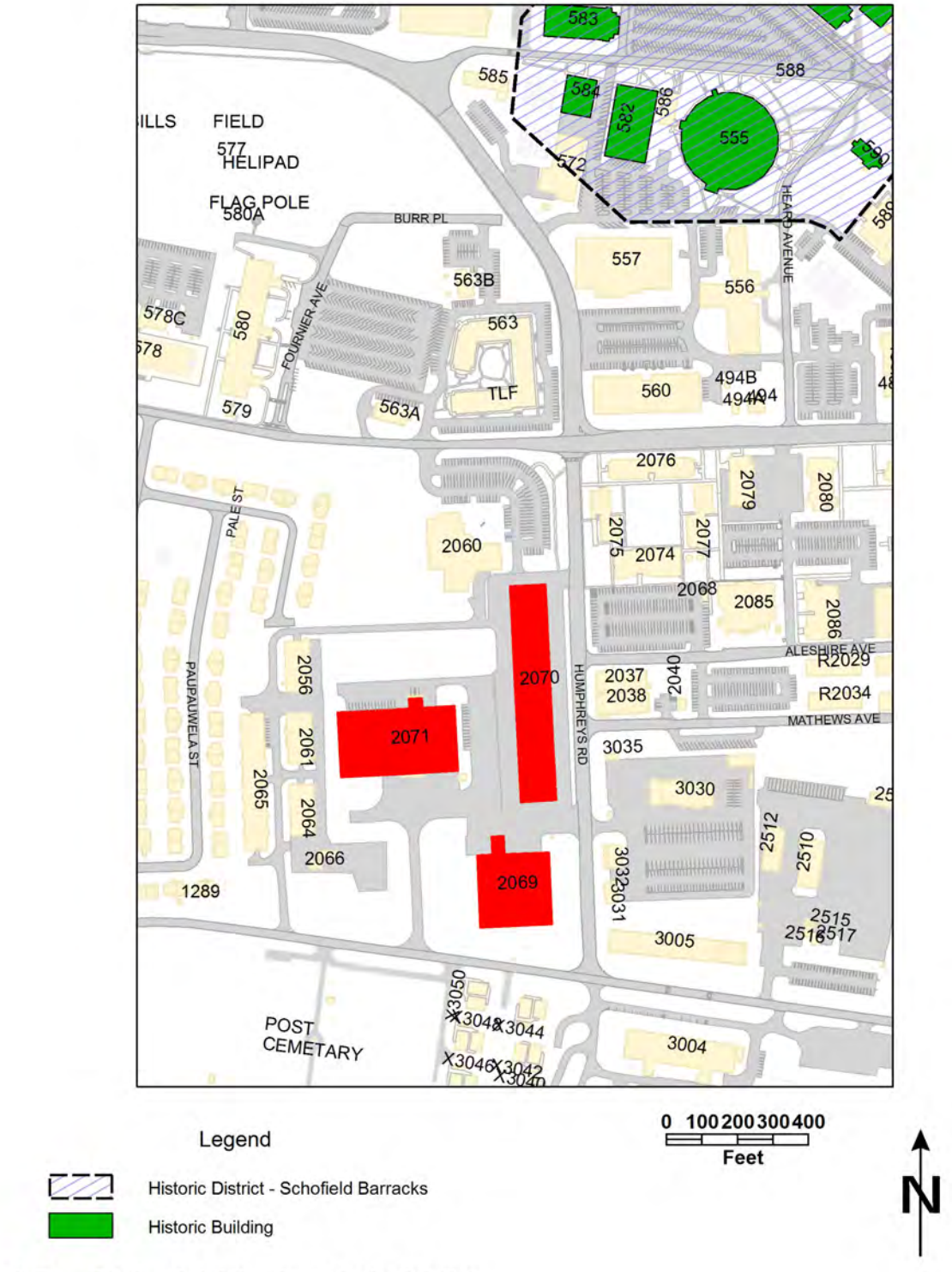
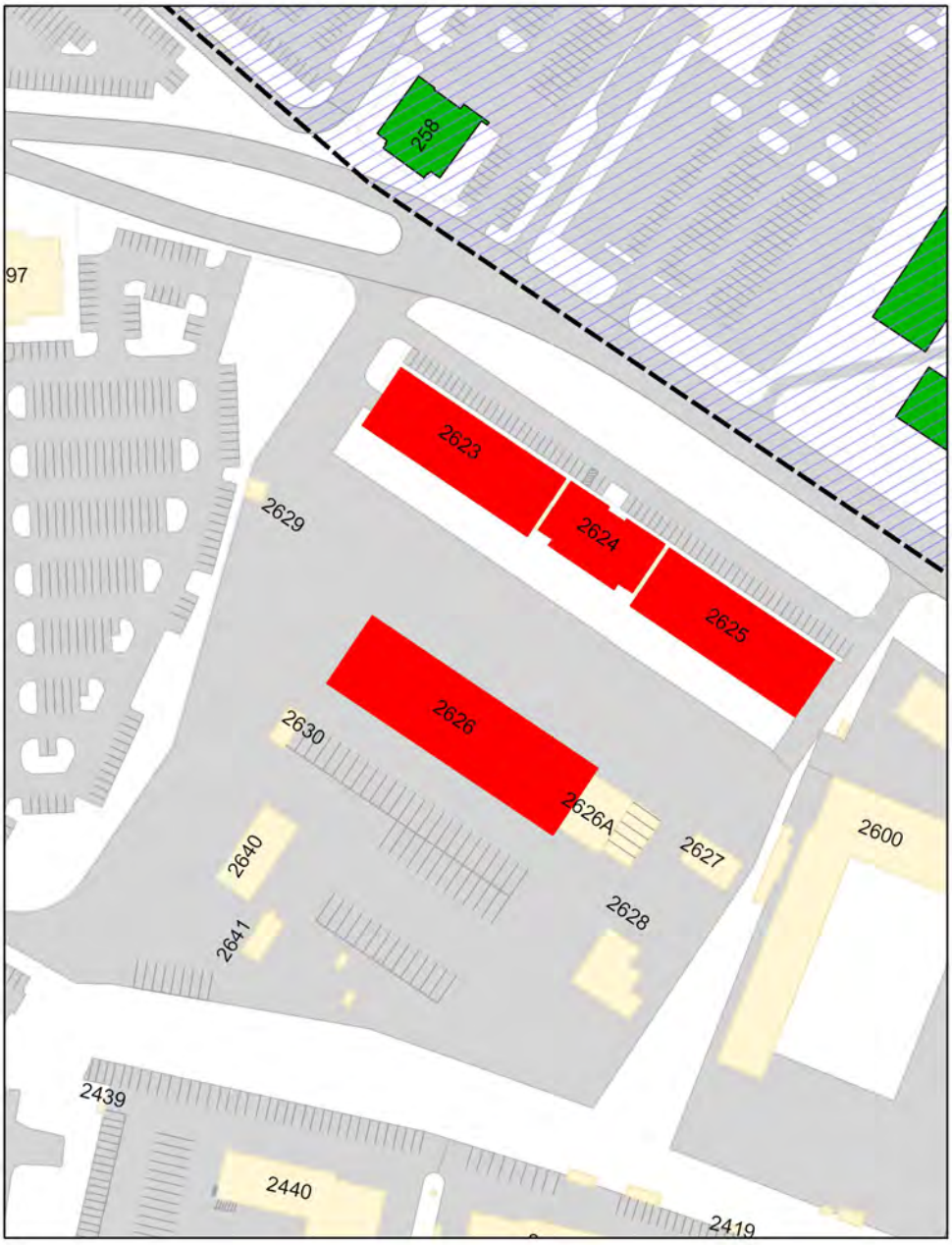


SB - Bldg 2069, 2070 & 2071



Legend

Historic District-Schofield Barracks

Historic Building

0 50 100 150
Feet

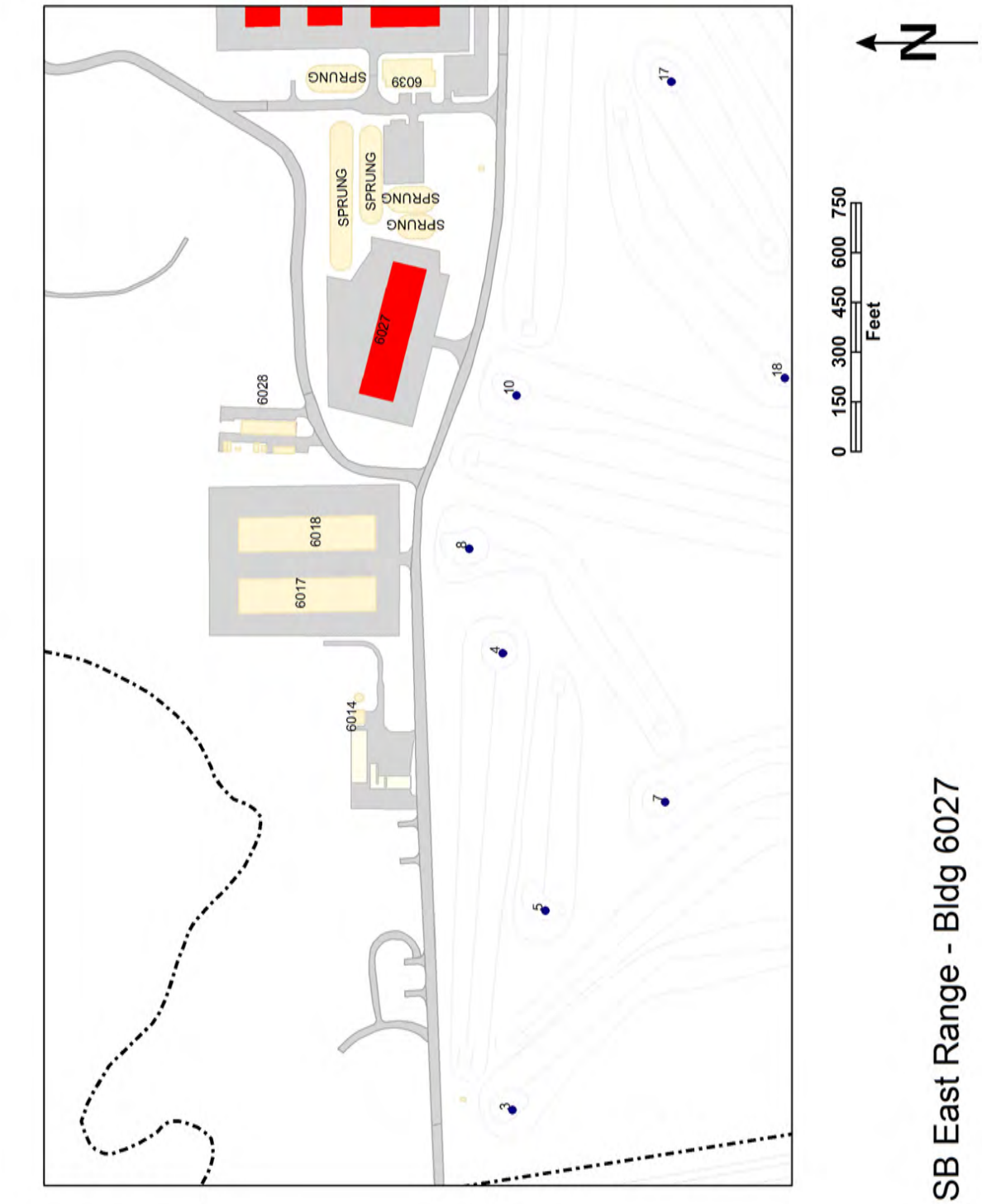
N
W E
S

SB - Bldg 2623, 2624, 2625 & 2626

N

0 500 1000 1500 2000
Feet

Schofield Barracks East Range


SPRUNG
6039
SPRUNG
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6027
6028
6018
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6014
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18
10
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7
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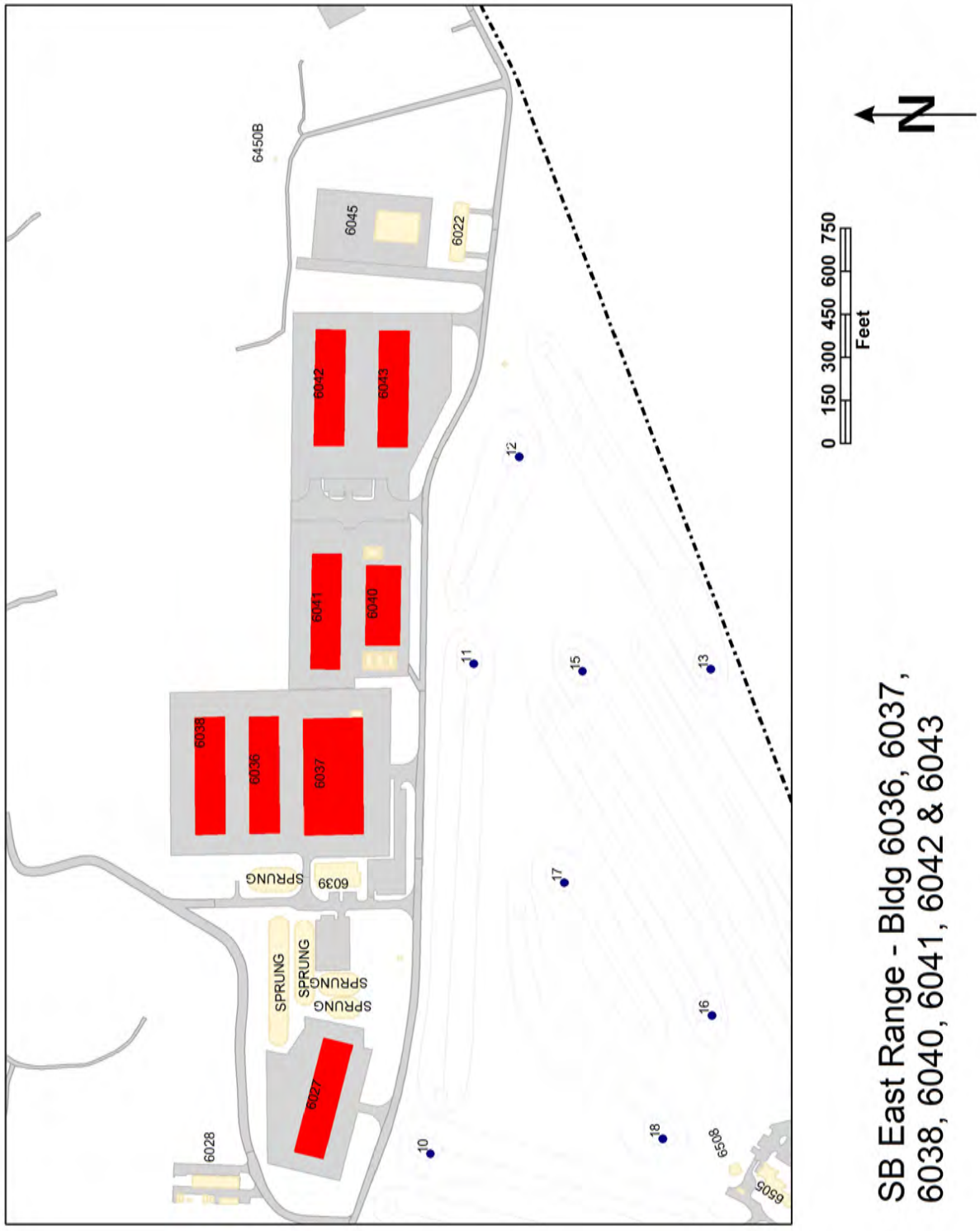
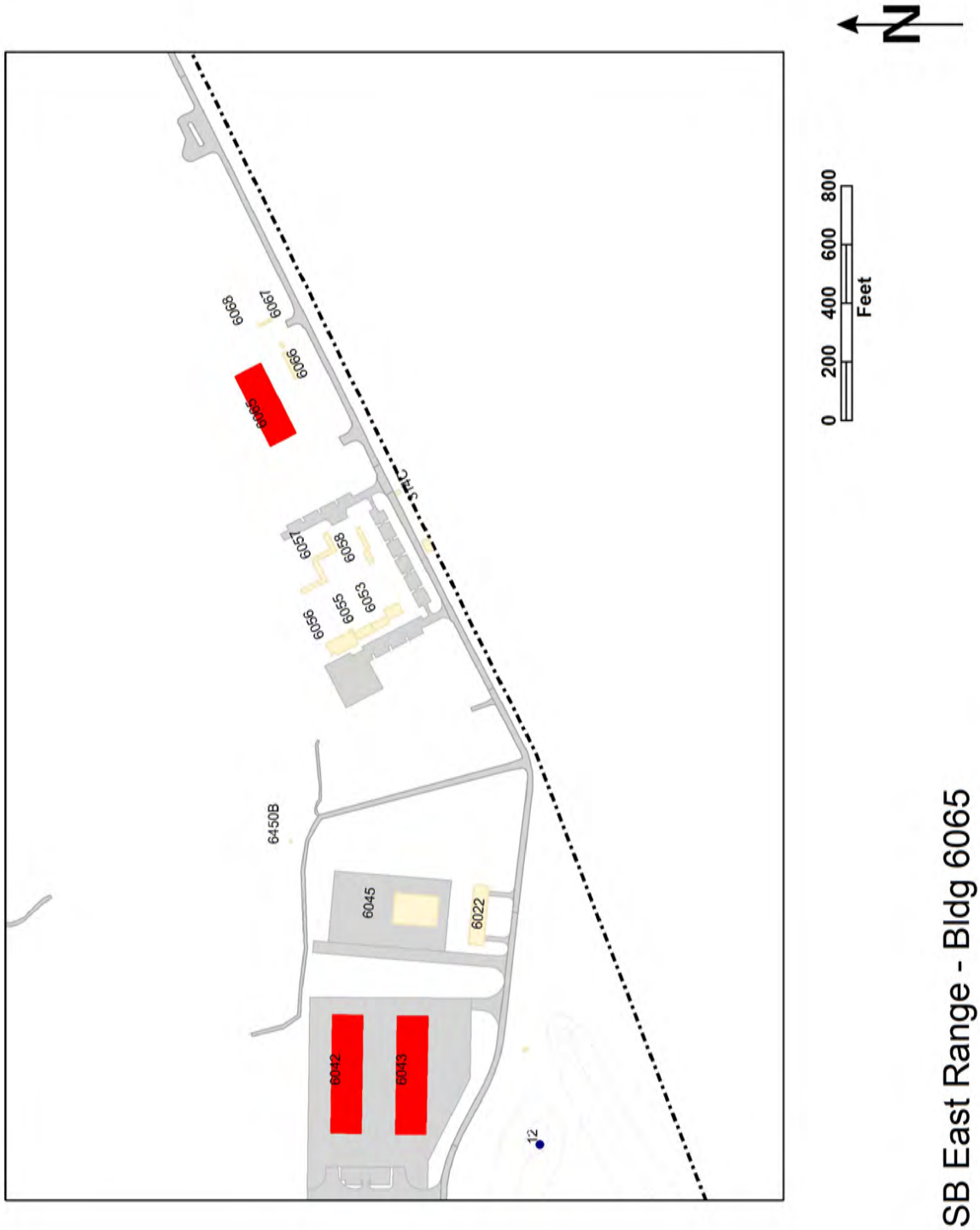
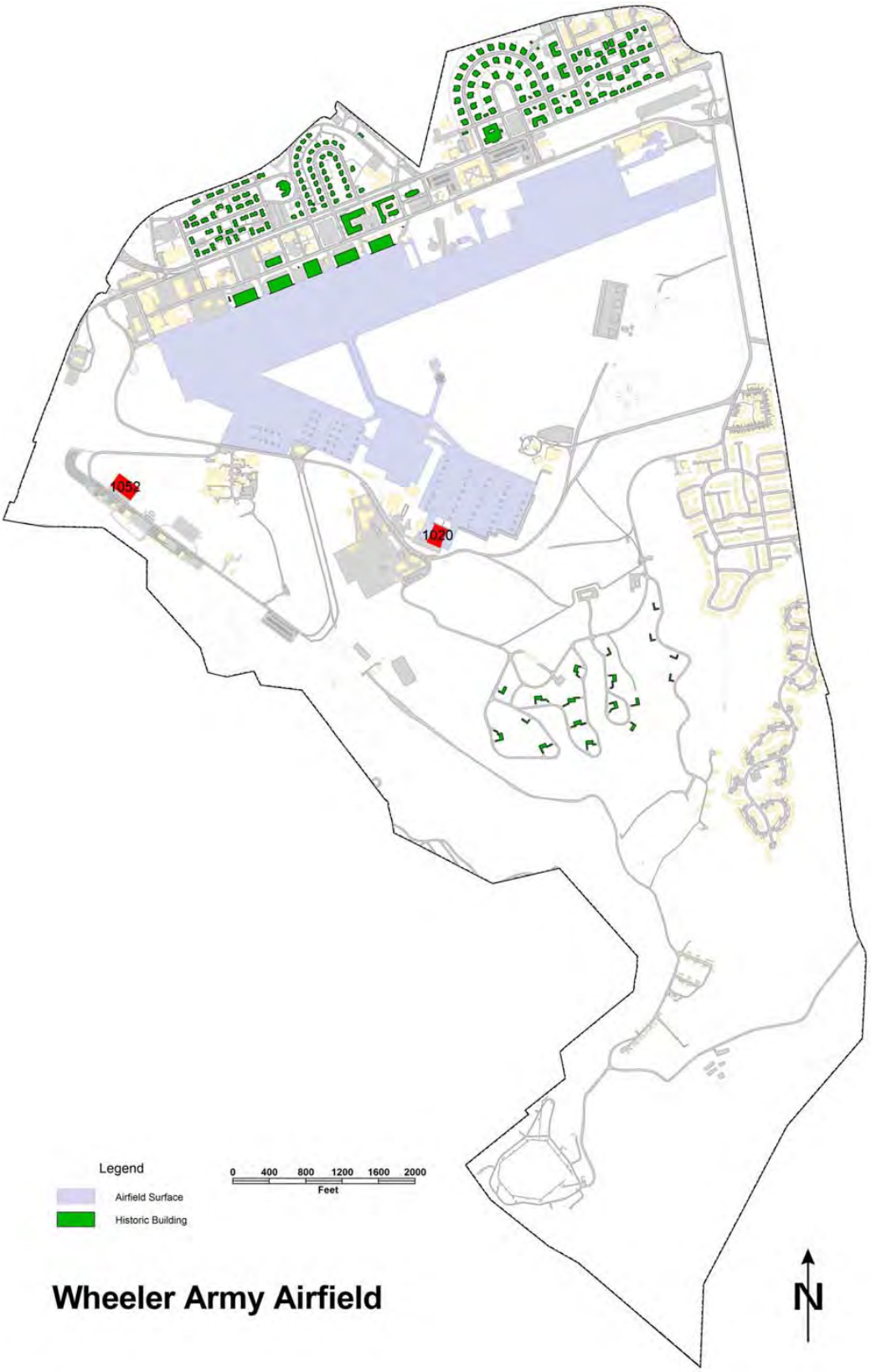
0 150 300 450 600 750
Feet
SB East Range - Bldg 6027

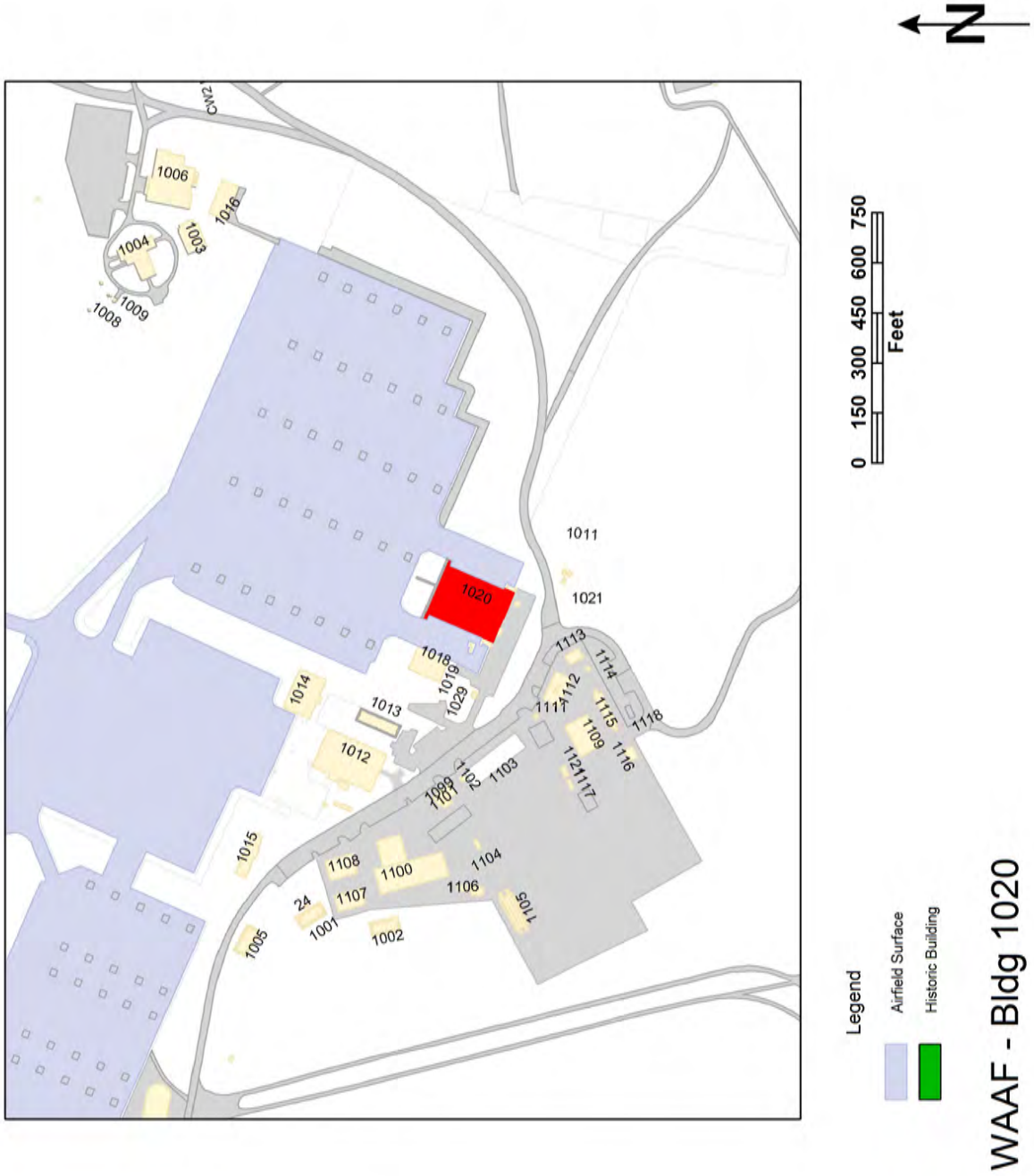


SB East Range - Bldg 6036, 6037, 6038, 6040, 6041, 6042 & 6043



SB East Range - Bldg 6065


1032
1020
Legend
Airfield Surface
Historic Building
0 400 800 1200 1600 2000
Feet
Wheeler Army Airfield
N


N
0 150 300 450 600 750
Feet
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1121
1117
1103
1102
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1099
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1106
1107
1105
24
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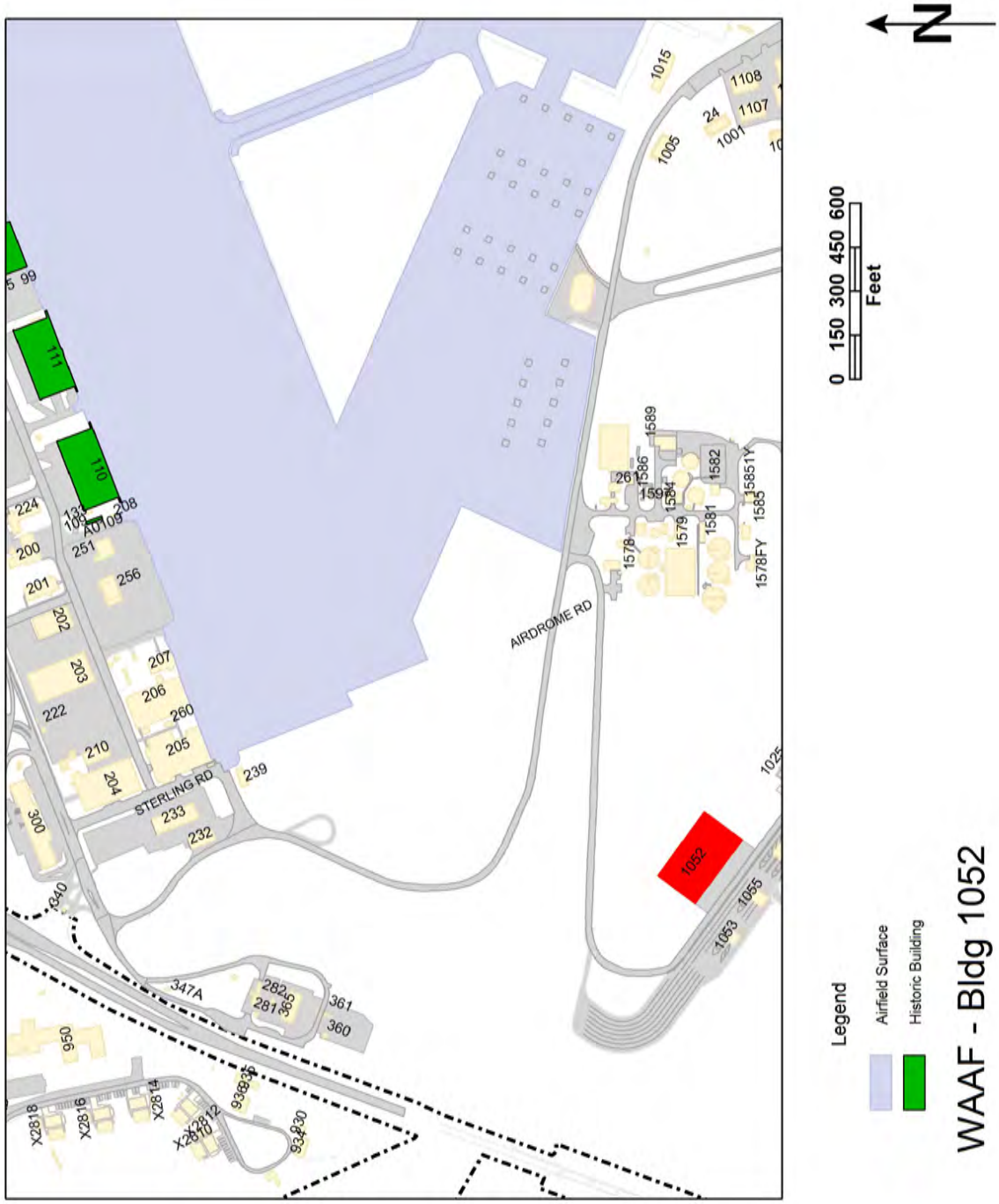
1002
1005
Legend
Airfield Surface
Historic Building
WAAF - Bldg 1020


N
0 150 300 450 600
Feet
AIRDROME RD
STERLING RD
111
110
1052
Legend
Airfield Surface
Historic Building
WAAF - Bldg 1052

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

GUY H. KAULUKUKUI
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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAHUHIHEWA BUILDING
601 KAMOKILA BLVD, KAPOLEI HI 96707

DATE: March 23, 2012

LOG: 2012.0747
DOC: 1203AW08

TO: Robert Eastwood
Director of Public Works
Department of the Army
US Army Installation Management Command, Pacific Region
Headquarters, United States Army Garrison , Hawaii
851 Wright Avenue, Wheeler Army Airfield
Schofield Barracks, Hawaii 96857-5000

SUBJECT: **National Historic Preservation Act (NHPA) Section 106 Consultation**
Project: Department of Defense Hawaii Solar Project
Permit # (None)
Owner: Department of the Army
Location: Schofield Barracks and Wheeler Army Airfield, Hawaii
Tax Map Key: (1) 7-7-001

This letter is in response to materials dated March 15, 2012, received by SHPD on March 19, 2012, regarding the proposed installation of solar panels on various buildings at Schofield Barracks and Wheeler Army Airfield as part of a larger Department of Defense project. The undertaking will be evaluated under NEPA in an Environmental Assessment (EA). The Area of Potential Effect (APE) has been determined to be approximately 254,000 square feet of properties on the two bases.

According to information provided, photovoltaic panels will be installed on twenty-five (25) buildings at Schofield Barracks and Wheeler Army Airfield. None of these buildings are currently of an age to considered eligible for inclusion on the National Register of Historic Places and only three (3) are near a current historic district and the panels on these buildings will not be visible from the district.

SHPD appreciates the maps and photos provided of the buildings affected by this undertaking. Based on the information provided, SHPD **concurs with the no historic properties affected determination.**

Any questions should be addressed to Angie Westfall at (808) 692-8032 or angie.r.westfall@hawaii.gov.

Mahalo for the opportunity to comment.

Angie Westfall
Architecture Branch Chief, Hawaii Historic Preservation Division

RECEIVED 9/29/12

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B-2 Navy Region Hawaii

JBPHH Consultation Letters

PMRF Consultation Letters

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Navy Region Hawai‘i

JBPHH Consultation Letters

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DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
850 TICONDEROGA ST STE 110
JBPHH, HAWAII 96860-5101

5750
Ser N45/289
MARCH 1, 2013

CERTIFIED MAIL NO. 7011 2000 0002 7211 8938

Mr. William Aila, Jr.
State Historic Preservation Officer
Department of Land and Natural Resources
State Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

Dear Mr. Aila:

SUBJECT: SECTION 106 CONSULTATION FOR A PROPOSED SOLAR POWER GENERATION PHOTOVOLTAIC (PV) ARRAY, WAIPIO PENINSULA, JOINT BASE PEARL HARBOR-HICKAM. TMK: 9-3-002:001

In January of 2010, the Navy initiated Section 106 consultation regarding the proposal to install a PV array on the Ford Island runway, which had been previously discussed with your office and the historic partners. Subsequent to the January 2010 consultation, the design submitted by the contractor differed in several aspects from the design specified during the consultation.

As part of an on-going Environmental Assessment for the project, the Navy considered other alternative sites and has identified Waipio Peninsula as the proposed location for the PV array. This letter is intended to continue consultation on the project.

Pursuant to Section 106 of the National Historic Preservation Act, the Navy requests review of the proposed project to install a PV array at Waipio Peninsula, Joint Base Pearl Harbor-Hickam. The project site is located within the Pearl Harbor National Historic Landmark. In accordance with the implementing regulations for Section 106 of the National Historic Preservation Act, we have reviewed the project and determined that it is an undertaking as defined in 36 CFR 800.16(y).

The proposed project is to be located on an approximately 42 acre portion of TMK (1)9-3-002:001, Enclosure 1. Waipio Peninsula is well-suited for a PV system array because of its large open space devoid of shading obstruction and a high degree of annual solar radiation.

Project Description

This project proposes to install a PV system array at Waipio Peninsula to achieve legislative and regulatory renewable energy mandates in a cost effective manner. Site work would include clearing

5750
Ser N45/ 289
MARCH 1 , 2013

and grubbing, installation of racks and inverters that would support approximately 50,000 PV panels, connections between the PV solar panels and construction of a 7-foot high secured perimeter fence around the panel array. Each panel will be mounted on a fixed racking system. Inverter stations, approximately 11 feet in height, will be constructed among the PV array (Enclosures 2 3, 4 and 5).

Power generated by the PV system would be transmitted from the PV array via an underground or pole-mounted cable along an existing roadway on Waipio Peninsula. The cable will then cross Pearl Harbor via horizontal directional drilling process. Upon reaching land at the Naval Shipyard, the cable connection to Station D at Building 177 will be via ground trenching and ducting. Once at Building 177, the cable will be routed into the building through existing exterior ducting.

The PV system design enclosed in this consultation package is conceptual, as the actual system and design will be determined by the solar contractor. The Navy will provide the SHPO and consulting parties an opportunity to review and comment on the 50% and pre-final design submittals.

Should the proposed final system design include a pole-mounted cable connection, approximately 50 wooden poles would be installed roughly 200 feet apart, along an existing two-mile road corridor on Waipio Peninsula. The poles would stand approximately 40 feet in height and would be installed to a depth of roughly 7 feet. The diameter of the poles would be approximately 18 inches and the attached cable(s) would measure approximately one inch in diameter.

Should the proposed final system design include direct burial of the cable, trenches would be required. These trenches would measure approximately two feet wide and three and a half feet deep along the same two mile road corridor on Waipio Peninsula.

Either method, direct burial or pole-mounted, would connect to the horizontal directionally drilled cable crossing the channel between Waipio Peninsula and the Naval Shipyard. Within the Shipyard area, the cable will be routed through existing underground conduits to the maximum extent possible. Where necessary, the cable would be buried in a trench measuring approximately 750 feet long, two feet wide and four feet deep to Station D within Building 177 as a tie-in to Navy electrical grid (Enclosure 2).

Area of Potential Effect

The proposed area of potential effect (APE) is shown in Enclosures 2 and 3. The direct APE is limited to the ground disturbance

5750
Ser N45/289
MARCH 1, 2013

necessary for installation of the PV array, the perimeter fence of the PV array, and excavation to set poles for an overhead cable connection or trenching for a buried connection and Building 177. The indirect (potential visual) APE would be the 400 feet on either side of the approximately 50 wooden poles, should an overhead connection be installed.

Identification of Historic Properties

Architecture

The proposed project is within the boundaries of the Pearl Harbor National Historic Landmark. Waipio Peninsula is a part of the Pearl Harbor Naval Base and activities that took place on the peninsula played a strategic role to the overall success of the war in the Pacific. Most notable activity was the Amphibious Operation Base which assisted the Pacific island-hopping campaigns that helped win the war. Almost all of the structures built on Waipio Peninsula during the early 1940's were temporary structures, such as tents, Quonset huts, and wooden warehouses. Most were demolished long ago. The few facilities that remain are the only physical evidence of Waipio Peninsula's role during WWII. None of the remaining facilities are located within the project APE.

Building 177, Power Plant, is a Historic Category II structure located within the Shipyard Historic Management Zone as described in the 2008 Navy Region Hawaii O'ahu Integrated Cultural Resources Management Plan (ICRMP). Building 177 is of a distinctive type and period of construction with bombproof design reflecting the Navy's need for unfailing power supply and represents the need for increased power due to expansion of the base in WWII. The structure is eligible for the National Register under Criteria 'A' - events and 'C' - distinctive type, period, and method of construction.

Archaeology

The majority of Waipio Peninsula, including the project APE, was the subject of an archaeological reconnaissance survey (Jensen and Head 1997). The survey found no archaeological historic properties within the project APE and noted extensive disturbance from bulldozing activity and large-scale sugar cane agriculture.

Loko Hanaloa (State Inventory of Historic Properties #50-50-80-125), a pre-Contact era fishpond, was once located immediately to the west of the project's direct APE. However, an archaeological study of the fishponds of Pearl Harbor (Athens 2000) revealed that Loko Hanaloa is no longer extant. Results of paleoenvironmental analysis from a

5750
Ser N45/289
MARCH 1, 2013

core sample extending to a depth of almost 14 meters (45 feet) below ground surface and seven radiocarbon dates showed inverted stratigraphic layers and dates indiciating no evidence of intact fishpond sediments. Per the 2008 ICRMP, the portion of the fishpond in the project's indirect (visual) APE, which would be applicable only if cable is pole-mounted, is not eligible for listing on the National Register of Historic Places.

Additionally, the ICRMP (page 4-22) and the 2003 Navy Region Hawaii Programmatic Agreement Stipulation IX.A.1, show that the proposed project area is located an area with no and/or low potential for sites.

Finally, mature shoreline vegetation along the east facing coast of Waipio Peninsula helps to provide visual screening of the existing 50 foot high Hawaiian Electric Company power poles located within the proposed project area from major views within the Shipyard and Ford Island Historic Management Zones.

Determination of Effect

It is the determination of the Navy that the undertaking will have 'no adverse effect' upon the Pearl Harbor National Historic Landmark or any identified historic properties based on the following factors:

- No modifications to Building 177 will occur because the electrical distribution line connection to the building will be achieved by using existing conduit. This requirement shall be stipulated in the contractor's statement of work.

- Historic properties or significant view planes to or from the Waipio Peninsula Management Zone will not be affected due to existing vegetation screening (Enclosure 6). The contractor's statement of work shall stipulate no shoreline vegetation removal will occur as part of the proposed project.

- The absence of known surface or subsurface archaeological sites within the direct APE and its location within a low/no probability zone. The contractor's statement of work shall stipulate if during the performance of an undertaking, historic properties or a previously unidentified property eligible for listing on the National Register is discovered, the Navy will take all reasonable measures to avoid or minimize harm to the property until it concludes post-review discovery consultations.

- SHPO will be afforded the opportunity to review and comment on contractor's design milestone submittals.

5750
Ser N45/ 289
MARCH 1, 2013

We request your concurrence with our determination of 'no adverse effect' for the installation of a PV array at Waipio Peninsula and its associated actions, including power connections to Station D in the Naval Shipyard as described above. As defined in 36 CFR 800.5(c) we will assume your concurrence if no response is received from your office within 30 days of receipt of this letter.

Should you have any questions regarding this undertaking, please contact Mr. Aaron Poentis, Region Environmental Program Director, Naval Facilities Engineering Command Hawaii at telephone 471-1171, x226 or e-mail at aaron.poentis@navy.mil.

Sincerely,

M. D. Williamson
Captain, CEC, U.S. Navy
Regional Engineer
By direction of the
Commander

Enclosures:
1. Project Location Maps
2. Site Plan & Area of Potential Effect (APE)
3. Detailed Plan - PV Array
4. Proposed Typical Inverter Station
5. Proposed PV Racking System and Perimeter Security Fence
6. View to Waipio Peninsula

Copy to:
Angie Westfall, State Historic Preservation Division
Kiersten Faulkner, Historic Hawaii Foundation
Betsy Merritt and Brian Turner, National Trust for Historic Preservation
Elaine Jackson-Retondo, National Park Service
Shad Kane, Oahu Council of Hawaiian Civic Clubs
Keola Lindsey, Office of Hawaiian Affairs
Louise Brodnitz, Advisory Council on Historic Preservation

Enclosure 1

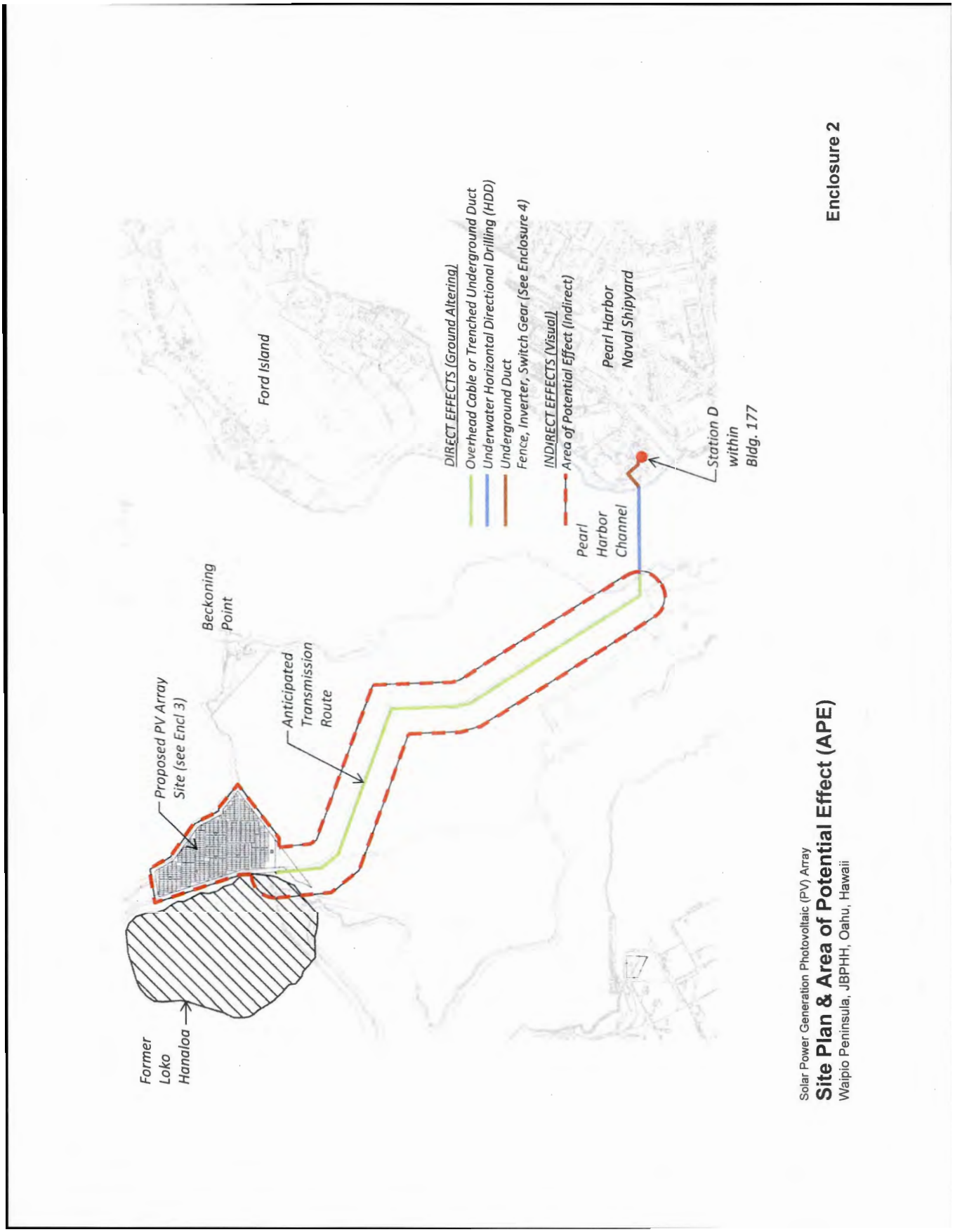
Solar Power Generation Photovoltaic (PV) Array

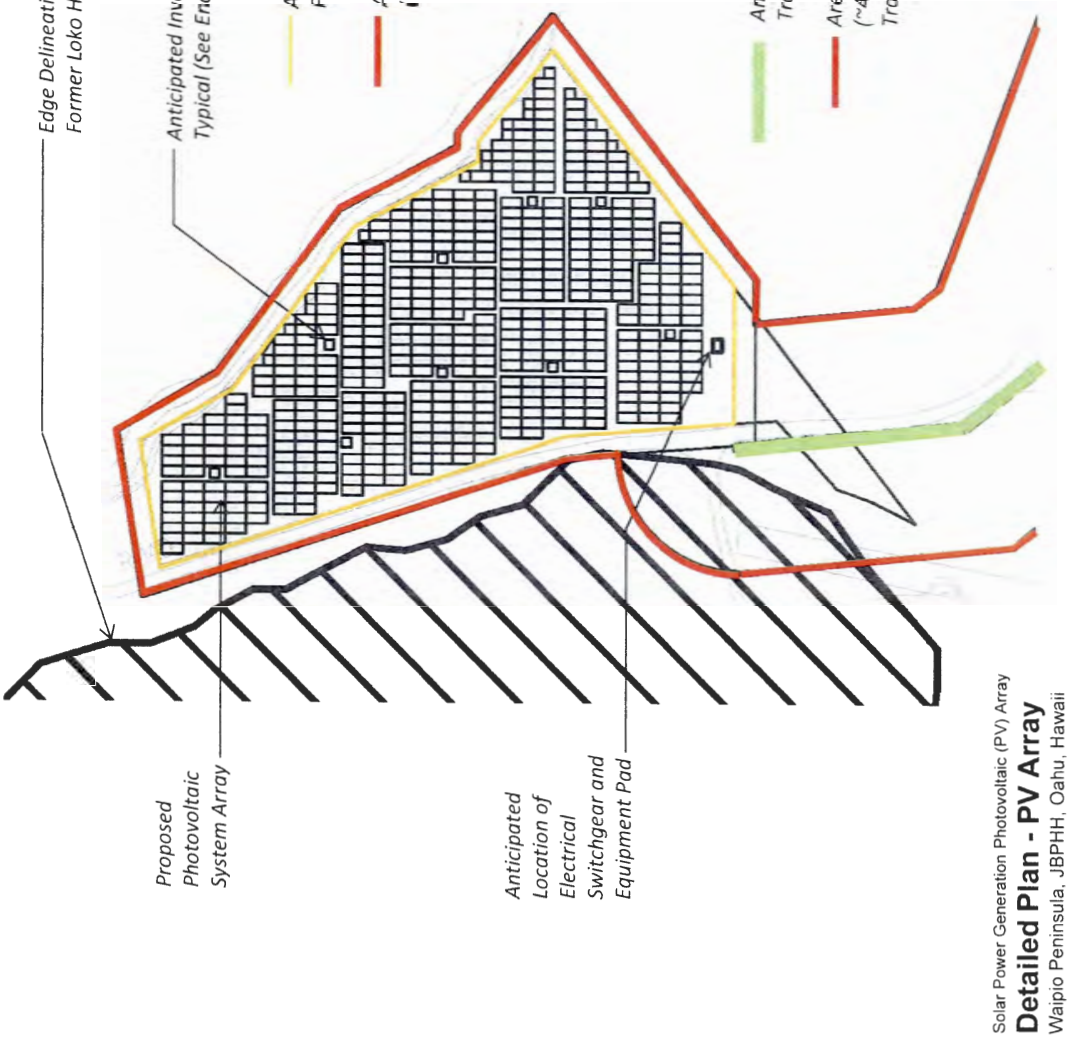
Project Location Maps

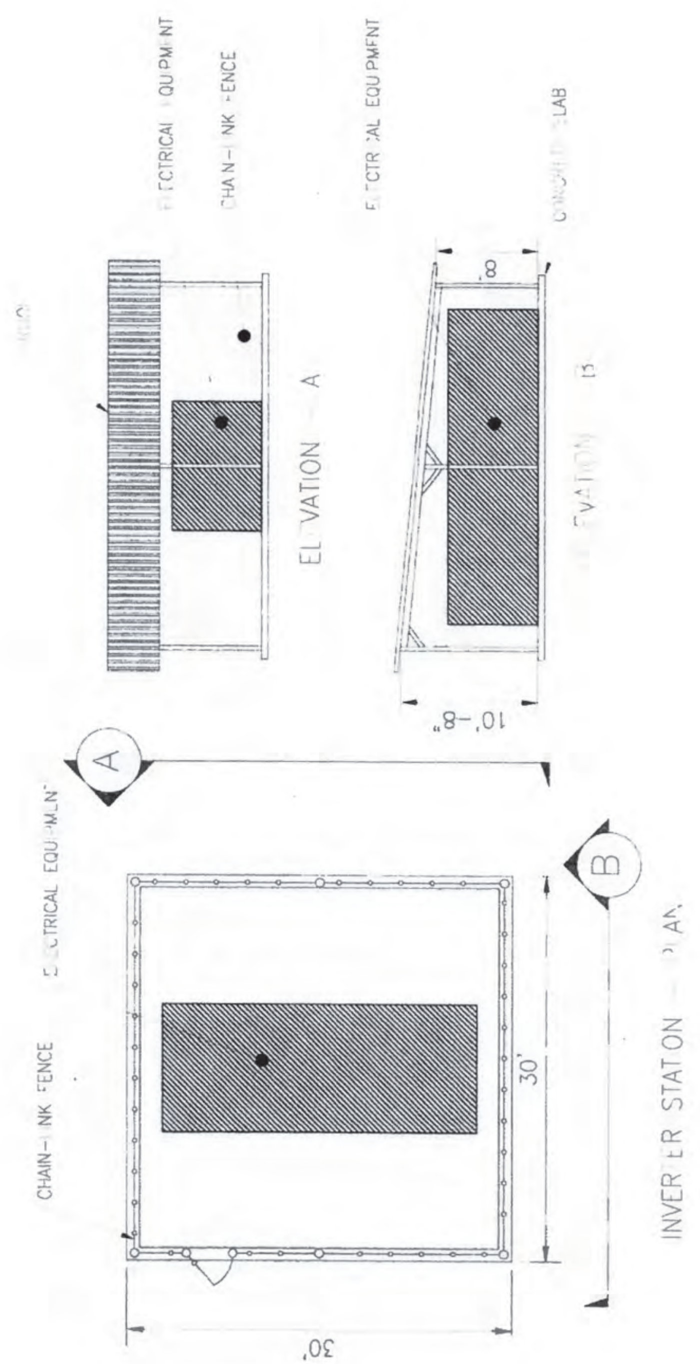
Waipio Peninsula, JBPHH, Oahu, Hawaii

Vicinity Map

Map of Oahu


Enclosure 2
Solar Power Generation Photovoltaic (PV) Array
Site Plan & Area of Potential Effect (APE)
Waipio Peninsula, JBPHH, Oahu, Hawaii
Former Loko Hanaloa
Proposed PV Array Site (see Encl 3)
Anticipated Transmission Route
Beckoning Point
Ford Island
Pearl Harbor Channel
Pearl Harbor Naval Shipyard
Station D within Bldg. 177
DIRECT EFFECTS (Ground Altering)
Overhead Cable or Trenched Underground Duct
Underwater Horizontal Directional Drilling (HDD)
Underground Duct
Fence, Inverter, Switch Gear (See Enclosure 4)
INDIRECT EFFECTS (Visual)
Area of Potential Effect (Indirect)


Edge Delineation of Former Loko Hanaloa
Anticipated Inverter Pad Locations, Typical (See Enclosure 5)
Anticipated Perimeter Fence Alignment
Area of Potential Effect - Indirect (70 feet from perimeter fence line)
Anticipated Power Transmission Route
Area of Potential Effect – Indirect (~400 feet on either side of O.H. Transmission Line)
Proposed Photovoltaic System Array
Anticipated Location of Electrical Switchgear and Equipment Pad
Enclosure 3
Solar Power Generation Photovoltaic (PV) Array
Detailed Plan - PV Array
Waipio Peninsula, JBPHH, Oahu, Hawaii



Solar Power Generation Photovoltaic (PV) Array
Proposed Typical Inverter Station
Waipio Peninsula, JBPHH, Oahu, Hawaii

Enclosure 4

Enclosure 5

Solar Power Generation Photovoltaic (PV) Array

Proposed PV Racking System and Perimeter Security Fence

Waipio Peninsula, JBPHH, Oahu, Hawaii

Enclosure 6

Solar Power Generation Photovoltaic (PV) Array

View to Waipio Peninsula

Waipio Peninsula, JBPHH, Oahu, Hawaii

Source: Helber Hastert & Fee, Planners

Setting of the USS Nevada Memorial with views to Waipio Peninsula and the Waianae Mountains beyond. Mature shoreline vegetation along the Waipio Pensinsula helps to provide visual screening of the existing 50 foot high Hawaiian Electric Company power poles beyond located within the proposed project area from major views within the Shipyard and Ford Island Historic Management Zones.

National Trust for Historic Preservation
Save the past. Enrich the future.

April 1, 2013

Mr. Aaron Poentis
Region Environmental Program Director
Naval Facilities Engineering Command Hawaii
850 Ticonderoga St., Suite 110
Joint Base Pearl Harbor-Hickam, Hawaii 96860-6101

Re: Section 106 Consultation for Proposed Solar Power Generation PV Array, Waipio Peninsula, Joint Base Pearl Harbor-Hickam, TMK: 9-3-002:001

Dear Mr. Poentis,

This letter responds to a letter dated March 1, 2013 signed by Capt. M.D. Williamson and addressed to William Aila, Jr., SHPO, regarding the above-referenced undertaking. The National Trust for Historic Preservation strongly supports the development of renewable energy, and we commend the Navy's initiative in pursuing this development, especially in Hawaii. We also support the siting of photovoltaic (PV) panels on the Waipio Peninsula generally, as a less harmful alternative to the Ford Island runway site.[1]

However, there has been a history of "bait and switch" with respect to the impacts of solar PV projects, in which the impacts of the projects turn out to be more harmful than originally anticipated as the design details of the projects are developed (e.g., the Ford Island runway proposal), and as construction goes forward (e.g., the Kalaeloa Renewable Energy Project). We are concerned that the Navy is being a bit too casual in its willingness to assume that any potential adverse effects from this project will be negligible.

Even though the proposed Waipio Peninsula site is clearly much less harmful than the Ford Island runway site, the proposed project is still within the boundary of the Pearl Harbor National Historic Landmark (NHL). Accordingly, we have requested additional information about how the specific site on Waipio Peninsula was selected as part of the Navy's efforts to minimize harm to the NHL "to the maximum extent possible," as required by Section 110(f) of the National Historic Preservation Act, 16 U.S.C. § 470h-2(f). For the reasons discussed in more detail below, the National Trust disagrees with the proposed finding of "no adverse effect," pursuant to 36 C.F.R. § 800.5(c)(2)(i), because the Navy has not yet provided adequate information to show why the proposed site is the least harmful site within the Waipio Peninsula.

The Consulting Parties Have Not Been Provided 30 Days to Comment on the Proposed Determination of "No Adverse Effect"

Although the "no adverse effect" determination letter signed by Capt. Williamson bears a

[1] We were concerned to hear during our March 19, 2013 consultation meeting, that the Waipio Peninsula site is not being treated as an "alternative" to the Ford Island Runway site, but that the Navy will be proposing that *both* sites be used for solar PV development.

date of March 1, 2013 (therefore leading the Navy to call for any responses by April 1, 2013), and it was allegedly hand-delivered to the SHPO on Friday, March 1, the Navy's letter was not e-mailed to the consulting parties until Tuesday, March 5. The National Trust did not receive a copy of the letter until March 12, 2013, because the Navy used an erroneous e-mail address.[2] Therefore, we have not been provided 30 days to comment on the proposed finding of no adverse effect.

Additional Information Requested on March 19, 2013 Has Not Yet Been Provided.

During our conference call on March 19, 2013, which included discussion of this undertaking, the consulting parties asked a number of questions regarding the Navy's rationale for selecting this specific site within the Waipio Peninsula. The March 1 letter states that a 1997 archaeological reconnaissance survey identified no significant resources, and concluded that the adjacent site of the former fishpond was no longer extant and retained no integrity. Furthermore, this broad area is deemed to have little or no potential for archaeological resources.

As a result, the Navy has considered broad portions of the Waipio Peninsula as potential locations for solar energy development. An article entitled "Harboring Energy" by Alan Yonan, published in the Honolulu Star-Advertiser on September 18, 2011, included a map provided by Sempra Generation, which showed the majority of Waipio Peninsula under consideration for solar development. (The map is included as an attachment to this letter.) In addition, the Navy's Enhanced Use Lease website shows a large area of Waipio Peninsula under consideration for solar PV development. *See* https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_bdd_pp/eul/projects/waipio/index.html.

Our request for additional information seeks to understand the Navy's rationale for selecting this particular site within the Peninsula, and the Navy's rationale for why this specific site would minimize harm to the NHL "to the maximum extent possible." In addition, we raised questions about the potential future expansion of the PV field within the Waipio Peninsula, and asked for more analysis about which areas would be best suited for expansion.

We Disagree With the Proposed Area of Potential Effects.

Enclosure 2 to the Navy's March 1 letter proposes an APE for indirect (visual) effects that is much too narrow. The map shows the APE for *indirect* effects as being limited to the footprint of the PV field, and a narrow corridor along the transmission line, rather than corresponding with an area in which these components of the project would actually be visible. More visual assessment needs to be conducted in order to determine where the

[2] The reason for the delay in sending the letter to the National Trust was that Elisha Wallace, who had successfully e-mailed numerous documents to the National Trust until Sept. 21, 2012, was "given" a different e-mail address to use at some point after Sept. 21 by an unidentified person, and the new e-mail address "given" to Ms. Wallace included multiple errors (betsy.merritt@nthp.gov). As a result, I received no e-mails from Elisha Wallace at all after Sept. 21, 2012, until this error was discovered on March 12, 2013.

elements of the project may potentially be visible, including from Ford Island, and to develop a revised APE accordingly.

The ICRMP Suggests Historic Resources and Key View Planes that Need to be Addressed Specifically.

Figure 1 on page 5-13 of the ICRMP shows that views of Waipio Peninsula from two different locations on Ford Island are especially significant. Potential visual impacts to these key view planes have not been adequately addressed in the materials provided to date. Enclosure 6 to the March 1 letter shows a photo of the Waipio Peninsula from the USS Nevada Memorial, and states, "Mature shoreline vegetation along the Waipio Peninsula *helps* to provide visual screening of the existing 50 foot high [HECO] power poles . . . " (Emphasis added.) We would like more information about exactly what portions of the Waipio Peninsula are visible from Ford Island, and based on what height restrictions.

In addition, Figure 1 on page 5-13 of the ICRMP shows a "historic railroad corridor" on the Waipio Peninsula. It appears that this historic railroad corridor would be immediately adjacent to the proposed PV site, and would be crossed by the proposed route for the transmission line. This historic railroad corridor is not mentioned in the Navy's March 1 letter to the SHPO. We would like more information about the potential effects of the PV project, including the transmission line, on the historic railroad corridor.

The Proposed Conditions Are Not Sufficient to Ensure that Adverse Effects Will Be Avoided.

The Section 106 regulations allow for the imposition of "conditions . . . , such as the subsequent review of plans for rehabilitation by the SHPO/THPO to ensure consistency with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines, to avoid adverse effects." 36 C.F.R. § 800.5(b). The Navy's March 1 letter proposes four such "conditions":

- The contractor's statement of work will require that the electrical distribution line connection to Building 177 (a Category II historic building) will be achieved by using existing conduit;
- The contractor's statement of work will stipulate that no shoreline vegetation removal will occur;
- The contractor's statement of work will include protocols to address the unanticipated discovery of historic properties during construction; and
- The SHPO will be afforded an opportunity to review and comment on the contractor's "design milestone submittals."

We are particularly concerned about the Navy's reliance on existing shoreline vegetation to shield against any adverse visual effects, regardless of whether an elevated transmission line is used. Enclosure 3 to the Navy's March 1 letter ("Detailed Plan – PV Array") shows the PV panels going right up to the shoreline, and does not appear to depict any space for the existing vegetation to serve as a buffer. Furthermore, as we all know, things can go wrong, and the accidental or mistaken removal of some of the shoreline vegetation by the

contractor could fundamentally negate the assumption that the vegetation will adequately screen views of the project.[3] This again raises the question why a site farther away from the shoreline would not provide more assurance that harm will be minimized "to the maximum extent possible."

We also note that the proposed conditions do not include any restrictions on the use or height of power poles for the transmission line. Although the Navy's March 1 letter estimates that the power poles would be 40 feet high, it does not explain why the power poles would be 10 feet shorter than the existing 50-foot-high HECO poles. Without a specific condition restricting the height of the poles, there would be no guarantee of this limitation in any event.

Nor do the proposed conditions include any requirements about the fence surrounding the proposed PV array. The specific design of the fence will be crucial in assessing potential visual effects of the project. For example, the Navy would want to ensure that the fence completely blocks the visibility of the project so that views from Ford Island are not affected. At the same time, the Navy would want to ensure that the fence itself does not introduce a new visual element that is adverse.

Any conditions should also address the circumstances under which the PV field might be expanded in the future, which is clearly anticipated.

Documentation is Not Sufficient to Support a Determination of "No Adverse Effect"

The Section 106 regulations require the following documentation to support the Navy's proposed determination:

> (e) *Finding of no adverse effect or adverse effect*. Documentation shall include:
>
> (1) A description of the undertaking, specifying the Federal involvement, and its area of potential effects, including photographs, maps, and drawings, as necessary;
>
> (2) A description of the steps taken to identify historic properties;
>
> (3) A description of the affected historic properties, including information on the characteristics that qualify them for the National Register;
>
> (4) A description of the undertaking's effects on historic properties;

[3] The National Trust has been made painfully aware of the consequences of such a mistake at Fort Belvoir, which is immediately adjacent to the National Trust's Woodlawn Historic Site in Alexandria, Virginia (also a National Historic Landmark). The Army determined that a housing project close to the Woodlawn boundary would have "no adverse effect" on Woodlawn because the existing vegetation would provide an effective visual buffer. When the construction contractor mistakenly bulldozed some of the existing vegetation, the adverse visual effect became glaring, and will take decades to fully mitigate through the planting of additional new vegetation.

> (5) An explanation of why the criteria of adverse effect were found applicable or inapplicable, including any conditions or future actions to avoid, minimize or mitigate adverse effects; and
>
> (6) Copies or summaries of any views provided by consulting parties and the public.

36 C.F.R. § 800.11(e). In our view, more information is needed regarding items (2), (4), and (5). Item (2) should include more information about surveys. For example, during our March 19 consultation meeting, I raised the question whether any recent undertakings have occurred on Waipio Peninsula, and whether those may have provided an opportunity to update or verify the 1997 archaeological reconnaissance survey. We have not received that information yet. Item (4) should include more visual analysis in order to assess potential indirect effects of the project, including more analysis of key views from Ford Island. Item (5) should include more explanation about how this specific site was chosen from the entire Peninsula; how and why this site minimizes harm "to the maximum extent possible;" why a site farther away from the shoreline would not reduce the potential for adverse visual effects; and whether additional conditions addressing power poles, fencing, vegetation, later expansion of the project, etc. should be developed.

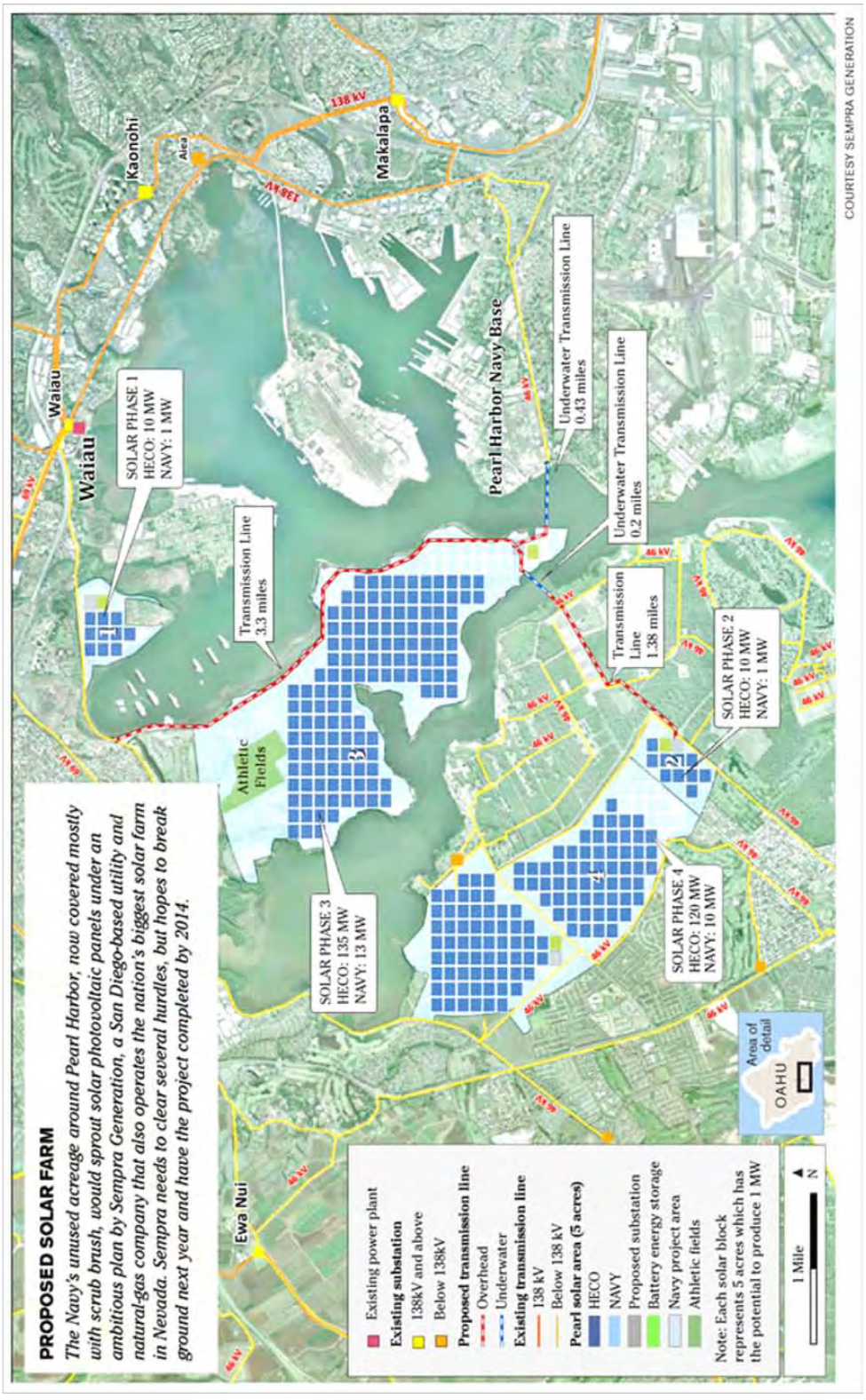
Thank you in advance for reviewing and considering the reasons for our disagreement with the Navy's proposed finding of "no adverse effect." We would appreciate the opportunity to consult further with the Navy about the potential effects of this project on the Pearl Harbor National Historic Landmark, pursuant to 36 C.F.R. 800.5(c)(2).

Sincerely,

Elizabeth Merritt

Elizabeth S. Merritt
Deputy General Counsel

cc: Louise Brodnitz, Caroline Hall, and Reid Nelson, ACHP
Elaine Jackson-Retondo, NPS
Susan Lebo, Oahu Lead Archaeologist, State Historic Preservation Division
Kiersten Faulkner, Historic Hawaii Foundation
Keola Lindsay, Office of Hawaiian Affairs
Shad Kane, Oahu Council of Hawaiian Civic Clubs


PROPOSED SOLAR FARM
The Navy's unused acreage around Pearl Harbor, now covered mostly with scrub brush, would sprout solar photovoltaic panels under an ambitious plan by Sempra Generation, a San Diego-based utility and natural-gas company that also operates the nation's biggest solar farm in Nevada. Sempra needs to clear several hurdles, but hopes to break ground next year and have the project completed by 2014.
Waiau
Kaonohi
Aiea
Makalapa
Pearl Harbor Navy Base
Ewa Nui
Athletic Fields
SOLAR PHASE 1
HECO: 10 MW
NAVY: 1 MW
Transmission Line
3.3 miles
SOLAR PHASE 3
HECO: 135 MW
NAVY: 13 MW
Underwater Transmission Line
0.43 miles
Underwater Transmission Line
0.2 miles
Transmission Line
1.38 miles
SOLAR PHASE 2
HECO: 10 MW
NAVY: 1 MW
SOLAR PHASE 4
HECO: 120 MW
NAVY: 10 MW
Area of detail
OAHU
Existing power plant
Existing substation
138kV and above
Below 138kV
Proposed transmission line
Overhead
Underwater
Existing transmission line
138 kV
Below 138 kV
Pearl solar area (5 acres)
HECO
NAVY
Proposed substation
Battery energy storage
Navy project area
Athletic fields
Note: Each solar block represents 5 acres which has the potential to produce 1 MW
1 Mile
N
COURTESY SEMPRA GENERATION

HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

601 Kamokila Boulevard, Suite 555
Kapolei, HI 96806

April 1, 2013

Mr. Aaron Poentis
Region Environmental Program Director
Naval Facilities Engineering Command Hawaii
400 Marshall Road, Building X11
Pearl Harbor, HI 96860-3139
Aaron.poentis@navy.mil

LOG NO: 2013.2090
DOC NO: 1304SL03
Archaeology, Architecture

Dear Mr. Poentis:

SUBJECT: **Chapter 6E-8 and National Historic Preservation Act (NHPA) Section 106 Review – Request for Concurrence of "No Adverse Effect"**
Solar Power Generation Photovoltaic (PV) Array, Waipio Peninsula,
Joint Base Pearl Harbor-Hickam
Waipi'o Ahupua'a, 'Ewa District, Island of O'ahu
TMK: (1) 9-3-002:001

Thank you for the opportunity to respond to your request for concurrence on the U.S. Department of the Navy (Navy) "determination of 'no adverse effect' for the installation of a PV array at Waipio Peninsula and its associated actions, including power connections to Station D in the Naval Shipyard." The Navy has determined that the project is an undertaking as defined in 36 CFR 800.16(y).

The proposed project will be located within an 42-acre portion of TMK: (1) 9-3-002:001. It will involve installation of a PV system array at Waipio Peninsula. The work will include vegetation clearing and grubbing, installation of racks and inverters to support about 50,000 PV panels, connections between the PV solar panels, and construction of a 7-foot high secured perimeter fence around the panel array. The power generated by the PV system will be transmitted from the PV array via an underground or pole-mounted cable along an existing roadway, then across Pearl Harbor using a horizontal directional drilling process, and to Station D at Building 177 via ground trenching and ducting.

The final design has not been determined. The first design involves a pole-mounted cable connection. If selected, about 50 wooden poles will be installed about 200 feet apart, along an existing two-mile road corridor on the Peninsula. The poles will stand about 40 feet in height and be installed to a depth of about 7 feet below current grade. The second design involves direct burial of the cable. If selected, this design requires excavation of trenches about 2 feet wide and 3.5 feet deep along the existing two-mile corridor. Within the Shipyard area, the cable will be routed through existing underground conduits to the maximum extent possible. Where necessary, the cable will be buried in a trench measuring about 750 feet long, 2 feet wide and 4 feet deep to Station D within Building 177 as a tie-in to Navy electrical grid.

The area of potential effect (APE) is shown on the plans, but the actual acreage will not be determined until the final design is selected. The direct APE will consist of the total area involving ground disturbance for installation of the PV array, the perimeter fence, the excavation to set the poles for an overhead cable connection or trenching for a buried connection and Building 177. The indirect or potential visual APE will consist of 400 feet on either side of the estimated 50 wooden poles, should the overhead connection design be installed.

The proposed undertaking occurs within the boundaries of the Pearl Harbor National Historic Landmark. Waipio Peninsula is part of Pearl Harbor Naval Base and activities that took place there played a strategic role to the overall success of the war in the Pacific. The few facilities that remain from this period are the only physical evidence of the Waipio Peninsula's role during WWII. None of these remaining facilities are located within the direct APE.

Mr. Poentis
April 1, 2013
Page 2

Building 177 (Power Plant) is a Historic Category II structure located within the Shipyard Historic Management Zone. It is eligible for the National Register under Criteria A (events) and C (distinctive type, period, and method of construction.

In addition, the proposed undertaking is described as being within an area of no and/or low potential for archaeological historic properties. The Navy indicates that most of Waipio Peninsula, including the direct APE, was subjected to an archaeological reconnaissance survey (Jensen and Head 1997). No archaeological historic properties were identified within the APE and the survey noted extensive disturbance from building activity and sugar cane plantation agriculture. Loko Hanaloa (SIHP 50-50-80-125), a pre-Contact fishpond occurred west of the direct APE. An archaeological study involving paleo-environmental analysis (Athens 2000) revealed no evidence of intact fishpond sediments.

The Navy's determination of "no adverse effect" is based on the following factors: (1) no modifications to Building 177, (2) mature vegetation along the shoreline will provide visual screening, (3) no or low potential for subsurface archeological sites within the direct APE, and that (4) SHPD will have the opportunity to review and comment on contractor's design milestone submittals.

Based on the aforementioned undertaking description, *SHPD requests additional information prior to issuing an effect determination*.

First, we request acreage of the direct APE and expansion of the visual APE. Second, we request an archaeological inventory survey involving subsurface testing be conducted within the direct APE. The determination of no to low potential for subsurface historic properties is based on former sugar cane agricultural activity. No indications are provided that subsurface testing has been conducted to document the depth of this prior agricultural activity and the potential of buried historic properties below the former agricultural zone.

In addition to the two above mentioned issues, we request more detailed architectural plans for the PV system, including the invertors and electrical service areas. We also request an opportunity to conduct a site visit to see the proposed structural locations, including the estimated 50 pole locations, and to examine the view planes. Presently we have insufficient information to assess the visual effects. Lastly, we request the project include stipulations for addressing long-term visual effects, including plans for addressing possible future loss of the mature shoreline vegetation which is identified as the primary visual screening.

Please contact Susan A. Lebo at (808) 692-8019 or at Susan.A.Lebo@hawaii.gov for any questions or concerns regarding archaeological resources. Please contact me at (808) 692-8032 or at Angie.R.Westfall@hawaii.gov if you have any questions or concerns regarding architectural resources, including visual effects, or any questions regarding this letter.

Aloha,

Angie R. Westfall
Architecture Branch Chief

HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

601 Kamokila Boulevard, Suite 555
Kapolei, HI 96806

April 17, 2013

Mr. Aaron Poentis
Region Environmental Program Director
Naval Facilities Engineering Command Hawaii
400 Marshall Road, Building X11
Pearl Harbor, HI 96860-3139
Aaron.poentis@navy.mil

LOG NO: 2013.2090
DOC NO: 1304SL12
Archaeology, Architecture

Dear Mr. Poentis:

SUBJECT: **Chapter 6E-8 and National Historic Preservation Act (NHPA) Section 106 Review – Revised - Request for Concurrence of "No Adverse Effect"**
Solar Power Generation Photovoltaic (PV) Array, Waipio Peninsula,
Joint Base Pearl Harbor-Hickam
Waipi'o Ahupua'a, 'Ewa District, Island of O'ahu
TMK: (1) 9-3-002:001

Thank you for the opportunity to respond to your request for concurrence on the U.S. Department of the Navy (Navy) "determination of 'no adverse effect' for the installation of a PV array at Waipio Peninsula and its associated actions, including power connections to Station D in the Naval Shipyard." The Navy has determined that the project is an undertaking as defined in 36 CFR 800.16(y). Our office received the initial submittal on March 1, 2013. We requested additional information and a site visit (April 1, 2013; Log No. 2013.2090, Doc. No. 1304SL12).

The proposed undertaking occurs within the boundaries of the Pearl Harbor National Historic Landmark. Of the few facilities dating from Waipio Peninsula's role during WWII, none are located within the direct APE. Building 177 (Power Plant) is a Historic Category II structure located within the Shipyard Historic Management Zone. It is eligible for the National Register under Criteria A (events) and C (distinctive type, period, and method of construction). Loko Hanaloa (SIHP 50-50-80-125) is a pre-Contact fishpond which plans indicate is west of the direct APE.

The undertaking will be located within a 40-acre portion of TMK: (1) 9-3-002:001 and includes the PV site, trenching for cable route, directional drilling under the channel, and existing conduit to/within Station D at Building 177. The area of potential effect (APE) is 51 acres and includes all of the abovementioned and anticipated direct and visual APE.

The newly-selected design involves a PV system array installed on low racks. The ground-disturbing work will include vegetation clearing and grubbing, installation of racks and inverters to support about 50,000 PV panels, connections between the PV solar panels, and construction of a 7-foot high secured perimeter fence around the panel array. The power generated by the PV system will be transmitted from the PV array via an underground cable along an existing roadway, then across Pearl Harbor using a horizontal directional drilling process, and to Station D at Building 177 via ground trenching and ducting.

The additional information and site visit on April 16, 2013 addressed our earlier concerns regarding investigating potential subsurface archaeological deposits, the proposed PV system options, and possible visual effects (April 1, 2013; Log No. 2013.2090, Doc. No. 1304SL12). The updated archaeological information confirms the proposed undertaking is within an area of no and/or low potential for archaeological historic properties and that investigations conducted in the vicinity confirm extensive grading, grubbing, and filling of the area. The revised design will involve only shallow excavations to install the racks. Similarly, the excavations for the inverters, fence, and cables will not extend below previously disturbed sediments and/or imported fill layers. The selection of a PV system

Mr. Poentis
April 17, 2013
Page 2

involving installing panels mounted on a low fixed rack system has address our concerns regarding long-term visual effects.

We now concur that **no historic properties will be adversely affected** by the proposed Solar Power Generation Photovoltaic (PV) Array undertaking at Waipio Peninsula, TMK: (1) 9-3-002:001. Our concurrence is based on the Navy's documentation of the following factors: (1) no modifications to Building 177, (2) mature vegetation along the shoreline will provide visual screening, (3) no or low potential for subsurface archeological sites within the direct APE, and that (4) SHPD will have the opportunity to review and comment on contractor's design milestone submittals.

Please contact Susan A. Lebo at (808) 692-8019 or at Susan.A.Lebo@hawaii.gov for any questions or concerns regarding archaeological resources. Please contact me at (808) 692-8032 or at Angie.R.Westfall@hawaii.gov if you have any questions or concerns regarding architectural resources, including visual effects, or any questions regarding this letter.

Aloha,

Angie R. Westfall
Architecture Branch Chief

cc: Valerie Curtis, Valerie.n.curtis@navy.mil
Stacey Tangonan, Stacey.tangonan@navy.mil
Angie Westfall, Angie.R.Westfall@hawaii.gov

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
850 TICONDEROGA ST STE 110
JBPHH, HAWAII 96860-5101

5750
Ser N45/514
30 Apr 13

CERTIFIED MAIL NO. 7011 1570 0002 2356 6471

Ms. Betsy Merritt
National Trust for Historic Preservation
1785 Massachusetts Avenue NW
Washington, DC 20036

Dear Ms. Merritt:

SUBJECT: SECTION 106 CONSULTATION FOR PROPOSED SOLAR POWER GENERATION PHOTOVOLTAIC ARRAY, WAIPIO PENINSULA, JOINT BASE PEARL HARBOR-HICKAM. TMK: 9-3-002:001

Thank you for your letter, dated April 1, 2013, regarding the proposed Solar Power Generation Photovoltaic (PV) Array at Waipio Peninsula.

Thank you for promptly reviewing the "no adverse effect" determination letter addressed to the State Historic Preservation Division ("SHPD") at the National Trust for Historic Preservation ("NTHP"). Please accept my apology for incorrectly sending it to you at your former email address; we have since corrected your e-mail address in our directory.

We have reviewed your letter and would like to submit the information found in the attached summary document to address the cultural resources issues raised. This additional information clarifies the design constraints and/or protective measures instituted to address the concerns about direct and indirect effects and historic properties. These protective measures that will be implemented during and after construction will ensure that this undertaking on Waipio Peninsula will not affect historic properties and will preserve the integrity of the Pearl Harbor National Historic Landmark ("NHL").

In addition, we have had an opportunity for Hawaii SHPD staff to visit the proposed site at Waipio Peninsula to give them a first-hand look at our plans and the cultural and historic aspects of the site. Following this site visit, SHPD provided us a letter, dated April 17, 2013, concurring with our "no adverse effect" determination. (Enclosure 1).

Thank you for your continued effort to work with Commander, Navy Region Hawaii, ("COMNAVREG Hawaii") in fulfilling our National Historic Preservation Act stewardship.

5750
Ser N45/514
30 Apr 13

Should you have any questions regarding this letter, please contact, Mr. Aaron Poentis, Navy Region Environmental Program Director at 471-1171, extension 226 or email at aaron.poentis@navy.mil.

Sincerely,

M. D. WILLIAMSON
Captain, CEC, U.S. Navy
Regional Engineer
By direction of the
Commander

Enclosures:
1. Hawaii, SHPD Letter on concurrence
2. Existing Escarpment Conditions at Shoreline
3. Height Verification of Existing Shoreline Vegetation
4. PCP - Significant Views
5. Ford Island - Significant Views
6. 1982 Aerial Photo - Waipio Peninsula

Copy to:
Angie Westfall, State Historic Preservation Division
Kiersten Faulkner, Historic Hawaii Foundation
Betsy Merritt and Brian Turner, National Trust for Historic Preservation
Elaine Jackson-Retondo, National Park Service
Shad Kane, Oahu Council of Hawaiian Civic Clubs
Keola Lindsey, Office of Hawaiian Affairs
Louise Brodnitz, Advisory Council on Historic Preservation

COMNAVREG Hawaii Summary Response

Based on the referenced article in the *Star-Advertiser* on Sep. 18, 2011, it appeared that the majority of Waipio Peninsula was under consideration for solar development. We would like to advise you that the information in the article is no longer valid. The article was published at a time early in the planning process before the Navy began looking closely at individual property concerns. The discussion below provides the reasons for limiting solar development on the Waipio Peninsula.

In addition, there was a similar concern about the Navy's Enhanced Use Lease (EUL) website, which shows a schematic drawing with a large area of Waipio under consideration for PV arrays. While the schematic drawing does portray a large area, the website does not include the land-use constraints, which are also further described below. The website does include a statement that the EUL opportunities on Waipio have been postponed and may be withdrawn.

The Navy's rationale for selecting the Waipio Peninsula was based on its operational benefits, anticipated economic feasibility, and consideration of environmental, cultural resource, safety and other land-use constraints. To specifically address cultural resources during the planning process, the 2011 Historic Asset Management Process (HAMP) provides tools to assess cumulative impacts to the Pearl Harbor National Historic Landmark (NHL) (Volume II, Chapters 1, 2 and 9). The HAMP is Joint Base Pearl Harbor-Hickam's method for analyzing potential adverse effects to the NHL to minimize harm to the maximum extent possible during the planning process, as required by Section 110(f) of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470h-2(f).

Based on the analysis resulting from the HAMP's methodology, such as an historic overlay analysis of cultural landscape data, historic inventory data, period of significance information (not involved in December 7, 1941 attack on Pearl Harbor, acquired after the attack), and the very low concentration of historic resources on Waipio Peninsula, the proposed site within Waipio Peninsula was designated as a Tertiary Zone, which is identified in the HAMP as an area of lower sensitivity within the expansive NHL. Siting was also sensitive to the buried/disturbed Loko Hanaloa fishpond, so the proposed activity was not sited over any portion of it. Thus, by choosing a site in the Tertiary Zone as opposed to one with a higher concentration of historic resources, Navy is minimizing harm to the NHL to the maximum extent possible.

In addition to accounting for historic properties, various other constraints restrict the use of most of the land at Waipio Peninsula for PV ground-mount array opportunities. For example, the majority of the Waipio Peninsula falls within an assortment of restricted security and safety arcs related to the ordnance storage function at West Loch. Specific areas on the peninsula are also encumbered for training, or are designated as environmental restoration sites. (The constraints listed above are not reflected in the *Star Advertiser* drawing or the map on the EUL website, because specific location information showing

the operationally restricted areas is not allowed for public release due to security issues).

However, our evaluation of the remaining available land on Waipio Peninsula shows that an adjacent area to the west of the current proposed site might be suitable for expansion of the current PV ground-mount array in the future. Before undertaking any expansion, substantial cultural and natural information, as well as consultations, would be required to be evaluated prior to any future potential use of this area. Evaluation of this potential area, which is located outside of the area of potential effect, is outside the scope of this current project and thus not under consideration.

Indirect effects (visual) for the proposed area of potential effects ("APE") were evaluated. First, we want to highlight that the proposed project no longer includes the option for over-head transmission lines and the associated 40 foot poles. Therefore, this project revision negates the issue of potential visual impacts associated with the over-head transmission lines. Instead, the transmission lines are going to be buried underground in shallow tracks measuring approximately two feet wide by three and a half foot deep along the same route as the originally planned transmission line. Previous research in "Goodman and Cleghorn" 1998, "Athens (ed.)" 2000, and Jenson and Head (1997), supports the determination that archaeological sites would not be affected by burying the lines in the manner described.

The 2008 Oahu Integrated Cultural Resources Management Plan (ICRMP) does show that the views of Waipio Peninsula from locations on Ford Island and Pearl City Peninsula are significant to the character of the NHL. Furthermore, the vegetation visible from Ford Island on Waipio Peninsula is protected under NHPA as a character-defining feature of the Pearl Harbor Region as listed on Figure 1 of page 5-11 of the ICRMP. The typical height of the vegetation is at least 15 feet high from the ground and at least 30 feet from the bottom of the escarpment (Enclosures 2 and 3).

The site is also within the significant views indicated on the Ford Island Historic Boundary Map and the Pearl City Peninsula Historic Boundary Map. Panoramic site photos were taken from these vantage points toward the project site (Enclosures 4 and 5). These panoramic site photos clearly show that the existing vegetation would effectively screen from significant views the elements of the proposed project which would include the PV panels on racks (5 feet high), inverter enclosures (10 feet high), any lighting structures (10 feet high), and the perimeter security fence (7 feet high). National Electrical Safety Code ("NESC") Section 11, 110.A.1 requires a 7-foot high perimeter chain-link fence around energy-producing equipment to protect from electrocution hazards and also to protect the equipment enclosed. All elements of the proposed project will be well below the height of the existing vegetation and will not affect the view plane. Moreover, after reviewing the panoramic photos and visiting the site on April 16, 2013, the Hawaii SHPD letter of April 17th states that the "selection of a PV system involving installing panels mounted on a low fixed rack system has addressed the SHPD's concerns regarding long-term visual effects".

To protect the vegetation screens along the shoreline on Waipio Peninsula, the Navy will require in the Request for Proposal ("RFP") a 20 foot setback from the water, which will allow adequate space for the vegetation to serve as a screen. The 20 foot setback will ensure that the vegetation will remain sufficiently dense to protect against impacting the significant views from Ford Island. Additionally, to ensure that the shoreline vegetation remains undisturbed and prevent any adverse visual effects, the Navy will require the contractor to propose temporary fencing-off of the vegetation to act as a buffer during construction activities to make sure no inadvertent or accidental damage occurs. For example, this protection could be a bright orange construction snow fencing, or other agreed-upon, preferred method, which could be easily removed to preserve the environment in its pre-construction condition. This requirement will also be written into the RFP and become enforceable through the subsequent contract. These protections would ensure no accidental removal of the vegetation screening the view of Waipio Peninsula.

The ICRMP also includes a "Historic railroad corridor" on the Waipio Peninsula. This corridor would be within the area of potential effect, as well as the construction zone for the underground transmission line. Currently, the corridor is preserved and maintained as an existing unpaved roadway. The Waipio Point Access Road follows the path that historically contained rails and ties, but there are no longer any rails, ties, or associated berm(s) along the historic railroad corridor. The historic railway corridor will continue to act as an access road to the area, and construction traffic related to the PV panels would use the historic corridor during construction. However, the project would not change the historic corridor route and thus would have no impact on the corridor. Furthermore, placement of the underground transmission line would be within this historic railroad corridor, but since the physical remains of the railroad are no longer in existence, any digging along the corridor would be backfilled to restore the environment to its pre-construction condition. Thus, the placement of the transmission lines also would have no long-term impact on the corridor.

Another issue raised in the NTHP letter was whether there was sufficient documentation developed to support a determination of "No Adverse effect". Three areas of concern were highlighted:

The first area of concern was whether the surveys were current and adequate enough to provide an accurate description of the historic resources on Waipio Peninsula. Information on above ground resources such as historic properties of an architectural nature, and landscape resources, are found in Historic American Building Survey (HABS) HI-386 Waipio Peninsula, the 2011 Pearl Harbor Naval Complex Cultural Landscape Report, and 2011 HAMP. Information of an archaeological nature can be found in the 2008 ICRMP (page 4-22, Figure 5)which shows the entire project APE is in an area with "No and/or Low Potential for Sites." This predictive modeling map is based on previous archaeology in the area, historical information, and oral histories of previous land uses. Previous archaeological research on the peninsula includes an archaeological coring study in 2000 by "Athens (ed.)" that found approximately 40 feet of fill and disturbance above the adjacent Loko

Hanaloa fishpond. A surface and subsurface survey of archaeological resources was conducted to the north of the proposed PV project location in 1998 by "Goodman and Clegorn" for the Waipio Sports Complex, which confirmed earlier findings in 1997 by "Jensen and Head" (page 6) that any evidence of archeological resources on the peninsula would have been disturbed and/or deeply buried by previous mechanical landfill activities associated with sugarcane agriculture (Enclosure 6). The "Goodman and Cleghorn" study concludes that previous landfill activities had effectively covered the peninsula with at least 3.0 meters (approximately 10 feet) of fill, effectively burying any evidence of prehistoric land use (page 33). Based on these results, the planned projects ground disturbing activities to approximately 4 feet would not impact any archeological resources of this area.

The second area of concern was whether the documentation was sufficient to provide an adequate description of the undertaking's effects on historic properties, with the focus being on providing more visual analysis to assess potential indirect effects and views from Ford Island. The discussion in previous paragraphs illustrates how the use of the ICRMP, Boundary maps, and panoramic site photos provided sufficient information to analyze and prevent any indirect effects and preserve the existing view planes. As a result of this analysis, the Navy is committed to protecting the attributes determined to preserve the view planes.

The third area of concern was a request to provide more explanation on how the specific site was chosen from the entire Peninsula; how this site minimizes harm to the maximum extent possible; why a site farther away from the shoreline would not reduce the potential for adverse visual effects; and whether additional conditions addressing power poles, fencing, vegetation, later expansion of the project, etc. should be developed. The discussion in the previous paragraphs provided responses to these concerns.

Overall, we believe this summary of responses to the concerns presented by the NTHP's letter supports our no adverse effect determination by demonstrating that a thorough, rigorous, and detailed evaluation has been done on the Waipio Peninsula for this undertaking.

HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

601 Kamokila Boulevard, Suite 555
Kapolei, HI 96806

April 17, 2013

Mr. Aaron Poentis
Region Environmental Program Director
Naval Facilities Engineering Command Hawaii
400 Marshall Road, Building X11
Pearl Harbor, HI 96860-3139
Aaron.poentis@navy.mil

LOG NO: 2013.2090
DOC NO: 1304SL12
Archaeology, Architecture

Dear Mr. Poentis:

SUBJECT: **Chapter 6E-8 and National Historic Preservation Act (NHPA) Section 106 Review – Revised - Request for Concurrence of "No Adverse Effect"**
Solar Power Generation Photovoltaic (PV) Array, Waipio Peninsula,
Joint Base Pearl Harbor-Hickam
Waipi'o Ahupua'a, 'Ewa District, Island of O'ahu
TMK: (1) 9-3-002:001

Thank you for the opportunity to respond to your request for concurrence on the U.S. Department of the Navy (Navy) "determination of 'no adverse effect' for the installation of a PV array at Waipio Peninsula and its associated actions, including power connections to Station D in the Naval Shipyard." The Navy has determined that the project is an undertaking as defined in 36 CFR 800.16(y). Our office received the initial submittal on March 1, 2013. We requested additional information and a site visit (April 1, 2013; Log No. 2013.2090, Doc. No. 1304SL12).

The proposed undertaking occurs within the boundaries of the Pearl Harbor National Historic Landmark. Of the few facilities dating from Waipio Peninsula's role during WWII, none are located within the direct APE. Building 177 (Power Plant) is a Historic Category II structure located within the Shipyard Historic Management Zone. It is eligible for the National Register under Criteria A (events) and C (distinctive type, period, and method of construction). Loko Hanaloa (SIHP 50-50-80-125) is a pre-Contact fishpond which plans indicate is west of the direct APE.

The undertaking will be located within a 40-acre portion of TMK: (1) 9-3-002:001 and includes the PV site, trenching for cable route, directional drilling under the channel, and existing conduit to/within Station D at Building 177. The area of potential effect (APE) is 51 acres and includes all of the abovementioned and anticipated direct and visual APE.

The newly-selected design involves a PV system array installed on low racks. The ground-disturbing work will include vegetation clearing and grubbing, installation of racks and inverters to support about 50,000 PV panels, connections between the PV solar panels, and construction of a 7-foot high secured perimeter fence around the panel array. The power generated by the PV system will be transmitted from the PV array via an underground cable along an existing roadway, then across Pearl Harbor using a horizontal directional drilling process, and to Station D at Building 177 via ground trenching and ducting.

The additional information and site visit on April 16, 2013 addressed our earlier concerns regarding investigating potential subsurface archaeological deposits, the proposed PV system options, and possible visual effects (April 1, 2013; Log No. 2013.2090, Doc. No. 1304SL12). The updated archaeological information confirms the proposed undertaking is within an area of no and/or low potential for archaeological historic properties and that investigations conducted in the vicinity confirm extensive grading, grubbing, and filling of the area. The revised design will involve only shallow excavations to install the racks. Similarly, the excavations for the inverters, fence, and cables will not extend below previously disturbed sediments and/or imported fill layers. The selection of a PV system

Mr. Poentis
April 17, 2013
Page 2

involving installing panels mounted on a low fixed rack system has address our concerns regarding long-term visual effects.

We now concur that **no historic properties will be adversely affected** by the proposed Solar Power Generation Photovoltaic (PV) Array undertaking at Waipio Peninsula, TMK: (1) 9-3-002:001. Our concurrence is based on the Navy's documentation of the following factors: (1) no modifications to Building 177, (2) mature vegetation along the shoreline will provide visual screening, (3) no or low potential for subsurface archeological sites within the direct APE, and that (4) SHPD will have the opportunity to review and comment on contractor's design milestone submittals.

Please contact Susan A. Lebo at (808) 692-8019 or at Susan.A.Lebo@hawaii.gov for any questions or concerns regarding archaeological resources. Please contact me at (808) 692-8032 or at Angie.R.Westfall@hawaii.gov if you have any questions or concerns regarding architectural resources, including visual effects, or any questions regarding this letter.

Aloha,

Angie R. Westfall
Architecture Branch Chief

cc: Valerie Curtis, Valerie.n.curtis@navy.mil
Stacey Tangonan, Stacey.tangonan@navy.mil
Angie Westfall, Angie.R.Westfall@hawaii.gov

Enclosure 1

Navy Response Letter to NTHP
Solar Power Generation Photovoltaic (PV) Array
Existing Escarpment Conditions at Shoreline
Waipio Peninsula, JBPHH, Oahu, Hawaii

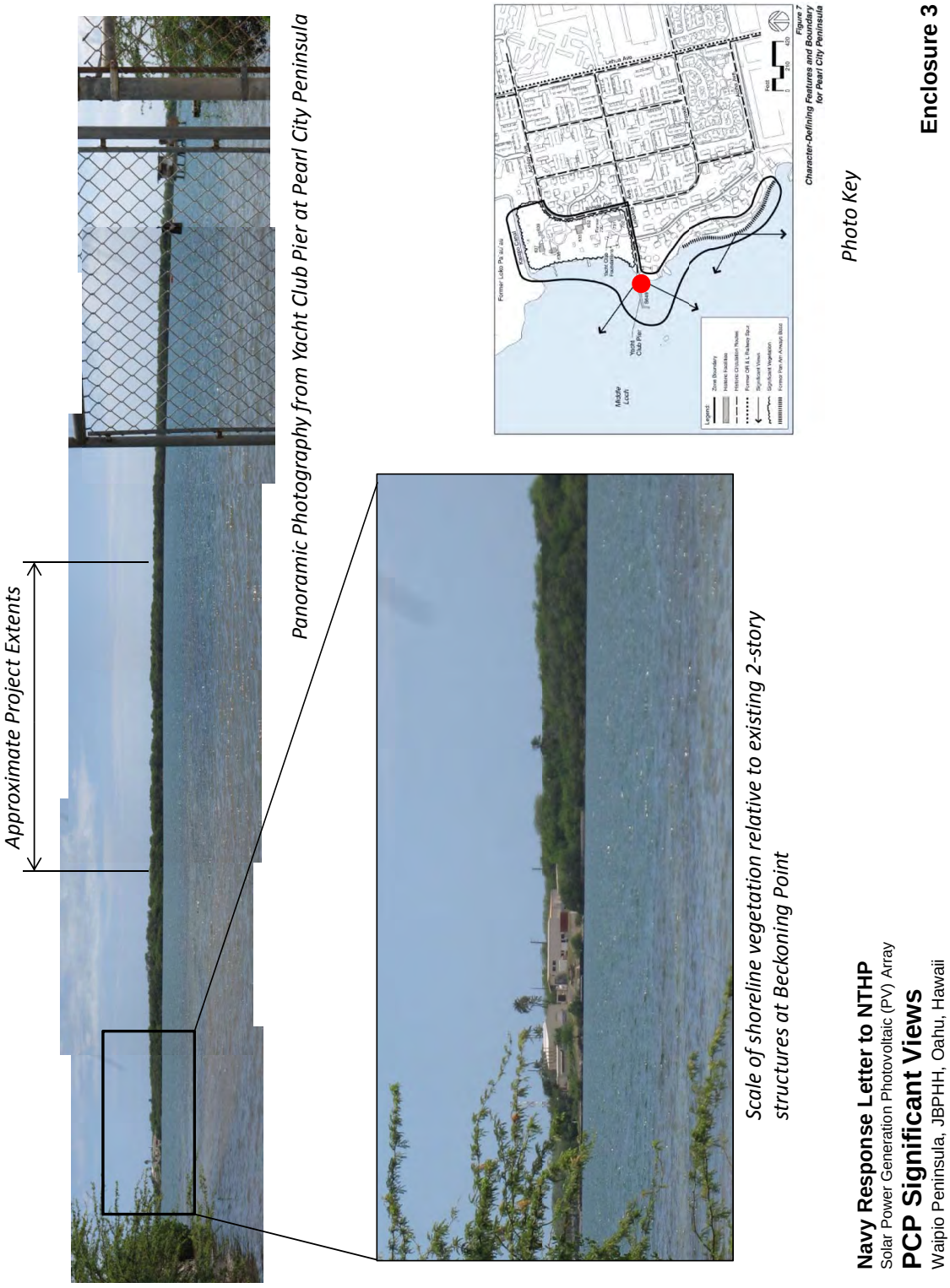
Escarpment edge condition at perimeter of proposed PV project site.

Escarpment edge condition at proposed start of horizontal directional drilling location.

Enclosure 2

Navy Response Letter to NTHP
Solar Power Generation Photovoltaic (PV) Array
Height Verification of Existing Shoreline Vegetation
Waipio Peninsula, JBPHH, Oahu, Hawaii

Height verification of existing vegetation near escarpment on proposed site.



Enclosure 3

Navy Response Letter to NTHP
Solar Power Generation Photovoltaic (PV) Array
PCP Significant Views
Waipio Peninsula, JBPHH, Oahu, Hawaii

Enclosure 4

Navy Response Letter to NTHP
Solar Power Generation Photovoltaic (PV) Array
Ford Island Significant Views
Waipio Peninsula, JBPHH, Oahu, Hawaii

Panoramic Photography from Utah Memorial at Ford Island

Photo Key

Enclosure 5

Navy Response Letter to NTHP
Solar Power Generation Photovoltaic (PV) Array
1982 Aerial Photo – Waipio Peninsula
Waipio Peninsula, JBPHH, Oahu, Hawaii

From: Tangonan, Stacey L CIV NAVFAC HI, HIOPHEV2
To: Susan.A.Lebo@hawaii.gov; Angie.R.Westfall@hawaii.gov
Subject: (1) 9-3-002:001 Waipio Photovoltaic
Date: Thursday, May 02, 2013 6:18:13 PM
Attachments: Encl 3-4_REV_25APR13.pdf

Dr. Lebo and Ms. Westfall,

This email is to acknowledge the receipt of SHPOs concurrence letter dated April 17, 2013 regarding the Solar Power Generation Photovoltaic (PV) Array on Waipio Peninsula, Joint Base Pearl Harbor-Hickam.

As a follow up, we are confirming that the anticipated transmission route will be placed in an underground duct, thus the visual APE has been greatly reduced due to the deletion of the power poles. The PV Array will be set back behind the mature vegetation along the shoreline, approximately 20 feet back from the existing escarpment which is further set back from the current shoreline. As you observed during the April 16th site visit, the shoreline vegetation is dense and many trees are three times the height of the highest element of the project, and provides complete visual screening so that no significant views are adversely affected.

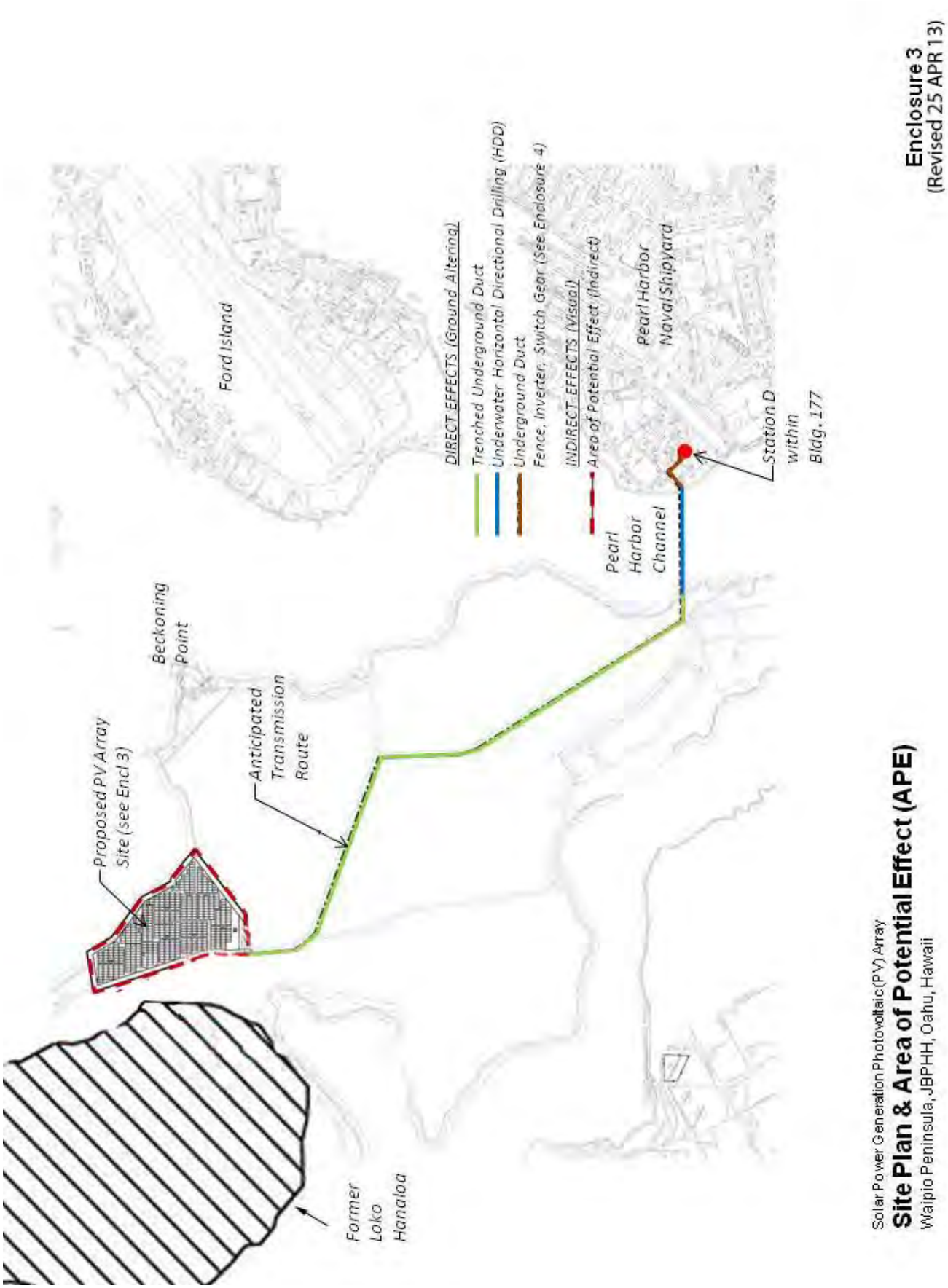
As requested, attached are the updated maps (Enclosures 3 and 4) from the original Section 106 correspondence showing a revised APE now that the scope specifies transmission lines to be routed underground.

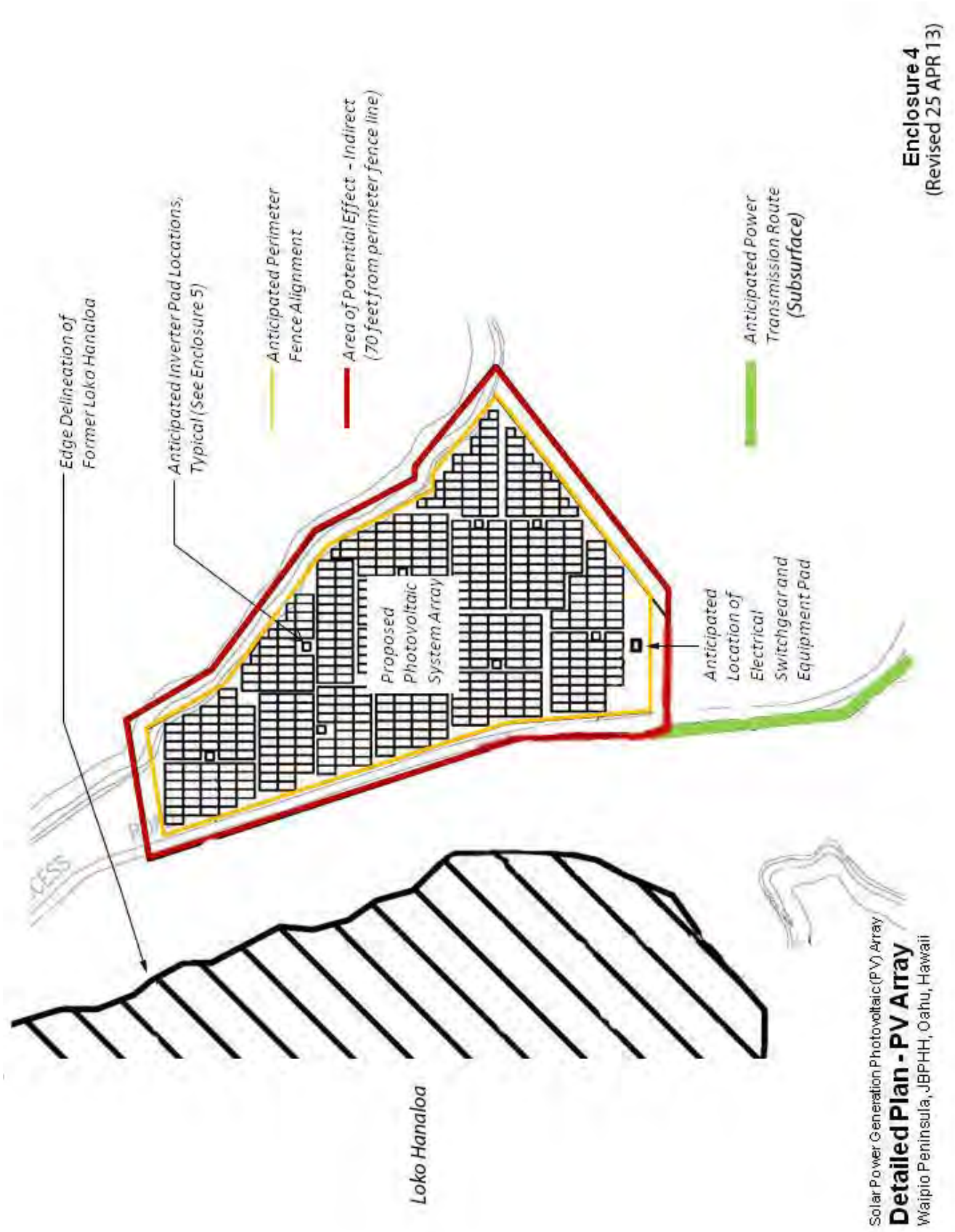
Please retain this email as a confirmation of the Navy's receipt of the SHPOs concurrence letter. Thank you for your continued support.

Very respectfully,

Stacey

Stacey Tangonan, RA, LEED AP
NAVFAC Hawaii, OPHEV5
400 Marshall Road, Building 55
Pearl Harbor, HI 96860-3139
Tel: (808) 471-9894
Fax: (808) 471-9869


Enclosure 3
(Revised 25 APR 13)
Solar Power Generation Photovoltaic (PV) Array
Site Plan & Area of Potential Effect (APE)
Waipio Peninsula, JBPHH, Oahu, Hawaii
DIRECT EFFECTS (Ground Altering)
Trenched Underground Duct
Underwater Horizontal Directional Drilling (HDD)
Underground Duct
Fence, Inverter, Switch Gear (See Enclosure 4)
INDIRECT EFFECTS (Visual)
Area of Potential Effect (Indirect)
Ford Island
Pearl Harbor Naval Shipyard
Station D within Bldg. 177
Pearl Harbor Channel
Beckoning Point
Anticipated Transmission Route
Proposed PV Array Site (see Encl 3)
Former Loko Hanaloa


Enclosure 4
(Revised 25 APR 13)
Edge Delineation of Former Loko Hanaloa
Anticipated Inverter Pad Locations, Typical (See Enclosure 5)
Anticipated Perimeter Fence Alignment
Area of Potential Effect - Indirect (70 feet from perimeter fence line)
Anticipated Power Transmission Route (Subsurface)
Proposed Photovoltaic System Array
Anticipated Location of Electrical Switchgear and Equipment Pad
Loko Hanaloa
Solar Power Generation Photovoltaic (PV) Array
Detailed Plan - PV Array
Waipio Peninsula, JBPHH, Oahu, Hawaii

National Trust for Historic Preservation
Save the past. Enrich the future.

May 6, 2013

Mike Williamson, P.E.
Captain, CEC, USN
Commanding Officer NAVFAC HI
850 Ticonderoga St., Suite 110
Joint Base Pearl Harbor-Hickam, Hawaii 96860-6101

Re: Section 106 Consultation for Proposed Solar Power Generation PV Array, Waipio Peninsula, Joint Base Pearl Harbor-Hickam, TMK: 9-3-002:001

Dear Capt. Williamson,

Thank you for your responses to the letter from the National Trust for Historic Preservation dated April 1, 2013, which raised concerns about the Navy's "no adverse effect" determination for the proposed solar PV project on Waipio Peninsula. In addition to the Navy's written response, sent on April 30, 2013, I appreciated the opportunity for two lengthy telephone conference calls in which the Navy was able to provide answers to many of my questions. Because the project is within the boundaries of the Pearl Harbor National Historic Landmark (NHL) District, we were also able to include the National Park Service in one of our conference calls.

In response to our inquiries about why this site in particular was chosen, as opposed to other potential sites on the Waipio Peninsula, some of the information provided in the Navy's written documentation was inconsistent or inadequate to explain the site choice. For example, the site of the former Loko Hanaloa Fishpond is repeatedly referenced, in both the March 1 and April 30, 2013 letters from the Navy, as having lost its historic integrity, even under National Register Criterion D, because of approximately 40 feet of fill and disturbance—a determination the National Trust does not dispute. Yet the "Summary Response" attached to the Navy's April 30 letter cites efforts to *avoid* the insignificant Fishpond as one reason why the solar project is proposed for the shoreline on the east side of the Waipio Point Access Road, as opposed to the western side of the road where the former Fishpond was located.[1] Other proffered rationales also fail to explain the site choice within Waipio Peninsula. For example, efforts to avoid areas on the peninsula that are designated for "training" would not explain the site selection, because the chosen site is *within* a designated training area. Similarly, selection of a site within a zone designated as "Tertiary" in the HAMP is certainly appropriate, but does not explain the choice of this particular site within the Peninsula, since the entire Waipio Peninsula is a Tertiary Zone.

Based on the telephone conference calls, my understanding is that the true rationale for the specific site choice relies primarily on two constraints, given that the 42-acre size of

[1] "Siting was also sensitive to the buried/disturbed Loko Hanaloa fishpond, so the proposed activity was not sited over any portion of it." (Navy Response to National Trust, p.4, Apr 30, 2013).

the proposed installation was chosen in order to correspond as closely as possible with the size of the former proposal for the Ford Island Runway. *First,* the cost of transmission is very high, which would lead to the selection of a site as far south on the Waipio peninsula as possible in order to reduce transmission distance. *Second*, the safety "arcs" associated with the Navy's activities at the southern end of Waipio Peninsula,[2] where the Navy is engaged in filtering and remediating dredged soil, preclude the use of most of the Peninsula. It is our understanding that, according to the Navy's representations, any potential site further south on Waipio Peninsula would infringe within these safety "arcs." In response to my questions about why the transmission lines would be allowed to cross within the safety arcs but not the PV panels themselves, I understand the reason to be that a potential catastrophic event such as an explosion would pose a much lower risk to buried transmission cable than to above-ground infrastructure such as PV panels, inverter stations, etc.

If these assumptions or understandings of the facts are incorrect, I would appreciate clarification from the Navy. These constraints do not explain the choice of the proposed site over the site of the former fishpond, but I understand that the fishpond site would be considered in the long term for potential future expansion of the solar energy field.[3]

Based upon the additional information provided by the Navy, it does appear that "conditions" could be developed that would reasonably ensure that the effects of this undertaking on the NHL District would not be adverse, pursuant to 36 C.F.R. § 800.5(b). In our view, those "conditions" would need to include the following in order to be effective:

- **Landscape buffer to protect against visual intrusion.** The "Summary Response" document states that the RFP for the project will require "a 20 foot setback from the *water,*" (Summary Response at p.6) (emphasis added). As we discussed, however, 20 feet from the water would only get you up to the top of an escarpment, if that far, so it will be essential to revise the RFP in order to ensure that the 20-foot setback is measured from the top of the escarpment, not from the water. (As stated during the telephone conference call, the National Trust would prefer a 25-foot buffer, but we

[2] The "Summary Response" on April 30 stated that "the majority of the Waipio Peninsula falls within an assortment of restricted security and safety arcs related to the ordnance storage function at *West Loch*." (Summary Response at p.4) (emphasis added). I understand from our telephone conference calls, however, that this is incorrect, and that the safety arcs at Waipio actually relate to activities on Waipio Peninsula itself rather than the ordnance storage at West Loch. (My question was raised in the context of anticipating that West Loch is likely to be the next site selected for a Solar MAC project, and I wondered why all those safety arcs would not preclude siting the project there, just like they preclude siting the Waipio project on the southern portion of the peninsula.)

[3] In the longer term, we would like to encourage the Navy to develop a policy to protect fishpond features that might remain, such as walls, berms, terraces, hand laid stones, or gates. Some of these unique physical landscape features remain, even if they are buried and the fishpond site as a whole lacks sufficient integrity to qualify as a contributing feature for the National Register. The Navy should look for opportunities to document, retain, and interpret these features.

understand the Navy's position to be that every available square foot needs to be filled with PV panels and associated infrastructure, so that a wider buffer would result in a project that would produce less energy. This pressure caused by the need for every square foot raises concerns about whether the contractor might be tempted to shave a few feet off the buffer zone in order to maximize the installation, unless somebody is on-site with a ruler double-checking compliance. As a result, we recommend two safeguards:

- ***Construction fencing to protect the vegetation buffer.*** The condition should also specifically require that orange construction fencing be installed at the inside boundary of the vegetation buffer zone, and it should be inspected by the State Historic Preservation Office (SHPO) and the Navy to confirm the appropriate location, prior to any vegetation removal.
- ***Historical Survey of Shoreline.*** We recommend a current visual survey of areas along the shoreline that will be within the protected buffer zone. The exposed shoreline and vegetated area along the escarpment has the potential for visually observing military defensive positions or the remains of former structures such as gun positions and observation points, which may have importance and should be avoided during construction. This visual survey should be conducted by a professional with expertise in military history and structures, rather than a traditional archaeologist. Any identified military remains should be inspected to ensure that they are fully included within the vegetation buffer zone and protected.
- ***Penalty for violations***. We recommend including a penalty clause that would be triggered by accidental destruction or removal of vegetation within the vegetative buffer, as an extra incentive for the contractor to ensure compliance with this provision.

- **Protection of Building 177**. As planned, the contractor's statement of work will require that the connection of the electrical distribution line to Building 177 (a Category II historic building) will be accomplished through existing conduit.
- **Review of conceptual plans.** The contract should explicitly require review of all plans by the SHPO, at two or three stages during project development. As we have learned the hard way at the Kalaeloa Renewable Energy Project, and as we saw with respect to the Ford Island plans, these projects can have a tendency to expand during the course of the planning. Even when there is consensus during the initial review, the plans need to be reviewed again as they are refined.
- **Protocol for unanticipated discovery of archaeological resources.** We also understand that the contract will include standard language acceptable to the SHPO for addressing the discovery of unexpected archaeological resources during construction.
- **Prohibition of above-ground power poles**. Since the Navy has decided not to use elevated transmission lines, a prohibition on above-ground transmission infrastructure should be included in the contract, to confirm and enforce this limitation on potential visual impacts.
- **Permanent fencing limited to 7 feet high.** The Navy has asserted that the "National Electrical Safety Code" standards require a 7-foot-high chain link fence surrounding the PV installation. The contract should explicitly limit the fence to no

higher than 7 feet. If the SHPO has a preference for the appearance of the chain link fence (e.g., some SHPOs prefer black chain link rather than silver), that preference should be honored.

- **Protection of the railroad corridor**. The location and significance of the former railroad corridor should be referenced in the conditions, and the contractor should be prohibited from any construction activities that would damage the corridor. The fenceline along the railroad corridor (the west side of the PV field) should also be set back to ensure no intrusion within the corridor. Any point(s) where the underground transmission line would cross the corridor should be specifically addressed to ensure that no permanent damage is done to the corridor. Although we agree with the Navy that the proposed construction would be unlikely to have any permanent impact on the railroad corridor, it is important to disclose its significance in order to ensure that the contractor is aware of the potential implications of its construction activities. We recommend specifically prohibiting paving of the dirt road.
- **Prohibition against any expansion of the PV field**. The contract should explicitly prohibit any additional construction or expansion of the project without full consultation under Section 106 in advance.
- **Long-term restoration of the site**. At the end of the lease term (which we understand to be 20 years), the contract needs to provide for the treatment of the site. If the lease is to be renewed or PV equipment is to be replaced, Section 106 consultation needs to occur, since many circumstances may have changed by that time. If the lease is not renewed (or if the lease is terminated early for some reason), the contract must provide for the restoration of the site to its original condition, including the removal of all PV panels, inverter structures, and all other above-ground equipment and infrastructure. Underground infrastructure may be treated differently by the Navy.

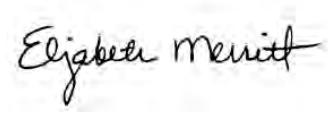
Corrections Needed

- Please ensure that the records for this project include a corrected APE map. As we previously commented, the APE map provided with the Navy's March 1, 2013 letter does not adequately reflect the area of potential visual impact, but erroneously states that potential indirect impacts would be limited to 70 feet from the perimeter fence line. The response materials submitted by the Navy on April 30 do not appear to include a corrected APE map. (We would appreciate receiving a copy of the new APE map once it has been corrected.)
- In addition, the SHPO's April 17, 2013 determination of "no historic properties" needs to be corrected, since the project will be located within an NHL District. As we discussed with the National Park Service last week, the proper determination would be "no adverse effect," as the Navy has appropriately characterized it.
- Please ensure that the HAMP is corrected to include reference to the historic railroad corridor. This is identified in the ICRMP as a historic feature on Waipio Peninsula, but does not appear to be referenced in the HAMP. (I did an electronic search of the HAMP documents provided to the National Trust, but was unable to find it.)

Finally, I would like to take the opportunity to comment that your approach to resolving the National Trust's concerns has been an effective one, based on a greater degree of responsiveness and candor than has often been the case in recent years. We hope that the Navy will be encouraged to use greater disclosure and consultation as a strategy from the outset in the future. Thank you again.

Please feel free to contact me if you have any questions.

Sincerely,



Elizabeth S. Merritt
Deputy General Counsel

cc: Louise Brodnitz, Caroline Hall, and Reid Nelson, ACHP
Elaine Jackson-Retondo, NPS
Susan Lebo, Oahu Lead Archaeologist, State Historic Preservation Division
Kiersten Faulkner, Historic Hawaii Foundation
Keola Lindsay, Office of Hawaiian Affairs

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA'AINA
FIRST DEPUTY

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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

June 26, 2013

Mr. Aaron Poentis
Region Environmental Program Director
Naval Facilities Engineering Command Hawaii
400 Marshall Road, Building X11
Pearl Harbor, HI 96860-3139
Aaron.poentis@navy.mil

LOG NO: 2013.2090(2)
DOC NO: 1304SL12
Archaeology, Architecture

Dear Mr. Poentis:

SUBJECT: **Chapter 6E-8 and National Historic Preservation Act (NHPA) Section 106 Review – Revised - Request for Concurrence of "No Adverse Effect"**
Solar Power Generation Photovoltaic (PV) Array, Waipio Peninsula,
Joint Base Pearl Harbor-Hickam
Waipi'o Ahupua'a, 'Ewa District, Island of O'ahu
TMK: (1) 9-3-002:001

Revision Note: *This letter is being updated to respond to a National Trust for Historic Preservation comment regarding the verbiage used in the SHPD effects determination. The determination phrasing (in bold on the second page of this letter) is now in better compliance to CFR 800 and is the only change to the original letter.*

Thank you for the opportunity to respond to your request for concurrence on the U.S. Department of the Navy (Navy) "determination of 'no adverse effect' for the installation of a PV array at Waipio Peninsula and its associated actions, including power connections to Station D in the Naval Shipyard." The Navy has determined that the project is an undertaking as defined in 36 CFR 800.16(y). Our office received the initial submittal on March 1, 2013. We requested additional information and a site visit (April 1, 2013; Log No. 2013.2090, Doc. No. 1304SL12).

The proposed undertaking occurs within the boundaries of the Pearl Harbor National Historic Landmark. Of the few facilities dating from Waipio Peninsula's role during WWII, none are located within the direct APE. Building 177 (Power Plant) is a Historic Category II structure located within the Shipyard Historic Management Zone. It is eligible for the National Register under Criteria A (events) and C (distinctive type, period, and method of construction). Loko Hanaloa (SIHP 50-50-80-125) is a pre-Contact fishpond which plans indicate is west of the direct APE.

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The newly-selected design involves a PV system array installed on low racks. The ground-disturbing work will include vegetation clearing and grubbing, installation of racks and inverters to support about 50,000 PV panels, connections between the PV solar panels, and construction of a 7-foot high secured perimeter fence around the panel array. The power generated by the PV system will be transmitted from the PV array via an underground cable along an existing roadway, then across Pearl Harbor using a horizontal directional drilling process, and to Station D at Building 177 via ground trenching and ducting.

Mr. Poentis
April 17, 2013
Page 2

The additional information and site visit on April 16, 2013 addressed our earlier concerns regarding investigating potential subsurface archaeological deposits, the proposed PV system options, and possible visual effects (April 1, 2013; Log No. 2013.2090, Doc. No. 1304SL12). The updated archaeological information confirms the proposed undertaking is within an area of no and/or low potential for archaeological historic properties and that investigations conducted in the vicinity confirm extensive grading, grubbing, and filling of the area. The revised design will involve only shallow excavations to install the racks. Similarly, the excavations for the inverters, fence, and cables will not extend below previously disturbed sediments and/or imported fill layers. The selection of a PV system involving installing panels mounted on a low fixed rack system has address our concerns regarding long-term visual effects.

SHPD concurs with the determination of no adverse effect by the proposed Solar Power Generation Photovoltaic (PV) Array undertaking at Waipio Peninsula, TMK: (1) 9-3-002:001. Our concurrence is based on the Navy's documentation of the following factors: (1) no modifications to Building 177, (2) mature vegetation along the shoreline will provide visual screening, (3) no or low potential for subsurface archeological sites within the direct APE, and that (4) SHPD will have the opportunity to review and comment on contractor's design milestone submittals.

Please contact Susan A. Lebo at (808) 692-8019 or at Susan.A.Lebo@hawaii.gov for any questions or concerns regarding archaeological resources. Please contact me at (808) 692-8032 or at Angie.R.Westfall@hawaii.gov if you have any questions or concerns regarding architectural resources, including visual effects, or any questions regarding this letter.

Aloha,

Angie R. Westfall
Architecture Branch Chief

cc: Valerie Curtis, Valerie.n.curtis@navy.mil
Stacey Tangonan, Stacey.tangonan@navy.mil
Angie Westfall, Angie.R.Westfall@hawaii.gov

Navy Region Hawai'i

PMRF Consultation Letters

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DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
850 TICONDEROGA ST STE 110
PEARL HARBOR HI 96860-5101

5750
Ser N4/837
May 24, 2010

CERTIFIED MAIL NO. 7007 3020 0002 3044 0963

Ms. Nancy McMahon
Deputy State Historic Preservation Officer
Department of Land and Natural Resources
State Historic Preservation Division
Kakuhihewa Building
601 Kamokila Boulevard, Room 555
Kapolei, HI 96707

Dear Ms. McMahon:

In accordance with the implementing regulations for Section 106 of the National Historic Preservation Act, we have evaluated this project and determined that it is an undertaking as defined in 36 CFR 800.16(y). The Navy therefore requests your review of the proposed Photovoltaic Installation project.

This project is located on Pacific Missile Range Facility (PMRF), Tax Map Key (4) 1-2-02:13, Waimea *ahupua`a*, Kona district, island of Kaua`i, state of Hawai`i.

Project Description

The purpose of this project is to install photovoltaic panels at five (5) locations within central PMRF. According to the 2005 ICRMP, area locations A1-5 are all located in areas determined to have a medium probability for subsurface historic resources.

The exact method of excavation is not yet known. However, the proposed undertaking will require ground disturbing activities of varying degrees including but not limited to the use of excavators, bore rigs, hand shovels, and rakes. Excavation will require trench work to depths of approximately 24 inches below ground surface.

Area of Potential Effect

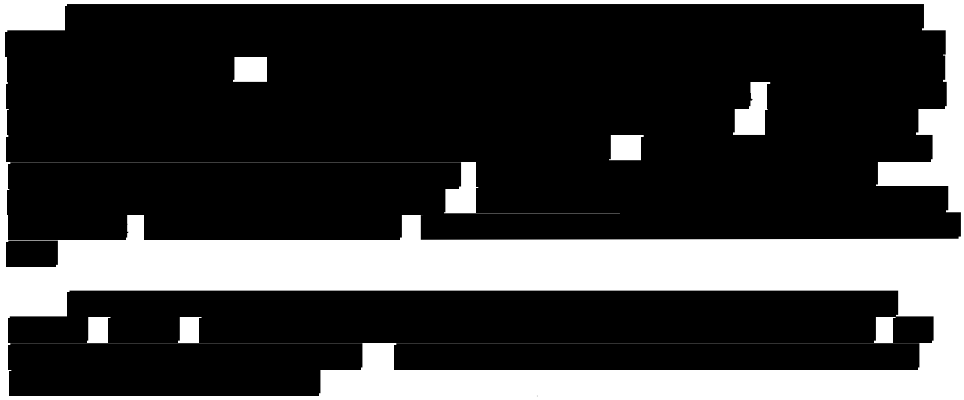
The Area of Potential Effect (APE) is defined in relation to the archaeological probability map for PMRF.

Identification of Historic Properties

There are no known historic properties within the APE. The closest known sites to the APE are shown on the map. These sites are comprised of [redacted]

5750
Ser N4/ 837
May 24, 2010

[redacted] and various WWII era military sites (Sites 2000, 2001, 2002), which are located outside the project boundaries where they do not have the potential of being affected by installation actions.



Sites 2000, 2001, and 2002 are WW II related military sites which where identified and documented in the Wulzen et al surveys (1997). These sites are described respectively as a concrete box, concrete slab, and fence. All three sites, as shown on the map, were assessed not significant under the National Register of Historic Places criteria. Even so, these sites will be avoided and do not have the potential to be affected by installation actions. Sites 2000, 2001, and 2002 are located along the Area A-4 trench line.

Determination of Effect

While the proposed action will take place within the vicinity of sites [redacted] 2000, 2001, and 2002 neither the sites themselves nor the features which comprise them will be physically or otherwise impacted.

Based on all the above, the proposed Photovoltaic Installation project would result in a "no historic properties affected" determination in accordance with Section 106 implementing regulations under 36 CFR 800.4 (d)(1). However, as a precaution and in accordance with the Pacific Missile Range Facility Archaeological Monitoring Plan attached, full time monitoring is suggested for area A-1 due to its close proximity to site 0825. Spot monitoring is suggested in area A-2, A-4, and A-5 where previous studies in the general vicinity have resulted in negative findings. No monitoring is recommended in Area A-3 which was extensively tested in 2009 (report in progress). Please see table below for a monitoring recommendation summary.

5750
Ser N4/ 837
May 24, 2010

The archaeological monitoring plan was previously submitted and approved by your office for all Pacific Missile Range Facility Archaeological Monitoring projects.

Area	Monitoring Recommendation
A-1	Fulltime
A-2	Spot
A-3	None
A-4	Spot
A-5	Spot

Should you have any questions regarding this undertaking, please contact Ms. Kari Nishioka, Naval Facilities Engineering Command, Pacific, at (808) 472-1427.

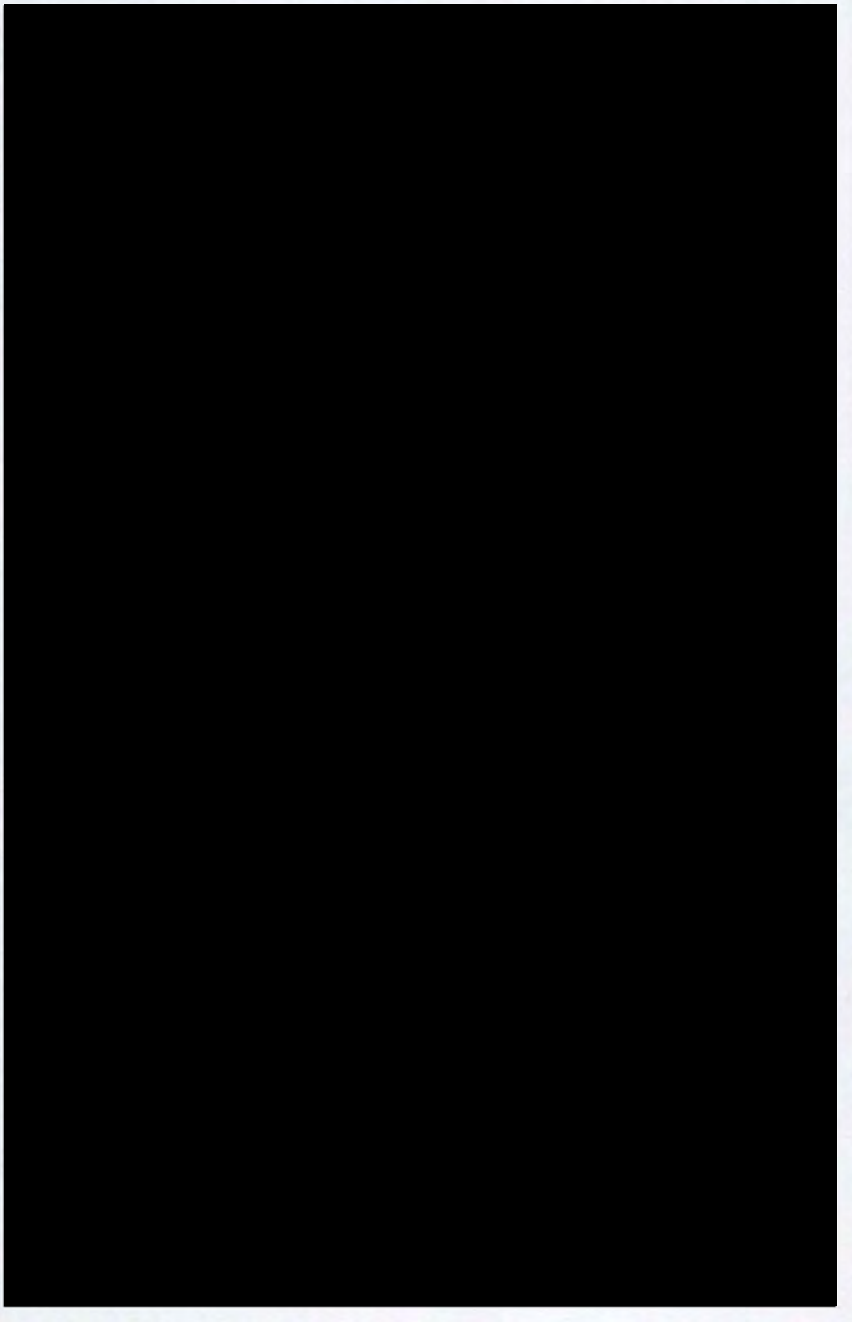
Sincerely,

E. J. D'ANDREA
Lieutenant Commander, CEC, U.S. Navy
Special Assistant for historic Preservation
By direction of the
Commander

Enclosures: 1. Area of Potential Effect
2. Archaeological Monitoring Plan

3

AREA OF POTENTIAL EFFECT



Enclosure (1)

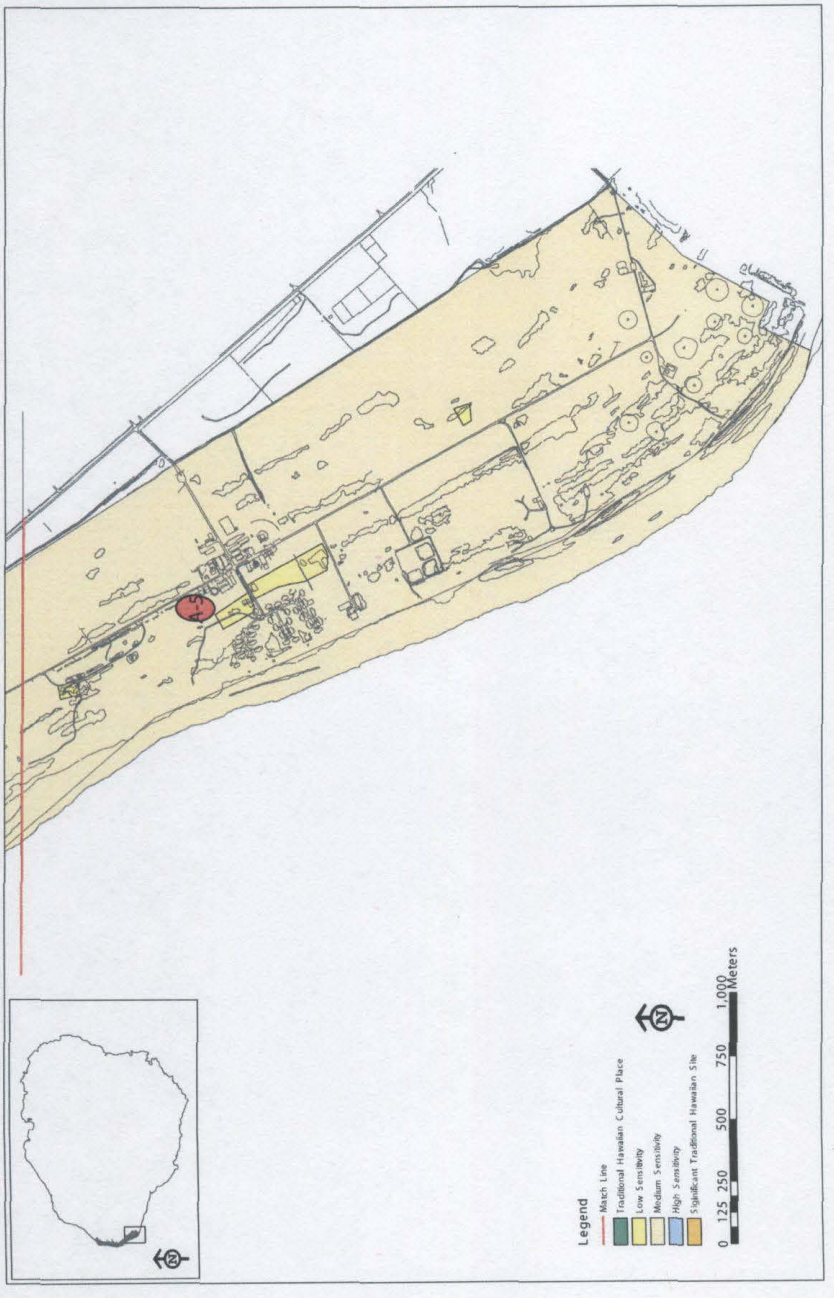
Enclosure (1)

AREA OF POTENTIAL EFFECT (Cont'd)

[redacted]

2

AREA OF POTENTIAL EFFECT (Cont'd)



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Enclosure (1)

ARCHAEOLOGICAL MONITORING PLAN FOR PROJECTS ON PMRF

Proposed activities associated with the U.S. Navy's Pacific Missile Range Facility (PMRF) Enhanced Capability Environmental Impact Statement (EIS) include ground disturbance from construction, military exercises, and military operations. Inasmuch as several of the locations encompassed by the proposed action and alternatives (including the No Action Alternative) are known to encompass areas with potential archaeological sensitivity, an Archaeological Monitoring Plan has been developed to deal with the possible unexpected discovery of archaeological materials (prehistoric, historic, or traditional) and burials.

All monitoring activities will be undertaken by a qualified archaeologist familiar with the range of cultural resources likely to be found within the project area. In the event that monitoring activities are to take place within a known contaminated site, the archaeologist will be OSHA 40-hour trained.

Archaeological monitoring will consist of identification, evaluation, collection, recording, analysis, and reporting of archaeological remains during ground disturbing activities. The data retrieved shall be sufficient to characterize the nature of all major deposits and strata, regardless of the cultural content, and discuss their known extent through time and space.

The archaeological monitor will be authorized to halt ground disturbing operations in order to evaluate, assess, and determine what course of action should be taken for the protection of any identified cultural materials.

A coordination meeting shall take place between the archaeological monitor and the construction team, prior to any ground-disturbing activities taking place. The meeting shall outline the duties and responsibilities of both the archaeologists and the construction team.

Arrangements for the services of a physical anthropologist (or other scientists as appropriate) with a background in human osteology will be made prior to any ground disturbing activities. In the event that osteological analysis of skeletal remains is required, this work will conform with the provisions of the Draft Burial Plan, provided as Attachment K to this Memorandum of Agreement.

The archaeological monitor will be present while all ground disturbing activities are occurring. The monitor will inspect the backdirt removed from construction areas as well as exposed soil profiles.

If archaeological materials are encountered, the monitor will record and collect data sufficient to determine the significance of the site.

Enclosure (2)

If the site is determined to be not significant, the monitor will perform appropriate procedures, including plotting the location on the project topographic map, taking samples (as appropriate), preparing site maps, and photography.

If the site is determined to be significant, the monitor will notify the following individuals in order to formulate the most appropriate mitigation measures:

- PMRF Environmental Engineer or cultural resources point-of-contact
- U.S. Navy Archaeologist
- Hawaii State Historic Preservation Officer

If the site contains grave or ceremonial objects or human remains, the monitor will secure the site and notify the following individuals:

- PMRF Environmental Engineer or cultural resources point-of-contact
- U.S. Navy Archaeologist
- Hawaii State Historic Preservation Officer
- Hui Malama I Na Kupuna O Hawaii Nei
- Office of Hawaiian Affairs

Subsequent actions will follow the guidance provided in the Native American Protection and Repatriation Act (NAGPRA) and the Draft Burial Plan provided as Attachment K to this Memorandum.

Stratigraphic profiles of excavated areas containing cultural materials will be made and photographs taken. A sampling of stratigraphic profiles will be drawn of excavated areas, regardless of the presence of cultural materials, in order to provide useful information regarding the lack of cultural materials in a given area.

A report addressing any findings or subsequent mitigation resulting from the monitoring will be submitted to the Hawaii State Historic Preservation Officer for review.

With the exception of grave or ceremonial objects, or human's remains, any cultural materials discovered during the conduct of this monitoring plan will remain the property of the PMRF and will be curated in accordance with current PMRF policy. Grave or ceremonial objects and/or human remains will be treated in accordance with the Draft Burial Plan, provided as Attachment K to this Memorandum of Agreement.

MEMORANDUM OF AGREEMENT
AMONG
THE UNITED STATES DEPARTMENT OF THE NAVY,
PACIFIC MISSILE RANGE FACILITY;
THE HAWAII STATE HISTORIC PRESERVATION OFFICER;
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
ACTIVITIES PROPOSED WITHIN
THE PACIFIC MISSILE RANGE FACILITY ENHANCED CAPABILITY
ENVIRONMENTAL IMPACT STATEMENT,
BARKING SANDS, KAUAI, HAWAII

January 1999

ATTACHMENT K

BURIAL TREATMENT PLAN

This burial treatment plan has been developed by the Commanding Officer, Pacific Missile Range Facility (PACMISRANFAC) in compliance with the Native American Graves Protection and Repatriation Act (NAGPRA) and Section 106 of the National Historic Preservation Act and provides detailed procedures to be followed when Native Hawaiian remains are inadvertently encountered during construction activities, erosion or any other natural or human activity.

The plan reflects understandings between PACMISRANFAC, SHPO, KIBC, Na Ohana Papa O Mana, Hui Malama I Na Kupuna O Hawaii Nei, and OHA regarding the inadvertent discovery, disinterment, reinterment, temporarily curate and preservation of native Hawaiian human remains. It is noted that the general policy of the signatories shall be for burials not to be moved when at all possible.

Each party will observe the following understandings. Each party may terminate this agreement upon notice to the other, and each party will give prompt consideration to any changes proposed by the other.

COSTS

1. The U.S. Navy shall pay for all preservation in-place costs, as arranged in individual cases, in compliance with the National Historic Preservation Act.

2. The U.S. Navy shall pay for all archaeological costs (field, laboratory and report) in compliance with the National Historic Preservation Act.

3. PACMISRANFAC shall pay for disinterment and reinterment ceremonies provided for by this agreement. The amount of payment shall be agreed upon from time to time between PACMISRANFAC, OHA and KIBC representatives. Payments in any given Federal Government fiscal year shall not exceed $1,000 without specific approval of the Commanding Officer, PACMISRANFAC.

PREVIOUSLY IDENTIFIED HAWAIIAN BURIALS

1. Whenever a project is proposed within an area which contains previously identified Hawaiian burial sites, including burial sites identified during archaeological survey for projects under Section 106 compliance, the project proposal shall be submitted to the KIBC for its review. Within thirty days of the submittal the SHPO shall determine whether the burial sites within the project area shall be preserved in place or relocated.

2. If the remains are to be preserved in-place, they shall be preserved in-place in accordance with the preservation part of this agreement.

3. If the remains are to be relocated, they shall be disinterred in accordance with the disinterment part of this agreement.

INADVERTENT DISCOVERY
OF
HUMAN REMAINS

When human remains are inadvertently discovered on base, the following steps shall occur:

1. Work shall stop in the immediate area and the U.S. Navy's archaeologist at PACNAVFACENGCOM, Hui Malama I Na Kupuna O Hawaii Nei, Na Ohana Papa O Mana, OHA and SHPO, shall be notified.

2. The remains shall not be moved until the U.S. Navy's archaeologist has the opportunity to determine whether they are recent remains under the jurisdiction of police authorities or whether they are historic remains, older than 50 years in age. If they are recent remains, the remains are not considered under this agreement.

3. If the remains are historic, the U.S. Navy archaeologist, or a designated professional archaeologist, shall document the context of the remains, burial features, grave goods, and attempt to establish the ethnic identity of the remains with minimal disturbance.

4. If the remains appear likely to be native Hawaiian, the SHPO, KIBC and OHA's Kaŭai office shall be notified. If the remains appear unlikely to be native Hawaiian, the SHPO shall be notified, and arrangements other than those covered in this agreement shall be followed.

5. If the remains are in no danger and can be preserved in-place, they shall be preserved in-place in accordance with the preservation part of this agreement.

6. If the remains are threatened by construction or erosion and cannot be preserved in-place, they shall be disinterred in accordance with the disinterment part of this agreement.

7. Steps 1-4, above, shall be executed within 5 working days of discovery.

PRESERVATION IN-PLACE

When human remains are discovered and can be preserved in-place, the following steps shall occur:

1. The remains shall be covered up in their original manner as indicated by the archaeological findings (e.g., with sand, with stone platform, etc.).

2. The remains shall be marked on PACMISRANFAC maps to ensure protection in the face of future base planning and activities.

3. The remains shall be protected by appropriate means (e.g., sign, low fence, etc.) as determined appropriate by the KIBC and OHA's Kauai field representative

4. An appropriate ceremony shall occur, as considered necessary by the KIBC and OHA's Kauai field representative.

DISINTERMENT & REINTERMENT

When human remains must be disinterred, the following steps shall occur:

1. When remains are established to be native Hawaiian or are considered likely to be native Hawaiian, OHA's Kauai field representative and the KIBC shall determine if a ceremony is needed prior to disinterment. This determination shall be made within 48 hours of notification of these agencies of the decision for disinterment. If a ceremony is desired, a Federal employee acceptable to these agencies shall conduct the ceremony. If an acceptable Federal employee is not available, then a ceremony may be conducted by a nonfederal person designated by OHA's Kauai field representative and the KIBC. This ceremony may include the main elements of: ho'oponopono: mihi - an explanation and apology for the disturbance; hala - a forgiveness for the offending action; and oki - an emotional resolution that the offense of disturbing will not have future harmful consequences. This ceremony is regarded by native Hawaiians as a healing between living individuals and souls associated with burial. The ceremony will ordinarily involve one to four persons and take approximately one hour.

2. The U.S. Navy's archaeologist, in consultation with the SHPO, shall see that the remains are removed by archaeologists employed or engaged by the Federal Government. Minimal osteological analyses shall be performed within 5 days to determine or verify whether the remains are native Hawaiians (when uncertain) and to establish the number of individuals, age and sex. The proper standards of professional conduct, respect, and sensitivity shall be observed during the removal and treatment of the remains, and the integrity of each individual's remains and of any ho'omoe pu (associated grave goods) will be maintained. All osteological analyses shall be done with due recognition of native Hawaiian beliefs and respect for ancestral bones. No analyses shall be conducted which result in a destruction of bone material.

3. During the time prior to reburial, the remains shall stay on the island of Kaua'i and adequate securing for the integrity of disinterred individuals shall be assured. Further, OHA, SHPO, and KIBC shall be notified of the likely duration of time prior to reburial.

4. Human remains and their associated grave goods shall be reinterred in an underground concrete shelter at PACMISRANFAC (Facility No. 443) for permanent interment in individual casings of concrete. The shelter will have a lockable gate as the only entrance to prevent unauthorized access. The Government will maintain records for the location of the remains within the shelter.

REPORTS

Archaeological reports, whether for remains preserved in-place of for remains which are disinterred/reinterred, shall be prepared. Copies shall be filed with each signatory.

ACCESS TO PACMISRANFAC

All access by SHPO, KIBC and OHA representatives to PACMISRANFAC under this memorandum shall be subject to reasonable PACMISRANFAC requirements for identification, escort and other administrative and security procedures. Individuals who are not State or Federal employees may be required to sign liability waivers as a condition of entry to PACMISRANFAC.

Rec'd 6/18/10
Scanned & distro'd

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 14, 2010

Lt. Commander E. J. D'Andrea
United States Navy
Assistant Regional Engineer
Navy Region Hawaii
850 Ticonderoga Street, Ste 110
Pearl Harbor, Hawai'i 96860-5101

LOG NO: 2010.2161
DOC NO: 1006NM42
Archaeology

Dear Lt. Commander D'Andrea:

SUBJECT: National Historic Preservation Act (NHPA) Section 106 Consultation
Install Photovoltaic panels at five locations within central PMRF
Waimea, Kona, Kauai, Hawai'i
TMK: (4) 1-2-002: 13

Thank you for providing the notification of your plans to install photovoltaic panels at five locations at PMRF. Depth of excavations will be approximately 24 inches below the surface. There are no historic properties in the proposed APE.

The SHPD concurs with the Navy's determination of **no historic properties affected** to historic resources with the understanding that archaeological monitoring will be conducted in area A-1 due to its close proximity of site 825 and spot monitoring in areas A-2, A-4 and A-5.

Please contact me at (808) 692-8015 if there are any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO),
Archaeology and Historic Preservation Manager

B-3 Marine Corps Base Hawaii

SHPO Consultation Letters

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UNITED STATES MARINE CORPS
MARINE CORPS BASE HAWAII
BOX 63002 KANEOHE BAY, HAWAII 96863-3002

IN REPLY REFER TO:
5090
LE/127-12
March 14, 2012

CERTIFIED MAIL NO.: 7010 1870 0002 7901 1961

Mr. William Aila
State Historic Preservation Officer
Department of Land and Natural Resources
Kakuihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

Dear Mr. Aila:

SUBJECT: INSTALLATION OF PHOTOVOLCTAIC PANELS ABOARD MCB HAWAII, DISTRICT OF KO'OLAUPOKO, AHUPUA'A OF KĀNE'OHE, ON THE ISLAND OF O'AHU, TMK 1-4-4-08:001.

Marine Corps Base (MCB) Hawaii is consulting with your office in compliance with Section 106 of the National Historic Preservation Act regarding the proposed project to install photovoltaic (PV) panels aboard MCB Hawaii. This letter initiates our Section 106 consultation for this project.

PROJECT DESCRIPTION

The proposed project includes building rooftops, existing parking lots, and open spaces [Enclosures 1 and 2]. This MCB Hawaii proposed PV project is part of the DOD Hawaii Joint Solar Multiple Award Contract (MAC) Utilities Service Contract, during which time the contractor would own, operate, and maintain the PV for 20 years. The proposed PV would help MCB Hawaii meet its Net Zero energy goal. Enclosure 3 includes the list of buildings and locations proposed for the project as well as the details of the project.

In addition to the installation of the PV on the roof, the project will also require a small concrete pad adjacent to the building for support equipment, including the inverter. Excavation for the pad will be limited to a depth of 2 to 3 ft.

Proposed carports will be installed on existing parking areas, including parking areas in MCB Hawaii Kaneohe Bay and Camp Smith. Most of the existing parking areas are paved. The extent of the ground disturbance for the carports will consist of excavation for the carport posts and post footing and trenching from the carports to the nearest transformers. Trench width will be approximately 12 inches width and approximately 2 ft deep.

Ground mounted PV will be installed at Puuloa Rifle Training Facility (RTF) at existing grassed over areas [see Enclosure 3]. The ground mount will be surface mounted on a concrete base.

IDENTIFICATION OF HISTORIC PROPERTY

Many of the PV panels are proposed for installation on building rooftops throughout MCB Hawaii. Buildings 219, 242, 373, 503, 1090, 3037, 3088, 6088 at MCB Hawaii Kaneohe Bay and Bldg 450 at Camp Smith were previously consulted upon. New building locations include both non-historic and historic buildings. Non-historic building include 1088, 1092, 1304, 1404,

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LE/127-12
March 12, 2012

1629, 1666, 4088, 6002, 6039, 6088, 5109, 6477, at Kaneohe Bay and Bldg 600 at Camp Smith. Historic buildings include 208, 209, 271, 375, and 388 at Kaneohe Bay. Information from the Historic Building Inventory is included in Enclosure 4.

Building 208 is a warehouse constructed in 1941. The southern portion of the warehouse was constructed in 1941 and designed by the architectural firm of Albert Kahn. A parapet wall divides the original building from the newer addition on the north. Bldg 208 is a one story concrete block structure with a low slope gable roof.

Building 209 is a warehouse located across the parking lot from Bldg 208. It designed by the architectural firm of Albert Kahn. This warehouse was originally much larger than Bldg 208. It is a one story rectangular structure with a low- slope gable steel roof structure.

Building 271 is a warehouse constructed in 1944 that originally stored aircraft parts. This warehouse consists of a large, one-story, rectangular mass with rectangular shed addition. It has a post and beam structure with concrete foundation. The building has a low-slope gable roof with corrugated metal roofing and long walls open at top for ventilation.

Building 375 is a maintenance hangar constructed in 1944. It is located southeast of B Street and Third Street, not along hangar row near the sea plane ramps that are part of the National Historic Landmark (NHL). It consists of a large complex form with a large rectangular space and a two-story concrete lean-to on each side and a tall rectangular form at each corner of one end. The building has a low slope gable roof.

Building 388 is a warehouse constructed in 1944. The building consists of a one-story rectangular wood structure with horizontal wood tongue and groove siding. It has a wood constructed low-gable roof with tongue and groove sheathing and exposed rafters at the eaves.

The proposed PV project will not be located at or near archaeological sites. The project is adjacent to existing buildings and was previously disturbed during initial base construction. Archaeological monitoring will be conducted; however, since human remains have been recovered from fill materials in around old utilities and under 1940s and 1950s era building foundations.

AREA OF POTENTIAL EFFECT

The area of potential effect (APE) has been determined to include only the footprint of the proposed PV project aboard MCB Hawaii.

DETERMINATION OF AFFECT

MCB Hawaii has determined that the proposed project to install rooftop PV and PV carports at existing parking lots at MCB Hawaii will result in no adverse effect to historic properties in accordance with Section 106 Implementing Regulations at 36 CFR 800.4(d)(1) based on the following: 1) the proposed PV panels on historic buildings will be flush with the roof; 2) the PV panels will be able to be easily removed without damaging the roof; 3) the PV carports will be constructed in existing parking lots; and 4) an

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March 12, 2012

archaeologist will monitor all ground disturbing activities since existing sands used as fill material may contain human remains. If human remains are discovered, all work in the vicinity will stop and the remains will be stabilized and protected. Treatment will proceed under the authority of the Native American Graves Protection and Repatriation Act (NAGPRA).

Should you or your staff have any questions or concerns please contact the MCB Hawaii Cultural Resources Management staff, Ms. June Cleghorn at 257-6920 extension 254 or via email at june.cleghorn@usmc.mil or Ms. Coral Rasmussen at 257-6920 extension 252 or via email at coral.rasmussen@usmc.mil.

Sincerely,

B. F. GEORGE
Captain, U. S. Marine Corps
Director, Environmental Compliance and Protection Department
By direction of the Commanding Officer

Enclosures:
(1) Location of proposed PV carports and buildings with rooftop PV (shown in light blue) aboard MCB Hawaii Kaneohe Bay.
(2) Location of proposed PV carports and buildings with rooftop PV (shown in light blue) at Camp Smith.
(3) Current proposed list of buildings and PV carport locations.
(4) Information about the historic buildings from 2011 Historic Building Inventory.

Reference:

Environmental Compliance and Protection Department Marine Corps Base Hawaii
2011 *Historic Building Inventory: World War II Era Buildings aboard Marine Corps Base Hawaii, Kaneohe Bay.* Draft report prepared by Environmental Compliance and Protection Department Marine Corps Base Hawaii, Kaneohe Bay, Hawai'i.

U.S. Army Corps of Engineers
2006 *Integrated Cultural Resources Management Plan (ICRMP), Marine Corps Base Hawaii, O'ahu, Hawai'i.* Prepared for Installation Commander, Marine Corps Base Hawaii. U.S. Army Corps of Engineers, Honolulu Engineer District, Fort Shafter, Hawai'i.

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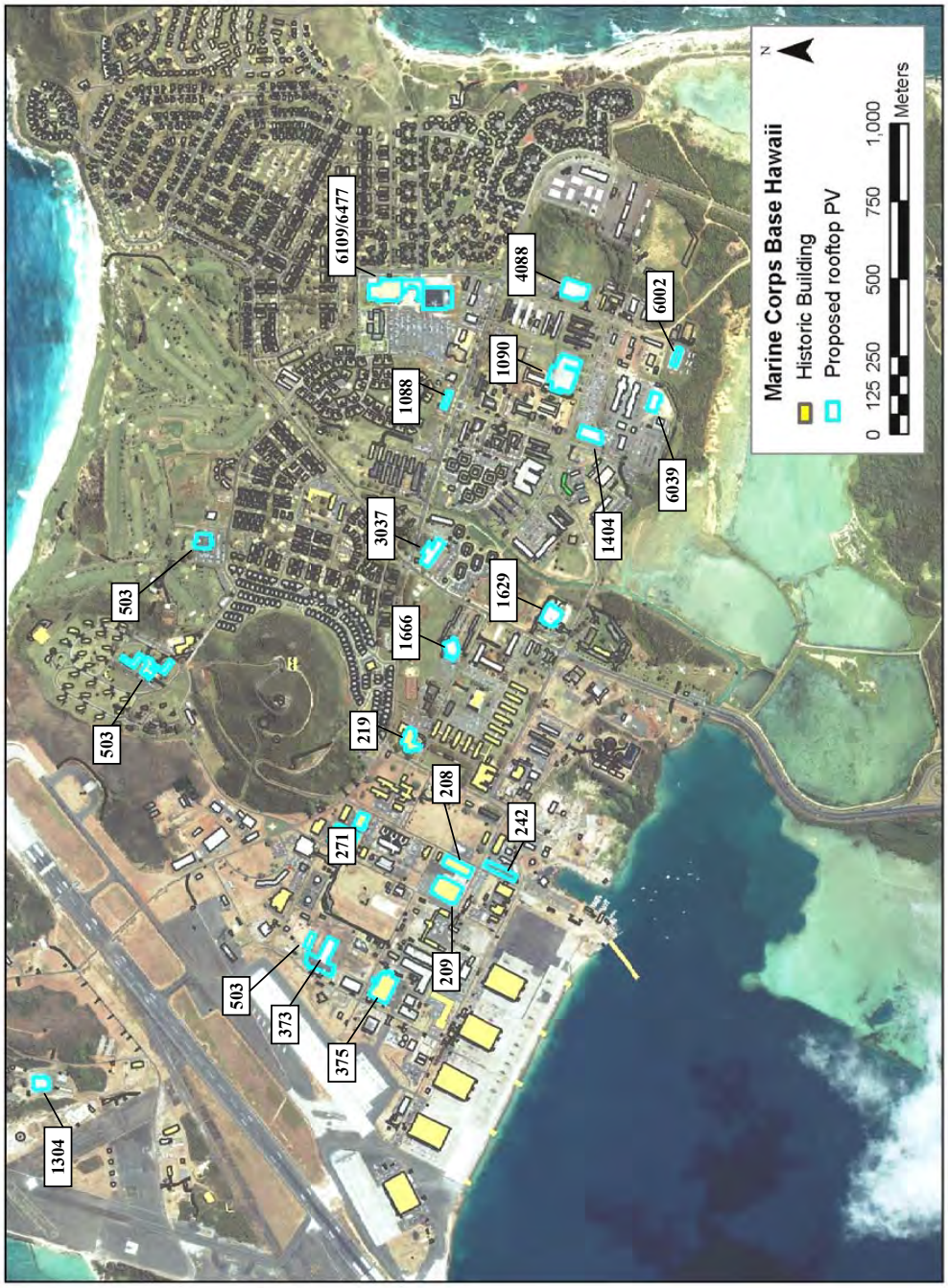
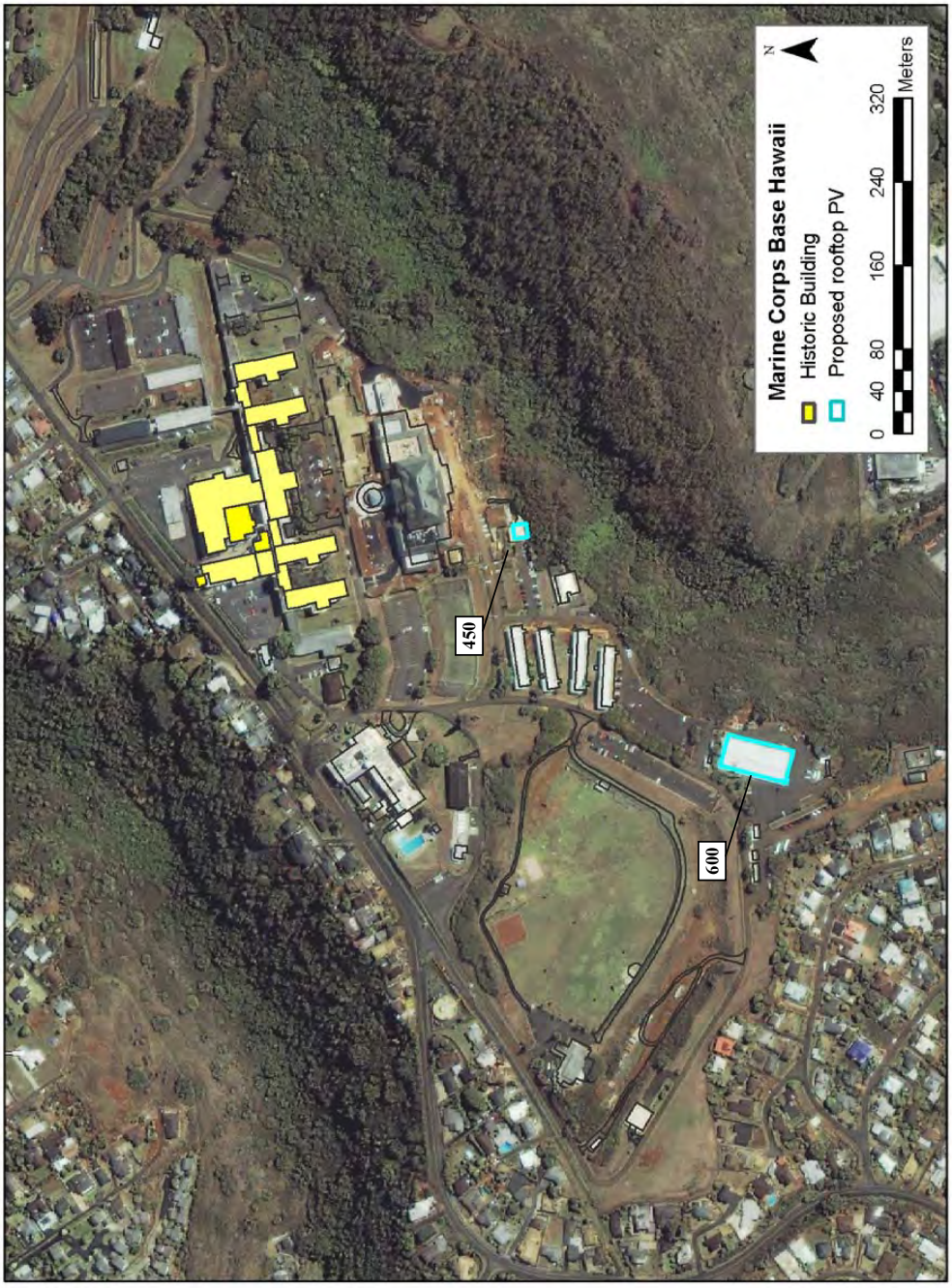


Enclosure 1. Location of proposed PV carports and buildings with rooftop PV (shown in light blue) aboard MCB Hawaii (GEOFIWEST 2012).



Enclosure 2. Location of proposed PV carports and buildings with rooftop PV (shown in light blue) at Camp Smith (GEOFIWEST 2012).

5

Enclosure 3. List of proposed buildings and PV carport locations.

PROPOSED ACTIONS – ***MARINE CORPS BASE HAWAII SOLAR PROJECT***
For carports, *none existing; all will be provided new.*

NRHP ELIGIBLE	SITE	SIZE (USE APPROX #)	SQ FT (APPROX)	PANELS (APPROX)	RACKING	PROJECT DESCRIPTION	IF ROOFTOP, IDENTIFY AGE OF BLDG AND ITS USE	LIFE TIME EXPECTED
	Marine Corps Base Hawaii TO#2							
	MCBH Kaneohe Bay							
No	Bldg 242 Roof	230kW	24,866	960	bolted	PV panels on racks bolted to low-slope, built-up roof with mineral surface cap sheet on one-story wood frame building.	Admin and storage building built in 1941, re-roofed 2006.	30 more years. Major exterior renovation 2009.
Yes	Bldg 271 Roof	144kW	16,000	600	bolted	PV panels on racks bolted to low-slope, built-up roof with mineral surface cap sheet on one-story wood frame building.	One-story warehouse building built in 1944, repaired in 2005	30 more years
No	**Bldg 3037 Roof**	**68kW**	**7,000**	**284**	**bolted**	**PV panels on racks bolted to metal roofing**	**One-story Gymnasium built in 1983**	**50 more years**
No	Bldg 3037 Carport	130 kW	-	542	bolted	PV panels on new carport structure on existing paved parking lot.	New carport	Solar power services contract for 20 years. PV life ~30 years.
No	Bldg 1092 Roof	223 kW	22,000	930	Ballasted*	PV panels on racks ballasted to flat, built-up roof with mineral surface cap sheet on one-story reinforced concrete building.	One-story warehouse with offices, built in 1953	50 more years
No	Bldg 373 Roof	180kW	22,000	750	bolted	PV panels on racks bolted to metal roofing	One-story vehicle maintenance building, built in 1983	30 more years

NRHP ELIGIBLE	SITE	SIZE (USE APPROX #)	SQ FT (APPROX)	PANELS (APPROX)	RACKING	PROJECT DESCRIPTION	IF ROOFTOP, IDENTIFY AGE OF BLDG AND ITS USE	LIFE TIME EXPECTED
Yes	Bldg 388 Roof	108 kW	~9,000	450	Bolted	PV panels on racks bolted to wood decking on wood frame building.	One-story warehouse, built in 1944	30 more years
	MCBH Camp Smith							
No	Bldg 450 Carport	130kW	-	542	-	PV panels on new carport structure on existing paved parking lot.	New carport	Solar power services contract for 20 years. PV life ~30 years.
No	Bldg 600 Roof	340 kW	~20,000	900	TBD	PV panels on racks bolted to low-slope metal roofing on steel structure.	One-story admin and maintenance building, built in 1983	50 more years
	MCBH Puuloa							
No	Rifle Range, unused land at main gate.	230kW	~25,000		Helical pier**	Ground-mounted PV, fenced enclosure on existing turf, to generate solar power sufficient to provide a Zero Net Energy (330,600kWh/year)	N.A.	Solar power services contract for 20 years. PV life ~30 years.
	Marine Corps Base Hawaii Future Task Orders							
No	Ground Mount, Ulupau foothill below magazines, above landfill	~2,200kW	~240,000		Helical pier**	Ground-mounted PV, fenced enclosure on cleared & grubbed existing ground encumbered by ESQD arcs.	N.A.	Solar power services contract for 20 years. PV life ~30 years.
Adj to hist bldg	Ground Mount, Pearl City Annex	~30kW	~5,000		Helical pier**	Ground-mounted PV, fenced enclosure on existing ground or concrete slab, to generate solar power sufficient to provide Zero Net Energy (38,000kWh/year)	N.A.	Solar power services contract for 20 years. PV life ~30 years.

NRHP ELIGIBLE	SITE	SIZE (USE APPROX #)	SQ FT (APPROX)	PANELS (APPROX)	RACKING	PROJECT DESCRIPTION	IF ROOFTOP, IDENTIFY AGE OF BLDG AND ITS USE	LIFE TIME EXPECTED
Yes	Aircraft Maintenance Hangar 375	~300kW	32,700		bolted	PV panels on racks bolted to metal decking on low-slope built-up roofing w/elastomeric coating	One-story hangar bays with two-story admin & maintenance rooms, built in 1944	50 more years
Yes	Data Center/Warehouse 208	~300kW	31,000		Bolted	built-up roofing w/elastomeric coating	One-story concrete building, built in 1941	50 more years
Yes	Admin/Warehouse 209	~500kW	54,000		Bolted	PV Panels on racks bolted to wood decking with EPDM roofing – 5 flat roofs reroofed 2007	One-story concrete building, with clerestory, built in 1941	50 more years
Yes	Theater/ Library 219	~140kW	14,400		Ballasted*	built-up roofing w/elastomeric coating	2-story concrete building , built in 1941	50 more years
No	Exchange Retail/ Service Outlets 1090	~320kW	34,300		Ballasted*	PV panels on racks ballasted to flat, built-up roof with mineral surface cap sheet on one-story reinforced concrete building.	One-story concrete building with 3 main flat roofs & clerestories , built in 1953	50 more years
No	Bldg 1090 Parking Carports	~290kW	324 stalls		Bolted	~162 double parking stall PV carports on existing paved parking area	New carports	Solar power services contract for 20 years. PV life ~30 years.

NRHP ELIGIBLE	SITE	SIZE (USE APPROX #)	SQ FT (APPROX)	PANELS (APPROX)	RACKING	PROJECT DESCRIPTION	IF ROOFTOP, IDENTIFY AGE OF BLDG AND ITS USE	LIFE TIME EXPECTED
No	Exchange Warehouse/ Offices 1404	~250kW	27,600		Bolted	PV panels on racks bolted to low-slope metal roofing on steel structure.	One-story metal-clad steel structure with 2-story office modules inside, built in 1973	30 more years
No	Enlisted Club 1629	~240kW	25,500		Bolted	PV panels on racks bolted to low-slope metal roofing on steel structure.	One-story metal-clad steel structure, built in 1974	30 more years
No	Bowling Alley 1666	~160kW	17,300		TBD	PV panels on racks on low-slope, built-up roof with mineral surface cap sheet.	One-story concrete and steel structure, built in 1976	50 more years
No	Medical Warehouse 4088	~310kW	33,600		Bolted	PV panels on racks bolted to low-slope metal roofing on steel structure.	One-story metal-clad steel structure, built in 1974	30 more years
No	Exchange Retail/ Service Outlets 6109/6477	~1,000kW	103,207		Ballasted*	PV panels on racks ballasted to flat, built-up roof with mineral surface cap sheet on one-story reinforced concrete building.	One-story concrete building with 2 main flat roofs, built in 1996/98	50 more years
No	Mokapu Mall Parking Lot for 6109, 6477, & 6088	~455kW	506 stalls		Bolted	~253 double parking stalls, PV carports on existing paved parking area	New carports	Solar power services contract for 20 years. PV life ~30 years.
No	BEQ Parking for 1604/1632	~74kW	82 stalls		Bolted	~41 double parking stalls, PV carports on existing paved parking area	New carports	Solar power services contract for 20 years. PV life ~30 years.

NRHP ELIGIBLE	SITE	SIZE (USE APPROX #)	SQ FT (APPROX)	PANELS (APPROX)	RACKING	PROJECT DESCRIPTION	IF ROOFTOP, IDENTIFY AGE OF BLDG AND ITS USE	LIFE TIME EXPECTED
No	BEQ Parking for 1634/1635	~54kW	60 stalls		Bolted	~27 double parking stalls, PV carports on existing paved parking area	New carports	Solar power services contract for 20 years. PV life ~30 years.
No	BEQ Parking for 1655/1656	~140kW	156 stalls		Bolted	~78 double parking stalls, PV carports on existing paved parking area	New carports	Solar power services contract for 20 years. PV life ~30 years.
yes	BOQ 503	~170kW	18,000		Ballasted*	PV panels on racks ballasted to flat, built-up roof with mineral surface cap sheet on 3-story reinforced concrete building.	One-story concrete building with 4 flat roofs, built in 1941	50 more years
No	SNCO/Golf Clubhouse 3088	~72kW	82 stalls		Bolted	~41 double parking stalls, PV carports on existing paved parking area	New carports	Solar power services contract for 20 years. PV life ~30 years.
No	Commissary 6088	~485kW	49,200		Ballasted*	PV panels on racks ballasted to flat, EPDM roof on reinforced concrete building.	2-story concrete building with 2 flat roofs, built in 1993	50 more years
No	Regimental HQ 1088	~83kW	8,500		Ballasted*	PV panels on racks ballasted to flat, built-up roof with mineral surface cap sheet on 2-story reinforced concrete building.	2-story concrete building with flat roof, built in 1953	50 more years
No	Missile Maintenance Bldg 1304	~167kW	17,000		Bolted	PV panels on racks bolted to low-slope metal roofing on steel frame building	One-story steel frame, metal-clad building and canopy, built in 1968	30 more years
No	Communication s Bldg 6002	~98kW	10,000		Ballasted*	PV panels on racks ballasted to almost flat concrete roof with built-up composition roofing.	One-story concrete building, built in 1989	30 more years

NRHP ELIGIBLE	SITE	SIZE (USE APPROX #)	SQ FT (APPROX)	PANELS (APPROX)	RACKING	PROJECT DESCRIPTION	IF ROOFTOP, IDENTIFY AGE OF BLDG AND ITS USE	LIFE TIME EXPECTED
No	Communications/Electronics Maintenance Bldg 6039	~167kW	17,000		Bolted	PV panels on racks bolted to low-slope metal roofing on steel frame building	One-story steel frame, metal-clad building and canopy, built in 1990	30 more years

* Designed primarily for flat roof installations, solar panel are supported by ballasted mounting that does not penetrate the roof and keeps the panels in place.

**The helical pile or anchor is a deep foundation system used to support or resist loads in tension or compression, whichever is desired. The piles are installed utilizing equipment ranging from large excavators to lightweight handheld equipment.

Camp Smith Bldg 600, Roof-Mounted PV

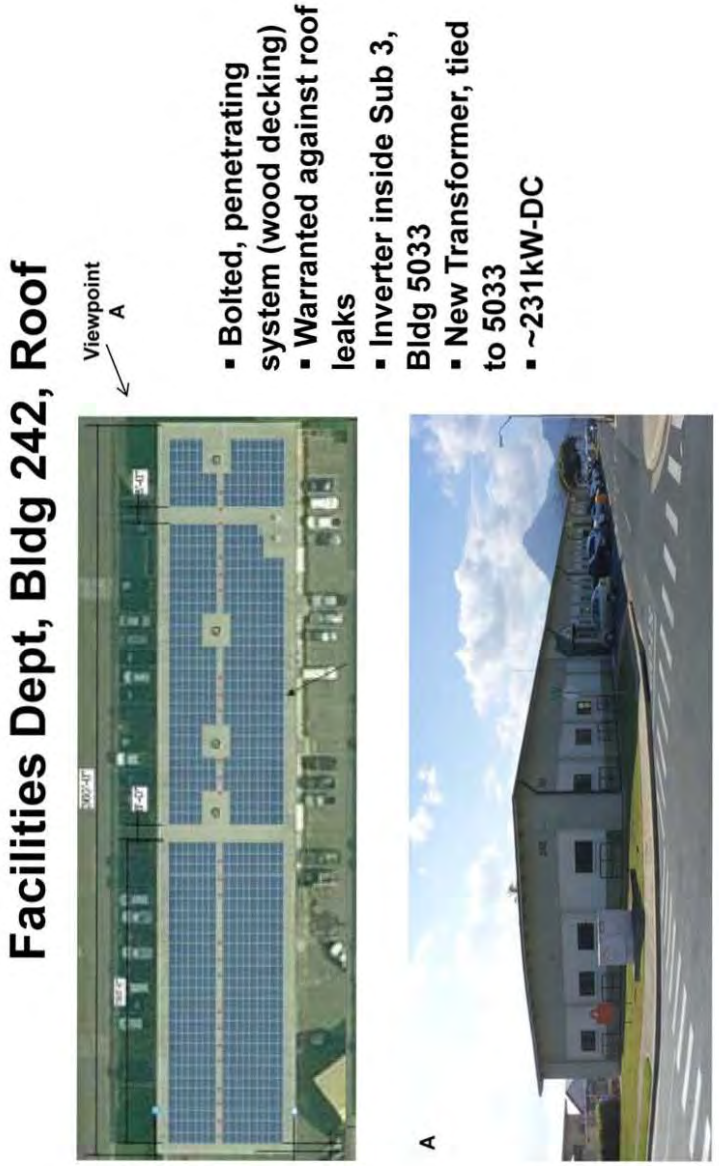
- Substitute for Carports deleted nearby due to not economically viable
- Approx 20KSF of Roof-Mounted PV
- ~190KW-DC
- Structural support clipped to standing seam of metal roofing
- Inverters outdoors on concrete pads
- Existing transformer

12

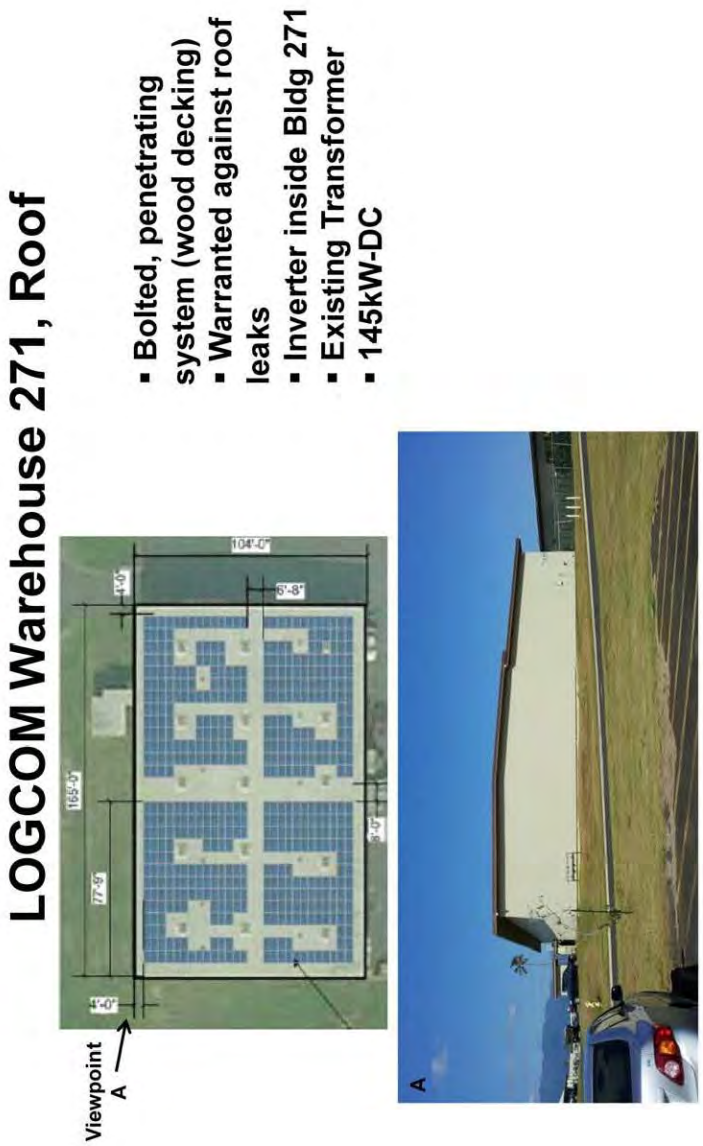
Puuloa TF, Ground-Mount

- Structural support fixed at 20° tilt, 180° azimuth
- Enclosed in chain-link fence(s) w/lockable gate(s)
- Inverter(s) outdoors on concrete pad(s)
- Existing Transformer
- ~230kW-DC for net zero (330,600kWh/year)

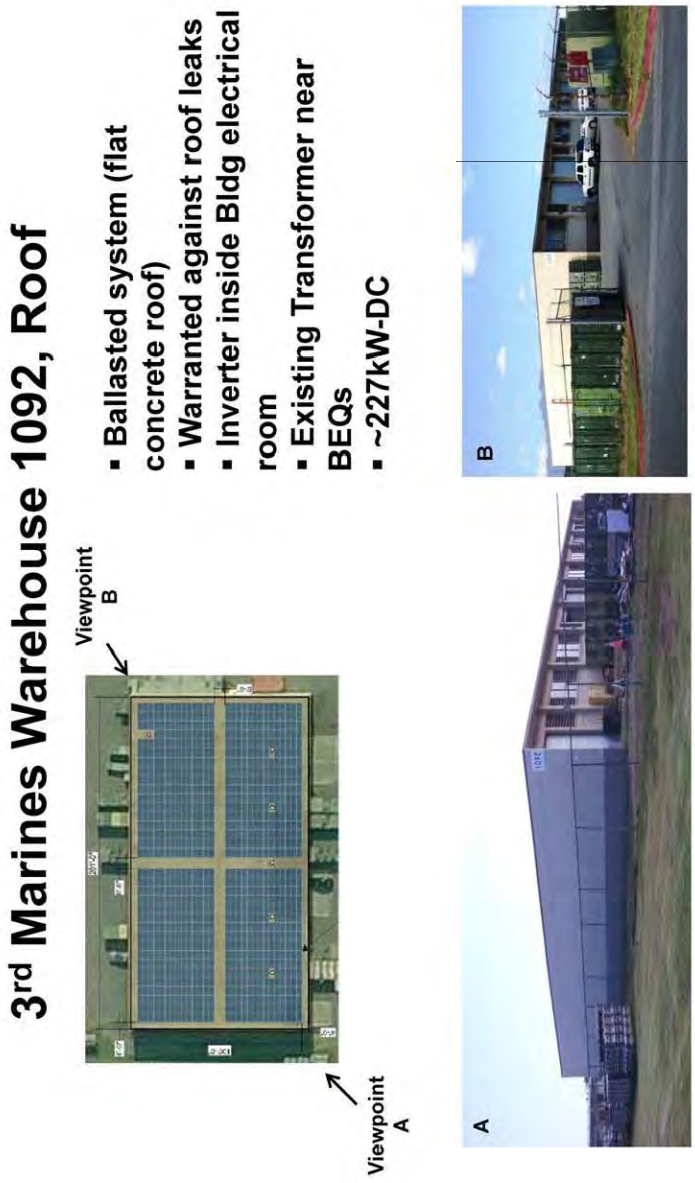
13


Facilities Dept, Bldg 242, Roof
Viewpoint A
▪ Bolted, penetrating system (wood decking)
▪ Warranted against roof leaks
▪ Inverter inside Sub 3, Bldg 5033
▪ New Transformer, tied to 5033
▪ ~231kW-DC
A

14


LOGCOM Warehouse 271, Roof
▪ Bolted, penetrating system (wood decking)
▪ Warranted against roof leaks
▪ Inverter inside Bldg 271
▪ Existing Transformer
▪ 145kW-DC
104'-0"
4'-0"
6'-8"
165'-0"
17'-9"
3'-0"
4'-0"
Viewpoint A
A

15


3rd Marines Warehouse 1092, Roof
▪ Ballasted system (flat concrete roof)
▪ Warranted against roof leaks
▪ Inverter inside Bldg electrical room
▪ Existing Transformer near BEQs
▪ ~227kW-DC
Viewpoint B
Viewpoint A
A
B

16


Bldg 373 & 388 Roof-Mounted PV
▪ Substitute for Carports deleted nearby due to MCON project
▪ ~30KSF available
▪ 2 roofs
▪ ~288KW-DC
▪ Warranted against roof leaks
▪ Inverter(s)
▪ Existing Transformer
Viewpoint A
Viewpoint B
Bldg 388
Bldg 373
A
B

17

MCCS Gymnasium 3037, Rooftop

- Substitute for deleted Carports at BEQs 5070/71
- ~6,800SF
- Fitness Center Roof
- ~68KW-DC
- Warranted against roof leaks
- Inverter
- Existing Transformer
- Link with carport PV at parking lot

18

MCCS Gymnasium Bldg 3037, Parking Lot Carports

- ~90 Stalls
- ~130KW-DC
- T-Frame Structure
- Inverter at carport, protected by bollards
- Existing Transformer
- Link with Bldg 3037 Rooftop PV

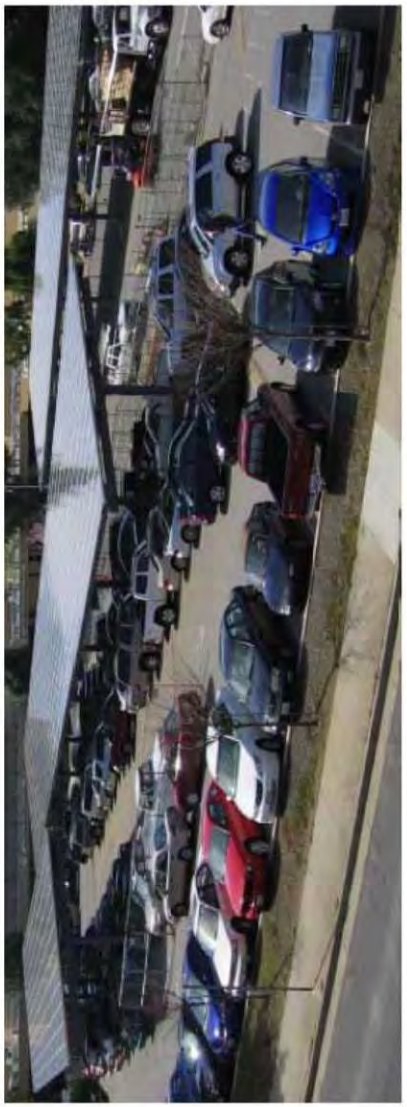
19

Camp Smith near Bldg 450, Parking Lot Carports

- ~44 Stalls x 2 w/overhangs
- ~130kW-DC
- T-Frame Structure
- Inverter near existing transformer

20

Typical Sunshade/Carport Structure



- Bolted Connections
- 32FT Depth
- 27FT Span Between Posts
- Lighting?
- EV Charging Stations?

21

Enclosure 4.

FACILITY NO.: 208 **NAME/USE**: DPI/SERVMART

Location: Northwest of D Street and Second Street

Year Constructed: 1941

SIGNIFICANCE

- Original half of structure designed by Albert Kahn, Inc.
- One of a pair of warehouses facing a common parking/loading area
- Part of the 1939 initial proposed base layout

CHARACTERISTICS

Defining Characteristics (Exterior):
- One-story rectangular concrete block structure
- Low-slope gable roof structure with exposed rafters and tongue and groove wood sheathing
- Covered concrete loading dock
- Large double multi-lite sliding doors
- Rectangular high vents along roadside elevation
- Gutter and rhythm of downspouts along roadside elevation
- Historic steel sash awning windows

Defining Characteristics (Interior):
- Historic plumbing fixtures (white porcelain toilet/sink)
- Historic light fixtures
- Historic steel refrigerator doors and refrigeration system (inoperable)

Detracting Characteristics (Exterior)
- Windows painted-over or infilled
- Later addition to warehouse
- Parapet wall dividing new addition from original building

Detracting Characteristics (Interior)
- Fluorescent light fixtures
- Hung acoustical tile ceiling
- Raised floor
- Open interior areas partitioned

IMAGES

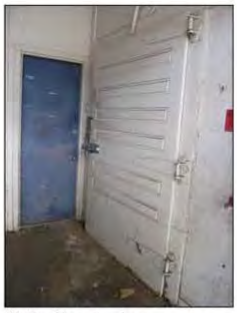
Photograph showing original Facility 208 aboard Naval Air Station Kaneohe following the Japanese Attack. Although the hangars have sustained heavy damage, Facility 208 appears unaffected. Note: the addition has not yet been constructed.

129

22

Facility 208, view to northwest.

Facility 208, view to east.



Steel refrigerator doors.

Wood tongue and groove ceiling.

Hung acoustical tile ceiling and raised floor.

130

23

FACILITY NO.: 209 **NAME/USE:** General WHSE/ADMIN/CFAO SUPPLY COMTR

Location: Northeast of C Street and Second Street

Year Constructed: 1941

SIGNIFICANCE

- Designed by Albert Kahn, Inc.
- One of a pair of warehouses facing a common parking/loading area
- Part of the 1939 initial proposed base layout

CHARACTERISTICS

Defining Characteristics (Exterior):
- One-story rectangular concrete structure with clerestory
- Low-slope gable steel roof structure with exposed rafters and tongue and groove sheathing
- Covered concrete loading dock
- Metal framed awning windows at clerestory
- Historic fenestration pattern
- Overhead door

Defining Characteristics (Interior):
- Historic light fixtures
- Steel sash awning windows
- Historic plumbing fixtures
- Steel interior doors
- Large open spaces

Detracting Characteristics (Exterior)
- One-story shed roof addition at one end
- Windows replaced by jalousies and plywood
- Air-conditioning units have been installed and some windows painted-over
- Doors replaced with metal and glass doors

Detracting Characteristics (Interior)
- Hung acoustical tile
- Open interior spaces partitioned
- Fluorescent light fixtures
- Resilient floor tiles
- Doors replaced or in-filled
- Metal mesh partitions

131

IMAGES

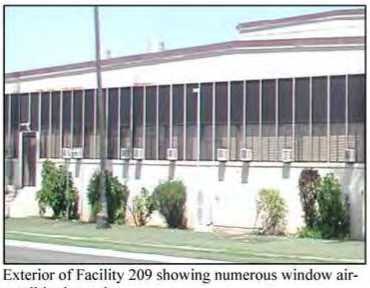
Photograph showing Facility 209 aboard Naval Air Station Kaneohe following the Japanese Attack. Facility 209 is west of Facility 208.

Facility 209 showing covered concrete loading dock, view to west.

132

25

Facility 209, view to north.



Exterior of Facility 209 showing numerous window air-conditioning units.

Multi-lite window panel at Facility 209 with painted windows.

Facility 209 showing the large interior space and clerestory.

133

26

FACILITY NO.: 271 **NAME/USE:** Warehouse/ SASSY Warehouse Storage

Location: Northwest of Fifth Street and D Street

Year Constructed: 1944

SIGNIFICANCE

- One of a complex of warehouses in a fenced area with a common parking/loading area
- Originally stored aircraft parts

Note: Applicable Program Alternative (36 CFR 800): Programmatic Memorandum of Agreement for World War II Temporary Buildings (1939-1946)

CHARACTERISTICS

Defining Characteristics (Exterior):
- Large, one-story, rectangular mass with rectangular shed addition
- Post and beam structure with concrete foundation
- Low-slope gable roof with corrugated metal roofing
- Long walls open at top for ventilation
- Corrugated metal siding with continuous screen vent at top of walls under eave
- Large, flush plywood sliding doors

Defining Characteristics (Interior):
- Large open space
- Wood columns
- Exposed roof structure
- Tongue and groove ceiling/roof decking

Detracting Characteristics (Exterior)
- New metal roll-up door
- Boarded windows in shed addition
- Corrugated translucent panels

Detracting Characteristics (Interior)
- Offices added to interior Offices to left, roll-up door to right
- Numerous raceways

IMAGES

Facility 271, 26 August 1945, view to southwest.

187

27

Facility 271, view to northwest.

Detail of Facility 271, view to west.

188

28

Interior of Facility 270 showing tongue and groove ceiling /roof decking.

Detail of interior space showing added electrical panels.

Interior of Facility 271 showing offices to left, roll-up door to right

189

29

FACILITY NO.: 375 **NAME/USE:** Maintenance Hangar/Avionics Shop

Location: Southeast of B Street and Third Street

Year Constructed: 1944

SIGNIFICANCE

- Significant initial base support building representing the main purpose of the base

CHARACTERISTICS

Defining Characteristics (Exterior):
- Large complex form consisting of a large rectangular space with two-story concrete lean-to on each side and a tall rectangular form at each corner of one end
- Low slope gable roof
- Large sliding hangar doors on one end with pockets

Defining Characteristics (Interior):
- Exposed steel truss framing on interior
- Mezzanine level offices
- Large interior open space
- Concrete Floors
- Interior concrete block walls
- Interior steel sash windows
- High plaster ceilings with exposed joists
- Historic light fixtures in select rooms
- Select historic steel doors

Detracting Characteristics (Exterior)
- Windows boarded, in-filled, replaced with translucent corrugated panels or painted-over
- Door openings in-filled or added
- Corrugated metal siding added
- Skylights

Detracting Characteristics (Interior)
- Interior open spaces partitioned
- Hung acoustical tile
- Fluorescent light fixtures
- Resilient floor tiles
- Air-conditioning ducts
- Replacement doors in lean to-areas
- Major plumbing fixtures removed

209

30

IMAGES

Facility 375, view to northwest.

Example of painted over Windows.

Historic steel doors.

Exposed steel truss framing on interior of Facility 375.

210

31

FACILITY NO.: 388 **NAME/USE:** General Warehouse/MWSS-174/STG AIR/GR ORG UTS MARCOR

Location: Southwest of Sixth Street and B Street

Year Constructed: 1944

SIGNIFICANCE

- Initial base support building during World War II

Note: Applicable Program Alternative (36 CFR 800): Programmatic Memorandum of Agreement for World War II Temporary Buildings (1939-1946)

CHARACTERISTICS

Defining Characteristics (Exterior):
- One-story rectangular wood structure with horizontal wood tongue and groove siding
- Wood constructed low-gable roof with tongue and groove sheathing and exposed rafters at eave
- Large plywood flush entry sliding door
- Continuous horizontal vent at top of wall below eave with expanded metal mesh
- Heavy timber construction

Defining Characteristics (Interior):
- Double tongue and groove roof decking
- Concrete base for wood posts

Detracting Characteristics (Exterior)
- Added windows openings with double-hung or jalousie windows
- Shed roofed addition
- Air-conditioning units

Detracting Characteristics (Interior)
- Open space partitioned with gypsum board and hung acoustical tile ceiling
- Wire mesh storage cage
- Fluorescent lighting
- Fire sprinkling system

IMAGES

Aerial view of Naval Air Station Kaneohe in 1952 showing Facility 388.

213

32

Facility 388, view to west.

Window additions and air-conditioning units in the northwest corner of Facility 388

Repaired truss system inside Facility 388. Note added pipes for sprinkler system.

Interior of Facility 388.

Vent below eave at Facility 388.

214

33

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAHUHIHEWA BUILDING
601 KAMOKILA BLVD, KAPOLEI HI 96706

DATE: April 5, 2012

LOG: 2012.0699
DOC: 1203AW07

TO: D.R. George
Captain, U.S. Marine Corps
Director, Environmental Compliance & Protection Department
P.O. Box 63002 Kaneohe Bay
Kaneohe Marine Corps Base, Hawaii 96863-3002

SUBJECT: **National Historic Preservation Act (NHPA) Section 106 Consultation**
Project: Installation of Photovoltaic Panels – MCBH, Camp Smith, and Pearl City Peninsula
Building Owner: Marine Corps Base Hawaii
Location: Kaneohe Marine Corps Base Hawaii, Camp Smith, and Pearl City Peninsula
Tax Map Key: (1) 4-4-008:001 (MCBH) – others not provided

This letter is in response to a communication dated March 14, 2012, received by our office on March 14, 2012 regarding the proposed project to install photovoltaic (PV) panels on building rooftops, existing parking lots, and open spaces. This undertaking is part of a larger Department of Defense (DoD) mandate towards alternative energy sources. The Area of Potential Effect (APE) is the entire Kaneohe Marine Corps Base Hawaii and parcels located at Camp Smith and Pearl City Peninsula.

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We appreciate the exclusion of many historic buildings and their immediate surroundings (parking lots) from the undertaking on board MCBH. Therefore, **SHPD concurs that the project as outlined will have no adverse effect on historic property.**

Although not directly within our purview, I would be remiss if I did not express serious misgivings with the manner in which this alternative energy mandate is being implemented on board MCBH. It is our opinion the installation of approximately 200,000 square feet of carports constructed for the primary purpose of placing PV panels on their roofs will result in negative visual and "operational" impacts to MCBH overall.

SHPD is in consultation with other branches of the military - reviewing their proposed undertakings in complying with the DoD directive - and none are building structures to accommodate the PV panels.

We question the exclusion of many buildings (both historic and modern) at the three undertaking locations that could accommodate PV panels on their roofs with little or no impacts. We do not feel the need (or lack of need) for a new roof should be a determining factor in the selection process.

While we support alternative energy initiatives, like any other design/construction solution, they should take into account the larger context in which they are placed. It seems there are many modern buildings on board MCBH that would be good candidates for this undertaking.

If sufficient suitable buildings are not available, SHPD would not be opposed to historic buildings with flat or parapet roofs being employed. Historic buildings, much like all of us, must adapt to change in order to remain a viable and contributing member of our environment.

The National Parks Service has recently issued a Technical Preservation Brief titled: *Interpreting the Secretary of the Interiors Standard's for Rehabilitation: Incorporating Solar Panels in a Rehabilitation Project* (ITS Number 52) providing guidelines for installing solar panels on historic properties. [http://www.nps.gov/tps/standards/applying-rehabilitation/its-bulletins/ITS52-SolarPanels.pdf]

And we here at SHPD would be happy to work with you should you be open to alternatives to the carports and find it necessary to place them on additional historic structures.

Any questions should be addressed to Angie Westfall, SHPD Architecture Branch Chief, at (808) 692-8032, or angie.r.westfall@hawaii.gov.

Mahalo

Angie Westfall
Architecture Branch Chief, Hawaii Historic Preservation Division

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD12/6165

April 12, 2012

D.R. George
Captain, U.S. Marine Corps
Director, Environmental Compliance and Protection Department
Marine Corps Base Hawai'i
Box 63002 Kāne'ohe Bay, Hawai'i 96863-3002

Re: National Historic Preservation Act Section 106 Consultation
Photovoltaic Panels Installation
Marine Corps Base Hawai'i-Kāne'ohe Bay, Camp Smith and Pu'uloa Training Facility, Island of O'ahu

Aloha e Captain George,

The Office of Hawaiian Affairs (OHA) is in receipt of your March 16, 2012 letter with enclosures initiating consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA) for the proposed installation of photovoltaic panels (the undertaking) at multiple locations aboard Marine Corps Base Hawai'i-Kāne'ohe Bay (MCBH), Camp Smith and the Pu'uloa Training Facility on the Island of O'ahu. Undertaking activities will consist of mounting photovoltaic panels on rooftops, in parking lots and in open spaces. Carports will be constructed in existing parking areas aboard MCBH and Camp Smith. Carport construction will require ground disturbance to maximum depths of approximately two (2) feet in areas of imported sand fill material aboard MCBH.

Your letter correctly recognizes that beach sand containing iwi kūpuna was used as construction material during the expansion of MCBH in the 1940's and 1950's. As a result, iwi kūpuna have been encountered in disturbed contexts throughout MCBH during ground altering activities. With this in mind, we concur with your proposal for archaeological monitoring in areas where beach sand may have been used as fill material during construction of the facilities. In the event iwi kūpuna are encountered during any activity related to this undertaking, we will expect the provisions of the Native American Graves Protection and Repatriation Act will be immediately implemented.

MCBH has determined that this undertaking will result in "no adverse effect" to historic properties. OHA concurs with your determination. We do note that the installation of photovoltaic panels is proposed on multiple historic buildings aboard MCBH and Camp Smith and thus, we encourage you to consult with organizations with an expressed interest and demonstrated expertise in these possible historic properties.

D.R. George
Captain, U.S. Marine Corps
April 12, 2012
Page 2 of 2

Thank you for initiating consultation. Should you have any questions or concerns, please contact Keola Lindsey at 594-0244 or keolal@oha.org.

'O wau iho nō me ka 'oia'i'o,

Kamana'opono M. Crabbe, Ph.D.

Kamana'opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer
Office of Hawaiian Affairs

KMC:kl

C: William Aila, Jr., State of Hawai'i Historic Preservation Officer
Pua Aiu, State Historic Preservation Division Administrator (via email)
Kiersten Faulkner, Historic Hawai'i Executive Director (via email)

Attachment 16 to Basing of MV-22 and H-1 Aircraft in Support of III
Marine Expeditionary Force (MEF) Elements in Hawaii
Programmatic Agreement, dated 11 July 2012
describing Hangar 101 Rehabilitation, including installation of roof mounted PV panels.
Attachment 16

PROJECT DESCRIPTION: HANGAR 1 REHABILITATION

Work includes renovation work on facilities 101, 167, 168, 170, 194, 195, 196, and the aircraft parking area around facility 101 (Hangar 1). All of these facilities and the majority of the paving are in a National Historic Landmark, Kaneohe Naval Air Station, designated in 1987.

In order to provide an adequately configured hangar for the in-coming HMLA squadron, the following renovations are proposed for Hangar 1 (see figures below):

- Installation of photo-voltaic panels on roof
- Apron repaving
- Renovation of existing crew and equipment space
- Renovation of existing administrative space
- Renovation of existing toilet rooms
- Installation of new bridge cranes in each hangar bay
- Installation of three machine room-less passenger elevators (to meet American with Disabilities Act Guidelines)
- Repainting of the hangar ceiling, including rust treatment
- Installation of an Aqueous Fire Fighting Foam (AFFF) fire protection system, including containment facilities on the exterior of the hangar and trenching of the hangar floor
- Seismic upgrades
- Mechanical, electrical, fire control, and information systems upgrades
- Painting and general repair
- Recoating and restriping of hangar bays
- Replace all exterior metal doors with fiber reinforced plastic (FRP) doors
- Retain and repair historic windows/window wall.

Buildings 167, 168, 170, 194, 195, and 196 will get new fire sprinklers.

Proposed work on the aircraft apron area includes: resurfacing, sealing, striping, modernization of the sewer and drainage collection systems, installation of AFFF infrastructure, fire protection upgrades, and the installation of a concrete parking ramp at aircraft parking locations. Also, storm water quality units along with outlet structures on the bay-side of the facility will be required to mitigate runoff of contaminates. The AFFF fire protection requires the addition of an external collection and holding system. An additional fire waterline loop system and fire hydrants will provide protection to the apron and exterior of Hangar 1.

Programmatic
Agreement

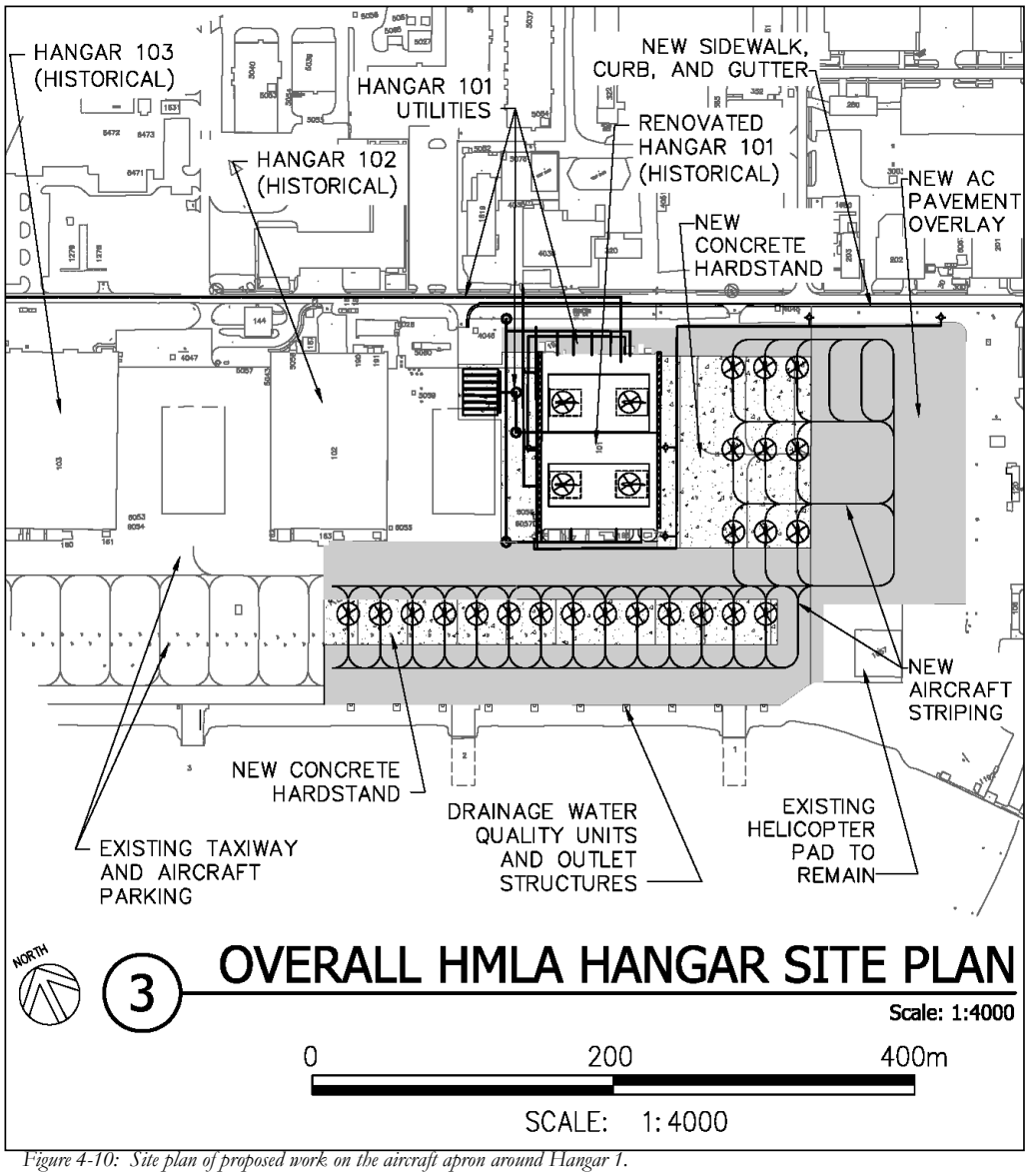


Figure 4-10: Site plan of proposed work on the aircraft apron around Hangar 1.

Programmatic
Agreement

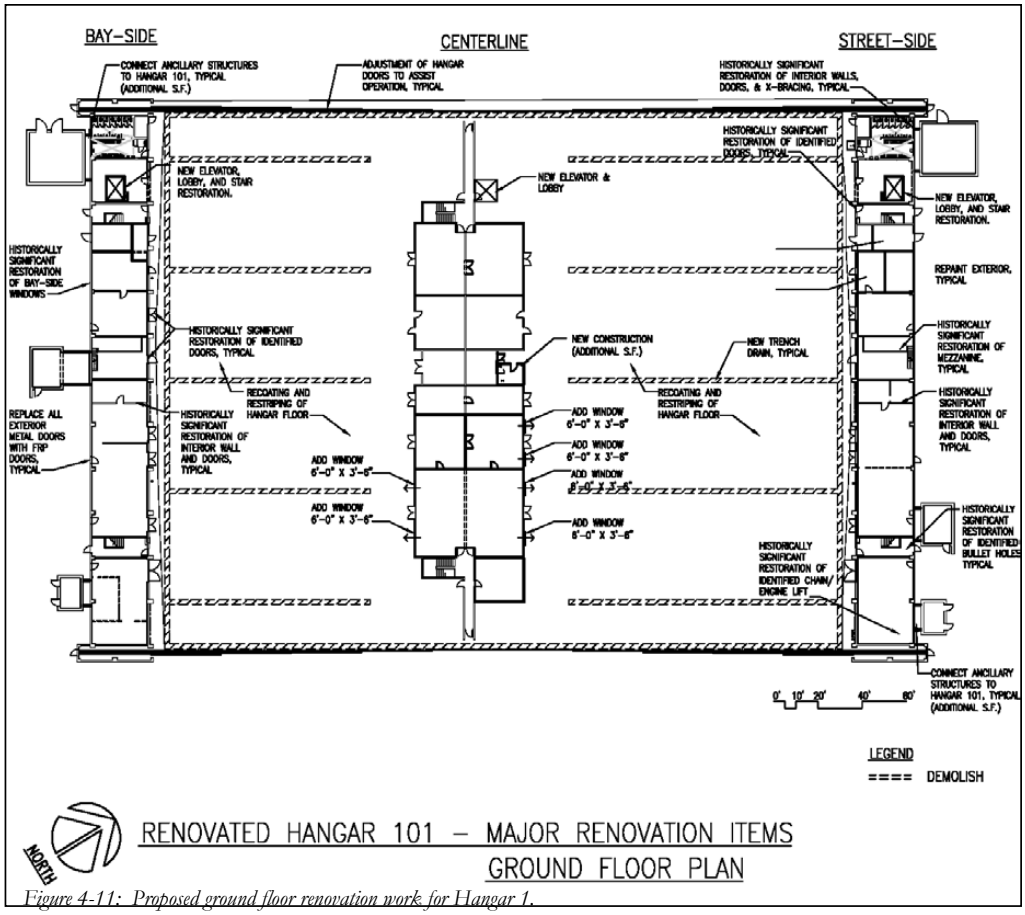


Figure 4-11: Proposed ground floor renovation work for Hangar 1.

Programmatic Agreement

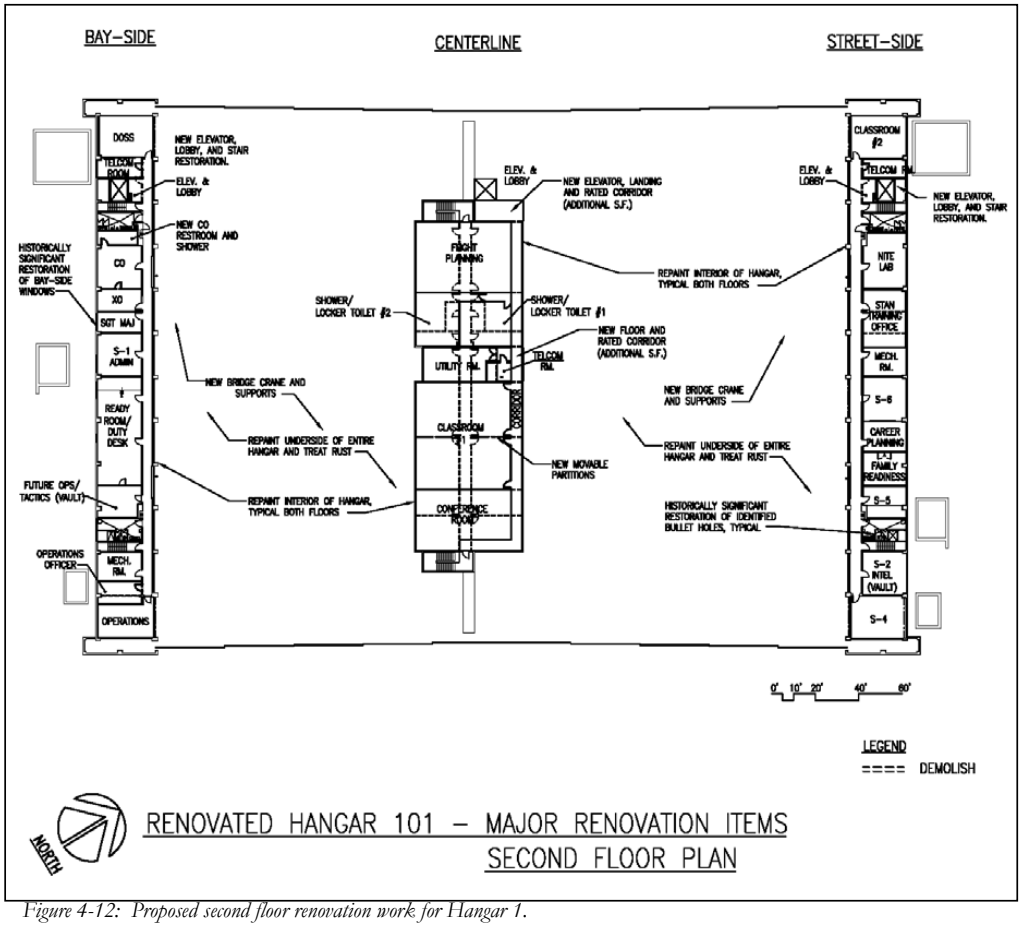


Figure 4-12: Proposed second floor renovation work for Hangar 1.

Programmatic
Agreement

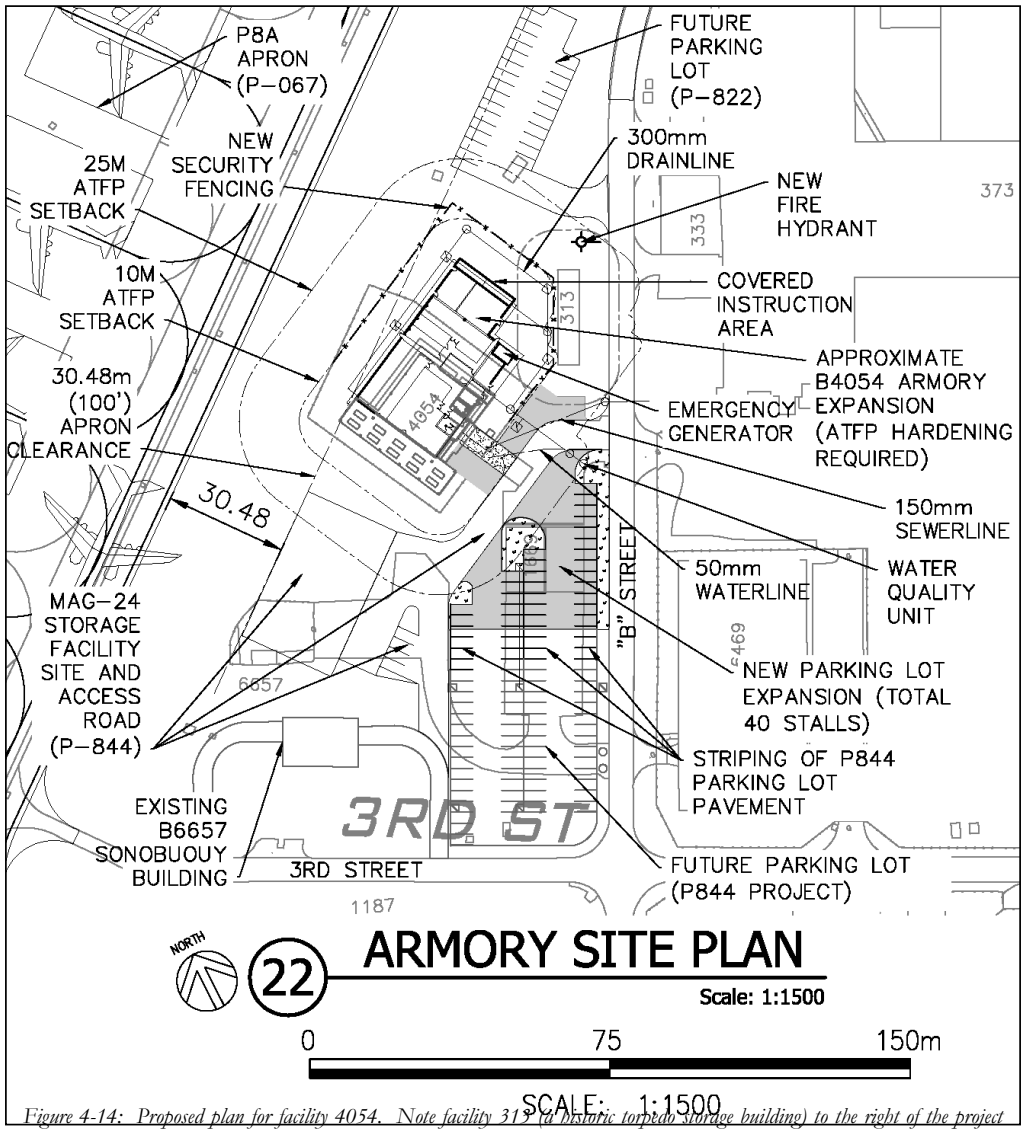


Figure 4-14: Proposed plan for facility 4054. Note facility 313 (a historic torpedo storage building) to the right of the project site. The facility 4054 additions are configured so that facility 313 remains.

Programmatic
Agreement

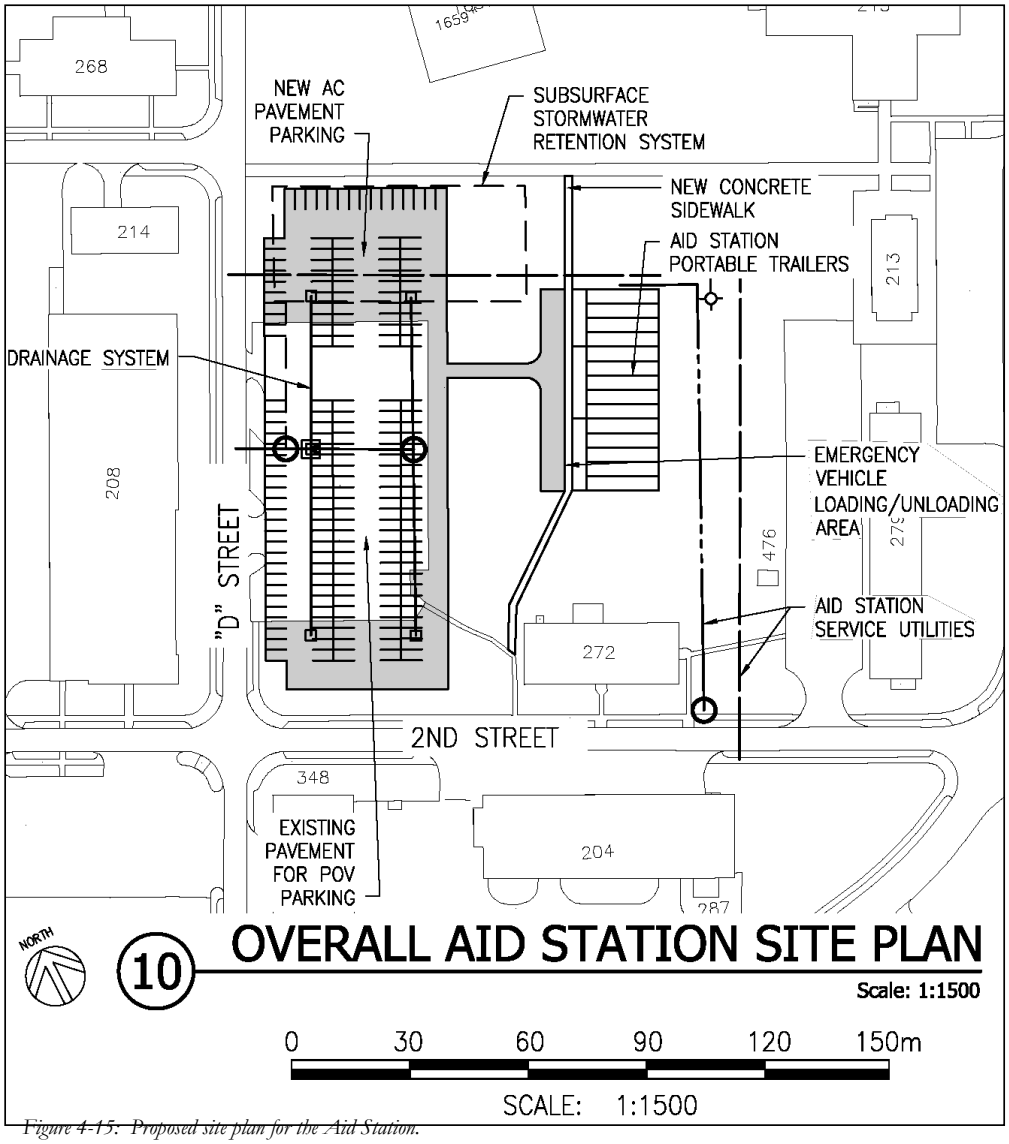


Figure 4-15: Proposed site plan for the Aid Station.

UNITED STATES MARINE CORPS
MARINE CORPS BASE HAWAII
BOX 63002 KANEOHE BAY, HAWAII 96863-3002

IN REPLY REFER TO:
5090
Ser LE/089-13
May 6, 2013

CERTIFIED MAIL NO.: 7008 2810 0002 1216 3955

Mr. William Aila
State Historic Preservation Officer
Department of Land and Natural Resources
Kakuihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

RE: INSTALLATION OF PHOTOVOLTAIC PANELS ABOARD MCB HAWAII, DISTRICT OF KO'OLAUPOKO, AHUPUA'A OF KĀNE'OHE, ON THE ISLAND OF O'AHU, TMK 1-4-4-010:001.

Dear Mr. Aila:

Marine Corps Base (MCB) Hawaii sent a written Section 106 consultation letter (Ser LE/063-13 dated 11 March 2013) to your office [Enclosure 1] regarding the proposed project to install photovoltaic (PV) panels on the roofs of the hangars (Facilities 101, 102, 103, and 104) aboard MCB Hawaii. It was received at your office on 14 March 2013. We have received no reply from your office regarding our request for your Sec 106 review of this proposed action. During telephone discussions with Angie Westfall, Architecture Branch Chief, Ms. Westfall indicated concern over Hangar 101, which is part of the NAS Kaneohe National Historic Landmark. PV on Hangar 101 is actually covered in the Programmatic Agreement (PA) for the Basing of MV-22 and H-1 Aircraft in Support of III Marine Expeditionary Force (MEF) Elements in Hawaii and thus will be removed from this consultation. Pursuant to 36CFR 800.4(d)(1)(i), our responsibilities under Sec 106, for this proposed action, were fulfilled as of 13 April 2013, because we received no objection from your office regarding our determination that the proposed project to install PV panels on the roofs of the hangars will result in no adverse effect to historic properties.

Thus, as a result of the above explanation, MCB Hawaii will proceed with the following federal undertaking: install PV panels on the roofs of the hangars aboard MCB Hawaii. Should you or your staff have any questions or concerns please contact the MCB Hawaii Cultural Resources Management staff, Ms. June Cleghorn at 257-7126 or via email at june.cleghorn@usmc.mil or Ms. Coral Rasmussen at 257-7134 or via email at coral.rasmussen@usmc.mil.

Sincerely,

D. R. GEORGE
Captain, U. S. Marine Corps
Director, Environmental Compliance and Protection Department
By direction of the Commanding Officer

Enclosure:
(1) Section 106 Consultation letter (Ser LE/443-12 dated 7 November 2012).

Enclosure 1

UNITED STATES MARINE CORPS
MARINE CORPS BASE HAWAII
BOX 63002 KANEOHE BAY, HAWAII 96863-3002

IN REPLY REFER TO:
5090
LE/063-13
March 11, 2013

CERTIFIED MAIL NO.: 7008 2810 0002 1216 3870

Mr. William Aila
State Historic Preservation Officer
Department of Land and Natural Resources
Kakuihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

RE: INSTALLATION OF PHOTOVOLTAIC PANELS ABOARD MCB HAWAII, DISTRICT OF KO'OLAUPOKO, AHUPUA'A OF KĀNE'OHE, ON THE ISLAND OF O'AHU, TMK 1-4-4-010:001.

Dear Mr. Aila:

Marine Corps Base (MCB) Hawaii is consulting with your office in compliance with Section 106 of the National Historic Preservation Act regarding the proposed project to install photovoltaic (PV) panels on the roofs of the hangars (Facilities 101, 102, 103, and 104) aboard MCB Hawaii. This letter initiates our Section 106 consultation for this project.

PROJECT DESCRIPTION

The proposed project is located in the southwest portion of Mokapu Peninsula [Enclosures 1 and 2]. This project is part of the DoD Hawaii Joint Solar Multiple Award Contract (MAC) Utilities Service Contract, during which time the contractor would own, operate, and maintain the PV for 20 years. The proposed PV would help MCB Hawaii meet its Net Zero energy goal. The PV on the hangar roofs will be in addition to the previously consulted PV for MCB Hawaii (dated 14 March 2012 LE/127-12; SHPO Concurrence dated 5 April 2012 LOG: 2012.0699/DOC: 1203AW07).

This project includes installation of the rooftop PV system and all associated equipment (referred to as the Balance of Systems (BOS)). The BOS includes inverters, wiring, and other electrical equipment. The specific PV system (product) has not been chosen. However, the system is expected to be similar to the one shown in Enclosure (3). The intent is to have the PV system lay on the roof of the building so that it is not visible from street level [Enclosure 4]. As such, the effect on the hangars should be minimal and reversible.

In addition to the installation of the PV on the roof, the project will also require a small concrete pad adjacent to the building for support equipment, including a 500 to 600 kilo watt inverter. Excavation for the pad will be limited to a depth of 2 to 3 ft. Care will be taken to position the support equipment in on the back side (along First Street rather than the Kaneohe Bay side) of the hangars [Enclosure 5].

IDENTIFICATION OF HISTORIC PROPERTY

The proposed project consists of installing PV panels on the roofs of the historic hangars (Facilities 101, 102, 103, and 104) [Enclosure 6] (Environmental Compliance and Protection Department MCB Hawaii 2011). Hangar 101 is part of the National Historic Landmark [see Enclosure 1]. The other

5090
LE/063-13
March 11, 2013

three hangars are eligible for nomination to the National Register of Historic Places (NRHP).

The hangars each consist of a large rectangular two story building with a tall rectangular form at each corner [Enclosure 7]. They are located just north of the seaplane ramps along the southern shore of Kaneohe Bay. Hangars 101, 102, and 103 were standing during the Japanese attack on 7 December 1941. Hangar 104 was still under construction. A fifth hangar (Hangar 105) was constructed in 1943. The NHL consists of Hangar 101, a parking apron, and five seaplane ramps located along the southwestern portion of MCB Hawaii [see Enclosure 6]. The hangars were also included in the original base plan and were designed by the noted architectural firm of Albert Kahn, Inc. During the 7 December 1941 attack, Hangar 101 was heavily damaged. Repairs to Hangar 101 were completed in 1942 (Environmental Compliance and Protection Department 2011:59). In 1987, Hangar 101, the seaplane ramps, and the parking apron east of Hangar 101 were designated as National Historic Landmark Number 97001299.

AREA OF POTENTIAL EFFECT

The area of potential effect (APE) has been determined to include only the footprint of the hangars proposed for rooftop PVs aboard MCB Hawaii.

DETERMINATION OF AFFECT

MCB Hawaii has determined that the proposed hangar PV project will result in no adverse effect to historic properties in accordance with Section 106 Implementing Regulations at 36 CFR 800.4(d)(1) based on the following: 1) the proposed PV project will lay PV flat across a slightly pitched roof; 2) the PV will be attached to the roof in such a manner that it can be removed without harming the roof; 3) the area around the hangars are either filled land or previously disturbed and thus no archaeological sites or deposits are anticipated; and 3) archaeological monitoring will be conducted as a best management practice in the event that Native American Graves Protection and Repatriation Act (NAGPRA) cultural items (including human skeletal materials) are located in sand fill material around the hangars. If NAGPRA cultural items are discovered, all work in the vicinity will stop and the remains will be stabilized and protected. Treatment will proceed under the authority of NAGPRA.

We request your review and concurrence within 30 days of receipt of this letter. As defined in 36 CFR 800.5(c) we will assume your concurrence if no objection is received from your office within 30 days of receipt of this letter. Should you or your staff have any questions or concerns please contact the MCB Hawaii Cultural Resources Management staff, Ms. June Cleghorn at 257-7126 or via email at june.cleghorn@usmc.mil or Coral Rasmussen at 257-7134 or via email at coral.rasmussen@usmc.mil.

Sincerely,

D. R. GEORGE
Captain, U. S. Marine Corps
Director, Environmental Compliance and Protection Department
By direction of the Commanding Officer

2

5090
LE/063-13
March 11, 2013

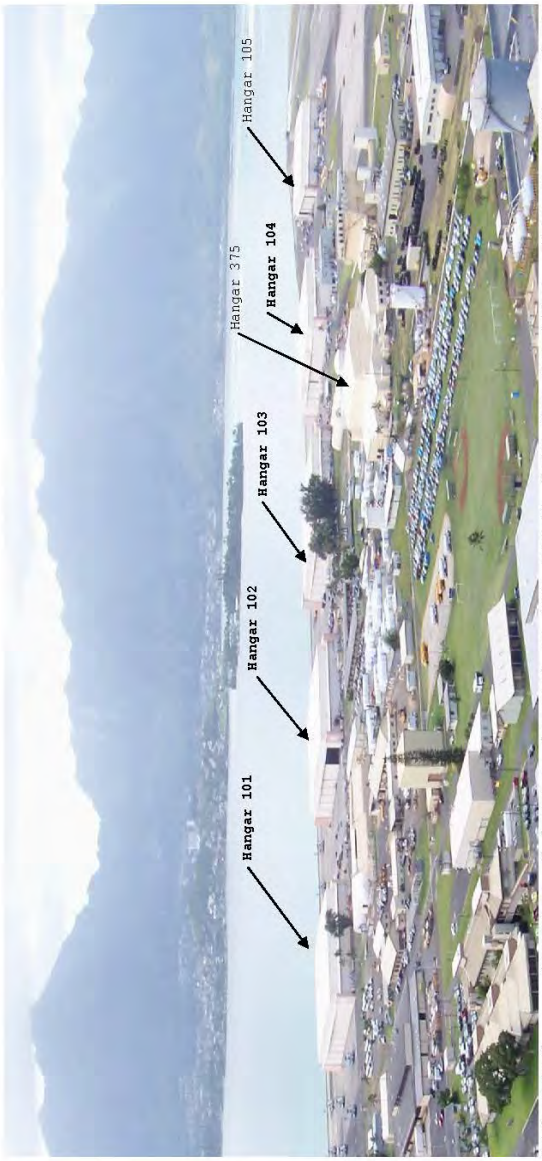
Enclosures:
(1) Location of hangars aboard MCB Hawaii.
(2) Overview of hangars located at MCB Hawaii from Puu Hawaiiloa.
(3) An example of an inverter on base.
(4) Example of surface laid PV system similar to PV system proposed for Hangars 101, 102, 103, and 104 aboard MCB Hawaii.
(5) The proposed inverter would be located along the north side of the hangars.
(6) Hangars 101, 102, 103, and 104 following the Japanese attack on 7 December 1941.
(7) Overview of the hangars along the southern shore of MCB Hawaii.
(8) Overview of Hangar 101 from the fuel pier, showing the view of the hangar from the ground.

Copy to:
Mr. Van Horn Diamond; Diamond 'Ohana
Ms. Nalani Olds; Olds 'Ohana
Ms. Delilah Ortiz; Ortiz 'Ohana
Ms. Emalia Keohokalole, Keohokalole 'Ohana
Ms. Clara Sweets Matthews; Ka Lahui Hawaii
Ms. Ella Pagauyo; Paguyo 'Ohana
Ms. Chazmin Sokolovski; Prince Kuhio Hawaiian Civic Club
Ms. Nau Kamalii; Boyd 'Ohana
Ms. Donna Ann Camvel; Paoa Kea Lono 'Ohana
Mr. Kamana'opono Crabbe; Office of Hawaiian Affairs
Mr. Cy Harris; Kekumano 'Ohana
Ms. Terrilee Napua Kekoolani Raymond; Kekoolani 'Ohana
Chair; Oahu Island Burial Council
Ms. Cathleen Mattoon; Koolauloa Hawaiian Civic Club
Mr. Edward Ayau; Hui Malama I Na Kupuna O Hawai'i Nei
Mr. Clive Cabral; Temple of Lono
Ms. Kaleo Paik
Ms. Kiersten Faulkner, Historic Hawaii Foundation

Reference:
Environmental Compliance and Protection Department Marine Corps Base Hawaii
2011 *Historic Building Inventory: World War II Era Buildings aboard Marine Corps Base Hawaii, Kaneohe Bay.* Prepared by Environmental Compliance and Protection Department Marine Corps Base Hawaii, Kaneohe Bay, Hawai'i

3

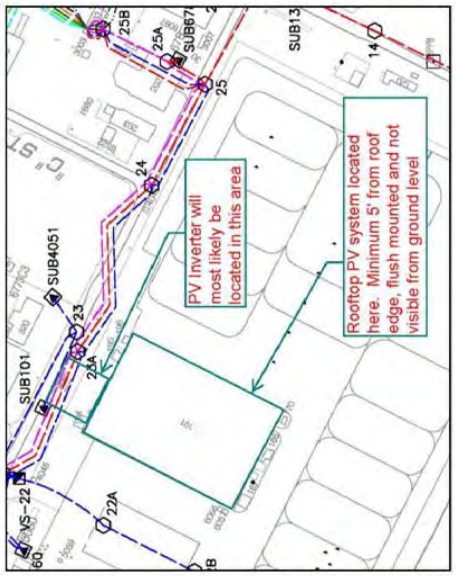
Enclosure 1. Location of hangars aboard MCB Hawaii (GeoFidelis 2013).



Enclosure 2. Overview of hangars located at MCB Hawaii from Puu Hawaiiloa, view to south. Note: Hangars 105 and 375 are not part of this consultation.

Enclosure 3. An example of an inverter on base.

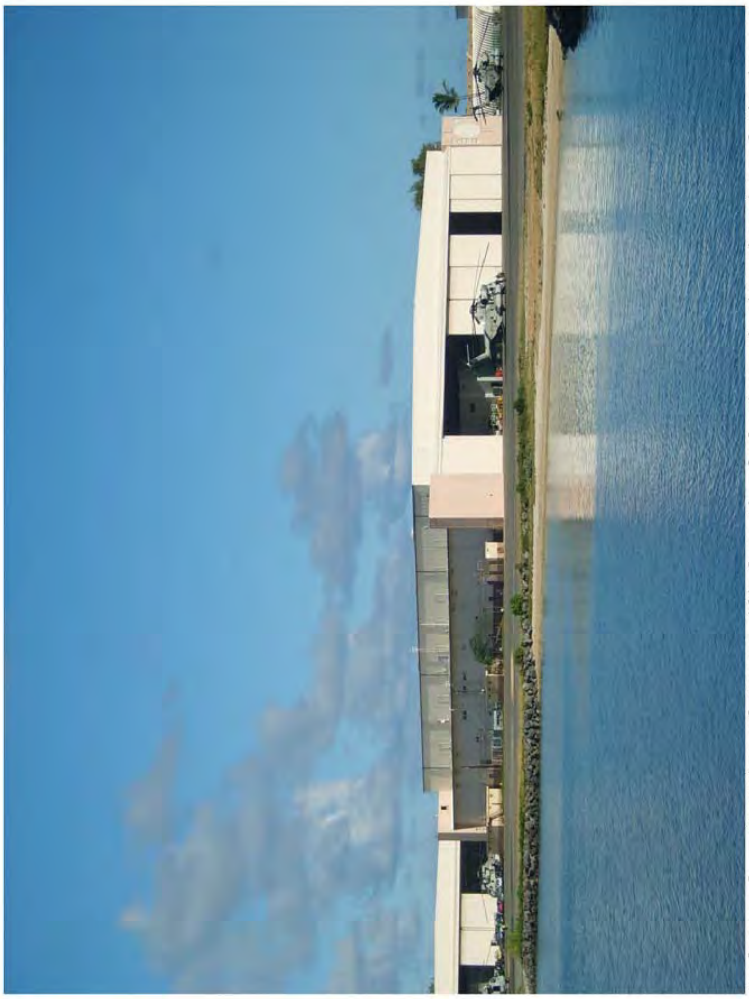
Enclosure 4. Example of surface laid PV system similar to PV system proposed for Hangars 101, 102, 103, and 104 aboard MCB Hawaii.



Enclosure 5. The proposed inverter would be located along the north side of the hangars. Hangar 101 visible in the photograph and plan view.


Photo # NH 97427 NAS Kaneohe Bay after the Japanese air raid, December 1941
Hangar 101
Hangar 102
Hangar 103
Hangar 104
Enclosure 6. Hangars 101, 102, 103, and 104 following the Japanese attack on 7 December 1941. Photo dated 9 December 1941.

Enclosure 7. Overview of the hangars along the southern shore of MCB Hawaii.



Enclosure 8. Overview of Hangar 101 from the fuel pier, showing the view of the hangar from the ground.