


Pacific Missile Range Facility
Integrated Natural Resources Management Plan

Final Environmental Assessment

Naval Facilities Engineering Systems Command, Hawai'i
Project Reference: Contract #N62470-13-D-8017-KB01

November 2024

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ABSTRACT

Designation:	Environmental Assessment
Title of Proposed Action:	Integrated Natural Resources Management Plan
Project Location:	Pacific Missile Range Facility, Hawai‘i
Lead Agency for the EA:	Department of the Navy
Cooperating Agency:	None
Affected Region:	Hawai‘i
Action Proponent:	Pacific Missile Range Facility
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Date:	November 2024

Navy Region Hawai‘i, a Command of the United States Navy (hereinafter, jointly referred to as the Navy), has prepared this Environmental Assessment in accordance with the National Environmental Policy Act, as implemented by the Council on Environmental Quality Regulations and Navy regulations for implementing the National Environmental Policy Act. The Proposed Action would implement the 2023 Integrated Natural Resources Management Plan Pacific Missile Range Facility. This Environmental Assessment evaluates the potential environmental impacts associated with one action alternative (Preferred Alternative) and a No Action Alternative.

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EXECUTIVE SUMMARY

ES.1 Proposed Action

The Proposed Action is to adopt and implement the 2023 Integrated Natural Resources Management Plan (INRMP) for the Pacific Missile Range Facility (PMRF), Kauaʻi, Hawaiʻi. The purpose of an INRMP is to implement an ecosystem-based conservation program that provides for conservation and rehabilitation of natural resources in a manner that is consistent with the military mission, integrates and coordinates all natural resources management activities, provides for sustainable multipurpose uses of natural resources, and provides for public access for use of natural resources subject to public safety and military security considerations. This Environmental Assessment (EA) has been prepared to evaluate the effects of the activities described in the 2023 PMRF INRMP.

ES.2 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to implement the 2023 PMRF INRMP, which provides an approach for natural resources management on PMRF-administered lands that is consistent with the Sikes Act (as amended) as well as the most recent Department of Defense (DoD) and Department of Navy (DoN or Navy) policy and guidance regarding INRMPs. The need for the Proposed Action is to provide a comprehensive, adaptive natural resources management approach for all PMRF properties. Both the INRMP and the natural resources management programs that it supports must meet DoD and DoN policy and guidance to conduct management of natural resources consistent with the mission (as defined in 10 United States Code Section 8062).

ES.3 Alternatives Considered

The DoN Environmental Readiness Program Manual (Office of the Chief of Naval Operations Manual [M]-5090.1, 2021) states that for actions associated with the implementation of an INRMP, analysis of a Proposed Action and No Action Alternatives is acceptable without considering additional alternatives. Therefore, no additional alternatives are carried forward in this EA.

ES.4 Summary of Environmental Resources Evaluated in the EA

Council on Environmental Quality regulations, National Environmental Policy Act (NEPA), and DoN instructions for implementing NEPA, specify that an EA should address those resource areas potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact. The environmental resource areas analyzed in the EA include: the physical environment including geology and soils, water resources, and climate change; biological resources including vegetation, nuisance and invasive animals, native, terrestrial, and marine species, and coastal and nearshore biological resources including habitat, fish and other animals, and algae; and the social and cultural environment including land use, outdoor recreation, and cultural resources. Each resource area is analyzed by each of the eight site locations: Barking Sands, Mākaha Ridge, Kōkeʻe State Park, Kamokalā Ridge Magazines, Port Allen, Kaʻula Island, Mauna Kapu, and Niʻihau Sites.

Because potential impacts were negligible or nonexistent, the following resources were not evaluated in this EA: air quality, airspace management, noise, infrastructure, transportation, public health and safety, hazardous materials and wastes, socioeconomics, environmental justice, and visual resources. The analysis in this EA addresses the natural resource management program in a programmatic context. As

management decisions are made and specific project designs are developed, further project and site-specific NEPA analysis and/or regulatory compliance may be required.

ES.5 Summary of Potential Environmental Consequences of the Action Alternatives

The following is a summary of the potential environmental consequences of the Preferred Alternative and No Action Alternative. The study area for the analysis of effects to resources associated with the Preferred Alternative includes the lands and waters of PMRF owned or leased by the Navy that could be affected by the proposed INRMP activities.

Physical Resources. Implementing the activities described in the 2023 PMRF INRMP would result in benefits to physical resources in those locations where management actions are proposed. The most current best management practices (BMP) would be used when implementing these and other INRMP projects to prevent negative effects to facility location physical resources. Therefore, implementation of the Preferred Alternative would not result in significant impacts to physical resources. The No Action Alternative would involve PMRF continuing to operate under an outdated INRMP. This would lead to no change to the management of physical resources. Though the benefits to physical resources resulting from implementation of the Preferred Alternative would not be realized, no significant impacts to existing water resources would occur.

Biological Resources. Implementing the activities described in the 2023 PMRF INRMP would result in benefits to biological resources in those locations where management actions are proposed. Species surveys and monitoring would add to knowledge of species distribution and abundance, ultimately aiding conservation efforts. Control of predators (including rodents, ungulates, and feral animals) and control of invasive and non-native species would reduce mortality and competition with species that can outcompete native species for resources. Habitat improvements would benefit native terrestrial and marine flora and fauna by providing the native habitats species require. Activities that result in education and outreach to the public, law enforcement, and recreation personnel would increase stewardship of biological resources. Additionally, the use of the most current management practices in implementing these and other INRMP projects would prevent negative effects to biological resources. There would be no significant impact on threatened and endangered species. Therefore, implementation of the Preferred Alternative would not result in significant impacts to biological resources. The No Action Alternative would involve PMRF continuing to operate under an outdated INRMP. This would lead to no change to the management of biological resources. Though the benefits to resources resulting from implementation of the Preferred Alternative would not be realized, no significant impacts to existing biological resources would occur.

Social and Cultural Environment. Implementing the activities described in the 2023 PMRF INRMP would result in benefits to social and cultural resources in those locations where management actions are proposed. Continued coordination among facilities planners, resource managers, State of Hawai‘i, and county officials would benefit implementation of INRMP management actions at all eight facility locations. PMRF’s recreation program would ensure recreationists are well informed, including education as to rules and requirements of recreating to preserve resources and the importance of natural resource stewardship. Development of a Natural Resources Information Center and associated components (e.g., brochures, educational information, self-guided nature-based walks) would benefit social and cultural resources while benefiting PMRF natural resources, this would include education of the rules and requirements for the preservation of resources and the importance of natural resource stewardship. Therefore, implementation of the Preferred Alternative would not result in significant impacts to the

social and cultural environment. The No Action Alternative would involve PMRF continuing to operate under an outdated INRMP. This would lead to no change to the management of the social and cultural environment. Though the benefits to resources resulting from implementation of the Preferred Alternative would not be realized, no significant impacts to the existing social and cultural environment would occur.

ES.6 Public Involvement

A Notice of Availability of the Draft INRMP and EA for review by the public was published in the Garden Island newspaper (May 16–18, 2024). The documents were made available on the Naval Facilities Engineering Systems Command (NAVFAC), Pacific website and hard copies were placed in the Waimea Public Library, Līhu'e Public Library, and Kapa'a Public Library. Online at:

(https://pacific.navfac.navy.mil/About-Us/National-Environmental-Policy-Act-NEPA-Information/#:~:text=Written%20comments%20on%20the%20INRMP%20and%20DEA%20may,postmarked%20by%20June%2015%2C%202024%20to%20be%20considered).

Comments were accepted from May 16, 2024, through June 15, 2024. Comments received on the 2023 PMRF INRMP and Draft EA were analyzed and, where appropriate, changes were incorporated into this EA.

Public comments received on the Draft EA that were addressed included addressing strategies to protect marine mammals (e.g., whales and dolphins) and addressing management issues of Hawaiian monk seals (*Neomonachus schauinslandi*) and sea turtles (primarily green; *Chelonia mydas*) in nearshore habitats. Comments regarding marine species were addressed by the Navy's Marine Species Monitoring Program that was developed in support of Navy Training and Testing Environmental Impact Statements (EISs)/Overseas EISs and their associated Biological Opinions and Marine Mammal Protection Act Letters of Authorization; the Navy has been conducting marine mammal monitoring in the offshore areas of the PMRF since 2008. For sea turtles, an interagency agreement was listed in 2023 to allow the Navy to partner with the National Marine Fisheries Service, Pacific Islands Fisheries Science Center, to deploy SPLASH tags (Global Positioning System and Argos) on sea turtles that will be pursued at PMRF; additionally, an appendix was added to the INRMP specific to sea turtle management actions at PMRF.

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Acronyms and Abbreviations

ac	acre
AICUZ	Air Installation Compatible Use Zone
AOA	Airfield Operations Areas
API	Agricultural Preservation Initiative
APZ	Accident potential zone
ARDEL	Advanced Radar Detection Evaluation Laboratory
AT/FP	Antiterrorism Force Protection
BASH	Bird/animal aircraft strike hazard
BMP	Best management practice
BO	Biological Opinion
BOS	Base Operations Support
CATEX	Categorical exclusion
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CO	Carbon monoxide
COMPACFLT	Commander, United States Pacific Fleet
COTS	Crown-of-thorns
CWA	Clean Water Act
CZ	Clear zone
DAR	Division of Aquatic Resources
DLNR	Department of Land and Natural Resources
DoD	Department of Defense
DOFAW	Division of Forestry and Wildlife
DoN	Department of the Navy
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EMR	Electromagnetic radiation
EO	Executive Order
ESA	Endangered Species Act
ESQD	Explosives Safety Quantity Distance
FACSFAC	Fleet Area Control and Surveillance Facility
Fed. Reg.	Federal Register
ft	foot or feet
FY	Fiscal year
GHA	Ground Hazard Area
GHG	Greenhouse gas
ha	hectare
HAMP	Historic Asset Management Process
HAPC	Habitat area of particular concern
HAR	Hawai‘i Administrative Rule
HCTT	Hawai‘i-California Training and Testing (EIS/OEIS)
HDOA	Department of Agriculture, State of Hawai‘i
HRC	Hawai‘i Range Complex (EIS/OEIS)
HRS	Hawai‘i Revised Statutes
HSTT	Hawai‘i-Southern California Training and Testing (EIS/OEIS)

HWMO	Hawai‘i Wildfire Management Organization
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
KISC	Kaua‘i Invasive Species Council
km	kilometer
km^2	square kilometer
LUC	Land Use Commission
m	meter
MBTA	Migratory Bird Treaty Act
MHI	Main Hawaiian Islands
mi	mile
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MSL	Mean sea level
MWR	Morale, Welfare and Recreation
NAAQS	National Ambient Air Quality Standards
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy, United States
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NWHI	Northwestern Hawaiian Islands
OEIS	Overseas Environmental Impact Statement
OPNAVINST	Office of the Chief of Naval Operations Instruction
PAC	Pacific (Region)
Pb	Lead
PMC	Pest Management Consultant
PMRF	Pacific Missile Range Facility
RDT&E	Research, development, test, and evaluation
RFFA	Reasonably Foreseeable Future Action
SLR	Sea level rise
SO_2	Sulfur dioxide
SOH	State of Hawai‘i
SOP	Standard operating procedure
SOS	Save our Shearwaters
TCP	Traditional cultural place or traditional cultural property
TMDL	Total Maximum Daily Load
U.S.	United States
U.S.C.	United States Code
UFC	Unified Facilities Criteria
USAF	United States Air Force
USDA	United States Department of Agriculture
USDA-WS	United States Department of Agriculture-Wildlife Services
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

1. Introduction

1.1 Project Background

The United States (U.S.) Department of the Navy (DoN or Navy) proposes to adopt and implement a revised Integrated Natural Resources Management Plan (INRMP) for the Pacific Missile Range Facility (PMRF) Complex in Hawai'i. The actions would take place at PMRF locations on the islands of Kaua'i, O'ahu, Ni'ihau, and Ka'ula, Hawai'i. Implementation of the INRMP would be ongoing and would coincide with existing operations at each facility.

The implementation of an INRMP is considered a major federal action requiring analysis under the National Environmental Policy Act (NEPA). This Environmental Assessment (EA) was prepared pursuant to the requirements of NEPA, as amended (42 U.S. Code [U.S.C.] 4347, Section [§] 102(2)(c)); and consistent with the implementing regulations issued by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [C.F.R.] 1500-1508) and the Office of the Chief of Naval Operations M-5090.1, *Environmental Readiness Program Manual,* dated June 25, 2021.

The DoN is aware of the November 12, 2024, decision in Marin Audubon Society v. Federal Aviation Administration, No. 23-1067 (D.C. Cir. Nov. 12, 2024). To the extent that a court may conclude that the CEQ regulations implementing NEPA are not judicially enforceable or binding on this agency action, the DoN has nonetheless elected to follow those regulations at 40 C.F.R. Parts 1500–1508, in addition to DoN's procedures/regulations implementing NEPA at 32 C.F.R. Part 775, to meet the agency's obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

1.2 Purpose and Need for the Proposed Action

The purpose of and need for the Proposed Action is to comply with the Sikes Act Improvement Act (Sikes Act) of 1997 (16 U.S.C. § 670(a) et seq.; Public Law Number 105-85, § 2901 et seq., 111 Stat. 1629, 2016 (1997), which requires the Secretary of Defense to carry out a program for the conservation and rehabilitation of natural resources on military installations. This is accomplished with the preparation and implementation of an INRMP, a comprehensive plan used to manage military installations' natural resources by providing and ensuring the sustained use of a landscape necessary to support the military mission in accordance with the best available science. The INRMP describes how current and future land use would support the military mission while managing and conserving natural resources to ensure compliance with applicable laws and regulations.

The Sikes Act of 1960, as amended (16 U.S.C. § 670(a)-(f), et seq.), states that an INRMP shall provide for "no net loss" in the capability of military installation lands to support the military mission of the installation. Therefore, mission requirements and considerations have been integrated into the INRMP for PMRF and the capability to support the mission is a natural resources priority. The Sikes Act specifically directs that INRMPs be reviewed "as to operation and effect," highlighting that the review is intended to determine whether existing INRMPs are being implemented to meet the requirements of the Sikes Act and contribute to the conservation and rehabilitation of natural resources on military installations. The Sikes Act and Department of Defense (DoD) policy requires all INRMPs to be reviewed annually by the installation in cooperation with involved parties and revised, as necessary, but at least every 5 years.

The INRMP addresses all required elements of the Sikes Act, relevant federal environmental laws, Executive Orders (EOs), and Memorandums of Understanding (MOUs), such as vegetation, wildlife, threatened and endangered species, and outdoor recreation. The INRMP provides management recommendations for natural resource actions to protect federally protected species; reduce soil and coastal erosion; protect and restore land and waterways from invasive species infestation; promote the conservation of native plant species; promote the protection of wetlands and floodplains where practicable; protect marine species; and prevent wildfire. The INRMP also includes strategies for data collection and database and records management and natural resources awareness, education, and personnel training.

1.3 Scope of Environmental Analysis

This EA includes an analysis of potential environmental impacts associated with the implementation of the Preferred Alternative (implementation of the 2023 INRMP) and the No Action Alternative (continuation of the 2010 INRMP). The environmental resource areas analyzed herein include: the physical environment including geology and soils, water resources, and climate change; including vegetation, nuisance and invasive animals, native, terrestrial and marine species, and coastal and nearshore biological resources including habitat, fish and other animals, and algae; and the social and cultural environment including land use, outdoor recreation, and cultural resources. Each resource area is analyzed by facility location.

Strategies for data collection and database and records management and natural resources awareness, education, and personnel training would be implemented base-wide and would benefit natural resource management across all the resource areas. Table 2 lists these strategies to show how implementation of the INRMP has evolved. However, the Affected Environment and Environmental Consequences section of this EA does not evaluate these strategies, as they relate primarily to implementation of all the natural resource management strategies, would have only beneficial effects, and do not pertain to a particular natural resource.

1.4 Key Documents

Analysis of other PMRF sites as part of prior studies and NEPA assessments were used in preparing this EA. Key documents are described in Appendix A and include: PMRF INRMP, Integrated Cultural Resources Management Plan (ICRMP), Hawai‘i Range Complex (HRC) Final Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS), and PMRF Master Plan.

1.5 Relevant Laws, Regulations, and Memorandums of Understanding

The Navy has prepared this EA based on federal laws, statutes, regulations, and policies pertinent to the implementation of the Proposed Action; a full list of which is provided in Appendix A.

1.6 Locations and Military Operations

The PMRF complex consists of 10 distinct sites within the County of Kaua‘i and the City and County of Honolulu (O‘ahu), State of Hawai‘i (SOH). PMRF falls under the command of Commander, Navy Region Hawai‘i. Navy Region Hawai‘i is comprised of over 23,000 acres (ac) (9,308 hectares [ha]) of land and water resources (Table 1). PMRF open ocean areas to the north, south, and west of Kaua‘i include over 1,100 square miles (mi) of instrumented underwater ranges, over 42,000 square mi of controlled airspace, and a Temporary Operating Area (TOA) covering 2.1 million square nautical miles of ocean area,

which includes Warning area 188. Most of the 2.1 million square nautical miles in the TOA falls outside of Warning Area 188; the TOA includes the entire Papahānaumokuākea Marine National Monument. This unique ocean range, combined with the highly technical instrumentation at the various base facilities can simulate a realistic environment for testing and training in the use of air, submarine, and surface weapon systems, as well as land-based weapon systems.

Table 1 The Ten Sites Comprising the PMRF Complex

Site Name	Location	Function
Barking Sands	Kauaʻi	Main Base
Mākaha Ridge	Kauaʻi	Secondary Range
Kōkeʻe State Park	Kauaʻi	Tracking Radars, Telemetry, Communications, Command, and Control Stations
Kamokalā Ridge Magazines	Kauaʻi	Explosive Storage
Miloliʻi Ridge*	Kauaʻi	Reflector Site
Port Allen	Kauaʻi	Pier and Building Facilities
Kaʻula Island	Offshore Island	Aircraft Gunnery and Inert Ordnance Target Practice
Mauna Kapu	Oʻahu	Communications and Radar
Mount Kaʻala*	Oʻahu	Communications and Radar
Niʻihau Sites	Niʻihau	Radar, Optics, and Electronic Warfare

* Not included in this EA; not included in Figure 1.

PMRF is both a Navy training range and a DoD military test range. PMRF's mission is to: *Provide integrated range service in a modern, multi-threat, multi-dimensional environment that ensures the safe conduct and evaluation of training and [testing and evaluation] T&E missions. Deliver quality products to improve customers' ability to achieve readiness and other national defense objectives* (CNIC 2022). The Navy, U.S. Air Force (USAF), Army, Marine Corps, Missile Defense Agency, allied research, development, test, and evaluation (RDT&E) programs, and other non-DoD agencies, including the Department of Energy, and commercial industry utilize PMRF.

This EA focuses on eight of the ten sites (Figure 1); no resources requiring management are to occur at the Miloliʻi Ridge reflector sites on Kauaʻi or the Mount Kaʻala communication site on Oʻahu. PMRF facilities are described in greater detail in each of their respective sections. This EA further includes PMRF's monitoring and proactive management activities to provide conservation benefits to aquatic species and habitats in nearshore waters adjacent to the sites. Although the PMRF installation boundary ends at the high-water mark and the Navy does not own submerged lands seaward of the high-water mark, a Safety Zone (33 C.F.R. Section 165.1406) and Danger Zone (33 C.F.R. Section 334.1390) adjacent to Barking Sands, and a Danger Zone adjacent to Kaʻula Island, are designated for Navy use and included in the INRMP study area. Last, the offshore underwater ranges are within open ocean areas and extend into territorial waters, which are not under the jurisdiction of PMRF or INRMP management study area, and therefore, these offshore areas are not included in this EA; however, the Navy conducts significant studies to further conservation of at-sea marine species in at-sea training and testing locations. Specifically surrounding PMRF, the Navy has ongoing annual marine mammal and sea turtle monitoring in the HRC to understand species identification and behavioral responses. The Navy's Marine Species Monitoring Program (https://www.navymarinespeciesmonitoring.us/) and Living Marine Resources Program have contributed millions of dollars to sponsor research and monitoring for over 30 years in Hawaiʻi and other training and testing locations. More information on the prior Hawaiʻi-Southern California Training and Testing (HSTT) EIS/OEIS and Marine Mammal Protection Act (MMPA) and

Endangered Species Act (ESA) authorizations can be found at https://www.nepa.navy.mil/hstt. Updated MMPA and ESA authorizations for activities covered under the Hawai‘i-California Training and Testing (HCTT) EIS/OEIS is expected by December 2025.

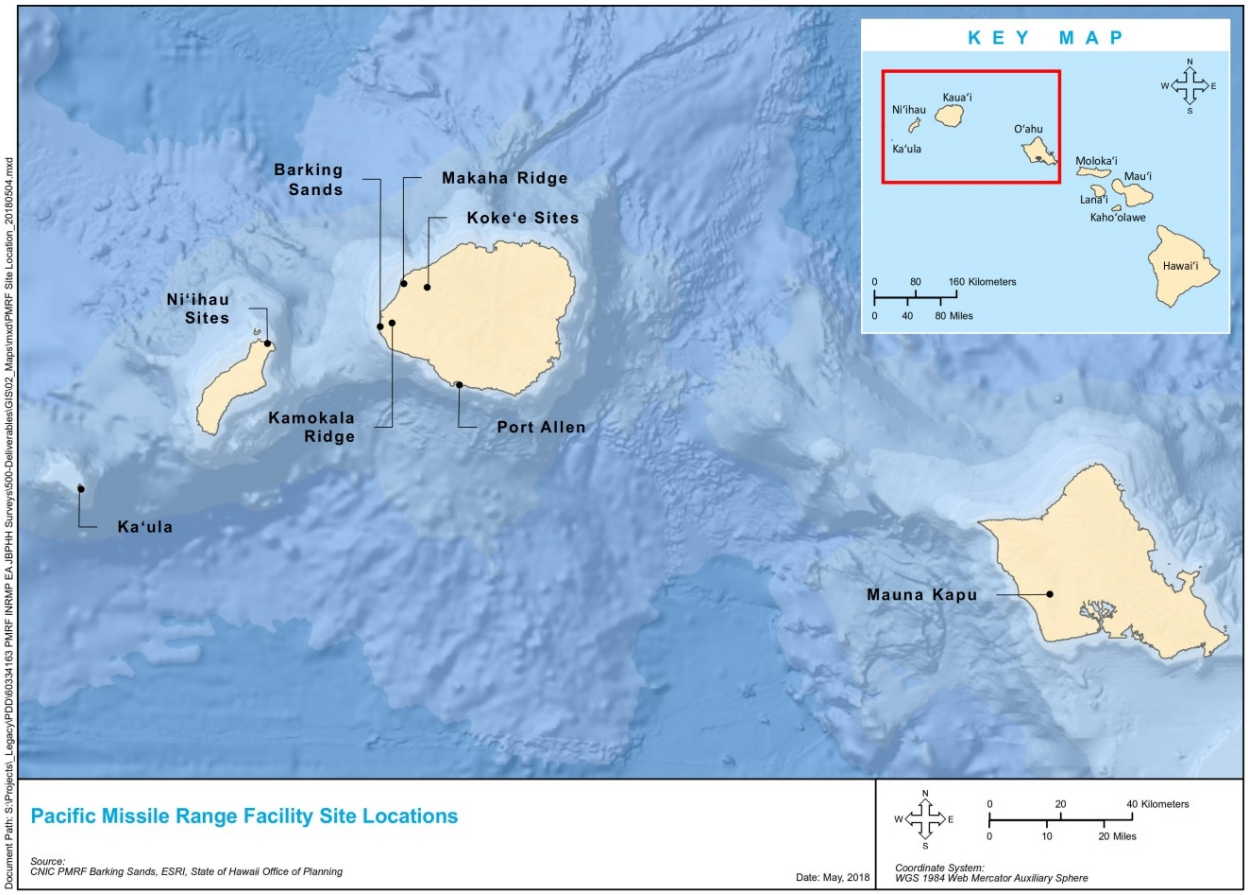

Figure 1 The Eight Sites of the PMRF Complex Addressed in this EA

2. Proposed Action and Alternatives

2.1 Proposed Action

PMRF proposes to enhance natural resources management at PMRF by implementing a revised 2023 INRMP. PMRF developed the INRMP to ensure consistency with the installation's military mission and to support "no net loss" in military mission capability for the installation lands, while providing for the conservation, rehabilitation, and the sustainable multipurpose use of natural resources on PMRF. The primary purpose of the INRMP is to provide a proactive natural resources management plan that guides PMRF in achieving natural resource management goals, mission requirements, and compliance with environmental regulations and policies (NAVFAC PAC 2022). The 2023 INRMP would serve as a principal information source for the preparation of future environmental analyses for proposed base actions.

2.2 Alternatives Considered

This EA analyzes two alternatives: the No Action Alternative and an Action Alternative (Preferred Alternative) to adopt and implement the 2023 INRMP for PMRF (Proposed Action).

2.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, the objectives and practices outlined in the 2010 INRMP for PMRF would remain in place. The No Action Alternative would not meet the purpose and need for the Proposed Action; however, as required by NEPA, the No Action Alternative is carried forward for analysis as it provides a baseline for measuring the environmental consequences of a Preferred Alternative. Further, the No Action Alternative would be in violation of the Sikes Act, which requires that INRMPs be revised a minimum of every 5 years (DoN 2010).

2.2.2 Preferred Alternative: Revised INRMP Implementation (Proposed Action)

The Preferred Alternative includes the adoption and implementation of a revised 2023 INRMP for PMRF. The INRMP identifies concerns, creates objectives, and outlines strategies to address those concerns and achieve those objectives. To evaluate impacts clearly and concisely, this EA focuses on the strategies (also called resource management actions) and analyzes the effects of implementation of those strategies. The revised INRMP would meet the goals and objectives for management of PMRF's natural resources in a manner that would be compatible with the military uses of the property and consistent with the Sikes Act.

Since the affected environment at the eight sites varies so widely, as do the proposed resource management actions, the EA is organized first by location, then by resource. This organization aligns with the Revised 2023 INRMP, which provides the most utility to Natural Resource Managers. To better understand the potential changes across alternatives, a comparison table (Table 2) was developed to show, at a glance, what management actions were proposed under the 2010 INRMP at which sites, and how they are being continued, revised, or eliminated under the Preferred Alternative. The management actions from the 2010 INRMP are summarized for brevity and ease of comparison. The full text of the 2010 management actions is provided in Appendix A. The analysis discussion for each site and resource section also includes the resource management actions for the convenience of the reader.

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Table 2 Alternatives Comparison

Notes: **BS** = Barking Sands, **MR** = Mākaha Ridge, **KS** = Kōkeʻe Sites, **KR** = Kamokalā Ridge, **PA** = Port Allen, **KI** = Kaʻula Island, **MK** = Mauna Kapu, **NI** = Niʻihau Island.

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Physical Environment	Geology and Soils	1. Base Planning: Follow standard methods to control erosion during all new construction projects.	●	●	●	●	–	–	●	–	1. Conduct general surveys for erosion and soil compaction issues annually to prioritize restoration sites.	●	●	–	–	–	–	–	–
		1. Critical Habitat and Dune Vegetation Restoration Project: Remove invasive vegetation and restore native vegetation to improve habitat and reduce erosion. 2. Wildland Fire Control: Use open spray nozzles, when possible, to minimize erosion and destruction of cultural resources.	●	–	–	–	–	–	–	–	1. Mitigate and prevent erosion of coastal dune habitat by out-planting, establishing, and monitoring native dune building plants in areas identified as having erosion issues. 2. Implement additional security measures such as increased signage and roping off certain areas to reduce off-road vehicle presence in the Nohili Dunes area. 3. Participate in future cooperative studies assessing potential shoreline loss that threatens base infrastructure or sensitive habitats.	●	–	–	–	–	–	–	–
		1. Soil Erosion Control: Limit vehicle access to paved roads and designated paved parking areas. Limit pedestrian traffic to established walkways. Stabilize slopes with soil-stabilizing cloth and out plantings of native drought tolerant species. Install an ungulate exclusion fence around protected plants and re-planted areas. 2. Feral Goat Control: Install exclusion fencing to exclude the goats from Mākaha Ridge Tracking Station to deter the consumption of erosion-inhibiting vegetation.	–	●	–	–	–	–	–	–	1. Monitor ungulate exclusion fence for areas vulnerable to ingress monthly and regularly monitor site for ungulate presence. Remove ungulates when identified within the fenced area. 2. Maintain Mākaha Ridge ungulate exclusion fencing for erosion control. 3. Out-plant native, drought tolerant plants in areas identified as having erosion and soil compaction issues. Ensure that a regular monitoring schedule and a sufficient irrigation system are in place until plants are well established.	–	●	–	–	–	–	–	–
	Water Resources	1. Base-wide Predator Control: Continue use of cage traps and other non-chemical methods as the primary means of predator control to prevent contamination of water resources. See also INRMP Appendix D – Legal Requirements for laws and policies related to water quality and pesticide and herbicide application.	●	●	–	–	–	–	–	–	1. Coordinate all use of pesticides by natural resources staff with the Naval Facilities Engineering Systems Command (NAVFAC), Pacific (region; PAC) Pest Management Consultant (PMC) and ensure that all applicators have received appropriate certifications.	●	●	●	–	–	–	–	–
											1. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.	●	●	–	–	–	–	–	–
		1. Marine Debris Cleanup: Continue participation in marine debris clean up events. 2. Wetlands Maintenance: Ensure proper permitting and no-net-loss of wetland acreage. Coordinate with SOH to maintain the irrigation ditch systems at Barking Sands.	●	–	–	–	–	–	–	–	1. Establish a monitoring program for the nearshore environment of PMRF to inform future management decisions and monitor changes over time. 2. Partner with Department of Land and Natural Resources (DLNR) Division of Aquatic Resources (DAR) to incorporate regular monitoring site(s) in PMRF's nearshore waters into the State's regular monitoring schedule, as feasible.	●	–	–	–	–	–	–	–
		1. Feral Goat Control: Install exclusion fencing to exclude the goats from Mākaha Ridge Tracking Station to improve coastal water quality.	–	●	–	–	–	–	–	–	1. Maintain Mākaha Ridge ungulate exclusion fencing for erosion control and to maintain water quality.	–	●	–	–	–	–	–	–
	Natural Hazards and Climate Change	1. Wildland Fire Control: Any wildland fires at all PMRF Facilities should continue to be addressed by the appropriate fire departments.	–	●	●	●	–	–	●	–	1. Coordinate with the PMRF Fire Department on developing updates to the existing Fire Management Plan.	●	●	●	●	●	●	●	●
		1. Wildland Fire Control: Clear vegetation from around the launch pads and wet the vegetation near the launch pads just prior to launch to prevent wildland fires. Provide emergency fire crews during launches to extinguish any fire and minimize its effects.	●	–	–	–	–	–	–	–	1. Remove deadfall in high-risk areas including near the Barking Sands missile launch site and the Kamokalā Ridge Magazines and replant with native, low fire risk species.	●	–	–	●	–	–	–	–
		1. Drainage Pumps and Ditch Maintenance: Continue to maintain the drainage pumps and ditches located within the 200 ac (81 ha) lease area. Continue to lease land at Barking Sands to maintain the drainage pumps and ditches to prevent flooding of the facility.	●	–	–	–	–	–	–	–	N/A.	–	–	–	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Vegetation	Invasive Plant Management	1. Invasive Species Prevention and Control: Continue all invasive species prevention and control actions. Continue to work with Kaua'i Invasive Species Council (KISC) and other stakeholders on a coordinated approach to alien plant species control for Barking Sands. Continue preventive measures to avoid the introduction of alien species and inadvertent destruction of the environment via cargo on inbound aircraft. 2. Develop a Biosecurity Program: Prohibit living plant materials from being brought to Hawai'i from outside the State. Pressure-wash all Navy and contractor vehicles coming to Hawai'i on the mainland or point of origin to minimize the amount of seeds or propagules of non-native species being transported. Inspect all construction materials including sand, gravel, aggregate, or road base and certify that such materials are weed free prior to transport. Monitor to detect, assess, and eliminate non-native species on a regular basis. Continue efforts to establish native vegetation in areas where non-native vegetation is present.	●	–	–	–	–	–	–	–	1. Include biosecurity requirements and provisions in Base Operating Support (BOS) and construction contracts to reduce the risk of introduction of invasive species and plant diseases. 2. Ensure that species identified as invasive in Hawai'i, including those on the Plant Pono "Black List", are not utilized for landscaping or erosion control projects by developing a Landscaping Guide to include in all base contracts, integrate into the installation appearance plan, and provide to project managers that specifies an approval process for species selection. 3. Ensure early detection and a rapid response to invasive plant species through a minimum of annual susrveys at all high-risk and sensitive areas. 4. Conduct removal of invasive plant species in sensitive areas, monitor for re-growth, and restore using out-plantings, if necessary, with a target of 80% reduction in invasive species within the areas of concern. 5. Decrease driving on dune vegetation, which can further increase the spread of invasive species into native habitats; continue to prohibit driving in designated Ni'ihau panicgrass (*Panicum niihauense*) critical habitat and culturally sensitive areas. 6. Strive to find new opportunities to collaborate with partners on removing invasive and exotic vegetation and planting opportunities. 7. Ensure that post planting care, including irrigation, invasive plant/weed control, and long-term monitoring and maintenance is implemented for all native plant restoration projects.	●	●	●	●	–	–	–	–
		1. Critical Habitat and Dune Vegetation Restoration Project: Continue to eradicate and control long-thorn kiawe (*Prosopis juniflora*).	●	–	–	–	–	–	–	–	1. Conduct removal of invasive plant species in sensitive areas, monitor for re-growth, and restore using out-plantings, if necessary, with a target of 80% reduction in invasive species within the areas of concern.	●	–	–	–	–	–	–	–
		1. Melastome Eradication: Provide KISC, Navy or SOH biologists access to a small patch of Asian melastome (*Melastoma candidum*) found near the roadside at Kōke'e Site D in order to eradicate this population.	–	–	●	–	–	–	–	–	1. Conduct invasive plant removals annually in areas near known Hawaiian picture-wing fly (*Drosophila sharpi* and *Drosophila musaphilia*) habitat to promote native tree health and propagation and reduce introductions of invasive species into adjacent habitat due to Navy operations.	–	–	●	–	–	–	–	–
	Native Plant Management	1. Landscape Design: Use native plants whenever possible and use sterile soil to prevent the introduction of weeds. Plant a variety of native trees, shrubs, and ground covers. Continue to evaluate all future landscape design and installation projects for the potential to include habitat restoration and the use of native plants whenever possible. 2. Protection of Natural Resources in Undeveloped Areas. Review construction and maintenance projects to ensure contractors are aware of guidelines to avoid impacting sensitive vegetation.	●	●	●	●	–	–	●	–	1. Update baseline floral surveys to improve understanding of plant community at PMRF. 2. Ensure and assist in the selection of locally sourced, non-invasive, and preferably native species, with a minimum of 50 percent native species for all new landscape planting projects by 2022 and 100 percent by 2028 while adhering to bird/animal aircraft strike hazard (BASH) requirements. 3. Ensure that post planting care, including irrigation, invasive plant/weed control, and long-term monitoring and maintenance is implemented for all native plant restoration projects. 4. Identify suitable locations for planting native Hawaiian plants, particularly those that benefit native pollinators in support of national pollinator objectives. 5. Strive to find new opportunities to collaborate with partners on removing invasive and exotic vegetation and planting opportunities. 6. The PMRF IEPD and NRM should continue to be the points of contact to provide relevant information on issues with potential to affect wildlife and native habitat, such as military operations and training, and tower and other construction and repair projects.	●	●	●	●	●	–	●	●
		1. Native Plant Restoration: The 2009 Feral Ungulate Management Plan calls for revegetation of selected eroded areas within the facility with native species expected to be found in and around Mākaha Ridge Tracking Station.	–	●	–	–	–	–	–	–	1. Out-plant native, drought tolerant plants in areas identified as having erosion and soil compaction issues. Ensure that a regular monitoring schedule and a sufficient irrigation system are in place until plants are well established.	–	●	–	–	–	–	–	–
		1. Native Plant Habitat Improvement: Conduct invasive vegetation removal, particularly in areas around existing native vegetation.	–	–	●	●	–	–	–	–	1. Conduct invasive plant removals annually in areas near known Hawaiian picture-wing fly habitat to promote native tree health and propagation and reduce introductions of invasive species into adjacent habitat due to Navy operations.	–	–	●	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Vegetation (Continued)	Native Plant Management (Continued)	1. Native Medicinal Plant Garden Development/Maintenance: Continue to maintain the native medicinal plant garden/display in the grassy area adjacent to the new Pass and Identification building at the Tartar Drive Gate (Main Gate). 2. Plant Nursery Development: Establish a plant nursery at Barking Sands to propagate native plants for landscaping and habitat restoration in cooperation with The National Tropical Botanical Garden. 3. Critical Habitat and Dune Vegetation Restoration Project: Conduct on-site dune vegetation restoration at Barking Sands through removal of long-thorn kiawe, koa haole (*Leucaena leucocephala*), and other invasive vegetation including buffelgrass (*Cenchrus ciliaris*), crown flower (*Calotropis gigantea*), and golden-crown beard (*Verbesina encelioides*). 4. Beach and Dune Access Restrictions: Continue to avoid disturbing dune areas to maintain native vegetation, including *Nama sandwicense*. Monitor for excessive traffic at areas adjacent to the beach cottages and other high-use recreational areas and, if necessary, cord off those areas to re-establish vegetation. Continue to prohibit off-road vehicle usage on the beach, and minimize usage by security personnel, to allow for reestablishment of native dune vegetation such as beach morning glory (*Ipomoea pes-caprae*), pōhinahina (*Vitex rotundafolia*), and pa'u o hi'iaka (*Jacquemontia ovalifolia*).	●	–	–	–	–	–	–	–	1. Mitigate and prevent erosion of coastal dune habitat by out-planting, establishing and monitoring native dune building plants in areas identified as having erosion issues.	●	–	–	–	–	–	–	–
		1. Botanical Surveys and Mapping Initiate: Initiate botanical surveys, create vegetation maps, and report the status of any protected species at the Mauna Kapu Facility in preparation for the next INRMP.	–	–	–	–	–	–	●	–	1. Conduct baseline flora surveys.	–	–	–	–	–	●	●	–
		1. N/A: The Navy has not been able to conduct floral surveys due to safety concerns and land ownership concerns.						●			1. Conduct land-based updates to floral surveys on Kaʻula Island if access is safe and allowable.	–	–	–	–	–	●	–	–
	Niʻihau Panicgrass	N/A.	–	–	–	–	–	–	–	–	1. Work to improve protection, habitat and/or consider out-planting Niʻihau panicgrass. Protections will be aimed at preventing unauthorized off-road vehicle use and invasive plant removal, and to demonstrate benefit to the species. 2. Out-plant native species and remove invasive species in areas with suitable Niʻihau panicgrass habitat and ensure an irrigation system is in place until plants become well established. 3. Consider undergoing the approval process to out-plant the endangered Niʻihau panicgrass in the effort to remove or reduce amount of PMRF property designated as critical habitat for the species. Coordinate with Federal and State partners to secure material for out-planting if pursued.	●	–	–	–	–	–	–	–
	Dwarf Iliau and Hawaiʻi Scaleseed; Other Listed Plant Species[1]	1. Protected Species Monitoring and Reporting: Conduct annual monitoring and status of protected species (dwarf iliau [*Wilkesia hobdyi*] and Hawaiʻi scaleseed [*Spermolepis hawaiiensis*]). 2. Botanical Surveys and Mapping: Update the status of protected species (dwarf iliau and Hawaiʻi scaleseed) in preparation for the next INRMP.	–	●	–	–	–	–	–	–	1. Implement erosion control efforts that directly benefit areas where protected species are present. 2. Conduct a reassessment of the status and condition of listed plant species on the cliffsides of Mākaha Ridge Tracking Station populations every five years and collaborate with partners to grant them access for further research and conservation efforts.	–	●	–	–	–	–	–	–
Biological Environment: Invasive Animals	Nuisance and Invasive Animal Management	1. Base-wide Predator Control: Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect both native and endangered species. 2. Invasive Species Prevention and Control: Continue all invasive species prevention and control actions. Continue to work with KISC and other stakeholders on a coordinated approach to alien plant species control for Barking Sands. Continue preventive measures to avoid the introduction of alien species and inadvertent destruction of the environment via cargo on inbound aircraft. 3. Develop a Biosecurity Program: Prohibit eggs and invertebrates (insects, snails and slugs) from being brought to Hawaiʻi from outside the State. Pressure wash all Navy and contractor vehicles coming to Hawaiʻi on the mainland or point of origin to minimize the amount of eggs or invertebrates of non-native species being transported. Inspect all construction materials including sand, gravel, aggregate, or road base and certify that such materials are invertebrate free prior to transport. Monitor to detect, assess, and eliminate non-native species on a regular basis.	●	–	–	–	–	–	–	–	1. Continue to fund control measures for non-native predator species at Barking Sands, Mākaha Ridge Tracking Station, and Kōkeʻe Site C (PMRF Biological Opinion [BO], 2014). 2. Develop a PMRF Biosecurity Plan and include those requirements and provisions in BOS and construction contracts to ensure invasive ants, frogs, and other non-native wildlife are not introduced via equipment or landscaping efforts. 3. Increase outreach to base personnel on reporting and early detection for invasive species not yet established at PMRF. Ensure all observations or reports of high-risk invasive species are communicated to KISC and to all other appropriate contacts. 4. Conduct surveys to improve baseline knowledge of populations of invasive animals at PMRF. 5. Work with partner organizations to identify sources of feral cats and dogs off base to reduce the population of these non-native predators.	●	●	●	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Invasive Animals (Continued)	Nuisance and Invasive Animal Management (Continued)	(Continued from above)	●	–	–	–	–	–	–	–	6. Consider partnering with the DLNR Division of Forestry and Wildlife (DOFAW) to do auditory predator deterrent studies on base and utilize the technology at PMRF if proven to be effective against predators. 7. Conduct ant surveys to assess presence of invasive ants including the little fire ants (*Wasmannia auropunctata*) at the Nohili Dune's wedge-tailed shearwater (*Ardenna pacifica*) colony. If little fire ants are detected, report to KISC and implement active control by using granular bait after fledglings have left the area. 8. Increase outreach about the hazards of feeding feral/invasive species with all personnel on PMRF and assist in the enforcement of such policies by practicing good communication with Security. 9. Continue to partner with the Hawai'i Department of Agriculture to ensure coconut rhinoceros beetle traps are checked and maintained at PMRF.	●	●	●	–	–	–	–	–
		1. Feral Goat Control: Install exclusion fencing to exclude the goats from Mākaha Ridge Tracking Station. 2. Trial Goat Hunting: Institute a trial goat hunting program with the Barking Sand Archery Club or other organization in coordination with DOFAW to reduce the presence of goats at the Mākaha Ridge Tracking Station.	–	●	–	–	–	–	–	–	1. Work with the PMRF Archery Club to control ungulate populations at the Kamokalā Ridge site by implementing trapping and baiting stations if the animals become a nuisance to Navy operations or pose a risk to protected species. 2. Conduct observations to identify feral cat presence at Kamokalā Ridge and consider expanding cat trapping if presence is consistent or becomes a nuisance.	–	–	–	●	–	–	–	–
		N/A.	–	–	–	–	–	–	–	–	1. Partner with DOFAW and other partners to coordinate barn owl and other predator control efforts on Ka'ula Island if access is safe and allowable and control methods are practicable.	–	–	–	–	–	●	–	–
Biological Environment: Bats	Hawaiian Hoary Bat Management	1. Hawaiian Hoary Bats (*Lasiurus cinereus semotus*): Prior to the operation of radar units at Barking Sands at nighttime, personnel will visually survey for bats in the area of impact using Anabat, or closed-circuit television cameras. 2. Hawaiian Hoary Bats: Evaluate the distribution and abundance surveys currently being conducted at the Kōke'e Sites, and if bats are detected, perform surveys on a routine periodic basis. 3. Protected Species Monitoring and Reporting-Hawaiian Hoary Bats Surveys: If Hawaiian hoary bats are observed up at Mākaha Ridge Tracking Station, evaluate the results to determine if regular monitoring is required.	●	●	●	–	–	–	–	–	1. Continue to avoid and minimize effects of base infrastructure, operations, and maintenance on Hawaiian hoary bats, by ensuring that trimming or removal of woody plants greater than 15 feet (ft) (5 meters [m]) tall is conducted outside of the Hawaiian hoary bat pupping season of 1 June to 15 September to avoid impacting bat pups (PMRF BO, 2014). 2. Conduct follow-up acoustic surveys for Hawaiian hoary bats every 5 years. If bat roosting and pupping sites are of interest for management of the species, then a mist netting and tracking study could be performed if warranted (PMRF BO, 2014). 3. Work with U.S. Fish and Wildlife Service (USFWS) to develop and implement a standard operating procedure (SOP) for bat roosting surveys if base operations warrant the need to remove and trim trees greater than 15 ft (5 m) tall during the Hawaiian hoary bat pupping season (PMRF BO, 2014).	●	●	●	●	–	–	–	–
Biological Environment: Birds	Endangered Seabird Management	1. Nocturnal Seabird Fallout Monitoring and Management: Consult with USFWS regarding fallout minimization and mitigation. 2. Use of Green Lights and Light Shielding to Protect Seabirds: Install and operate green bulbs, when plausible. Where green lights are not feasible, include shielding of white lights, install motion sensor lights, and determine areas where lights may be safely turned off.	●	●	●	–	–	–	–	–	1. Continue to promote base-wide awareness and implementation of the PMRF Dark Skies Program (PMRF BO, 2018) through early annual trainings. 2. Continue to improve the Dark Skies Program lighting waiver system and grant standing waivers where applicable to stream-line the waiver process. 3. Continue Dark Skies implementation in areas adjacent to colonial nesting grounds at high elevation nesting sites during critical fledging timeframes. 4. Conduct systematic ground searches for fallen out seabirds after high-risk night operations. 5. Incorporate results of radar studies into future programs. Consider conducting additional radar studies at the Mākaha Ridge and Kōke'e sites. 6. Pursue avenues to provide funding to Save Our Shearwaters (SOS) to assist with seabird rehabilitation costs. 7. Continue to host a SOS shearwater aid station at PMRF and monitor station during business days with SOS monitoring on weekends and holidays (PMRF BO, 2014).	●	●	●	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Birds (Continued)	Endangered Seabird Management (Continued)	(Continued from above)	●	●	●	–	–	–	–	–	8. Advise various tenants on base on appropriate safety lighting that is less attractive to endangered seabirds (i.e., motion sensing lights that go off after a set time period, shielded lights, facing light away from the coast, lower lumen, and lower to the ground). 9. Provide a 10-year calendar to mission planners with high-risk dates for endangered seabird fallout clearly depicted. 10. Develop a Wildlife Friendly Lighting Guide for installation personnel and tenants to assist in planning for lighting needs.	●	●	●	–	–	–	–	–
											1. Continue to fund and implement surveys to assess mortality from tower strikes at Kōkeʻe Site C to include scavenger trials, searcher efficiency trials, and carcass searches in accordance with USFWS communication tower monitoring protocols (PMRF BO, 2018). 2. Continue to fund and implement acoustic and visual monitoring programs of communication towers at Kōkeʻe Site C for seabird strikes to inform management and provide data to be used in the re-evaluation of the Newell's shearwater (*Puffinus auricularis newelli*) portion of the PMRF Base-wide BO. 3. Minimize the potential for death or injury of Newell's shearwater due to collisions with PMRF communication towers located at Kōkeʻe Site C (PMRF BO, 2018).	–	–	●	–	–	–	–	–
											1. Coordinate with facilities owner and USFWS to address lighting issues and continue to implement the Dark Skies program to the extent possible at the facility. 2. Train staff to recognize, respond and report to any circling or downed seabirds seen at the facility.	–	–	–	–	●	–	–	–
		1. Fauna Surveys Update/Initiate. Update fauna surveys and mapping, including protected bird species, in preparation for subsequent INRMP updates. Continue to coordinate with DOFAW to collect population-monitoring data for protected species.	●	●	●	●	–	–	●	–	1. Conduct baseline fauna surveys.	–	–	–	–	–	–	●	–
											1. Conduct aerial seabird surveys of Kaʻula Island as needed for management planning to inform species presence, location and numbers. 2. Conduct land-based updates to faunal surveys on Kaʻula Island if access is safe and allowable.	–	–	–	–	–	●	–	–
	Laysan Albatross Management	1. Base-wide Predator Control: Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect Migratory Bird Treaty Act (MBTA)-protected Laysan albatross (*Phoebastria immutabilis*) on the installation. 2. Bird Aircraft Strike Hazard: Continue hazing program under the United States Department of Agriculture-Wildlife Services (USDA-WS) permit. Capture and relocate Laysan albatross found at Barking Sands to off-base locations. Continue the egg translocation at Barking Sands by removing Laysan albatross nests and placing them in incubators to be translocated to foster nests at KPNRW and on private lands. Adopt similar policies for black-footed albatross to that of Laysan albatross to balance protection of the species with BASH requirements, if nesting shall occur in the area.	●	–	–	–	–	–	–	–	1. Continue the PMRF Laysan Albatross Egg Swap program. 2. Work with partners to ensure that as many albatross eggs as possible stay on Kaua'i and find new suitable egg relocation locations. 3. Continue to translocate albatross to the north shore of Kaua'i from January-April. 4. Coordinate with DOFAW on potential new albatross release sites. 5. Closely monitor re-sights of translocated albatross by working with partners on the north shore of Kaua'i to enter data into the Airtable app database. 6. Use data analysis to assess the effectiveness of albatross translocations based on location of translocation, time of year, and whether or not the albatross is a known breeder, sub-adult, or new bird to PMRF. 7. Support research on PMRF albatross populations that increases the understanding of their behavior as it relates to the PMRF airfield. 8. Continue base-wide predator control to protect MBTA-listed species including Laysan albatross; monitor for pigs, dogs, and cats in known breeding areas prior to the albatross breeding season and increase control efforts as needed.	●	–	–	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Birds (Continued)	Wedge-tailed Shearwater Management	1. Enhance and Improve Beach Cottages Shearwater Colony: Maintain and enhance the shearwater colony. Continue to have USDA-WS remove barn owls and haze the pueo (*Asio flammeus sandwichensis*) from the area. Provide additional educational material to guests staying at the beach cottages. Consider blocking off the road behind the fenced area to vehicle traffic during the night while the birds are in residence. Consider installing a few boardwalks from the grassy area down to the beach flats. Consider installing a viewing boardwalk on the beach side of the fenced area to reduce burrow crushing. To control shearwater burrowing under beach cottages, sidewalks, and other infrastructure, unoccupied problem burrows should be crushed as soon as possible when observed. Burrows can legally be crushed anytime between burrow initiation (usually around March when the birds arrive to the colony) and when eggs are laid (during the 1st or 2nd week of June). Remove kiawe in undeveloped areas adjacent to the colony to provide additional nesting habitat. 2. Invasive Species Prevention and Control: Exclude wedge-tailed shearwater burrowing areas from any weeding or planting activities during the nesting season. 3. SOS Support and Shearwater Banding: Continue to coordinate with the Kaua'i Humane Society's SOS program along with coordinating with USFWS and DOFAW to conduct shearwater banding training at the wedge-tailed shearwater colony at Barking Sands Beach Cottages.	●	–	–	–	–	–	–	–	1. Enhance wedge-tailed shearwater habitat in areas far from the PMRF airfield and human presence and develop deterrent measures for burrows in areas of human traffic and near the airfield. 2. Research and work with facilities and Morale, Welfare and Recreation (MWR) to implement methods for discouraging wedge-tailed shearwater from burrowing in the immediate vicinity of the PMRF beach cottages. 3. Continue to implement protective measures that prevent the crushing of burrows in the beach cottages area (e.g., signage, temporary rope fencing, wooden burrow tents, outreach materials in cottages). 4. Conduct annual wedge-tailed shearwater population surveys in the Kinikini Ditch, beach cottages, and Nohili Dunes areas. 5. Work with partners to collect additional data that supports adaptive management on PMRF and regional conservation objectives for shearwater species. 6. Conduct ant surveys to assess presence of invasive ants including the little fire ants at the Nohili Dune's wedge-tailed shearwater colony. If little fire ants are detected, report to KISC and implement active control by using granular bait after fledglings have left the area. 7. Continue to host a SOS aid station at PMRF and monitor station during business days with SOS monitoring on weekends and holidays (PMRF BO, 2014).	●	–	–	–	–	–	–	–
	Endangered Hawaiian Waterbird Management	1. Base-wide Predator Control: Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect Hawaiian waterbirds within the vicinity of the ditches and oxidation ponds. 2. Waterbird Species: Initiate formal Navy participation in the State-wide waterbird counts that occur at the Barking Sands oxidation ponds in January and August. 3. Invasive Species Prevention and Control: Avoid completely clearing wetland areas (excluding the ditches) of vegetation, as dense growth provides important habitat for endangered, endemic waterbirds. 4. Oxidation Pond Improvements: Develop a plan for improvements to the oxidation ponds at Barking Sands to enhance waterbird habitat. 5. Wetlands Maintenance: Ensure proper permitting and no-net-loss of wetland acreage. 6. Kawai'ele Wetlands Waterbird Sanctuary: Continue to be involved with DLNR in the planning process for the restoration of the Kawai'ele wetland which is part of the Kawai'ele Wildlife Sanctuary located immediately east of Barking Sands. Enlist volunteers to help support wetland restoration.	●	–	–	–	–	–	–	–	1. Continue to coordinate closely with Facilities Maintenance regarding restrictions on vegetation removal practices within a 100-ft (30.5 m) radius of waterbirds or their nests. 2. Discourage waterbird presence and nesting at the oxidation pond complex by maintaining vegetation at a height of less than 6 inches and by funding the installation of exclusionary measures. 3. Continue to coordinate with Facilities Maintenance to obtain environmental data on the oxidation pond regularly to better inform causes of avian botulism outbreaks and identify high risk conditions that require management actions. 4. Coordinate with Public Works to develop oxidation pond flushing protocols in response to avian botulism outbreaks or high-risk conditions. 5. Coordinate with Facilities Maintenance on all oxidation pond complex construction and restoration plans. 6. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly. 7. Replace and improve waterbird crossing signage at PMRF as needed to reduce risk of vehicle strikes (PMRF BO, 2014), evaluate efficacy of signs, and explore new tools to reduce vehicle strikes. 8. Continue to conduct regular monitoring for Hawaiian waterbird species at Barking Sands to effectively detect and reduce impacts to nests (PMRF BO, 2014). 9. Consider implementing a waterbird banding/telemetry program to track movement, monitor nest-site fidelity, and inform management on the base.	●	–	–	–	–	–	–	–
											1. If proposed Navy operations have the potential to impact waterbirds at Ni'ihau, conduct surveys to understand habitat use and trends.	–	–	–	–	–	–	–	●

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Birds (Continued)	Nēnē Management	1. Base-wide Predator Control: Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect endangered Hawaiian geese (nēnē; Branta sandvicensis) while on the installation. 2. Natural Resources Signs: Continue to install, maintain, and update, as necessary, natural resources signs at the facility. PMRF and NAVFAC PAC Natural Resources staffs have prepared signs indicating appropriate behavior to protect and preserve threatened and endangered species and other protected species. The signs should be placed where such interactions are most likely, such as green turtle habitat at Nohili Ditch and areas of frequent Hawaiian monk seal (Neomonachus schauinslandi) activity at Barking Sands or Hawaiian goose activity.	●	–	–	–	–	–	–	–	1. Collaborate with USFWS, PMRF Air Ops, and DOFAW to continue to revise action plans for nēnē that attempt to or successfully nest on the airfield to facilitate rapid response, based on past observations and new knowledge. 2. Coordinate with USFWS, DOFAW, PMRF Air Ops, and PMRF Public Works to annually review and update the PMRF Nēnē Management Plan (PMRF BO, 2014). 3. Work with PMRF Air Ops and USDA-WS to insure nēnē hazing efforts are increased prior to and during the breeding season with the possibility of including weekends especially if a nēnē pair has been regularly observed on or near the airfield. 4. Continue to conduct regularly standardized surveys of nēnē at PMRF Barking Sands, Mākaha Ridge, and Kōke'e sites to improve detection of nēnē nests, determine habitat types that attract the species, and to update management (PMRF BO, 2014). 5. Continue to communicate with facilities maintenance personnel about nēnē nest locations and collaborate with them to develop effective protective measures for the species and ensure that no vegetation removal or other persistent disturbances occur within 100 ft (30.5 m) of nest sites and goslings to reduce risk of take. 6. Support regular outreach to base visitors and personnel on the importance of not providing food and water to nēnē (PMRF BO, 2014), and develop outreach material aimed at increasing awareness of the species. 7. For all new construction at Barking Sands, including construction for tenant or customer DoD commands or other federal agencies, concrete, asphalt, gravel, xeriscaping, or native vegetation, rather than lawn, will be installed in open areas surrounding buildings and parking areas to decrease attraction of nēnē (PMRF BO, 2014). 8. Fund habitat modification that discourages nēnē presence near roadways, the airfield, and construction sites at Barking Sands. 9. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly. 10. Continue to explore and implement strategies to reduce risk of vehicle strikes, including additional vehicle calming measures, evaluate efficacy of permanent, temporary and marquee signs, and explore new tools to reduce vehicle strikes. 11. Continue to communicate and share data with USDA-WS and DOFAW regularly. 12. Collaborate with DOFAW to have all nēnē that hatch at PMRF banded and pursue permission and permits for PMRF natural resources staff to band birds if allowable. 13. Implement priority management actions identified in the PMRF Nēnē Management Plan. Work with partners to identify potential opportunities to collaborate on off-installation conservation efforts or research opportunities to inform nēnē management at PMRF and ensure a holistic approach that aligns with regional priorities for nēnē protection and recovery (PMRF BO, 2014).	●	●	●	–	–	–	–	–
		1. Predator Control: Update funding annually to protect nēnē if it is determined that predators are affecting nēnē nests at the Mākaha Ridge Tracking station.	–	●	–	–	–	–	–	–									

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Birds (Continued)	Migratory Bird Management	1. Bird Aircraft Strike Hazard: Continue hazing program under the USDA-WS permit. 2. Protection of Wildlife from Potential Electromagnetic Radiation (EMR) Impacts: Follow SOP requirements that ensure existing radars do not radiate lower than at least 4 to 6 degrees above horizontal to preclude EMR impacts on wildlife.	●	–	–	–	–	–	–	–	1. Continue to incorporate monitoring of shorebirds, cattle egrets, and black-crowned night herons (*Nycticorax nycticorax*) at wetland sites, and observations of barn owls, to inform control measures for non-native species and protective measures for native species. Conduct pueo surveys in high-quality habitat. 2. Keep track of any newly established non-native songbird species at PMRF and their numbers by participating in the annual Audubon Christmas Bird Count. 3. Continue to advise development projects at PMRF that have potential to negatively impact native MBTA species habitat on how to avoid impacts. 4. Advise development projects at PMRF on how to avoid creating habitat and foraging availability for non-native MBTA species at PMRF especially near the PMRF airfield. 5. Continue to promote base-wide awareness and implementation of the PMRF Dark Skies Program (PMRF BO, 2018) through early annual trainings.	●	●	●	●	–	–	–	–
		1. Fauna Surveys Update/Initiate. Update fauna surveys and mapping, including protected bird species, in preparation for subsequent INRMP updates.	●	●	●	●		●	●											
		1. Nocturnal Seabird Fallout Monitoring and Management: Consult with USFWS regarding fallout minimization and mitigation. 2. Use of Green Lights and Light Shielding to Protect Seabirds: Install and operate green bulbs, when plausible. Where green lights are not feasible, include shielding of white lights, install motion sensor lights, and determine areas where lights may be safely turned off.	●	●	●	–	–	–	–	–										
		N/A.	–	–	–	–	–	–	–	–	1. Coordinate with facilities owner and USFWS to address lighting issues and continue to implement the Dark Skies program to the extent possible at the facility. 2. Train staff to recognize, respond to, and report any circling or downed seabirds seen at the facility.	–	–	–	–	●	–	–	–
		N/A.	–	–	–	–	–	–	–	–	1. Continue implementing all military training SOPs.	●	●	●	–	–	●	–	–
		1. MBTA Compliance: Continue to limit inert ordnance target training on the predetermined area (~9 percent of the land area) at the southern tip of Ka'ula Island.	–	–	–	–	–	●	–	–	1. Conduct aerial seabird surveys of Ka'ula Island as needed for management planning to inform species presence, location, and numbers.	–	–	–	–	–	●		–
Biological Environment: Insects	Native Insects and Protected Pollinators Management	1. Landscape Design: Continue to utilize sterile soil to prevent the introduction of pests such as nematodes and weeds. 2. Landscape Design: Use native plants whenever possible and use sterile soil to prevent the introduction of weeds. Plant a variety of native trees, shrubs, and ground covers. Continue to evaluate all future landscape design and installation projects for the potential to include habitat restoration and the use of native plants whenever possible. 3. Base-wide Predator Control: Continue use of cage traps and other non-chemical methods as the primary means of predator control to prevent adverse effects to pollinators. See also INRMP Appendix D – Legal Requirements for laws and policies related to pesticide and herbicide application.	●	●	●	●	–	–	●	–	1. Conduct species inventory at additional PMRF sites, and conduct monitoring for native invertebrate species. Consider coordinating with USFWS entomologists to identify priority species and provide expertise and training to natural resources staff. 2. Coordinate all use of pesticides by natural resources staff with the NAVFAC PAC PMC and ensure that all applicators have received appropriate certifications. 3. Ensure that treatments will not have negative effects on protected species. 4. Prohibit the use of neonicotinoids at PMRF sites. 5. Ensure that plant communities found to support native terrestrial invertebrate species are protected, enhanced, and that construction or removal projects have minimal effects on these populations.	●	●	●	●	–		●	–
	Hawaiian Picture-wing Fly	1. Hawaiian Picture-Wing Fly: Perform surveys for the recently listed *Drosophila sharpi*. When these surveys occur, *Drosophila musaphilia* should also be included.	–	–	●	–	–	–	–	–	1. Conduct periodic surveys every 5 years to assess presence/absence of endangered Hawaiian picture-wing fly species at and directly adjacent to PMRF Kōke'e sites. 2. Conduct invasive plant removals in areas near known Hawaiian picture-wing fly habitat to promote native tree health and propagation and reduce introductions of invasive species into adjacent habitat due to Navy operations.	–	–	●	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Environment: Marine Mammals and Reptiles	Hawaiian Monk Seal Management	1. Base-wide Predator Control: Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect endangered Hawaiian monk seals. 2. Hawaiian Monk Seal Protection: Continue to employ several SOPs to protect, record and report monk seals to DAR that haul out on the beach or are observed injured or struggling. Continue to restrict recreational shore fishing to designated areas to reduce monk seal entanglement. Continue to restrict dogs off leashes along the beach to limit the potential for seal-dog interactions. Continue to ensure training activities do not affect hauled-out seals at PMRF beaches. Continue to prohibit vessel landing on Ka'ula Island due to UXO concerns. 3. Fishing Survey: Monitor level of fishing activity and ecosystem health, as it relates to fish stock abundance, monk-seal hookings, and marine debris, through surveys investigating level of fishing activity. 4. Natural Resources Signs: Place signage in areas of frequent Hawaiian monk seal activity at Barking Sands. 5. Hawaiian Monk Seal Protection: Continue to maintain training and contacts with National Oceanic and Atmospheric Administration's (NOAA's) Marine Mammal Stranding Network and execute a quick response to any monk seal beaching or entanglement events on PMRF beaches or nearshore waters.	●	–	–	–	–	–	–	–	1. Continue to ensure that Security reports sightings of monk seals during daily patrols at PMRF beaches and erects signage and barricades if observed where people frequent. 2. Continue to report observations of hauled-out Hawaiian monk seals to NOAA as soon as possible and provide high quality photos to assess seal health, ID, and aid in population abundance monitoring. 3. Collaborate with NOAA to implement Hawaiian monk seal recovery objectives when feasible. 4. Continue base-wide predator control to remove non-native predators, including feral cats and collaborate with partners on studies regarding toxoplasmosis at PMRF to inform these efforts; conduct outreach about the disease and its effects on wildlife and human health. 5. Continue to monitor for, and remove, marine debris as part of regular monk seal surveys at beaches frequently used by hauled out monk seals. 6. Continue to develop and install signage and implement trainings, educational materials, and presentations for security, other appropriate personnel, and the public on monk seals and the proper response to wildlife related observations. 7. Continue surveys and measuring of nearshore water quality parameters at six sites at Barking Sands (each with three sampling points) for habitat conservation and protection purposes. 8. Conduct regular surveys approximately five times per week of beaches near the Nohili Ditch outfall and Diver's Landing for monk seal presence, and all other beaches approximately twice per week.	●	–	–	–	–	–	–	–
		1. Monk Seal Monitoring: Identify and monitor individual monk seals to establish tracking trends such as abundance, survival, birth rate and movements between islands. Support a photography and data collection program to document where and when monk seals are observed. Train Ni'ihau residents on monk seal monitoring, photography, and data collection at a location determined by Ni'ihau Ranch.	–	–	–	–	–	–	–	●	1. Continue to conduct twice-yearly surveys through partnership with NOAA Fisheries for Hawaiian monk seals on Ni'ihau. 2. Continue to adhere to management strategies implemented by Ni'ihau Ranch on Ni'ihau, including restricted access, feral animal control, and not allowing dogs or ATVs on the island.	–	–	–	–	–	–	–	●
		1. Hawaiian Monk Seal Protection: Prohibit vessel landing on Ka'ula Island due to UXO concerns. Limit fishing at Ka'ula Island to maintain a marine environment with ample fish biomass and reduced stray fishing lines and nets, providing a benefit to the seals. Continue to check in all sorties to the Fleet Area Control and Surveillance Facility (FACSFAC) to ensure the absence of a monk seals within the drop zone.	–	–	–	–	–	●	–	–	1. Continue implementing all military training SOPs with regards to marine mammal interactions.	●	–	–	–	●	●	–	–
	Whale and Dolphin Management	1. Humpback Whales and other Cetaceans: Continue to participate in the NOAA Ocean Count on the last Saturday of December, January and February of each year.	●	–	–	–	–	–	–	–	1. Continue to report all observations of marine mammal strandings or deaths to National Marine Fisheries Service (NMFS) and assist in response efforts. 2. Improve coordination and communication regarding marine mammal strandings and other observations of note with NAVFAC PAC and Commander, United States Pacific Fleet (COMPACFLT).	●	–	–	–	–	●	–	●
											1. Implement and collaborate with partners on studies regarding toxoplasmosis at PMRF to inform predator control efforts and conduct outreach about the disease and its effects on wildlife and human health. 2. PMRF will cooperate with the Agribusiness Development Corporation (ADC) to ensure compliance with the Clean Water Act (CWA) and other environmental regulatory requirements where there is a nexus with federal monies or property.	●	–	–	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Biological Environment: Marine Mammals and Reptiles (Continued)	Sea Turtle Management	1. Sea Turtle Management: Continue logbook of sea turtle (most likely green turtles; *Chelonia mydas*) observations including sightings, tracks, and nesting events. Continue to protect, monitor, and record any sea turtle nests. Continue SOPs which require that beaches are surveyed one hour prior to beach landing exercises, and if sea turtles are present, then delay training until the animal(s) voluntarily leave the area. 2. Natural Resources Signs: Continue to install, maintain, and update, as necessary, green turtle habitat signs at the facility.	●	–	–	–	–	–	–	–	1. Continue to ensure daily patrols of PMRF's beaches for sea turtles to collect observational data and check for stranded, injured, or entangled turtles are conducted by partnering with Security. 2. Conduct surveys by biologists approximately five times per week of beaches near the Nohili Ditch outfall and Diver's Landing for sea turtle presence and ensure that marine surveys in nearshore areas quantify sea turtles and potential foraging or resting habitat. 3. Continue to survey beaches for sea turtle nesting activity during the nesting season, protect all nests observed with ropes and signage, mitigate light attraction issues on beaches, and coordinate with DAR to excavate nests. 4. Continue to encourage good communication between Security and natural resources regarding sea turtle activity on PMRF beaches to reduce negative impacts to the species from Security beach patrol vehicles. 5. Develop and use USFWS-approved outreach, educational materials, and signage with the objective to educate and provide information to residents, recreational users, visitors, and staff about proper procedures and acceptable activities within sea turtle habitat and how to act when coming in contact with sea turtles. 6. Continue to implement surveys to ensure no sea turtles are in affected areas during training exercises or in-water work. 7. An interagency agreement was established in fiscal year (FY) 23 to allow the Navy to partner with the NMFS Pacific Islands Fisheries Science Center (PIFSC) to deploy SPLASH tags (GPS and Argos) on sea turtles and will be pursued at PMRF. 8. An appendix was added to the INRMP specific to sea turtle management actions at PMRF. 9. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.	●	–	–	–	–	–	–	–
		N/A.	–	–	–	–	–	–	–	–	1. Continue implementing all military training SOPs with regards to sea turtle interactions.	●	–	–	–	●	●	–	–
		1. Sea Turtle Monitoring: Support a program to document where and when sea turtles are observed on land, as well as in sea turtle nests. Train Niʻihau residents on sea turtle monitoring and sea turtle nest data collection at a location determined by Niʻihau Ranch.	–	–	–	–	–	–	–	●	1. If proposed Navy operations have the potential to impact sea turtles or habitat, conduct surveys for listed sea turtles and nesting activity on Niʻihau to understand habitat use and trends. 2. Establish a monitoring program for the nearshore environment of PMRF to inform future management decisions and monitor changes over time. 3. Partner with DLNR DAR to incorporate regular monitoring site(s) in PMRF's nearshore waters into the State's regular monitoring schedule, as feasible.	–	–	–	–	–	–	–	●
Biological Environment: Coastal and Nearshore Resources	Fish, Essential Fish Habitat, and Corals	1. Marine Resources and Fisheries Survey Update: Fund a follow-on survey to the 2006 marine resources and fisheries survey of the coastal/marine environment at Barking Sands. 2. Fishing Survey: Level of fishing activity and ecosystem health, as it relates to fish stock abundance, monk-seal hookings, and marine debris, should be monitored through surveys investigating level of fishing activity. A fee for fishing-gear rental and for fishing access to base should be instituted to cover costs.	●	–	–	–	–	–	–	–	1. Establish a monitoring program for the nearshore environment of PMRF to inform future management decisions and monitor changes over time. 2. Partner with DLNR DAR to incorporate regular monitoring site(s) in PMRF's nearshore waters into the State's regular monitoring schedule, as feasible.	●	–	–	–	–	–	–	–

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Social and Cultural Environment	Land Management	1. Base Planning: A routine procedure should continue to be implemented to assure coordination among facilities planners, resource managers, SOH, and county officials. Continue to utilize the PMRF Environmental Coordinator as the point of contact to provide relevant information on issues with potential to affect wildlife and native habitat, such as military operations and training, and tower and other construction and repair projects. 2. Protection of Natural Resources in Undeveloped Areas: Review construction and maintenance projects at PMRF to ensure contractors are aware of guidelines to avoid impacting sensitive vegetation.	●	●	●	●	–	–	●	–	1. Continue to implement coordination among facilities planners, NAVFAC and COMPACFLT resource managers, FACSFAC and Data Collection and Scheduling Tool (DCAST) managers, SOH, and county officials. 2. The PMRF IEPD and NRM should continue to be the points of contact to provide relevant information on issues with potential to affect wildlife and native habitat, such as military operations and training, and tower and other construction and repair projects.	●	●	●	●	●	●	●	●
		3. Base Planning: Continue to follow standard methods to control erosion for all new construction projects. The proposed Maritime Directed Energy Test Center at Barking Sands should be sited to avoid protected species and their habitat.	●	–	–	–	–	–	–	–									
		1. Base Planning: Site the FORCEnet integration laboratory in a previously disturbed area. Avoid periods of bird fallout and, if that is not practicable, the Navy should conduct monitoring for seabird fallout near the FORCEnet integration laboratory portable trailer activities and antennas as appropriate.	–	●	●	–	–	–	–	–									
		1. Base Planning: Review locations and plans for any new equipment towers to minimize effects on protected species and their habitat.	●	●	–	–	–	–	–	–									
	Outdoor Recreation	1. Fishing, Surfing, Windsurfing, and Beach Activities: Continue to provide beach access through Barking Sands for surfing and boating to PMRF employees, active duty, reserve, and retired military and dependents, as well as any U.S. citizen who possess a valid annual PMRF Recreation Pass. 2. Dissemination of Pertinent Natural Resources Information to Recreation Pass Program Applicants: Provide PMRF Recreation Pass Program applicants with information on invasive species, aquatic hitchhikers, and other pertinent natural resources information as part of the application process. 3. Beach and Dune Access Restrictions: Continue all beach and dune access restrictions. Monitor for excessive traffic at areas adjacent to the beach cottages and other high-use recreational areas and temporarily cord off areas to re-establish the vegetation, if necessary.	●	–	–	–	–	–	–	–	1. Continue to provide public opportunities for natural resource related outdoor recreation where it does not conflict with public health and safety, the military mission, or security. 2. Ensure that the degree of access allowed for outdoor recreation is consistent with conservation of natural resources. 3. Continue to promote awareness among recreational users of the importance of resource stewardship and promote a sense of pride in the natural environment of PMRF. 4. Provide PMRF Recreation Pass Program applicants with information on pertinent natural resources information as part of the application process. 5. Continue to restore and enhance natural and cultural resource assets at PMRF for public benefit and enjoyment. 6. Develop a Natural Resources Information Center to include brochures and other materials promoting self-guided nature walks and bird watching opportunities on base and in the surrounding areas. Information on threats to native Hawaiian ecosystems and threatened and endangered species should be included, with particular emphasis on the introduction and spread of alien plant species and the negative effects of off-road vehicles in sensitive environments and measures that can be taken to avoid such impacts.	●	–	–	–	–	–	–	–
		1. Trial Goat Hunting. Institute a trial goat hunting program with the Barking Sand Archery Club or other organization in coordination with the DLNR DOFAW to reduce the presence of goats at the Mākaha Ridge Tracking Station.	–	●	–	–	–	–	–	–	1. Work with the PMRF Archery Club to control ungulate populations at the Kamokalā Ridge site by implementing trapping and baiting stations if the animals become a nuisance to Navy operations or pose a risk to protected species.	–	–	–	●	–	–	–	–
Other Management Actions	Data Collection and Database and Records Management	1. Integrate Natural Resources Survey Data in GIS Database: Continue to manage, integrate, access and report natural resources GIS data into PMRF GIS database. 2. Fauna Surveys Update/Initiate: continue to coordinate with DLNR-DOFAW to collect population-monitoring data for protected species. Population monitoring data should continue to be evaluated for any necessary changes or improvements in management actions. 3. Botanical Surveys and Mapping: Provide a 5-year update of botanical survey data. 4. INRMP Annual and 5-year Updates. Continue to update Navy metrics builder, meet with INRMP Working Group Members, and update document as required.	●	●	●	●	–	–	●	–	1. Ensure that natural resources staff follow established standardized monitoring and surveying procedures. 2. Continue to require GIS deliverables for all contractors, including in-house projects that follow appropriate data collection standards and ensure that all geospatial data is incorporated into the NAVFAC GeoReadiness Repository and that it complies with the Navy Data Model (NDM) adaptation of the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) for GIS database management. 3. Consider acquiring tablets or Trimble units with excel/GIS uploading capabilities that natural resources staff can utilize for data collection in the field. 4. Acquire the ability to upload GPS data directly to government computers. 5. Coordinate data sharing with natural resources partner agencies USFWS, DLNR and NOAA; coordinate common data collection formatting as possible.	●	●	●	●	●	●	●	●

Table 2 Alternatives Comparison (Continued)

Environment	Resource Category	2010 INRMP Management Actions (No Action Alternative)	BS	MR	KS	KR	PA	KI	MK	NI	2023 INRMP Management Actions (Preferred Alternative)	BS	MR	KS	KR	PA	KI	MK	NI
Other Management Actions (Continued)	Natural Resources Awareness, Education, and Training	1. Natural Resources Information Center: Continue to distribute natural resources information to reporting personnel, residents, and base visitors through a variety of printed materials and venues. Continue to provide natural resource information brochures to the Personnel Support Center for inclusion in "Welcome Aboard" packages given to all Navy personnel and family members. 2. Educational Outreach Partnership: Consider an educational outreach partnership between NOAA, west side kupuna, and PMRF staff, to develop a combined natural resource and cultural resource program focused on the beachfront in a recovering and remote location on Barking Sands. 3. Enhance and Improve Beach Cottages Shearwater Colony: Provide additional educational material to guests staying at the beach cottages. 4. Natural Resources Signs: Continue to install, maintain, and update, as necessary, natural resources signs at the facility.	●	–	–	–	–	–	–	–	1. Continue to present natural resources concerns and activities at quarterly indoctrination presentations or other means prior to personnel conducting activities. 2. Continue to implement trainings, educational materials, and presentations for security and other appropriate personnel on the proper response to wildlife related observations, and avoidance of driving on coastal strand vegetation and the culturally significant areas of base such as Nohili Dunes. 3. Ensure that standard reporting and response protocols for wildlife related observations are included in all security personnel vehicles.	●	●	●	●	●	●	●	●
											1. Initiate a bi-annual natural resources newsletter about issues of concern as well as good news stories sent out through email, bulletin board, and social media, in coordination with the PMRF Public Affairs Office. 2. Provide the Public Affairs Office with flyers to send out by email and for posting on bulletin boards around base regarding seasonally appropriate natural resources issues. 3. Include natural resources information in Welcome Aboard packages for incoming Navy personnel. 4. Coordinate and participate in volunteer events, educational programs, and natural resources related site visits from local schools. 5. Continue to coordinate with MWR to place natural resources related information in beach cottages, implement informational signage, and consider creating permanent natural resources displays near the beach cottages, Majors/Waiapua'a Bay and the MWR visitor check-in building. 6. Continue to work with base personnel on signage and other outreach and enforcement efforts to deter illegal feeding of animals as well as misuse of recreational areas.	●	●	●	●	●	–	–	–
		5. Law Enforcement: Continue to use existing law enforcement at its installations. Any incidents related to natural resources should continue to be reported to the PMRF Environmental Coordinator.	●	●	●	●	–	–	●	–	1. During daily security patrols, Security Forces shall report particular sightings of note of rare, threatened, or endangered species that may occur on base or in the nearshore environment. 2. Security forces provide a single point of contact for environmental emergencies such as injured bird response, which in turn shall conduct proper notifications to Environmental staff. 3. Security Forces shall enforce beach restrictions to protect special status species 4. PMRF's designated game warden shall oversee the PMRF Archery Club and coordinate hunts with PMRF Command and DOFAW.	●	●	●	●	●	–	–	–

Notes: **BS** = Barking Sands, **MR** = Mākaha Ridge, **KS** = Kōke'e Sites, **KR** = Kamokalā Ridge, **PA** = Port Allen, **KI** = Ka'ula Island, **MK** = Mauna Kapu, **NI** = Ni'ihau Island.

2.3 Summary of Impacts

Table 3 provides a summary of impacts by location and resource. Please refer to each respective location and resource for the full impact analysis. The methodology used to determine the level of impact is described in Section 3.2.

Table 3 Summary of Impacts

Environment	Resource Category	Barking Sands No Action	Barking Sands Preferred	Mākaha Ridge No Action	Mākaha Ridge Preferred	Kōkeʻe Sites No Action	Kōkeʻe Sites Preferred	Kamokalā Ridge No Action	Kamokalā Ridge Preferred	Port Allen No Action	Port Allen Preferred	Kaʻula Island No Action	Kaʻula Island Preferred	Mauna Kapu No Action	Mauna Kapu Preferred	Niʻihau Island No Action	Niʻihau Island Preferred
Physical	Geology and Soils	BEN	BEN	BEN	BEN	NONE	NONE	NONE	NONE	—	—	—	—	—	—	—	—
	Water Resources	BEN	BEN	BEN	BEN	NONE	NONE	NONE	NONE	—	—	—	—	—	—	—	—
	Natural Hazards	BEN	BEN	—	—	—	—	NONE	BEN	—	—	—	—	—	—	—	—
	Climate Change	BEN	BEN	—	—	—	—	—	—	—	—	NONE	NONE	—	—	NONE	NONE
Biological	Vegetation	BEN	BEN	BEN	BEN	BEN	BEN	BEN	BEN	—	—	—	—	—	—	—	—
	Nuisance and Invasive Animals	BEN	BEN	BEN	BEN	NONE	BEN	NONE	BEN	—	—	NONE	BEN	—	—	—	—
	Bats	BEN	BEN	BEN	BEN	BEN	BEN	NONE	BEN	—	—	—	—	NONE	BEN	—	—
	Birds	BEN	BEN	BEN	BEN	BEN	BEN	—	—	NONE	BEN	BEN	BEN	—	—	—	—
	Insects	BEN	BEN	BEN	BEN	BEN	BEN	—	—	—	—	—	—	—	—	—	—
	Marine Mammals, Marine Reptiles, and Other At-risk Marine Species	BEN	BEN	—	—	—	—	—	—	—	—	BEN	BEN	—	—	BEN	BEN
	Coastal and Nearshore Biological Resources	BEN	BEN	—	—	—	—	—	—	—	—	NONE	NONE	—	—	NONE	NONE
Social and Cultural	Land Use	NONE	NONE	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Outdoor Recreation	BEN	BEN	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Cultural Resources	NEG	NEG	NEG	NEG	NEG	NEG	—	—	—	—	—	—	—	—	—	—

Notes: BEN = Beneficial, NONE= No Impact, NEG= Negligible, — = eliminated from further analysis in this section.

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3. Affected Environment and Environmental Consequences

3.1 Introduction

Chapter 3 describes the current condition of the physical, biological, and social environments in the project area, which serves as a baseline for comparing the potential beneficial or detrimental impacts of each alternative.

In compliance with NEPA, CEQ guidance, and Navy guidelines, this EA analyzes only those resource areas potentially subject to impacts. In cases where initial screening identified no impact for an individual resource at a given facility, the resource was not included for further analysis. Section 3.2.3 summarizes resources not carried forward for detailed analysis.

In some cases, even if initial screening determined there were no impacts to a resource, this analysis provides a detailed discussion of the resource because of its importance for site management, cultural significance, or biological value. In those instances, a description of the affected environment is included for the benefit of the reader and resource managers.

3.2 Methods for Determining Level of Impact

3.2.1 Effects Analysis

Evaluation of the effects of the Proposed Action on each resource (e.g., vegetation, birds, recreation) is based on the affected area, the degree of the effect (the extent of a measurable change to the resource), the duration of the effect (short-term versus long-term), and the nature of the effect as either adverse or beneficial. Because plan implementation would involve ongoing actions, this analysis assumes a long-term duration of the impact for all resources. Table 4 defines impact criteria for this analysis, which provide a consistent methodology for assessment of potential effects across resources and project areas.

Table 5 summarizes the impact level for each resource, based on the defined assessment criteria. This analysis compares the impacts of the Preferred Alternative against the No Action Alternative, which serves as the baseline scenario.

Table 4 Methods for Determining the Level of Impact

Impact Assessment Criteria	Criteria Category	Criteria Category Description
Degree of Effect	Low	A change in the resource condition is minimal and does not noticeably alter the resource's function in the environment.
Degree of Effect	Medium	A change in the resource condition is measurable or observable, and an alteration in the environment is noticeable and detectable.
Degree of Effect	High	A change in a resource condition is measurable or observable, and the alteration in resource's function is clear and consistently observable.
Affected Area	Local	Impact is limited geographically and would not extend to a broad region or broad sector of the resource population.
Affected Area	Regional	Impact extends beyond the project area, affecting the immediate project area, into the area of concern, and potentially the entire region.
Affected Area	State/Island Extent	Impact would potentially affect resources or populations in the entire island or beyond.
Resource Value	Common	The affected resource is considered usual or ordinary in the region, is not depleted, and is unprotected by legislation. The resource does not fill a distinctive or irreplaceable role in the region.
Resource Value	Important	The affected resource is protected by legislation other than the ESA, e.g., Migratory Bird Act, and/or fills a distinctive role in the local area or region that is important or irreplaceable.
Resource Value	Unique	The affected resource is listed as threatened or endangered (or proposed for listing) under the ESA or is depleted either within the locality or the region. The portion of the resource affected fills a distinctive ecosystem role within the locality or the region.
Duration	Temporary	Impact is intermittent, infrequent, and/or typically last less than 1 month.
Duration	Interim	Impact is frequent or extends for long periods of time. This includes longer term projects.
Duration	Long-term	Impact is permanent, or duration of the project is ongoing, and lasts for a period longer than 1 year.

Table 5 Summary Impact Levels

Impact Level	Description of Impact Level
Beneficial	Plan implementation would improve condition of a given resource, preserve or increase resource availability to the public, or increase the population of an important or unique resource population. Change can be of any magnitude but must be interpreted as a beneficial impact to the resource area of concern. Effect can be of any geographic extent. Context is dependent on the resource, e.g., a beneficial impact on vegetation can be an increase in the population of native or endangered (unique) species or a decrease in the population of invasive (often common) species. Impact can be of any duration, although it generally is improved long term.
No Impact	No effect of the proposed project on the resource for any criterion when compared to the No Action Alternative. Actions involve continuation of previously implemented INRMP management objectives and strategies, and/or actions involve the implementation of new or increased monitoring measures.
Negligible	Impacts are generally low in intensity (cannot be measured or observed), are of localized extent, and do not affect important or unique resources. Impact is either temporary or interim.
Minor	Impacts are unlikely but possible, and/or tend to be low in intensity, are local or regional in extent, and common resources may experience more intense impacts, unique resources are not impacted. Impact duration is either temporary or interim.
Moderate	Impacts are unavoidable with mitigation measures, may be of medium or low intensity, with potential for local or regional impacts. Resources are important in context. Impact duration is interim or long-term.
Major	Impacts are generally medium or high intensity, long-term or permanent in duration, of a regional or island wide extent, and negatively affect important or unique resources. Involves an irrevocable commitment of a unique resource. Impact duration is long-term.

3.2.2 Cumulative Effects with Other Reasonably Foreseeable Future Actions

This analysis considers additive impacts from Reasonably Foreseeable Future Actions (RFFAs) that may occur later in time or farther removed in distance from the Proposed Action but that have a reasonably close causal relationship to the Proposed Action. This analysis includes a review of public documents prepared by federal, state, and local government agencies, management plans, land use plans, and other planning related studies to determine potential effects from RFFAs that could combine with the potential effects of the Proposed Action. This analysis also includes a search of the SOH Office of Planning and Sustainable Development EA/EIS database to determine whether analyses of any properties adjacent to the PMRF facilities were completed and published for RFFAs. Table 6 provides a list of RFFAs relevant to this analysis. This list includes only those projects with a reasonably close causal relationship to the Proposed Action (the Preferred Alternative in this EA). Future actions with no potential to cause effects that could combine with effects of the Proposed Action do not appear in Table 6 since the analysis of those RFFAs does not forward the goal of informed decision-making. The resource analyses for each affected project location include evaluation of additive impacts from the RFFAs listed in Table 6.

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Table 6 Reasonably Foreseeable Future Actions

Project/Activity	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Power Grid Consolidation [1]	Barking Sands	Navy	Power Grid Consolidation, Range and Airfield Operations District and Personnel Support District.	Ongoing
Environmental Restoration Plan [2]	All facilities	Navy	Identifies Comprehensive Environmental Response, Compensation, and Liability Act and Resource Conservation and Recovery Act releases, as well as releases under related provisions; reports releases and recommends site restoration practices.	Ongoing
State Wildlife Action Plan [2]	All facilities	DLNR	Addresses threats to, and conservation needs of native flora and fauna.	Ongoing
Biosecurity Plan for Micronesia and Hawai'i [2]	All facilities	Navy	Recommends actions to address threats from non-native/invasive species.	Ongoing
Hawaiian Bird Conservation Action Plan [2]	All facilities	USFWS, Pacific Rim Conservation, DOFAW	Identifies research needs, primary threats, and conservation goals for Hawaiian birds that are in critical need of conservation.	Ongoing
Kawai'ele Bird Sanctuary [2]	Barking Sands	DLNR DOFAW	Continuance of typical activities, including sand mining for wetland and coastal upland restoration.	Ongoing
Advanced Radar Detection Laboratory (ARDEL) [2,3]	Barking Sands	Navy	Operation of the Advanced Radar Facility.	Ongoing
Implementation of the Integrated Cultural Resources Management Plan (ICRMP) [3]	All facilities	Navy	Preserve, protect, and enhance cultural resources.	Ongoing
Long-Range Missile Tests [3]	To Be Determined (TBD)	Missile Defense Agency	Several missile tests/launches are expected to occur into the future.	Ongoing
Commercial Wind Energy Development [4]	O'ahu	Various	Three offshore wind projects have been proposed for federal waters around O'ahu.	Proposed
Commercial Fishing Activities [4,5]	Barking Sands, Ka'ula, Ni'ihau	Various Commercial Vessels	Twenty major fisheries in Hawaiian waters include tuna, billfish, bottom fish, other species of pelagic fish, and a smaller invertebrate fishery.	Ongoing
Maritime Traffic [4,5]	Barking Sands, Ka'ula, Ni'ihau	Various Commercial Vessels	Ten harbors located on six major Hawaiian Islands serve the commercial cargo, passenger, and fishing industries. Two major points on Kaua'i are Nāwiliwili and Port Allen (both are small harbors).	Ongoing
Research Activities [5]	Barking Sands, Ka'ula, Ni'ihau	Various Vessels	Research and evaluation of fishery-dependent data to provide analyses of fishery dynamics and to understand factors affecting catch of non-target, associated, and dependent species (e.g., bycatch, and take of protected species).	Ongoing
Ongoing base infrastructure, operations, and maintenance activities [6]	All facilities	Navy	Ongoing activities at PMRF facilities result in incidental take of Newell's shearwaters. A BO was issued by USFWS for these activities.	Ongoing

Sources:

[1] MILCON Database (DoD 2018).

[2] 2023 INRMP (NAVFAC PAC 2022).

[3] HRC Final EIS (DoN 2008a).

[4] "Hawai'i-Southern California Training and Testing EIS/Overseas EIS" (DoN 2018).

[5] Pacific Islands Fisheries Science Center, Programmatic Environmental Assessment (URS Group 2015).

[6] USFWS; BO (USFWS 2018).

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3.2.3 Resources Not Carried Forward for Analysis

Subject matter experts concluded that the No Action Alternative and the Preferred Alternative would have no impact on the resources listed in Table 7. Therefore, this EA limits analysis of those resources to the screening-level analysis summarized in Table 7 below. CEQ guidance supports this approach, which serves to streamline the analysis, provide clarity for the reader, and reduce the document length.

Table 7 List of Resources Eliminated from Further Analysis

Resource	Description and Justification for Elimination
Air Quality	The U.S. Environmental Protection Agency (USEPA) assesses air quality based on the concentrations of principal pollutants, called "criteria pollutants," which include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO2), ozone, suspended particulate matter less than or equal to 10 microns in diameter (PM10), fine particulate matter less than or equal to 2.5 microns in diameter (PM2.5), and lead (Pb). CO, SO_2, Pb, and other particulates are emitted directly into the atmosphere from emissions sources. Under the Clean Air Act, the USEPA established National Ambient Air Quality Standards (NAAQS) (40 C.F.R. part 50) for these pollutants. Areas that are and have historically been in compliance with the NAAQS are designated as attainment areas. Areas that violate a federal air quality standard are designated as non-attainment areas. In the SOH, the most common criteria air pollutant in exceedance of NAAQS is SO_2. This exceedance is due to volcanic activity on Hawai'i Island and is considered a "natural excluded event pollutant"; there are no designated non-attainment areas for criteria air pollutants in the State. Air quality is not addressed in the INRMP as a management objective; thus, the EA No Action and Preferred Alternatives do not include any actions specific to air quality. Therefore, air quality was not addressed in this EA.
Airspace Management	The No Action and Preferred Alternatives are entirely land-based. Airspace usage associated with training and testing at PMRF and its other installations is evaluated in the HRC EIS/OEIS (DoN 2008a) and complies with SOPs and Federal Aviation Administration requirements on airspace use. The use or modification of airspace would not occur as part of this project and no hazards to air navigation, or obstructions, would be introduced through the implementation of either alternative, therefore airspace management was not addressed in this EA.
Noise	Noise impacts from ongoing activities associated with training and testing at PMRF are evaluated in the HRC EIS/OEIS (DoN 2008a) and HSTT EIS/OEIS (DoN 2018). While the HRC/HSTT EIS/OEIS identifies noise as a potential impact associated with training and testing, these impacts are not addressed in the INRMP, and therefore are not addressed in this EA.
Infrastructure	The implementation of the INRMP would have no impact on public infrastructure, including but not limited to public utilities, telecommunication systems, and municipally separate storm water systems, therefore, were not carried forward for further analysis in this EA.
Transportation	Transportation is the movement within the area of effect of all equipment, facilities, materials, and people by ground, water, and air. The implementation of the INRMP would have no impact on existing transportation, so was not addressed in this EA.
Public Health and Safety	All resource management actions implemented as a part of the INRMP, balance the needs of the natural resources located at the respective PMRF facilities, while also ensuring the Navy's mission is carried out. Implementation of the INRMP would have no impact on public health and safety and therefore was not analyzed in this EA.

Table 7 List of Resources Eliminated from Further Analysis (Continued)

Resource	Description and Justification for Elimination
Hazardous Materials and Wastes	An analysis of the effects of facilities' operations on the use of hazardous materials and waste is evaluated in the PMRF Enhanced Capability EIS (DoN 1998). However, the INRMP does not include any resource management actions affecting hazardous materials, therefore, hazardous materials and waste was not addressed in this EA.
Socioeconomics	Socioeconomics depict the social and economic attributes of a community through the review of characteristics such as demographics, income, employment, and housing. Socioeconomic conditions in PMRF are evaluated in the PMRF Enhanced Capability EIS (DoN 1998). Implementation of the INRMP would have no impact on socioeconomic characteristics and therefore was not addressed in this EA.
Environmental Justice	Implementation of the INRMP would not impact environmental justice. There would not be disproportionately high environmental or health impacts on off-installation low-income or minority populations from the implementation of the INRMP; therefore, this resource area was not carried forward for further analysis in this EA.
Visual Resources	Visual resources include the generally valued visual features of a landscape that are experienced by people, such as ocean or mountain views. Impacts to visual resources would include any action that impedes an existing view of a visual resource. The INRMP does not include any management objectives that would affect visual resources at any of the areas associated with PMRF; therefore, visual resources were not evaluated in this EA.

3.3 Barking Sands

The Barking Sands site is located along the western coastline of Kaua‘i on the Mānā Coastal Plain (Figure 2). The facility encompasses 2,538 ac of Navy-owned and leased land. Barking Sands is bordered to the north by Polihale State Park, to the south by Kokole Point, to the east by agricultural lands, and to the west by the Pacific Ocean. Barking Sands is the principal operations site for PMRF and supports surface, subsurface, air, and space operations. Operations activities and their associated support facilities at Barking Sands are divided into four major areas—Nohili Sector (north), Mānā Point Sector (central), Majors/Waiapua‘a Bay Sector (south), and Offshore Sector—with unique activities that dictate the constraints for that area; see Section 2.2 of the INRMP for more information.

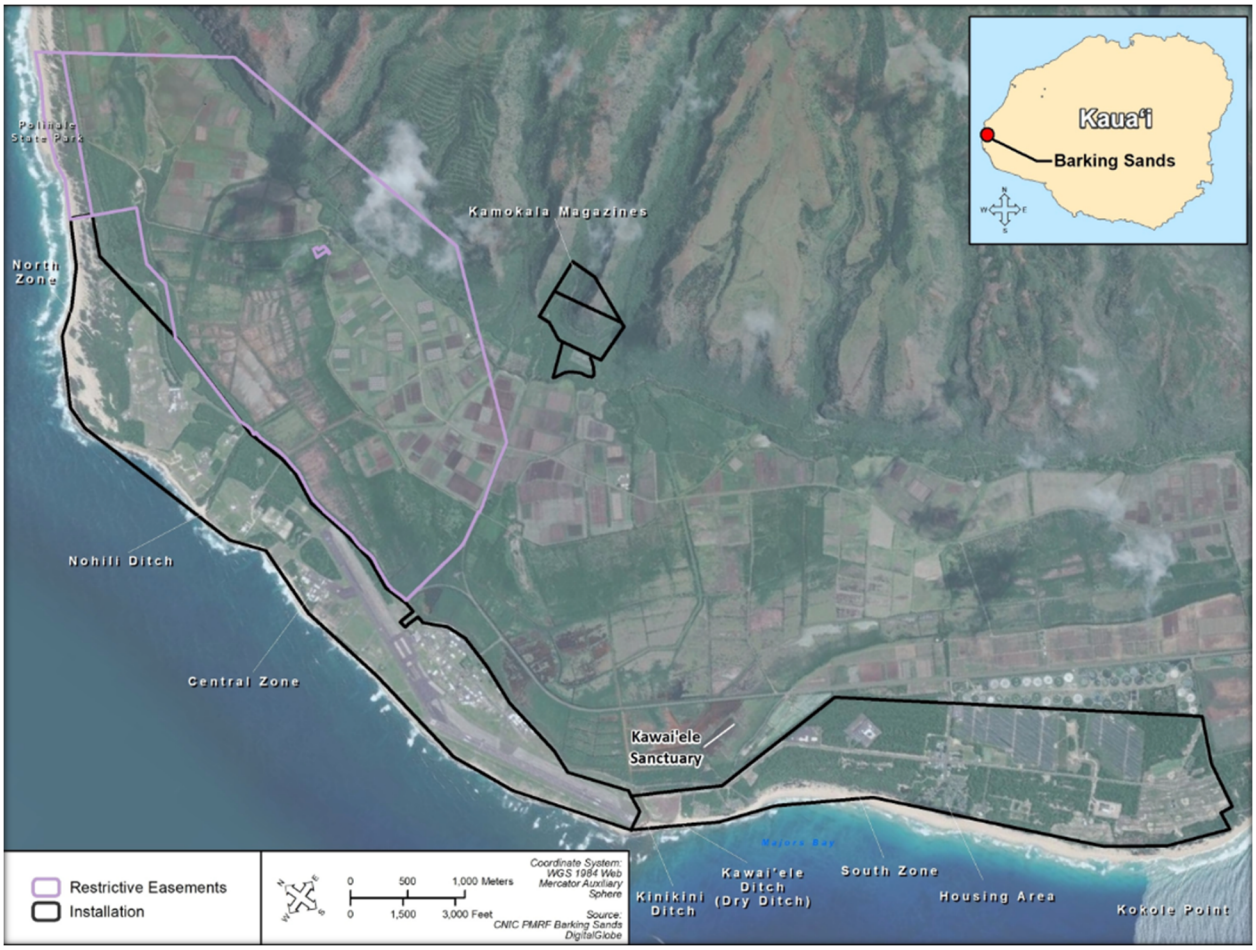

Figure 2 Barking Sands Main Zones

Although the PMRF installation boundary ends at the high-water mark (except when designated for Navy use per 33 C.F.R. § 334.1390 or 33 C.F.R. § 165.1406) and the Navy does not own submerged lands seaward of the high-water mark, PMRF monitors and manages the adjacent nearshore waters for the protection of aquatic species and habitats (NAVFAC PAC 2022). The Navy controls land access to adjacent nearshore waters and excludes boats and other watercraft during range operations and other activities (NAVFAC PAC 2022). Safety Zone (33 C.F.R. Section 165.1406) and Danger Zone (33 C.F.R. Section 334.1390) adjacent to Barking Sands are designated for Navy use and included in the INRMP study area. The Navy operates offshore underwater ranges associated with PMRF but does not have exclusive

jurisdiction over these areas. The Navy does, however, conduct annual marine mammal and sea turtle monitoring for offshore areas at PMRF (NAVFAC PAC 2022). The natural resources of the underwater ranges are discussed in the HRC EIS/OEIS (DoN 2008a) and the HSTT EIS/OEIS (DoN 2018). Relevant resource sections below discuss impacts associated with INRMP actions affecting nearshore and offshore waters at PMRF.

3.3.1 Physical Environment

3.3.1.1 Geology and Soils

This discussion of geological resources includes the topography, geology, and soil types in the project area. An area's elevation, slope, and surface features define its topography. The geology of an area may include bedrock materials, mineral deposits, and fossil remains. Soil refers to unconsolidated earthen materials that overlie bedrock or another parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility determine the ability for the ground to support structures and facilities and determine the ability of the soil to absorb and drain water.

Affected Environment

Located on the west coast of Kaua'i on the Mānā Coastal Plain, the average elevation at Barking Sands is approximately 15 feet (ft) above mean sea level (MSL), with elevations ranging from sea level to approximately 75 ft at the highest point on the northern part of the property. At the southern end of the property, the topography is relatively flat, increasing from sea level to approximately 18 ft above MSL. Most coastal areas along Barking Sands exhibit beach erosion (C. H. Fletcher and Feirstein 2009; C. Fletcher et al. 2013; University of Hawai'i Coastal Geology Group 2013). The Mānā Coastal Plain is an accretionary strand plain that resulted from a convergence of longshore sediment transport from the north swell and trade wind swells from the east; the process was also preceded by a falling sea level at the end of the late Holocene epoch (C. H. Fletcher and Feirstein 2009; C. Fletcher et al. 2013; University of Hawai'i Coastal Geology Group 2013).

Soils at Barking Sands listed from most predominant to least predominant include: Jaucas loamy fine sand (JfB), beach sands (BS), Dune land (DL), Kaloko clay (Kfa), Kaloko clay loam (Kf), and fill land (Fd) (Figure 3) (USDA NRCS 2022). The topography, geology, and soil conditions at Barking Sands are described in depth in Section 3.3.1 of the INRMP.

Environmental Consequences

No Action Alternative

Under the 2010 INRMP, PMRF implemented the following strategies directly related to erosion control for soils and coastal dunes at Barking Sands:

1. *Base Planning:* Follow standard methods to control erosion during all new construction projects.
2. *Critical Habitat and Dune Vegetation Restoration Project:* Remove invasive vegetation and restore native vegetation to improve habitat and reduce erosion.
3. *Wildland Fire Control:* Use open spray nozzles when possible, to minimize erosion and destruction of cultural resources.

The continued implementation of the 2010 INRMP would result in a beneficial impact on soil and geological resources (sand) at Barking Sands, as the management actions improve the condition and long-term availability of the resource.

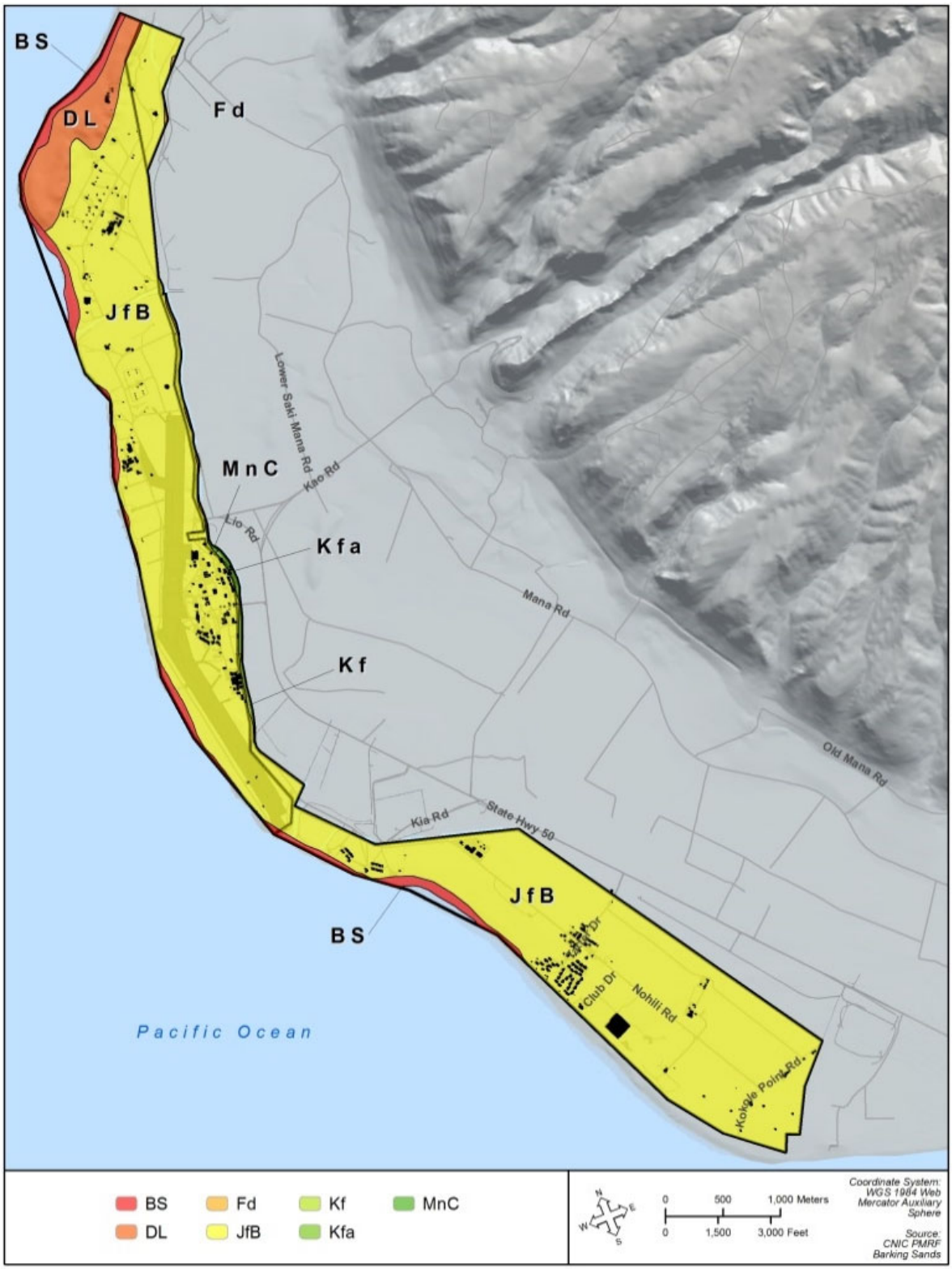

Figure 3 Barking Sands Soils

Preferred Alternative

The 2023 INRMP proposes to implement new erosion control measures at Barking Sands, to monitor and mitigate erosion, and to identify soil compaction sites. The erosion strategies include:

1. Conduct general surveys for erosion and soil compaction issues annually to prioritize restoration sites.
2. Mitigate and prevent erosion of coastal dune habitat by out-planting, establishing, and monitoring native dune building plants in areas identified as having erosion issues.
3. Implement additional security measures such as increased signage and roping off certain areas to reduce off-road vehicle presence in the Nohili Dunes area.
4. Participate in future cooperative studies assessing potential shoreline loss that threatens base infrastructure or sensitive habitats.

The proposed implementation measures would have a beneficial impact on soil and geological resources (sand) at Barking Sands compared to the No Action Alternative because new erosion monitoring and control and dune protection actions would improve the condition and long-term availability of the resource.

3.3.1.2 Water Resources

This discussion of water resources includes the physical characteristics of groundwater, surface water, nearshore marine waters, wetlands, and floodplains. Wildlife and vegetation are addressed in the Biological Resources section.

Groundwater is water that flows or seeps downward and saturates soil or rock, supplying springs and wells. Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contribution to the economic, ecological, recreational, and human health of a community or locale. A Total Maximum Daily Load (TMDL) is the maximum amount of a substance that can be assimilated by a water body without causing impairment. A water body is deemed impaired if water quality analyses conclude that exceedances of water quality standards occur.

Marine waters typically include estuaries, waters seaward of the historical height of tidal influence, and offshore high salinity waters. Marine water quality is described as the chemical and physical composition of the water that is affected by natural events and human influence. Nearshore areas include all submerged lands titled to the military and all other submerged lands that are adjacent to installations that extend from the mean high-water level, offshore to the boundary of any security areas controlled by the Military Services (DODI 4715.03). Although the PMRF installation boundary ends at the high-water mark (except when designated for Navy use per 33 C.F.R. § 334.1390 or 33 C.F.R. § 165.1406) and the Navy does not own submerged lands seaward of the high-water mark, PMRF conducts monitoring and implements proactive management to ensure conservation benefits are provided to aquatic species and habitats in waters adjacent to the installation (Miller et al. 2023).

Wetlands are jointly defined by the USEPA and U.S. Army Corps of Engineers as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Wetlands generally include “swamps, marshes, bogs, and similar areas” (33 U.S.C. §§ 1251–1387).

Floodplains are areas of low-lying ground adjacent to rivers, stream channels, large wetlands, or coastal waters. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, and nutrient cycling. Floodplains also help to maintain water quality

and are often home to a diverse array of plants and animals. In their natural vegetated state, floodplains slow the rate at which the incoming overland flow reaches the main waterbody. Floodplain boundaries are most often defined in terms of the magnitude of inundation, that is, the 100-year and 500-year flood. Floodplain delineation maps are produced by the Federal Emergency Management Agency to define the boundaries of floodplains and the level of flood risk in an area.

Affected Environment

Surface waters within the PMRF Barking Sands project area include Kinikini Ditch and Nohili Ditch and a man-made oxidation pond located on the southern portion of the site (Figure 4). Easements allow the agricultural lands to the east of PMRF Main Base to dewater via a series of interconnected drainage ditches that discharge into the Pacific Ocean through the Kawai'ele (also known as Dry Ditch), as well as the Kinikini Ditch and Nohili Ditch outfalls. Primarily, Dry Ditch is utilized for flood control during high rain events. Narrow bands of wetland habitat border portions of the ditches and pond areas. The estuarine and marine systems along the shoreline comprise the only remaining natural wetland habitat at Barking Sands (Gomez 2021).

PMRF Barking Sands borders the Pacific Ocean; the installation boundary ends at the high-water mark. The SOH Department of Health classifies the nearshore waters adjacent to Barking Sands bounded by the 100-fathom contour as Class A. As such, they are designated as protected, primarily for recreational use and aesthetic enjoyment. Class A waters may be used for other purposes that comply with the protection and propagation of fish, shellfish, and wildlife, and marine recreation. The Barking Sands Beach is listed on the *Draft 2024 State of Hawai'i Quality Monitoring and Assessment Report* impairment list, pursuant to the Clean Water Act (CWA) § 303(d). Barking Sands Coastal Waters were found to be impaired by chlorophyll-a and turbidity, and it was determined that a TMDL is needed, but has not been established (DOH CWB 2022). Barking Sands is considered low priority for initiating TMDL development within the current monitoring and assessment cycle.

Groundwater resources at Barking Sands consist primarily of a lens of brackish groundwater that floats on seawater. The aquifer is recharged by rainfall and seepage from underlying sediments. The nearest fresh groundwater source is located at the inland edge of the coastal plain, along the base of the cliffs (Figure 4). The groundwater increases in salinity from the base of the Mānā Cliffs to the Pacific Ocean (DoN 2008a).

Environmental Consequences

No Action Alternative

The 2010 INRMP contains measures to prevent or minimize the release of pollutants associated with chemical pest and invasive species management, measures to clean up marine debris, and measures to protect wetlands. The erosion control measures described above in Section 3.3.1.1 also protect water quality. In addition to erosion control measures, the 2010 INRMP contains the following measures to protect water quality:

1. *Base-wide Predator Control:* Continue use of cage traps and other non-chemical methods as the primary means of predator control to prevent contamination of water resources. See also INRMP Appendix D – Legal Requirements for laws and policies related to water quality and pesticide and herbicide application.
2. *Marine Debris Cleanup:* Continue participation in marine debris clean up events.
3. *Wetlands Maintenance:* Ensure proper permitting and no-net-loss of wetland acreage. Coordinate with SOH to maintain the irrigation ditch systems at Barking Sands.

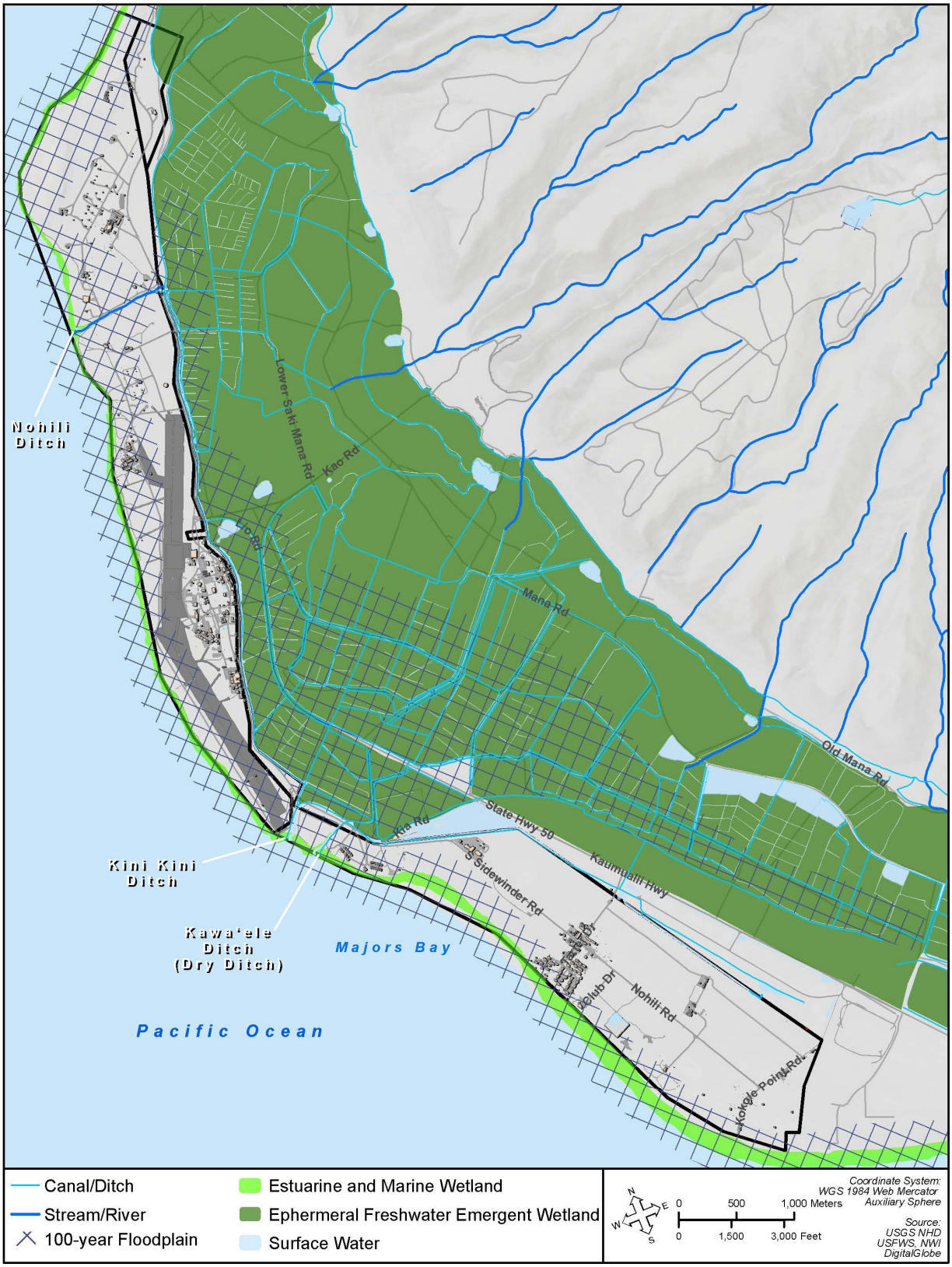

Figure 4 Water Resources at Barking Sands

The continued implementation of the 2010 INRMP would result in minor beneficial impacts to water resources at Barking Sands, as measures and best management practices (BMPs) implemented under the 2010 INRMP have prevented and/or minimized erosion, prevented adverse effects of pest and invasive species management actions on water resources that could otherwise have occurred without implementation of the INRMP, reduced marine debris, and protected wetlands.

Preferred Alternative

The erosion control measures discussed in Section 3.3.1.1 would protect water quality by reducing the total suspended solids entering downstream areas. This could decrease turbidity in nearshore waters and potentially reduce the total nutrients entering the system, which in turn would reduce concentrations of chlorophyll-a. In addition to erosion control measures, the 2023 INRMP includes the following strategies to protect water quality:

1. Coordinate all use of pesticides by natural resources staff with the Naval Facilities Engineering Systems Command (NAVFAC), Pacific (region; PAC) Pest Management Consultant (PMC) and ensure that all applicators have received appropriate certifications.
2. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.
3. Establish a monitoring program for the nearshore environment of PMRF to inform future management decisions and monitor changes over time.
4. Partner with Department of Land and Natural Resources (DLNR) Division of Aquatic Resources (DAR) to incorporate regular monitoring site(s) in PMRF's nearshore waters into the State's regular monitoring schedule, as feasible.

When compared to the No Action Alternative, there is a minor beneficial impact associated with implementation of the 2023 INRMP on water resources because new erosion monitoring and control, improved dune protection, and new water quality testing and monitoring would improve the overall management and condition of water resources at Barking Sands.

3.3.1.3 Natural Hazards

Natural hazards at Barking Sands include hurricanes, tsunamis, flooding, landslides, and wildfire. For the purposes of this EA, the analysis will focus on wildfire and flooding, including flooding from sea level rise (SLR), as those are the only natural hazards for which a resource management action is planned. INRMP actions would not change or exacerbate the effect of other natural hazards, including tsunamis, hurricanes, and landslides at Barking Sands.

Affected Environment

Historically, wildfires were an uncommon natural occurrence in Hawai'i and did not play a significant ecological or evolutionary role in most Hawaiian ecosystems. However, the rapid spread of non-native grasses and fire-adapted species has changed the composition of many natural communities and has markedly increased fire frequency and size (Stone, Smith, and Tunison 1992). Wildfire is now a major threat to communities and natural resources in Hawai'i. Over the past decade, an average of over 1,000 wildfires has burned over 17,000 ac each year in Hawai'i (HWMO 2017).

Like many places in Hawai'i, fires are a major concern at Barking Sands Main Base due to the spread of non-native grasses and fire adapted species (NAVFAC PAC 2022). Based on statewide surveys conducted by the Hawai'i Wildfire Management Organization (HWMO), Barking Sands is in a high hazard fire area, associated with increased temperatures and high fuel levels. With increasing temperatures and high fuel

levels from non-native grasses and other vegetation, wildland fire intensity and frequency can be expected to increase throughout Kaua‘i.

The anticipated SLR from climate change is the primary driver of flood risk at Barking Sands. The Intergovernmental Panel on Climate Change predicts up to 3.2 ft of global SLR by the year 2100 if greenhouse gas (GHG) emissions continue to increase at the current rate (IPCC 2021). The SOH initiated efforts to assess Hawai‘i’s exposure to SLR and modeled chronic flooding hazards (coastal passive flooding, marine inundation, and coastal erosion) on the Main Hawaiian Islands (MHI). The modeling used the 3.2 ft SLR scenario to predict long-term (mid to latter half of this century) exposure to coastal hazards and SLR, and the 1.1 ft SLR scenario to depict current or short-term hazards. These chronic flooding hazards were combined to define the SLR exposure area (Hawai‘i Climate Change Mitigation and Adaptation Commission 2017). Although past and future restoration management actions can help mitigate coastal dune erosion, the high wave energy along much of the Barking Sands shoreline, the predicted increases in storm surges, and SLR can potentially threaten the base’s coastal infrastructure and natural and cultural resources.

In the coastal area of Kaua‘i where Barking Sands is located, the key impacts associated with SLR will be coastal flooding and wave inundation, erosion, and inland flooding (Codiga and Wager 2011). The extensive shoreline at several of the PMRF facilities will also be susceptible to tsunami inundation (Commander, Navy Region Hawai‘i 2012). Impacts from inland flooding, saltwater intrusion, and some loss of seabirds and sea turtles nesting sites could be experienced as the result of SLR. Drainage issues from increases in the inundation of adjacent wetlands would be expected. State and county roads that provide primary access to all PMRF sites may not be usable due to flooding for weeks after a significant disaster (HHF Planners 2016). Climate change is also recognized by the USFWS as a specific threat to a number of the threatened and endangered species known to occur on or in the vicinity of PMRF including the short-tailed albatross (Section 3.3.2.4), Hawaiian monk seal (Section 3.3.2.6), green sea turtle (Section 3.3.2.6), and ‘ōhai (*Sesbania tomentosa*) (Section 3.3.2.1).

Figure 5a illustrates the exposure areas under the 1.1 ft and 3.2 ft SLR scenarios at Barking Sands. SLR projections from the SOH Sea Level Rise Viewer depict potential future exposure areas for up to 3.2 ft of SLR (Figure 5a), which roughly corresponds to the 2100 Medium SLR Projection (Figure 5b).

According to a literature review of best practices in the selection of SLR projections for planning and decision making in Sweet et al. (2017), for situations where long-term risk management is a priority, planners should select a scientifically plausible upper bound for high value infrastructure planning (including military installations) and an intermediate estimate as a lower bound for lower-value assets and/or to account for the possibility of substantially reduced future emissions.

Shoreline erosion poses another hazard for PMRF. Though not considered in the SLR inundation mapping, shoreline change projections show that some areas of Barking Sands are vulnerable to shoreline erosion. The base is currently protected from shoreline fluctuations and overtopping by coastal dunes that run the entire length of the western boundary of the base. There is a natural variability of the shoreline position and dune size (width and height) based on wave climate, sediment transport patterns, wind, and storm seasonality; however, with SLR they are at increased risk of erosion. This can lead to dune breaching and overtopping, which would result in flooding of the base.

Barking Sands is only exposed to permanent inundation under the 2100 highest scenario (Figure 5c) but is already exposed to the 100-year storm surge under current conditions. Storm surge conditions are a stronger driver of flood risk on-base; it is unrealistic to assume that PMRF would not take action to

reduce storm surge exposure well before the base is exposed to permanent inundation. The highest projection of 2100 (8.2 ft of SLR) with a 100-year storm (Figure 5c) is the highest scenario considered and reflects best practices from National Oceanic and Atmospheric Administration (NOAA) guidance that planners should select a scientifically plausible upper bound for high value infrastructure planning (including military installations).

Under the 2100 highest scenario, there would be catastrophic flooding across the entire base. Nearly all roads on the base could be exposed to deep flooding (greater than 3 ft). Almost all potable underground water lines on base could be exposed to flooding. Most airport support buildings—including the control tower building—could be within the area inundated.

Environmental Consequences

No Action Alternative

Current management actions implemented under the 2010 INRMP at Barking Sands to prevent natural hazards include wildland fire control as well as drainage pumps and ditch maintenance. The current strategies include:

1. Wildland Fire Control: Clear vegetation from around the launch pads and wet the vegetation near the launch pads just prior to launch to prevent wildland fires. Provide emergency fire crews during launches to extinguish any fire and minimize its effects.
2. Drainage Pumps and Ditch Maintenance: Continue to maintain the drainage pumps and ditches located within the 200-ac (81-ha) lease area. Continue to lease land at Barking Sands in order to maintain the drainage pumps and ditches to prevent flooding of the facility.

The continued implementation of the 2010 INRMP would result in a beneficial impact on natural hazards at Barking Sands, as the management actions mitigate the risk of wildland fire and flooding to surrounding areas.

Preferred Alternative

Actions proposed for implementation under the 2023 INRMP to mitigate wildland fire at Barking Sands include the following strategies:

1. Coordinate with the PMRF Fire Department on developing updates to the existing Fire Management Plan.
2. Remove deadfall in high-risk areas including near the Barking Sands missile launch site and the Kamokalā Ridge Magazines and replant with native, low fire risk species.

Compared to the No Action Alternative, these actions would have a beneficial impact on wildland fire management as updates to the existing Fire Management Plan and revegetation with low fire risk species would further reduce the threat of wildfire at the site.

New erosion control and dune protection measures under the Preferred Alternative, described in Section 3.3.1.1, would further protect the dunes, which serve as a natural barrier to coastal flooding.

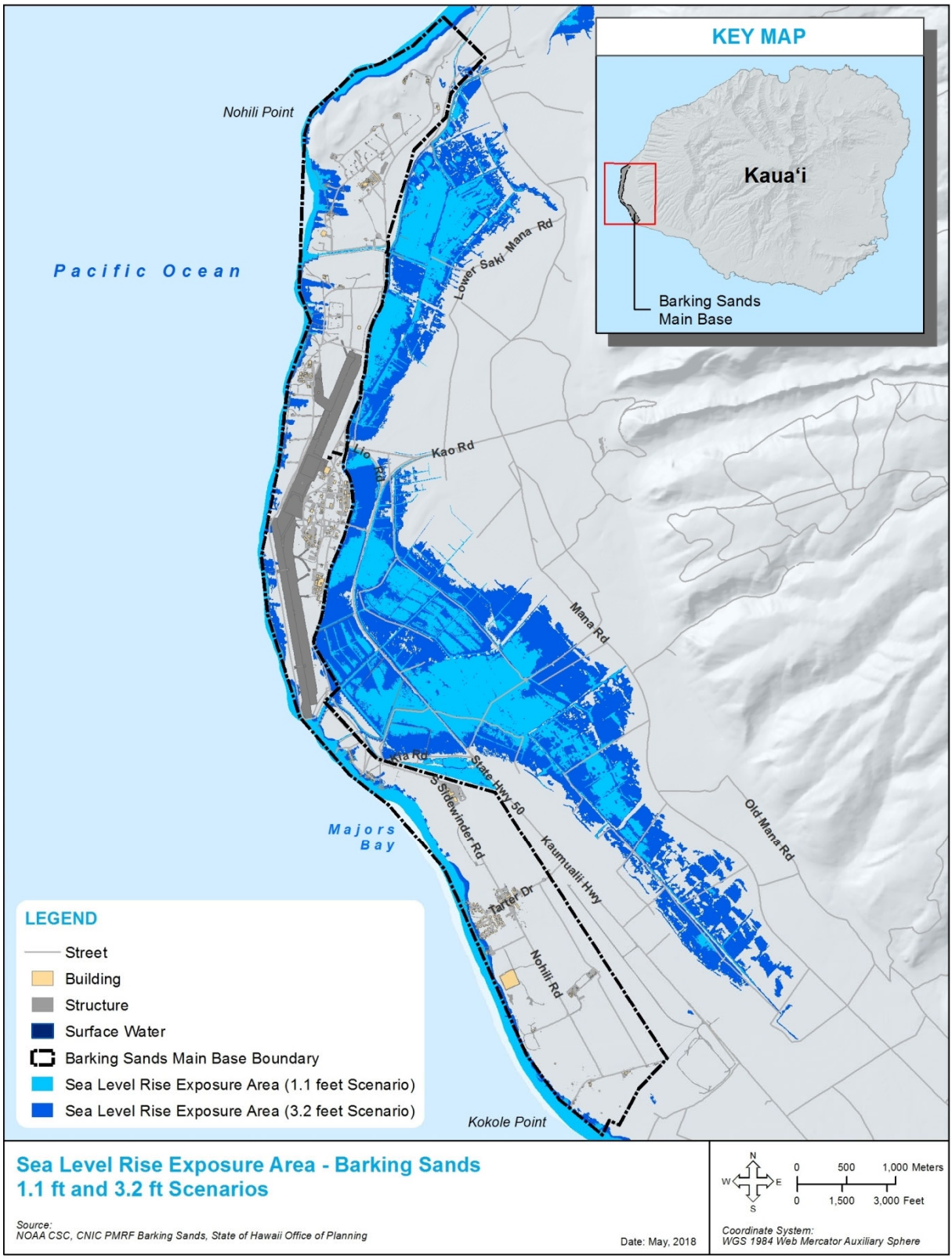

Figure 5a Barking Sands Exposure Areas Resulting from Sea Level Rise Scenarios (Tetra Tech, Inc. and University of Hawai'i Coastal Geology Group (2017) and CNIC PMRF (2018))

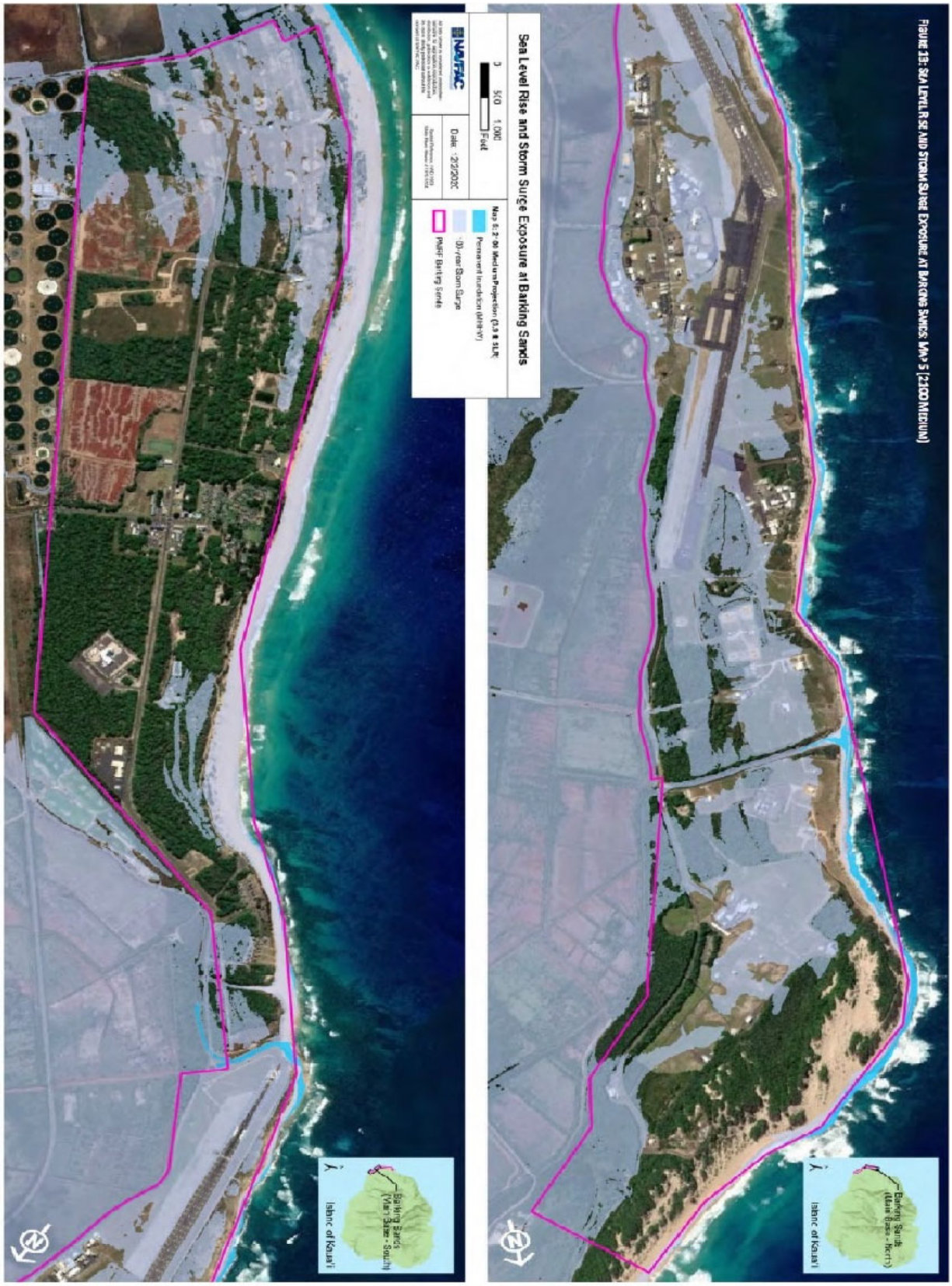

Figure 5b Barking Sands 3.9 ft SLR + MHHW 2100 Medium

Figure 5c Barking Sands 8.2 ft SLR + MHHW 2100 Highest

3.3.1.4 Climate Change

Affected Environment

The increasing concentration of GHGs caused by human activities is a strong driver for global climate change (IPCC 2021). EO 13693 was issued in 2015 with the goal to reduce federal agency direct GHG emissions by at least 40 percent over the next decade from 2008 levels. In response to EO 13693, DoD set a target to reduce its GHG emissions by 25 percent by 2025 (DoD 2016). In 2016, the CEQ released final guidance for federal agencies on how they should consider the impacts of their actions on global climate change in their NEPA reviews. This final guidance recommended that agencies consider the potential effects of a Preferred Alternative on climate change by assessing GHG emissions and, vice versa, the effects of climate change on a Preferred Alternative and its environmental impacts. On January 20, 2021, EO 13990 titled, "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis," was signed by the President. The potential impacts of the Preferred Alternative on climate change are considered in this section. Section 3.3.1.3 analyzes the impacts of climate change on the Preferred Alternative (e.g., erosion, flooding, SLR). Climate change is also discussed in depth in Section 5.3.4 of the 2023 INRMP.

Environmental Consequences

No Action Alternative

Impacts from GHG emissions are additive by nature, as individual emission sources are generally not large enough to have an impact on global climate change. GHG emissions resulting from the No Action Alternative would be primarily from vehicular trips made for natural resource survey purposes and, as individual sources, would not be large enough to have an appreciable effect on climate change. The continued implementation of the 2010 INRMP would have no impact on climate change.

Preferred Alternative

Impacts from GHG emissions are additive by nature, as individual emission sources are generally not large enough to have an impact on global climate change. GHG emissions resulting from the Preferred Alternative would be primarily from vehicular trips made for natural resource survey purposes and, as individual sources, would not be large enough to have an appreciable effect on climate change. Therefore, implementation of the Preferred Alternative would have no impact on climate change.

3.3.2 Biological Environment

The following section covers the flora and fauna that could occur at Barking Sands Main Base, including birds that fly over the project area. Identified habitat for the special species found at Barking Sands is shown in Figure 6. While the figure identifies the primary habitat locations for each species, there is potential for each species to be found outside the range identified in the figure.

3.3.2.1 Vegetation

Affected Environment

The vegetation present at the Barking Sands Facility was determined by botanical surveys conducted in 2000 and 2006, and a habitat classification and mapping effort was conducted at Barking Sands in 2005 (Table 8) (NAVFAC PAC 2005; 2006; Char 2000). Critical habitat has been designated for Ni'ihau panicgrass within the Barking Sands site (Figure 6) and the vegetation cover types identified within the site are provided in Table 8 and Figure 7. For a full list of plant species present at Barking Sands, see Appendix C of the 2023 INRMP (NAVFAC PAC 2022).

Wetland vegetation is also present at the Barking Sands Main Base. Various waterbirds, including two federally listed endangered birds (Section 3.3.2.4) utilize the small wetland area. Large, often floating mats of non-native species including seashore paspalum (*Paspalum vaginatum*) line the ditches. The lower banks of the ditches contain dense thickets of Indian fleabane (*Pluchea indica*) and mats of California grass (*Brachiaria mutica*), while the tops of the banks are lined with a narrow band of koa haole, long-thorn kiawe, and milo (*Thespesia populnea*).

There is no documentation of plant species federally listed under the ESA at the Barking Sands facility. However, potential special status species at Barking Sands include endangered Niʻihau panicgrass or lauʻehu and endangered Oʻahu riverhemp or ʻōhai.

Niʻihau panicgrass critical habitat is designated along PMRF's coastal strand habitat (Figure 6). However, the critical habitat is currently unoccupied by the species. The nearest known location is at Polihale State Park, just north of Barking Sands Main Base (USFWS 2008b).

Niʻihau panicgrass is endemic to the islands of Niʻihau and Kauaʻi and is federally listed as endangered under the ESA. Threats to Niʻihau panicgrass and its habitat include unauthorized off-road vehicle use and SLR encroaching on native habitat.

Major threats and concerns for native plants include habitat encroachment from development or invasive species, as well as the destruction of native and protected plant species and habitat from issues such as off-road vehicles, and climate change (Section 3.3.1.4).

Table 8 Vegetation Cover Types at Barking Sands

Cover Type	Native/Non-native	Area ac (ha)	Percent of Area
Agave	Non-native	2.3 (0.9)	0.10%
Agriculture	Non-native	22.5 (9.1)	0.96%
Long-thorn Kiawe (Long-thorn Algaroba)	Non-native	13.2 (5.3)	0.56%
Grass, Herb, Shrub	Non-native	0.3 (0.1)	0.01%
Kiawe Koa Haole Scrub	Non-native	1053.1 (426.2)	45.03%
Landscaped	Non-native	921.7 (373.0)	39.41%
Ruderal	Non-native	73.3 (29.7)	3.13%
Wetland Vegetation with Koa Haole	Non-native	25.3 (10.2)	1.08%
Aalii-Nama Scrub	Native	145.5 (58.9)	6.22%
ʻAkiʻaki (beach dropseed)	Native	0.2 (0.1)	0.01%
Naupaka	Native	20.9 (8.5)	0.89%
Naupaka, Ipomea	Native	0.5 (0.2)	0.02%
Pōhinahina	Native	1.8 (0.7)	0.08%
Pōhinahina-Naupaka Dune	Native	57.5 (23.3)	2.46%
Ipomoea	Native and Non-native	0.4 (0.2)	0.02%
Total	—	**2338.5 (946.4)**	**100.00%**

Source: NAVFAC PAC 2005.

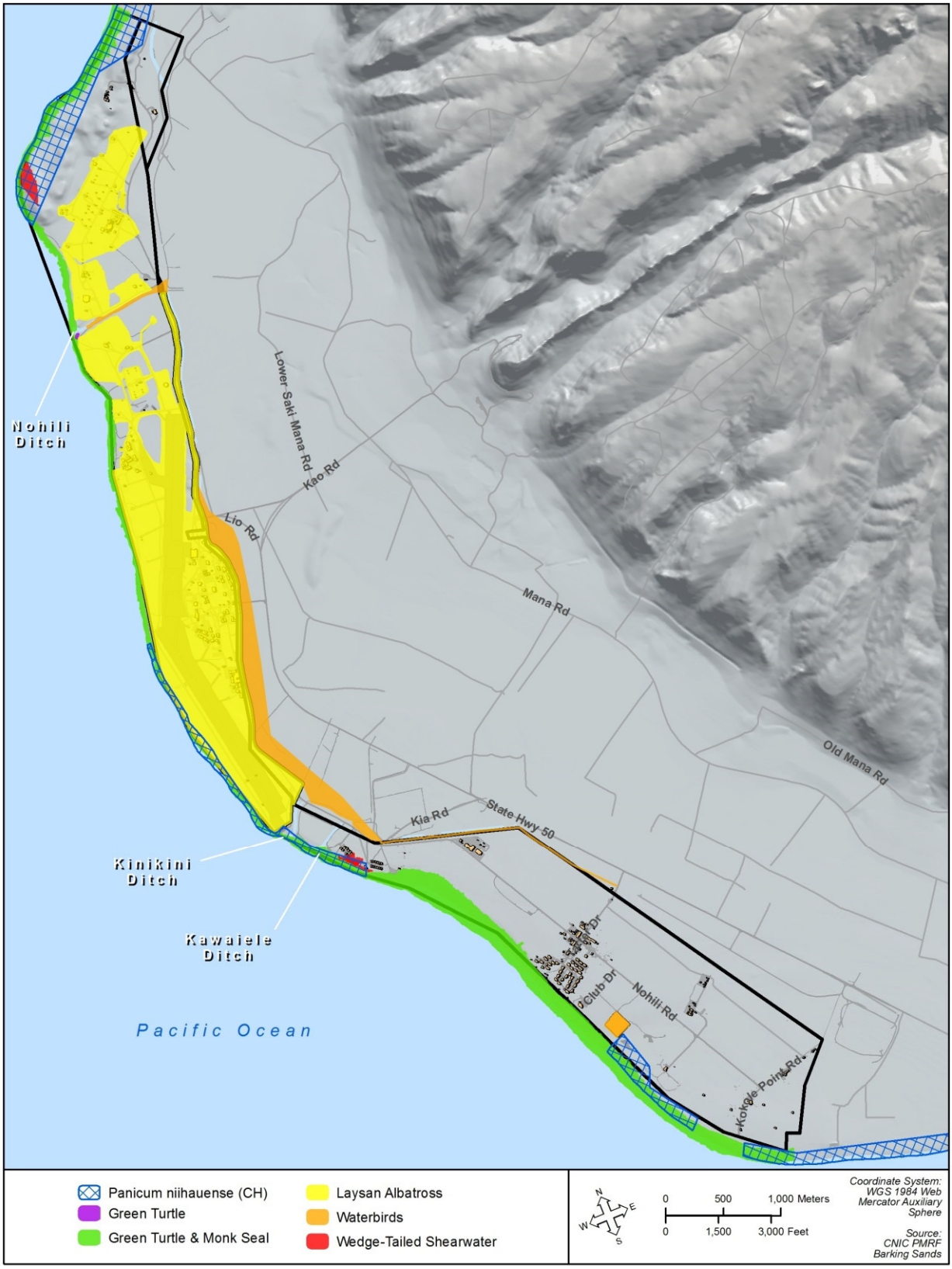

Figure 6 Protected Species General Habitat Location at Barking Sands

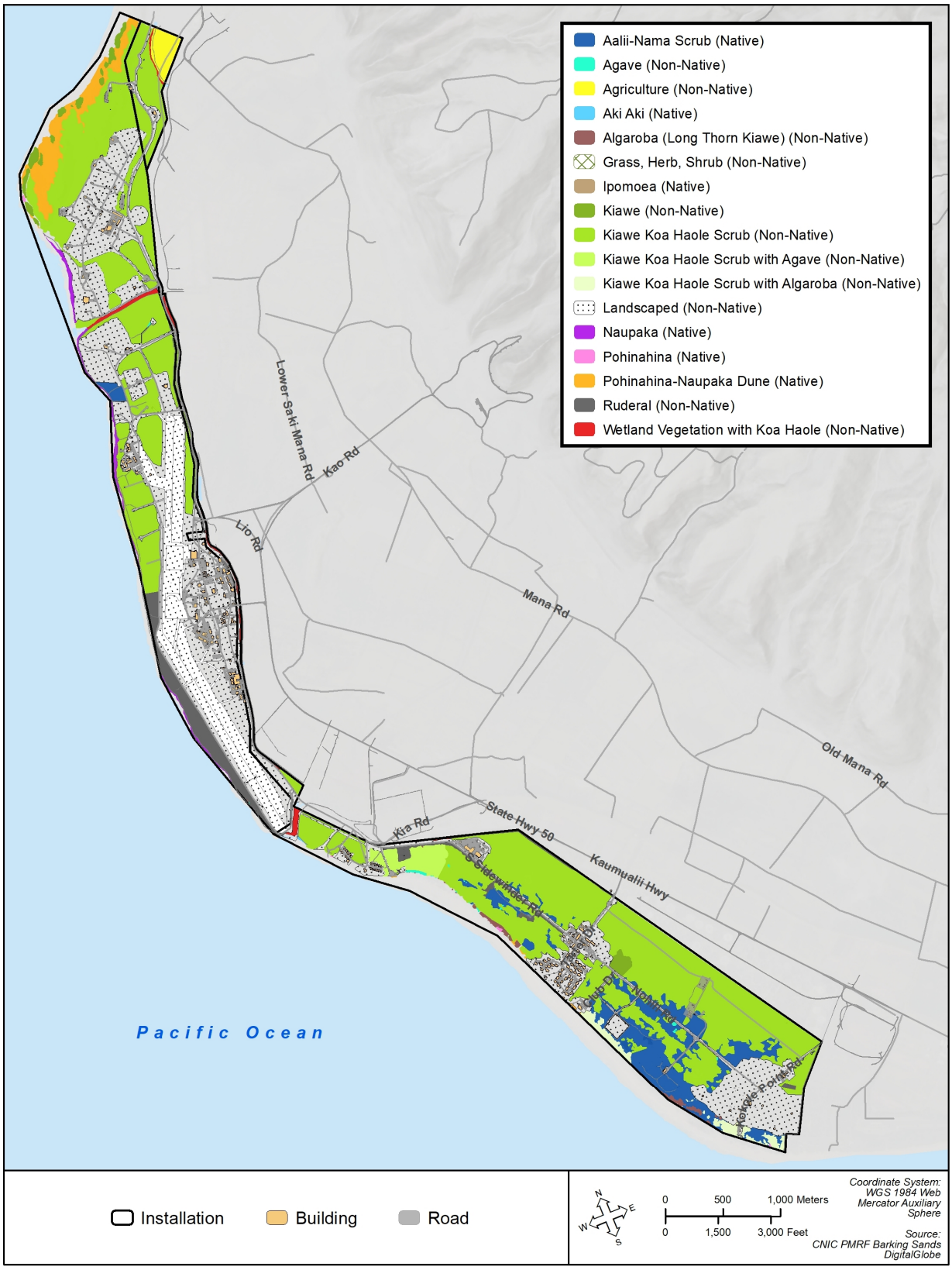

Figure 7 Vegetation Cover Types at Barking Sands

Environmental Consequences

Invasive Plant Management

No Action Alternative

To manage and prevent the spread of invasive, noxious, and priority invasive species, PMRF implemented the following actions at Barking Sands facilities.

1. Invasive Species Prevention and Control: Continue all invasive species prevention and control actions. Continue to work with Kaua'i Invasive Species Council (KISC) and other stakeholders on a coordinated approach to alien plant species control for Barking Sands. Continue preventive measures to avoid the introduction of alien species and inadvertent destruction of the environment via cargo on inbound aircraft.
2. Develop a Biosecurity Program: Prohibit living plant materials from being brought to Hawai'i from outside the State. Pressure-wash all Navy and contractor vehicles coming to Hawai'i on the mainland or point of origin to minimize the amount of seeds or propagules of non-native species being transported. Inspect all construction materials including sand, gravel, aggregate, or road base and certify that such materials are weed free prior to transport. Monitor to detect, assess, and eliminate non-native species on a regular basis. Continue efforts to establish native vegetation in areas where non-native vegetation is present.
3. Critical Habitat and Dune Vegetation Restoration Project: Continue to eradicate and control long-thorn kiawe.

The continued implementation of the 2010 INRMP would result in a beneficial impact on vegetation at Barking Sands, as the management actions reduce populations of harmful species.

Preferred Alternative

To minimize and prevent the encroachment of invasive species into protected species habitats and other priority native vegetation cover types to the greatest extent practicable, PMRF proposes to implement the following strategies:

1. Include biosecurity requirements and provisions in BOS and construction contracts to reduce the risk of introduction of invasive species and plant diseases.
2. Ensure that species identified as invasive in Hawai'i, including those on the Plant Pono "Black List", are not utilized for landscaping or erosion control projects by developing a Landscaping Guide to include in all base contracts, integrate into the installation appearance plan, and provide to project managers that specifies an approval process for species selection.
3. Ensure early detection through surveys and a rapid response to invasive plant species in sensitive areas.
4. Conduct removal of invasive plant species in sensitive areas, monitor for re-growth, and restore using out-plantings, if necessary, with a target of 80 percent reduction in invasive species within the areas of concern.
5. Decrease driving on dune vegetation, which can further increase the spread of invasive species into native habitats; continue to prohibit driving in designated Ni'ihau panicgrass critical habitat and culturally sensitive areas.
6. Strive to find new opportunities to collaborate with partners on removing invasive and exotic vegetation and planting opportunities.
7. Ensure that post planting care, including irrigation, invasive plant/weed control, and long-term monitoring and maintenance is implemented for all native plant restoration projects.

8. Conduct removal of invasive plant species in sensitive areas, monitor for re-growth, and restore using out-plantings, if necessary, with a target of 80% reduction in invasive species within the areas of concern.

The above actions would add to the continued implementation of ongoing management strategies resulting in a beneficial impact on managing invasive plants at Barking Sands when compared to the No Action Alternative.

Native Plant Management

No Action Alternative

Under the 2010 INRMP, the following management actions address native plant management at Barking Sands:

1. *Landscape Design:* Use native plants whenever possible and use sterile soil to prevent the introduction of weeds. Plant a variety of native trees, shrubs, and ground covers. Continue to evaluate all future landscape design and installation projects for the potential to include habitat restoration and the use of native plants whenever possible.
2. *Protection of Natural Resources in Undeveloped Areas:* Review construction and maintenance projects to ensure contractors are aware of guidelines to avoid impacting sensitive vegetation.
3. *Native Medicinal Plant Garden Development/Maintenance:* Continue to maintain the native medicinal plant garden/display in the grassy area adjacent to the new Pass and Identification building at the Tartar Drive Gate (Main Gate).
4. *Plant Nursery Development:* Establish a plant nursery at Barking Sands to propagate native plants for landscaping and habitat restoration in cooperation with The National Tropical Botanical Garden.
5. *Critical Habitat and Dune Vegetation Restoration Project:* Conduct on-site dune vegetation restoration at Barking Sands through removal of kiawe, koa haole, and other invasive vegetation to include buffelgrass, crown flower, and golden-crown beard.
6. *Beach and Dune Access Restrictions:* Continue to avoid disturbing dune areas in order to maintain native vegetation, including *Nama*. Monitor for excessive traffic at areas adjacent to the beach cottages and other high-use recreational areas and, if necessary, cord off those areas to re-establish vegetation. Continue to prohibit off-road vehicle usage on the beach, and minimize usage by security personnel, to allow for reestablishment of native dune vegetation such as beach morning glory, pōhinahina, and paʻu o hiʻiaka.

Continued implementation of the No Action alternative would have a beneficial impact on native plants or native plant habitat at Barking Sands by encouraging the use of native plants for landscaping and by preventing disturbance of sensitive areas.

Preferred Alternative

The 2023 INRMP proposes the following strategies to conserve and enhance native plant communities to the greatest extent practical:

1. Update baseline floral surveys to improve understanding of plant community at PMRF.
2. Ensure and assist in the selection of locally sourced, non-invasive, and preferably native species, with a minimum of 50 percent native species for all new landscape planting projects by 2022 and 100 percent by 2028 while adhering to BASH requirements.

3. Ensure that post planting care, including irrigation, invasive plant/weed control, and long-term monitoring and maintenance is implemented for all native plant restoration projects.
4. Identify suitable locations for planting native Hawaiian plants, particularly those that benefit native pollinators in support of national pollinator objectives.
5. Strive to find new opportunities to collaborate with partners on removing invasive and exotic vegetation and planting opportunities.
6. The PMRF IEPD and NRM should continue to be the points of contact to provide relevant information on issues with potential to affect wildlife and native habitat, such as military operations and training, and tower and other construction and repair projects.
7. Mitigate and prevent erosion of coastal dune habitat by out-planting, establishing, and monitoring native dune building plants in areas identified as having erosion issues.

The above actions would have beneficial impacts on native plants and native plant habitat at Barking Sands when compared to the No Action Alternative, as they increase the viability and population numbers of native plants at Barking Sands.

Ni‘ihau Panicgrass (or Lau‘ehu)

No Action Alternative

There are no actions implemented under the 2010 INRMP that could affect Ni‘ihau panicgrass resources at Barking Sands; therefore, there are no impacts.

Preferred Alternative

To provide a conservation benefit to Ni‘ihau panicgrass critical habitat, the following strategies are proposed under the 2023 INRMP:

1. Work to improve protection, habitat and/or consider out-planting Ni‘ihau panicgrass. Protections will be aimed at preventing unauthorized off-road vehicle use and invasive plant removal, and to demonstrate benefit to the species.
2. Out-plant native species and remove invasive species in areas with suitable Ni‘ihau panicgrass habitat and ensure an irrigation system is in place until plants become well established.
3. Consider undergoing the approval process to out-plant the endangered Ni‘ihau panicgrass in the effort to remove or reduce amount of PMRF property designated as critical habitat for the species. Coordinate with Federal and State partners to secure material for out-planting if pursued.

The above actions likely would have a moderate beneficial impact on Ni‘ihau panicgrass and its unoccupied critical habitat at Barking Sands when compared to the No Action Alternative.

3.3.2.2 Nuisance and Invasive Animals

Affected Environment

Feral cats, roof (black) rats, Polynesian rats, and common house mice were documented during wildlife studies and regular biological monitoring. During wildlife studies, signs also indicated the presence of feral pigs and black tailed deer. Some of these species pose serious threats to native wildlife.

The invasive common house mouse (*Mus musculus*) was found at Barking Sands in recent biological surveys. The house mouse is considered abundant and relatively common in Hawaiian ecosystems. Recent research indicates that house mice can have population-wide deleterious effects on seabirds and can cause significant injury to native plants, invertebrates, and other native bird species (USFWS 2017).

Other nuisance species present at Barking Sands include the non-native barn owl (*Tyto alba*), and the cattle egret (*Bubulcus ibis*)—these species are listed under the USFWS control order as they are known to predate other native species (50 C.F.R. Section 21.55). Under this order, all PMRF facilities are covered for take of these two Migratory Bird Treaty Act (MBTA) species.

The coconut rhinoceros beetle (*Oryctes rhinoceros*) is considered an injurious wildlife species and is designated by the SOH Department of Agriculture (HDOA) as a pest for control (Hawai‘i Administrative Rule [HAR] 69A). The beetle is considered a major pest and there is potential for extensive damage if the species establishes itself. Although the coconut rhinoceros beetle has never been detected on Kaua‘i, there is potential for beetles to make their way to PMRF via air traffic from O‘ahu or Guam.

The little fire ant is also considered an injurious wildlife species (HAR 124) and is listed by HDOA as a pest for control (HAR 69A). Populations are currently limited to areas on the northern shore of Kaua‘i.

Environmental Consequences

No Action Alternative

Nuisance and invasive animal management actions implemented under the 2010 INRMP include the following:

1. Base-wide Predator Control: Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect both native and endangered species.
2. Invasive Species Prevention and Control: Continue all invasive species prevention and control actions. Continue to work with KISC and other stakeholders on a coordinated approach to alien plant species control for Barking Sands. Continue preventive measures to avoid the introduction of alien species and inadvertent destruction of the environment via cargo on inbound aircraft.
3. Develop a Biosecurity Program: Prohibit eggs and invertebrates (insects, snails and slugs) from being brought to Hawai‘i from outside the State. Pressure wash all Navy and contractor vehicles coming to Hawai‘i on the mainland or point of origin to minimize the amount of eggs or invertebrates of non-native species being transported. Inspect all construction materials including sand, gravel, aggregate, or road base and certify that such materials are invertebrate free prior to transport. Monitor to detect, assess, and eliminate non-native species on a regular basis.

The continued implementation of the 2010 INRMP would result in a beneficial impact on nuisance and invasive animal management at Barking Sands, as the management actions reduce populations of harmful species.

Preferred Alternative

The 2023 INRMP proposes the following management actions to control nuisance and invasive animal species.

1. Continue to fund control measures for non-native predator species at Barking Sands, Mākaha Ridge Tracking Station, and Kōke‘e Site C (PMRF Biological Opinion [BO], 2014).
2. Develop a PMRF Biosecurity Plan and include those requirements and provisions in BOS and construction contracts to ensure invasive ants, frogs, and other non-native wildlife are not introduced via equipment or landscaping efforts.
3. Increase outreach to base personnel on reporting and early detection for invasive species not yet established at PMRF. Ensure all observations or reports of high-risk invasive species are communicated to KISC and to all other appropriate contacts.

4. Conduct surveys to improve baseline knowledge of populations of invasive animals at PMRF.
5. Work with partner organizations to identify sources of feral cats and dogs off base to reduce the population of these non-native predators.
6. Consider partnering with the DLNR Division of Forestry and Wildlife (DOFAW) to do auditory predator deterrent studies on base and utilize the technology at PMRF if proven to be effective against predators.
7. Conduct ant surveys to assess presence of invasive ants including the little fire ants at the Nohili Dune's wedge-tailed shearwater colony. If little fire ants are detected, report to KISC and implement active control by using granular bait after fledglings have left the area.
8. Increase outreach about the hazards of feeding feral/invasive species with all personnel on PMRF and assist in the enforcement of such policies by practicing good communication with Security.
9. Continue to partner with the HDOA to ensure coconut rhinoceros beetle traps are checked and maintained at PMRF.

These measures would have a beneficial impact on nuisance and invasive animal management when compared with the No Action alternative because they would improve baseline knowledge of invasive species and reduce populations of common and problematic species.

3.3.2.3 Bats

Affected Environment

The only native terrestrial mammal in the SOH is the Hawaiian hoary bat (or ʻōpeʻapeʻa). The Hawaiian hoary bat is listed as endangered under the ESA. It has been documented year-round on the base and is most commonly found in the winter. The ʻōpeʻapeʻa roosts, forages, and may breed at Barking Sands. Breeding season occurs during the months of September through December, and pupping occurs from June through September. During studies conducted at all PMRF facilities, the bat exhibited highest occupancy from September through February. Barking Sands Main base supports suitable habitat for roosting and foraging, and is likely used for breeding, pupping, and rearing. Threats to the bat include habitat loss and mortality from barbed wire fences and radar transmissions.

Environmental Consequences

No Action Alternative

Management actions implemented under the 2010 INRMP for the Hawaiian hoary bat include the following:

1. Hawaiian Hoary Bats: Prior to the operation of radar units at Barking Sands at nighttime, personnel will visually survey for bats in the area of impact using Anabat, or closed-circuit television cameras.

The continued implementation of the 2010 INRMP would result in a beneficial impact on the Hawaiian hoary bat at Barking Sands by minimizing or preventing the adverse effects of radar operation on bats.

Preferred Alternative

The 2023 INRMP proposed the following activities, based on findings of the 2014 PMRF BO, to reduce impacts to the Hawaiian hoary bat:

1. Continue to avoid and minimize effects of base infrastructure, operations, and maintenance on Hawaiian hoary bats, by ensuring that trimming or removal of woody plants greater than 15 ft

tall is conducted outside of the Hawaiian hoary bat pupping season of 1 June to 15 September to avoid impacting bat pups.

2. Conduct follow-up acoustic surveys for Hawaiian hoary bats every 5 years. If bat roosting and pupping sites are of interest for management of the species, then a mist netting and tracking study could be performed, if warranted.
3. Work with USFWS to develop and implement a standard operating procedure (SOP) for bat roosting surveys if base operations warrant the need to remove and trim trees greater than 15 ft tall during the Hawaiian hoary bat pupping season.

The activities proposed under the 2023 INRMP, including restriction on the season of vegetation trimming, follow-up acoustic surveys, and development of SOPs for bat roosting surveys, would have a beneficial impact on the Hawaiian hoary bat when compared to the No Action alternative.

3.3.2.4 Birds

Affected Environment

Avian surveys conducted at Barking Sands have identified 54 species of birds (Bruner 2000; Hamer Environmental L.P. 2016; NAVFAC PAC 2006; PMRF 2018). Of these, 25 are native and 29 are non-native, though many have become naturalized on Kaua'i (Pyle and Pyle 2017). Although non-native, most of these species are migratory and protected by the MBTA. In addition to formal surveys, PMRF natural resource biologists record incidental observations of listed species on a routine basis. These species are listed in Appendix C of the INRMP (NAVFAC PAC 2022).

Nine bird species listed as threatened or endangered under the ESA have been observed, and although the short-tailed albatross was the only seabird species observed during formal biological surveys, other seabirds are present in the vicinity and have the potential to fly over and/or are known to fallout on base. Fallout occurs when migratory birds do not reach their destination for a variety of reasons. Fallout may occur because of artificial light attraction, for which seabirds are particularly vulnerable. The effect of night lighting on seabirds is a major concern, as seabirds can be attracted to and disoriented by lights. When attracted to man-made lights, the birds, in particular fledglings, may become confused, collide with obstructions, or circle the artificial light until exhausted, resulting in fallout. Table 9 presents avifaunal species listed under the ESA that are known to occur on or adjacent to PMRF, as fly-overs, or in the nearshore waters of Barking Sands.

Major Threats

BASH concerns are applicable to all bird species present at Barking Sands. Table 10 lists threats to at-risk species.

Table 9 Endangered and Threatened Bird Species Present at Barking Sands

Type	Scientific Name	Common Name	Hawaiian Name	Federal Protection Status *
Seabirds	*Oceanodroma castro*	Band-rumped storm-petrel**	ʻAkēʻakē	E
Seabirds	*Phoebastria albatrus*	Short-tailed albatross**	—	E
Seabirds	*Pterodroma phaeopygia sandwichensis*	Hawaiian petrel**	ʻUaʻu	E
Seabirds	*Puffinus auricularis newelli*	Newell's shearwater**	ʻAʻo	T
Hawaiian Waterbirds	*Anas wyvilliana*	Hawaiian duck	Koloa maoli	E
Hawaiian Waterbirds	*Fulica alai*	Hawaiian coot	ʻAlae keʻokeʻo	E
Hawaiian Waterbirds	*Gallinula chloropus sandvicensis*	Hawaiian moorhen	ʻAlae ʻula	E
Hawaiian Waterbirds	*Himantopus mexicanus knudseni*	Hawaiian stilt	Aeʻo	E
Other	*Branta sandvicensis*	Hawaiian goose	Nēnē	T

*Federally listed under the ESA as E = Endangered, T = Threatened.
**Potential to fly over and/or known fallout on base.

Table 10 Threats to Special Status Bird Species

Bird Group or Species	Threats
Endangered Seabirds	BASH concerns, attraction to artificial light sources, and the striking of towers, powerlines, and antennas, and guy wires.
Laysan Albatross	See seabird concerns, predation of albatross by pigs and dogs.
Wedge-tailed Shearwater	See seabird concerns, negative human interactions (burrows crushed by foot traffic), habitat degradation.
Hawaiian Waterbirds	BASH concerns, avian botulism, threats to nest sites, vehicle strikes, vegetation removal, habitat degradation.
Hawaiian Goose	BASH concerns and airfield operations, vehicular strikes, nest site vulnerability, mortality or injury due to maintenance activities—specifically vegetation clearing, feeding of nēnē or nēnē inadvertently eating food thrown out by base personnel or visitors, and predators (feral pigs and dogs).
Migratory Birds	BASH concerns, development and habitat fragmentation.

Endangered and Threatened Seabirds

Endangered seabirds spend a large part of the year at sea, forage in the open ocean, and breed on Kauaʻi. Beginning in March and April, adults initiate breeding in colonial nesting grounds at high elevations in the interior portions of the island and fly over PMRF when traveling between nesting and foraging areas. Fledglings travel from the nesting colony to the sea in the fall, with potential to fly near PMRF. These species only fly to and from their burrows at night and depend on the moon and starlight for navigation. Due to this, the presence of unshielded lighting along their flyways can result in confusion and disorientation.

Based on radar surveys conducted by DOFAW from 2004 to 2008, an average of 15 nocturnal seabirds per hour flew over Kekaha and the Mānā Plain (NAVFAC PAC 2022). A 2015 radar study at Barking Sands found lower numbers of birds passing over the base compared to other sites on Kaua'i with an average of two target species per hour for the fall fledgling season. Passage rates were found to peak in early October, and during the fall fledging season. There are significant numbers of Newell's shearwater and Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*) passing over and near the base with an estimated mean of 92 per night and an estimated total of 5,128 during the 2016 fall sampling period (Hamer Environmental L.P. 2016; NAVFAC PAC 2022).

Laysan Albatross and Wedge-tailed Shearwater

Other at-risk seabird species at Barking Sands include the Laysan albatross and the wedge-tailed shearwater. The Laysan albatross is a breeding visitor commonly observed during nesting season from Nohili ditch to north end of base. The Laysan albatross breeds in the months of November and December and fledges from June to July. The wedge tailed shearwater is also a breeding visitor and has three active nesting colonies on Barking Sands—Nohili Dunes, Kinikini Ditch, and the beach cottages area. The wedge-tailed shearwater's breeding season takes place from March to June and fledging occurs between mid-November and early-December.

Endangered Hawaiian Waterbirds

Endangered Hawaiian waterbirds utilize wetland areas adjacent to PMRF including the Kawai'ele Waterbird Sanctuary and Mānā Plains Forest Reserve, as well as the Mānā Plain ditch system and ditches bordering PMRF property. On Barking Sands, they are generally limited to the PMRF oxidation pond complex, ditches, and beaches. All species of endangered Hawaiian waterbirds, except Hawaiian stilts, have been recorded nesting at PMRF.

Hawaiian Goose (Nēnē)

The nēnē is a year-round resident, occurs throughout Barking Sands, and is most commonly observed at the oxidation pond complex. Nesting activities have increased since 2009 (1 nest), to 39 nests in the 2021-2022 breeding season.

Migratory Birds

Several native migratory birds are known to fly-over or occur within Barking Sands for part of the year. These birds are federally protected under the MBTA. Some of these species use the islands actively for nesting, others use the Hawaiian Islands for the wintering grounds, and other MBTA birds are endemic. For a complete list of MBTA protected bird species, see the 2023 INRMP (NAVFAC PAC 2022).

Environmental Consequences

Endangered and Threatened Seabirds

No Action Alternative

Current management actions associated with the 2010 INRMP include:

1. Nocturnal Seabird Fallout Monitoring and Management: Consult with USFWS regarding fallout minimization and mitigation.

2. Use of Green Lights and Light Shielding to Protect Seabirds: Install and operate green bulbs, when plausible. Where green lights are not feasible, include shielding of white lights, install motion sensor lights, and determine areas where lights may be safely turned off.
3. Fauna Surveys Update/Initiate. Update fauna surveys and mapping, including protected bird species, in preparation for subsequent INRMP updates. Continue to coordinate with DOFAW to collect population-monitoring data for protected species.

The continued implementation of the 2010 INRMP would result in a beneficial impact on seabirds, as the management actions improve the long-term viability of populations present at Barking Sands.

Preferred Alternative

To avoid or minimize negative impacts to federally listed and endangered seabird species, the 2023 INRMP proposes the following strategies:

1. Continue to promote base-wide awareness and implementation of the PMRF Dark Skies Program (PMRF BO, 2018) through early annual trainings.
2. Continue to improve the Dark Skies Program lighting waiver system and grant standing waivers where applicable to stream-line the waiver process.
3. Continue Dark Skies implementation in areas adjacent to colonial nesting grounds at high elevation nesting sites during critical fledging timeframes.
4. Conduct systematic ground searches for fallen out seabirds after high-risk night operations.
5. Incorporate results of radar studies into future programs.
6. Pursue avenues to provide funding to Save Our Shearwaters (SOS) to assist with seabird rehabilitation costs.
7. Continue to host a SOS shearwater aid station at PMRF and monitor station during business days with SOS monitoring on weekends and holidays (PMRF BO, 2014).
8. Advise various tenants on base on appropriate safety lighting that is less attractive to endangered seabirds (i.e., motion sensing lights that go off after a set time period, shielded lights, facing light away from the coast, lower lumen, and lower to the ground).
9. Provide a 10-year calendar to mission planners with high-risk dates for endangered seabird fallout clearly depicted.
10. Develop a Wildlife Friendly Lighting Guide for installation personnel and tenants to assist in planning for lighting needs.

Implementation of the actions proposed in the revised 2023 INRMP would have a beneficial impact on endangered seabirds when compared with the No Action alternative because of improvements to the Dark Skies Program and continued support for SOS.

Laysan Albatross

No Action Alternative

Active management of the Laysan albatross is necessary as the birds are a serious BASH concern for air operations at PMRF. In response to BASH concerns, PMRF Barking Sands currently implements the following management activities under the 2010 INRMP.

1. Base-wide Predator Control: Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect MBTA-protected Laysan albatross on the installation.
2. Bird Aircraft Strike Hazard: Continue hazing program under the U.S. Department of Agriculture-Wildlife Services (USDA-WS) permit. Capture and relocate Laysan albatross found at Barking Sands to off-base locations. Continue the egg translocation at Barking Sands by removing Laysan

albatross nests and placing them in incubators to be translocated to foster nests at KPNRW and on private lands. Adopt similar policies for black-footed albatross to that of Laysan albatross to balance protection of the species with BASH requirements, if nesting shall occur in the area.

Continued implementation of the 2010 INRMP would result in a beneficial impact on Laysan albatross as management actions improve the long-term viability of populations present at Barking Sands.

Preferred Alternative

To minimize the impacts to Laysan albatross, while also providing flexibility for training and operations, the 2023 INRMP proposes the following strategies:

1. Continue the PMRF Laysan Albatross Egg Swap program (described above).
2. Work with partners to ensure that as many albatross eggs as possible stay on Kaua'i and find new suitable location for egg relocation.
3. Continue to translocate albatross to the north shore of Kaua'i daily from January-April.
4. Coordinate with DOFAW on potential new albatross release sites.
5. Closely monitor re-sights of translocated albatross by working with partners on the north shore of Kaua'i to enter data into the Airtable app database.
6. Use data analysis to assess the effectiveness of albatross translocations based on location of translocation, time of year, and whether the albatross is a known breeder, sub-adult, or new bird to PMRF.
7. Support research on the PMRF Laysan albatross population that increases the understanding of their behavior as it relates to the PMRF airfield.
8. Continue base-wide predator control to protect MBTA-listed species including Laysan albatross; monitor for pigs, dogs, and cats in known breeding areas prior to the albatross breeding season and increase control efforts as needed.

Implementation of the actions proposed in the 2023 INRMP would have a beneficial impact on the Laysan albatross compared to activities of the No Action Alternative due to increased monitoring and control activities and improved data analysis.

Wedge-tailed Shearwater

No Action Alternative

To address wedge-tailed shearwater threats, PMRF Barking Sands currently implements the following management activities under the 2010 INRMP.

1. *Enhance and Improve Beach Cottages Shearwater Colony:* Maintain and enhance the shearwater colony. Continue to have USDA-WS remove barn owls and haze the pueo from the area. Provide additional educational material to guests staying at the beach cottages. Consider blocking off the road behind the fenced area to vehicle traffic during the night while the birds are in residence. Consider installing a few boardwalks from the grassy area down to the beach flats. Consider installing a viewing boardwalk on the beach side of the fenced area to reduce burrow crushing. To control shearwater burrowing under beach cottages, sidewalks, and other infrastructure, unoccupied problem burrows should be crushed as soon as possible when observed. Burrows can legally be crushed anytime between burrow initiation (usually around March when the birds arrive to the colony) and when eggs are laid (during the 1st or 2nd week of June). Remove kiawe in undeveloped areas adjacent to the colony to provide additional nesting habitat.
2. *Invasive Species Prevention and Control:* Exclude wedge-tailed shearwater burrowing areas from any weeding or planting activities during the nesting season.

3. *SOS Support and Shearwater Banding:* Continue to coordinate with the Kaua'i Humane Society's SOS program along with coordinating with USFWS and DOFAW to conduct shearwater banding training at the wedge-tailed shearwater colony at Barking Sands Beach Cottages.

Continued implementation of the 2010 INRMP would result in a beneficial impact on wedge-tailed shearwaters as the management actions improve the long-term viability of populations present at Barking Sands.

Preferred Alternative

The 2023 INRMP proposes the following management actions to protect and enhance habitat, and improve understanding of wedge-tailed shearwaters:

1. Enhance wedge-tailed shearwater habitat in areas far from the PMRF airfield and human presence and develop deterrent measures for burrows in areas of human traffic and near the airfield.
2. Research and work with facilities and Morale, Welfare and Recreation (MWR) to implement methods for discouraging wedge-tailed shearwater from burrowing in the immediate vicinity of the PMRF beach cottages.
3. Continue to implement protective measures that prevent the crushing of burrows in the beach cottages area (e.g., signage, temporary rope fencing, wooden burrow tents, outreach materials in cottages).
4. Conduct annual wedge-tailed shearwater population surveys in the Kinikini Ditch, beach cottages, and Nohili Dunes areas.
5. Work with partners to collect additional data that supports adaptive management on PMRF and regional conservation objectives for shearwater species.
6. Conduct ant surveys to assess presence of invasive ants including the little fire ants at the Nohili Dune's wedge-tailed shearwater colony. If little fire ants are detected, report to KISC and implement active control by using granular bait after fledglings have left the area.
7. Continue to host a SOS shearwater aid station at PMRF and monitor station during business days with SOS monitoring on weekends and holidays (PMRF BO, 2014).

Implementation of the actions proposed in the revised 2023 INRMP would have a beneficial impact on the wedge-tailed shearwater when compared to activities of the No Action Alternative because of increased monitoring and coordination activities, habitat improvement away from the airfield, and continued SOS support.

Endangered Hawaiian Waterbirds

No Action Alternative

To minimize adverse effects on Hawaiian waterbirds located at Barking Sands, and in the adjacent Kawai'ele Waterbird Sanctuary and Mānā Forest Plains Forest Reserve, as well as the Mānā plain ditch system and ditches bordering PMRF property, current and historic management under the 2010 INRMP includes the following activities:

1. *Base-wide Predator Control:* Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect Hawaiian waterbirds within the vicinity of the ditches and oxidation ponds.
2. *Waterbird Species:* Initiate formal Navy participation in the State-wide waterbird counts that occur at the Barking Sands oxidation ponds in January and August.

3. *Invasive Species Prevention and Control:* Avoid completely clearing wetland areas (excluding the ditches) of vegetation, as dense growth provides important habitat for endangered, endemic waterbirds.
4. *Oxidation Pond Improvements:* Develop a plan for improvements to the oxidation ponds at Barking Sands to enhance waterbird habitat.
5. *Wetlands Maintenance:* Ensure proper permitting and no-net-loss of wetland acreage.
6. *Kawai'ele Wetlands Waterbird Sanctuary:* Continue to be involved with DLNR in the planning process for the restoration of the Kawai'ele wetland which is part of the Kawai'ele Wildlife Sanctuary located immediately east of Barking Sands. Enlist volunteers to help support wetland restoration.

The continued implementation of the 2010 INRMP would result in a beneficial impact on the at-risk Hawaiian waterbirds at Barking Sands, as the resource management actions would maintain and improve species' populations.

Preferred Alternative

To further address adverse effects on Hawaiian waterbirds and further improve the understanding of population dynamics to inform adaptive management decisions, the following strategies are proposed:

1. Continue to coordinate closely with Facilities Maintenance regarding restrictions on vegetation removal practices within a 100-ft (30.5-meter [m]) radius of waterbirds or their nests.
2. Discourage waterbird presence and nesting at the oxidation pond complex by maintaining vegetation at a height of less than 6 inches and by funding the installation of exclusionary measures.
3. Continue to coordinate with Facilities Maintenance to obtain environmental data on the oxidation pond regularly to better inform causes of avian botulism outbreaks and identify high risk conditions that require management actions.
4. Coordinate with Public Works to develop oxidation pond flushing protocols in response to avian botulism outbreaks or high-risk conditions.
5. Coordinate with Facilities Maintenance on all oxidation pond complex construction and restoration plans.
6. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.
7. Replace and improve waterbird crossing signage at PMRF as needed to reduce risk of vehicle strikes (PMRF BO, 2014), evaluate efficacy of signs, and explore new tools to reduce vehicle strikes.
8. Continue to conduct regular monitoring for Hawaiian waterbird species at Barking Sands to effectively detect and reduce impacts to nests (PMRF BO, 2014).
9. Consider implementing a waterbird banding/telemetry program to track movement, monitor nest-site fidelity, and inform management on the base.

Implementation of the actions proposed in the 2023 INRMP would have a beneficial impact on Hawaiian waterbirds when compared to activities of the No Action Alternative because of increased monitoring and coordination activities.

Hawaiian Goose (Nēnē)

No Action Alternative

Nēnē management under the 2010 INRMP includes the following activities:

1. *Base-wide Predator Control:* Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect endangered nēnē while on the installation.
2. *Natural Resources Signs:* Continue to install, maintain, and update, as necessary, natural resources signs at the facility. PMRF and NAVFAC PAC Natural Resources staffs have prepared signs indicating appropriate behavior to protect and preserve threatened and endangered species and other protected species. The signs should be placed where such interactions are most likely, such as green turtle habitat at Nohili Ditch and areas of frequent Hawaiian monk seal activity at Barking Sands or Hawaiian goose activity.

Continued implementation of the 2010 INRMP would have a beneficial impact on nēnē by reducing predator populations and improving awareness of nēnē presence.

Preferred Alternative

To reduce PMRF operation impacts to nēnē while providing maximum flexibility for testing and training, the 2023 INRMP proposes the following management and monitoring strategies.

1. Collaborate with USFWS, PMRF Air Ops, and DOFAW to continue revising action plans, based on past observations and new knowledge, to facilitate rapid response to nēnē that have attempted to nest or have successfully nested on the airfield.
2. Coordinate with USFWS, DOFAW, PMRF Air Ops, and PMRF Public Works to annually review and update the PMRF Nēnē Management Plan (PMRF BO, 2014).
3. Work with PMRF Air Ops and USDA-WS to insure nēnē hazing efforts are increased prior to and during the breeding season with the possibility of including weekends especially if a nēnē pair has been regularly observed on or near the airfield.
4. Continue to conduct regularly standardized surveys of nēnē at PMRF Barking Sands, Mākaha Ridge, and Kōkeʻe sites to improve detection of nēnē nests, determine habitat types that attract the species, and to update management (PMRF BO, 2014).
5. Continue to communicate with facilities maintenance personnel about nēnē nest locations and collaborate with them to develop effective protective measures for the species and ensure that no vegetation removal or other persistent disturbances occur within 100 ft (30.5 m) of nest sites and goslings to reduce risk of take.
6. Support regular outreach to base visitors and personnel on the importance of not providing food and water to nēnē (PMRF BO, 2014), and develop outreach material aimed at increasing awareness of the species.
7. For all new construction at Barking Sands, including construction for tenant or customer DoD commands or other federal agencies, concrete, asphalt, gravel, xeriscaping, or native vegetation, rather than lawn, will be installed in open areas surrounding buildings and parking areas to decrease attraction of nēnē (PMRF BO, 2014).
8. Fund habitat modification that discourages nēnē presence near roadways, the airfield, and construction sites at Barking Sands.
9. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.
10. Continue to explore and implement strategies to reduce risk of vehicle strikes, including additional vehicle calming measures, evaluate efficacy of permanent, temporary and marquee signs, and explore new tools to reduce vehicle strikes.
11. Continue to communicate and share data with USDA-WS and DOFAW regularly.
12. Collaborate with DOFAW to have all nēnē that hatch at PMRF banded and pursue permission and permits for PMRF natural resources staff to band birds if allowable.

13. Implement priority management actions identified in the PMRF Nēnē Management Plan. Work with partners to identify potential opportunities to collaborate on off-installation conservation efforts or research opportunities to inform nēnē management at PMRF and ensure a holistic approach that aligns with regional priorities for nēnē protection and recovery (PMRF BO, 2014).

Implementation of the actions proposed in the 2023 INRMP would have a beneficial impact on nēnē compared to the No Action Alternative due to increased monitoring, hazing, outreach, protection, and habitat improvement activities.

Migratory Birds

No Action Alternative

A MOU between the DOD and the USFWS is in effect to promote the conservation of migratory birds. The 2010 INRMP contains the following management activities to protect migratory birds at Barking Sands:

1. *Bird Aircraft Strike Hazard:* Continue hazing program under the USDA-WS permit.
2. *Protection of Wildlife from Potential Electromagnetic Radiation (EMR) Impacts:* Follow SOP requirements that ensure existing radars do not radiate lower than at least 4 to 6 degrees above horizontal to preclude EMR impacts on wildlife.
3. *Fauna Surveys Update/Initiate:* Update fauna surveys and mapping, including protected bird species, in preparation for subsequent INRMP updates.
4. *Nocturnal Seabird Fallout Monitoring and Management:* Consult with USFWS regarding fallout minimization and mitigation.
5. *Use of Green Lights and Light Shielding to Protect Seabirds:* Install and operate green bulbs, when plausible. Where green lights are not feasible, include shielding of white lights, install motion sensor lights, and determine areas where lights may be safely turned off.

The continued implementation of the 2010 INRMP would result in a beneficial impact on migratory birds at Barking Sands, as the resource management actions maintain and protect existing populations of migratory birds.

Preferred Alternative

To protect migratory birds and ensure the conservation of these species, the 2023 INRMP proposes the following actions:

1. Continue to incorporate monitoring of shorebirds, cattle egrets, and black-crowned night herons at wetland sites, and observations of barn owls, to inform control measures for non-native species and protective measures for native species. Conduct pueo surveys in high-quality habitat.
2. Keep track of any newly established non-native songbird species at PMRF and their numbers by participating in the annual Audubon Christmas Bird Count.
3. Continue to advise development projects at PMRF that have potential to negatively impact native MBTA species habitat on how to avoid impacts.
4. Advise development projects at PMRF on how to avoid creating habitat and foraging availability for non-native MBTA species at PMRF especially near the PMRF airfield.

Implementation of the Preferred Alternative would have a beneficial impact on migratory birds compared to the No Action Alternative. The resource management actions include increased monitoring and control of non-native birds and increased activities to advise development projects on how to improve native bird habitat and how not to create non-native bird habitat.

3.3.2.5 Insects

Affected Environment

Native insects and protected pollinator species

Coastal strand habitat at Barking Sands, consisting of relatively intact communities of plants native to Hawai‘i, has the potential to support a variety of native insect species. General baseline surveys for terrestrial invertebrate species as well as additional surveys for the federally endangered *Drosophila musaphilia* and *Drosophila sharpi* were conducted at Barking Sands and Kōke‘e Sites in 2021. To date, a total of 769 taxa have been found at PMRF with 675 of them identified to species. Of the 675 species identified, a significant number (347) are considered native endemics with numerous rare and undescribed species encountered. The 2021 baseline surveys also identified the rare endemic fly *Bryania bipunctata*, previously known only from the Northwestern Hawaiian Islands (NWHI) and Kaho‘olawe, and several native coastal midges at Barking Sands.

Known species of pollinators present at PMRF facilities include the introduced monarch butterfly (*Danaus plexippus*), the honeybee (*Apis spp*.), and the carpenter bee (*Xylocopa sp.*). At Barking Sands, honeybees (*Apis* spp.) generally swarm each year. In 2015, several bee swarms were captured, via swarm traps and transferred to hives at the northern and southern ends of Barking Sands. Beehives were determined to be in healthy condition when inspected for evidence of the intestinal parasite varroa mite (*Varroa destructor*) and other honeybee threats by the State apiarist.

Pollinator protections are implemented on PMRF facilities in accordance with the MOU between the DoD and the Pollinator Partnership, a non-profit 501(c)(3) organization that coordinates with the North American Pollinator Protection Campaign (NAPPC) to promote awareness and scientific understanding of pollinators. The MOU is entered pursuant to the provisions of the Sikes Act, and supports the Presidential Memorandum *Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators*; see Appendix B of the 2023 INRMP (NAVFAC PAC 2022).

Major threats to pollinator populations include loss of plant species associated with pollination, and the use of neonicotinoid pesticides.

Environmental Consequences

Native insects and protected pollinator species

No Action Alternative

Management actions under the 2010 INRMP that protect pollinator species and enhance habitat supportive of native insects include:

1. *Landscape Design:* Continue to utilize sterile soil to prevent the introduction of pests such as nematodes and weeds.
2. *Landscape Design:* Use native plants whenever possible and use sterile soil to prevent the introduction of weeds. Plant a variety of native trees, shrubs, and ground covers. Continue to evaluate all future landscape design and installation projects for the potential to include habitat restoration and the use of native plants whenever possible.
3. *Base-wide Predator Control:* Continue use of cage traps and other non-chemical methods as the primary means of predator control to prevent adverse effects to pollinators. See also INRMP Appendix D – Legal Requirements for laws and policies related to pesticide and herbicide application.

The continued implementation of the 2010 INRMP would result in a beneficial impact on native insects and protected pollinator species at Barking Sands, as the resource management actions improve habitat supportive of native insects and minimize exposure of pollinator species to harmful chemicals and pesticides.

Preferred Alternative

The 2023 INRMP contains the following strategies to improve habitat supportive of native insects and protect pollinator species:

1. Conduct species inventory at additional PMRF sites, and conduct monitoring for native invertebrate species. Consider coordinating with USFWS entomologists to identify priority species and provide expertise and training to natural resources staff.
2. Coordinate all use of pesticides by natural resources staff with the NAVFAC PAC PMC and ensure that all applicators have received appropriate certifications.
3. Ensure that treatments will not have negative effects on protected species.
4. Prohibit the use of neonicotinoids at PMRF sites.
5. Ensure that plant communities found to support native terrestrial invertebrate species are protected, enhanced, and that construction or removal projects have minimal effects on these populations.

The proposed 2023 INRMP strategies would have a beneficial impact on native insects and protected pollinator species compared to the No Action Alternative, as the actions include, in addition to continuing protection of habitat supportive of native insects and continuing management of the use of pesticides to minimize pollinator exposure, new monitoring for native invertebrate species and prohibition of the use of neonicotinoids.

3.3.2.6 Marine Mammals, Marine Reptiles, and Other At-Risk Marine Species

Affected Environment

The Hawaiian monk seal , humpback whale (*Megaptera novaeangliae*), spinner dolphin (*Stenella longirostris)*, and Hawaiian green sea turtle are the most likely species to be observed within 12 nautical miles of the PMRF coastline. All marine mammals known to occur on or in the waters adjacent to Barking Sands are protected by the ESA and/or the MMPA. Threats to these species include stranding, entanglement in marine debris, fishing practices, vessel strikes, threats from military training and testing exercises—evaluated in the HRC EIS/OEIS (DoN 2008a), and disease (i.e., toxoplasmosis transmitted by feral cat feces).

Hawaiian Monk Seal

Hawaiian monk seals were the first species to be listed as depleted under the MMPA on July 22, 1976 (41 Federal Register [Fed. Reg.] 30120) and were listed as an endangered species under the federal ESA on November 23, 1976 (41 Fed. Reg. 51612). The International Union for Conservation of Nature (IUCN) classifies the Hawaiian monk seal as endangered, and the Hawaiian monk seal is also protected under SOH law Hawai‘i Revised Statutes (HRS) § 195D-4.5 (NMFS 2015). Current estimates for individuals are 1,200 in the NWHI and 400 in the MHI (the islands of Hawai‘i, Maui, Moloka‘i, Lana‘i, Kaho‘olawe, O‘ahu, Kaua‘i, and Ni‘ihau); although there has been an increasing population trend in the past twenty years, primarily in the MHI, they are still at roughly one-third of their historic population (NOAA Marine Debris Program 2024).

Monk seal critical habitat was designated in 2015. Hawaiian monk seals utilize the beaches of Barking Sands to “haul-out” or rest year-round, particularly in winter/early spring. There is one documented

pupping event in 1999 at Barking Sands. Waters adjacent to PMRF are used by monk seals to access beaches and exhibit other shallow water behaviors like foraging. Monk seals are opportunistic feeders in both shallow nearshore waters and in deep offshore waters where they dive to significant depths preying on a variety of fish, cephalopods, and crustaceans (Cahoon et al., 2013). Their primary food sources are found around 0-30 ft deep and include reef fish, eels, octopus, squid, and all crustaceans including lobster, crab, and shrimp. Deeper dives are to about 1,700 ft where they bring up bottom fish like snapper and grouper.

Feeding and foraging behaviors of Hawaiian monk seals have been studied in both the NWHI and the MHI. Unlike the NWHI monk seals, the MHI population does not appear to be affected by limited food availability and competition with offshore fisheries; the interactions of greatest concern are between people and seals on beaches, and nearshore fishing activities (Lowry et al. 2011, Parrish et al. 2023, Parnell et al. 2024). Behavioral patterns can increase the risk of harm, such as foraging in nearshore waters, increasing the potential for interactions with fishing gear (Robinson et al. 2022).

Main concerns for the monk seals at Barking Sands include harassment of hauled out seals by people and pets, disturbance of monks seals from military training and testing exercises, negative fisheries interactions, marine debris entanglement and ingestion, and disease, specifically toxoplasmosis transmitted by feral cat feces (Barbieri et al. 2016; Harting et al. 2020). Protection strategies addressed in the INRMP for monk seals and their beach and nearshore habitats at Barking Sands pertain to addressing upstream erosion and runoff, protecting and monitoring critical habitat, conducting regular monk seal beach surveys, continuing law enforcement, improving water quality at coastal outflows, and addressing pressures from coastal and nearshore fishing activities.

Whales and Dolphins

Several species of whales and dolphins have been observed in the coastal waters near Barking Sands. These species are listed in Table 11. Three of the cetacean species present within the Barking Sands footprint are protected under the ESA: the MHI insular false killer whale *Pseudorca crassidens*), the fin whale (*Balaenoptera physalus*), and the sperm whale or palaoa (*Physeter microcephalus*), which are all listed as endangered. All other whale and dolphin species are protected under the MMPA.

PMRF provides support for the operation of offshore underwater ranges. The underwater ranges are within open ocean areas and extend into territorial waters, which are not under the jurisdiction of PMRF. Therefore, these offshore areas are not included in the INRMP. However, the Navy has conducted marine mammal monitoring in the MHIs, including the underwater range areas at PMRF, since 2008. The marine resources of the underwater ranges were discussed in the Marine Resources Assessment for the Hawaiian Islands Operating Area (DoN 2005) and analyzed in depth in the HSTT EIS/OEIS (DoN 2018). Ongoing marine mammal monitoring and research in Hawai‘i, which is primarily conducted at PMRF, is documented in annual marine species monitoring reports which support the U.S. Pacific Fleet’s ESA and MMPA authorizations (www.navymarinespeciesmonitoring.us).

Threats to whale and dolphin species include incidental take, inadequate fishing regulations, small population size, standings, environmental contaminants and naturally occurring biotoxins, marine debris ingestion and entanglement, vessel strike, adverse effects from military training and testing exercises, disease, and adverse effects associated with climate change (NOAA 2022).

INRMP strategy actions on beach, shoreline, and nearshore areas are not anticipated to affect or exacerbate threats to these species. However, for these species, conservation strategies include the

implementation of SOPs to reduce the likelihood of overlap in time and space with other stressors, and the implementation of mitigation measures reducing the likelihood of impacts.

Table 11 Whale and Dolphin Species Present at Barking Sands

Scientific Name	Common Name	Hawaiian Name	Federal Protection Status*
Globicephala macrorhynchus	Short-finned pilot whale	—	MMPA
Stenella attenuata	Pantropical spotted dolphin	Kiko	MMPA
Megaptera novaeangliae	Humpback whale	Koholā kuapiʻo	MMPA
Stenella longirostris	Spinner dolphin	Naiʻa	MMPA
Steno bredanensis	Rough-toothed dolphin	—	MMPA
Tursiops truncatus	Bottlenose dolphin	Naiʻa	MMPA
Pseudorca crassidens	False killer whale- MHI Insular Distinct Population Segment	—	E
Balaenoptera physalus	Fin whale	—	E
Physeter microcephalus	Sperm whale	Palaoa	E
Stenella coeruleoalba	Striped dolphin	—	MMPA
Mesoplodon desirostris	Blainville's beaked whale	—	MMPA
Ziphius cavirostris	Cuvier's beaked whale	—	MMPA
Kogia sima	Dwarf sperm whale	—	MMPA
Lagenodelphis hosei	Fraser's dolphin	—	MMPA
Orcinus orca	Killer whale	—	MMPA
Peponocephala electra	Melon-headed whale	—	MMPA
Feresa attenuata	Pygmy killer whale	—	MMPA
Kogia breviceps	Pygmy sperm whale	—	MMPA
Grampus griseus	Risso's dolphin	—	MMPA

*Federally listed under the ESA as E = Endangered, T = Threatened.

Green and Hawksbill Sea Turtles

Green sea turtles (or honu) in Hawaiʻi belong to the Central North Pacific Distinct Population Segment and are listed as threatened under the ESA. Populations of this species occur in the NWHI (French Frigate Shoals) and in the MHI, but this latter group is the result of captive rearing and relocating of turtles from the NWHI to Oʻahu. Genetic testing revealed only 15 females were responsible for all the clutches laid in the MHI (Frey et al. 2013).

Green sea turtles in the MHI were found to have an algal-based diet dominated by red algae (Rhodophyta) (Arthur and Balazs 2008) and regularly utilize PMRF beaches and nearshore waters for resting and foraging. Green sea turtles are commonly hauled out near the waters at the Nohili Ditch outfall and in front of Shenanigan's Restaurant. A total of 10 confirmed green sea turtle nests at Barking Sands were documented between 2015 and 2021. Nests were observed at Barking Sands on the southern coast, near the southern edge of the airfield, and at Nohili Dunes.

The Hawksbill sea turtle or honu'ea (*Eretmochelys imbricate*) has not been recorded at the Barking Sands Main Base facility; however, there is a possibility for the species to nest at PMRF or forage in its nearshore waters. The hawksbill sea turtle is critically endangered and is listed as endangered under the ESA.

Threats to sea turtle populations at Barking Sands include damage to sea turtle nests by vehicles driving on the beach (e.g., compaction of sand, crushing of eggs/hatchlings), stranding or entanglement in marine debris, beachfront lighting, and small boat collisions with green sea turtles.

Appendix C of the INRMP specifically addresses sea turtles.

Giant Manta Ray and Oceanic Whitetip Shark

The giant manta ray (*Manta birostris*), listed in 2018, is threatened under the ESA by NOAA fisheries throughout the species' range. Their range includes tropical, subtropical, and temperate bodies of water. They are common in offshore waters and near productive coastlines (Kashiwagi et al. 2011). While considered solitary and pelagic, they congregate at cleaning stations around offshore reefs and feeding in shallow waters during the day at depths of less than 10 m (Rohner et al. 2013). Documented dives of tagged rays show the species conducts night descents to 200-450 m depths (Rubin et al. 2008, Stewart et al. 2016) with maximum diving depth exceeding 1,000 m (Marshall et al. 2011). Diving behavior appears influenced seasonally and with shifts in prey; this species spends a greater proportion of time at the surface from April to June and in deeper waters from August to September (Miller and Klimovich 2017). Feeding studies show that adults and juveniles target the same prey, indicating they may occupy the same habitats within a location (Stewart et al. 2017). Giant manta rays primarily feed on planktonic organisms such as euphausiids, copepods, mysids, decapod larvae and shrimp, yet evidence indicates they also consume small and moderate sized fishes, too (Carpenter and Niem 2001; The Hawai'i Association for Marine Education and Research Inc. 2005; Rohner et al. 2017a; Stewart et al. 2017).

Major threats to the species include commercial fishing, commercial fishing bycatch, and international gill raker trade (NOAA 2018c). There have been no surveys conducted at PMRF for the species since its 2018 listing. Offshore areas are not under the jurisdiction of PMRF or the INRMP management study area; however, an updated BO for offshore activities covered under HCTT is expected by December 2025. INRMP management actions are not anticipated to affect or exacerbate threats to the species.

The oceanic whitetip shark (*Carcharhinus lonigmanus*) was listed as threatened in 2018 under the ESA by NOAA fisheries throughout all its range. This shark species is migratory but with high site-fidelity (Whitney et al. 2012) and found in offshore, tropical, and warm-temperate waters (Young et al. 2016). On occasion individuals visit shallower waters near land, especially around oceanic islands but are found at depths of up to 492 ft (150 m) (NOAA 2018d). This species has a clear preference for open ocean waters between 10-dgrees north and 10-degrees south. Genetic evidence separates Western Atlantic and Indo-Pacific populations, however, limited sampling in the Pacific leaves open questions about the connectivity dynamics in this large region (Ruck et al. 2024). Oceanic whitetips are epipelagic opportunistic hunters, preferring to forage in the upper layers of deep-water areas. They feed on bony fishes including lancetfish, oarfish, barracuda, jacks, dolphinfish, marlin, tuna, and mackerels. Other prey consists of stingrays, sea turtles, sea birds, gastropods, squid, crustaceans, and carrion (dead whales and dolphins) (Compagno et al. 2005). Little is known about the movement or potential migration paths for oceanic whitetips. In the Pacific, satellite tags to observe this shark's behavior revealed a pattern in their movements, reproductive biology, and fisheries interactions such that females exhibited higher philopatry than males and were more likely to be found in shallow waters throughout the year whereas male sightings in shallow waters were highest in April and May; pupping season appears to be May into early June (Whitney et al. 2012).

There have been no surveys conducted for the species; however, its current range includes nearshore and pelagic waters off the coast of the Islands. Major threats include bycatch and shark fin trade (NMFS 2018b). Offshore areas are not under the jurisdiction of PMRF or the INRMP management study area. INRMP management actions are not anticipated to affect or exacerbate threats to the species; compliance with all federal laws, regulations, and ESA mandates will occur.

Environmental Consequences

Hawaiian Monk Seal

No Action Alternative

Management actions in the 2010 INRMP that protect the Hawaiian monk seal include the following:

1. *Base-wide Predator Control:* Continue base-wide predator control (dogs, cats, owls, rodents, barn owls, and cattle egrets) to protect endangered Hawaiian monk seals.
2. *Hawaiian Monk Seal Protection:* Continue to employ a number of SOPs to protect, record and report monk seals to DAR that haul out on the beach or are observed injured or struggling. Continue to restrict recreational shore fishing to designated areas to reduce monk seal entanglement. Continue to restrict dogs off leashes along the beach to limit the potential for seal-dog interactions. Continue to ensure training activities do not affect hauled-out seals at PMRF beaches. Continue to prohibit vessel landing on Kaʻula Island due to UXO concerns.
3. *Fishing Survey:* Monitor level of fishing activity and ecosystem health, as it relates to fish stock abundance, monk-seal hookings, and marine debris, through surveys investigating level of fishing activity.
4. *Natural Resources Signs:* Place signage in areas of frequent Hawaiian monk seal activity at Barking Sands.

The continued implementation of the 2010 INRMP would result in a beneficial impact on monk seals at Barking Sands, as the management actions improve the long-term viability of monk seal populations present at Barking Sands.

Preferred Alternative

Monk seal protection SOPs would continue under the proposed INRMP. Objectives of the 2023 INRMP for PMRF that specifically address Hawaiian monk seal management include:

1. Continue to ensure that Security reports sightings of monk seals during daily patrols at PMRF beaches and erects signage and barricades if observed where people frequent.
2. Continue to report observations of hauled-out Hawaiian monk seals to NOAA as soon as possible and provide high quality photos to assess seal health, ID, and aid in population abundance monitoring.
3. Collaborate with NOAA to implement Hawaiian monk seal recovery objectives when feasible.
4. Continue base-wide predator control to remove non-native predators, including feral cats and collaborate with partners on studies regarding toxoplasmosis at PMRF to inform these efforts; conduct outreach about the disease and its effects on wildlife and human health.
5. Continue to monitor for, and remove, marine debris as part of regular monk seal surveys at beaches frequently used by hauled out monk seals.
6. Continue to develop and install signage and implement trainings, educational materials, and presentations for security, other appropriate personnel, and the public on monk seals and the proper response to wildlife related observations.

7. Continue surveys and measuring of nearshore water quality parameters at six sites at Barking Sands (each with three sampling points) for habitat conservation and protection purposes.
8. Conduct regular surveys approximately five times per week of beaches near the Nohili Ditch outfall and Diver's Landing for monk seal presence, and all other beaches approximately twice per week.

The above actions would have a beneficial impact on the Hawaiian monk seal when compared to the No Action Alternative, as the Preferred Alternative includes increased monitoring for Hawaiian monk seals and new studies regarding potential sources of Hawaiian monk seal disease.

Whales and Dolphins

No Action Alternative

Current management of the whale and dolphin species under the 2010 INRMP involves surveys and monitoring. PMRF reports stranded, beached, and/or dead whales along the installation's shoreline in partnership with NOAA Fisheries. The 2010 INRMP includes one management action related to whales and dolphins:

1. Humpback Whales and Other Cetaceans: Continue to participate in the NOAA Ocean Count on the last Saturday of December, January and February of each year.

As whale and dolphin management in the 2010 INRMP is limited to participation in existing NOAA cetacean surveys three times annually, continued implementation of the 2010 INRMP would have no impact on whales and dolphins.

Preferred Alternative

To protect and monitor populations of whales and dolphins at Barking Sands, the 2023 INRMP proposes the following strategies.

1. Continue to report all observations of marine mammal strandings or deaths to National Marine Fisheries Service (NMFS) and assist in response efforts.
2. Improve coordination and communication regarding marine mammal strandings and other observations of note with NAVFAC PAC and COMPACFLT.
3. Implement and collaborate with partners on studies regarding toxoplasmosis at PMRF to inform predator control efforts and conduct outreach about the disease and its effects on wildlife and human health.
4. PMRF will cooperate with the ADC so that it can comply with the CWA and other environmental regulatory requirements where there is a nexus with federal monies or property.

These strategies would have beneficial impacts on whales and dolphins in the Barking Sands project area when compared to the No Action Alternative due to implementation of toxoplasmosis studies to better understand threats to marine species.

Green and Hawksbill Sea Turtles

No Action Alternative

Since 2006, monitoring and reporting of sea turtle activity has occurred at PMRF. Management actions implemented under the 2010 INRMP include:

1. Sea Turtle Management: Continue logbook of sea turtle (most likely green turtles) observations including sightings, tracks, and nesting events. Continue to protect, monitor, and record any sea

turtle nests. Continue SOPs which require that beaches are surveyed one hour prior to beach landing exercises, and if sea turtles are present, then delay training until the animal(s) voluntarily leave the area.
2. Natural Resources Signs: Continue to install, maintain, and update, as necessary, green turtle habitat signs at the facility.

The continued implementation of the 2010 INRMP would result in a beneficial impact to sea turtles at Barking Sands, as the management actions improve the long-term viability of turtle populations present at Barking Sands.

Preferred Alternative

Green and hawksbill turtle management strategies proposed under the 2023 INRMP include:

1. Continue to ensure daily patrols of PMRF's beaches for sea turtles to collect observational data and check for stranded, injured, or entangled turtles are conducted by partnering with Security.
2. Conduct surveys by biologists approximately five times per week of beaches near the Nohili Ditch outfall and Diver's Landing for sea turtle presence and ensure that marine surveys in nearshore areas quantify sea turtles and potential foraging or resting habitat.
3. Continue to survey beaches for sea turtle nesting activity during the nesting season, protect all nests observed with ropes and signage, mitigate light attraction issues on beaches, and coordinate with DAR to excavate nests.
4. Continue to encourage good communication between Security and natural resources regarding sea turtle activity on PMRF beaches to reduce negative impacts to the species from Security beach patrol vehicles.
5. Develop and use USFWS-approved outreach, educational materials, and signage with the objective to educate and provide information to residents, recreational users, visitors, and staff about proper procedures and acceptable activities within sea turtle habitat and how to act when coming in contact with sea turtles.
6. Continue to implement surveys to ensure no sea turtles are in affected areas during training exercises or in-water work.
7. An interagency agreement was established in fiscal year (FY) 23 to allow the Navy to partner with the NMFS PIFSC to deploy SPLASH tags (GPS and Argos radio transmitters that are attached to the turtle carapace) and will be pursued at PMRF.
8. An appendix was added to the INRMP that is specific to sea turtle management actions at PMRF.
9. Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.

Compared to the No Action Alternative, the above 2023 INRMP activities would have a beneficial impact on green and hawksbill sea turtles due to increased surveys and monitoring and outreach and educational activities.

Giant Manta Ray and Oceanic Whitetip Shark

No INRMP management actions are anticipated to affect or exacerbate threats to the species. Therefore, there will be no impact to the species.

3.3.2.7 Coastal and Nearshore Biological Resources

Affected Environment

For the INRMP and this associated EA, Barking Sands nearshore environment is broken into three sectors. The Nohili Sector (also referred to as the North Zone) located in the northern portion of Barking sands, the Mānā Point Sector (also referred to as the Central Zone) in the central area of Barking Sands, and the Majors Bay/Waiapua'a Bay Sector (also referred to as the South Zone) in the southern portion (Figure 8 and Figure 9).

Fish, Essential Fish Habitat, and Corals

The bathymetric characteristics of the nearshore environment at Barking Sands provide considerable shelter for many fish and invertebrate species. Based on 2000 and 2006 surveys, the Nohili sector contained the highest species richness ranging from 72 to 78 species recorded over a 30-minute period of observation. Fish counts were lower on the flat limestone platforms of the Mānā, and Major Point sectors compared to the Nohili sector. At Majors/Waiapua'a Bay, 22 species of fish were observed in 2000, and a total of 30 species were recorded in 2006. At Mānā Point, a total of 30 species were encountered in 2000, and a total of 55 species were recorded in 2006 (Dollar and Brock 2007). The Navy is conducting a further study, as of 2022 (NAVFAC PAC 2022).

In 2006 surveys, mean fish biomass was 110 g/m^2 in the Nohili sector, approximately 50 g/m^2 in the Mānā Point Sector, and 10 g/m^2 in the Majors/Waiapua'a Bay Sector. During both surveys the total fish biomass remained relatively constant, likely attributed to the decline in fishing activities at Barking Sands (Dollar and Brock 2007). Fish biomass in both the Nohili sector and the Mānā Point sector is generally considered high for the MHI (McCoy et al. 2016).

Essential Fish Habitat (EFH) includes all "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). EFH therefore includes all water surrounding PMRF facilities, including the benthic habitat, corals, coastal streams and rivers necessary for the spawning of anadromous or amphidromous fish. EFH has been designated and described along the entire Kaua'i shoreline and surrounding waters up to the 200-nautical mile exclusive economic zone (EEZ) for a number of species complexes including bottom fish species, pelagic fishes, crustaceans, precious corals, and coral reef ecosystem taxa (NAVFAC PAC 2022).

The Navy must provide a written assessment to NMFS for any activity that may adversely affect EFH. The standard notification and consultation process provides recommendations to minimize, offset, or mitigate impacts associated with activities. Activities that impact EFH include general operation and construction projects adjacent to any nearshore waters or streams.

A narrow fringing reef follows the coastline up to Nohili Point and Barking Sands; coral cover is low for most offshore areas and is dominated by stony corals including lobe coral pōhaku puna (*Porites lobata)*, cauliflower coral ko'a *(Pocillopora meandrina),* and ringed rice coral (*Montipora patula).* Coral cover is highest in the Nohili area, on the north side of the Main Base, ranging 32 to 39 percent total coral cover. At the south end of the Main Base the nearshore region of Majors/ Waiapua'a Bay there is little to no solid reef structures, and benthic cover is predominately sandy bottom. Antler coral (*Pocillopora eydouxi*) dominates the offshore sector, depth ranging from 49 to 66 ft (DoN 2008a). Other corals found offshore have a collective coverage of about 5 percent; these corals include cauliflower coral, lobe coral,

rice coral, and others. Also present along the shelf break are black coral (*Antipathes spp.*) and wire coral (*Cirrhipathes anguina*) (DoN 2010; NAVFAC PAC 2022).

To avoid impacting coral reefs in the coastal and nearshore environment, the Navy conducts environmental reviews of any action likely to affect U.S. coral reef ecosystems in accordance with NEPA and DoD policy. The PMRF Natural Resources Program has conducted periodic surveys of the marine nearshore environment to assess species diversity, abundance, and demographic structure along the Barking Sand's shoreline (Dollar and Brock 2007).

Current manageable threats to coral reefs at PMRF include derelict fishing gear, marine debris, and land-based pollution and sedimentation. Crown-of-thorns (COTS) sea stars also have potential to damage reefs if populations reach outbreak levels. Populations were not at outbreak levels in 2007 surveys (Dollar and Brock 2007).

Macroinvertebrates

Macroinvertebrates are discussed in Section 3.3.6.4 of the 2023 INRMP. Macroinvertebrate species observed in the Barking Sands nearshore environment include limpets or ʻopihi (*Cellana* spp.), littorine snails (*Littorina sp. and Nerita sp.*), rock oyster (*Spondylus tenebrosus),* cone shells (Conus spp.), sea urchins (*Echinometra mathaei*), and sea cucumbers (*Holothuria atra*) (Dollar and Brock 2007). In 2013, surveys were conducted along the entire coastline of the PMRF to assess the density and structure of ʻopihi populations on the installation and to compare them to other ʻopihi populations on Kauaʻi and across the Hawaiian Archipelago (Bird and Toonen 2014). An estimated 110,000 black foot ʻopihi, or ʻopihi makaiauli (*Cellana exarata*), and 4,000 yellow foot ʻopihi, or ʻopihi ʻalinalina, (*C. sandwicensis*) were found at Barking Sands during the course of the 2014 study. Giant ʻopihi, ʻopihi kōʻele (*C. talcosa*), were also observed but were rare likely due to lack of suitable habitat on the installation. ʻOpihi are culturally significant marine mollusks historically over-harvested in Hawaiʻi (Bird and Toonen 2014).

COTS sea stars were recorded at the Majors/Waiapuaʻa Bay section of Barking Sands in 2006 (Dollar and Brock 2007). COTS are corallivorous (coral-eating) invertebrates that can inflict devastating impacts on the ecological integrity of reef systems and can alter coral community structure when populations reach outbreak levels, or exceedance of approximately 1,500 organisms per square kilometer (km^2) (Timmers et al. 2011).

Environmental Consequences

Fish, Essential Fish Habitat, and Corals

No Action Alternative

The Navy currently limits onshore fishing at Barking Sands to the Recreation Area and the Special Use Area (Section 3.3.3.2). Fishing restrictions allow for only pole, throw net, and spear fishing. Fishing and beach access restrictions are enforced by installation security personnel, who patrol the beach several times per day.

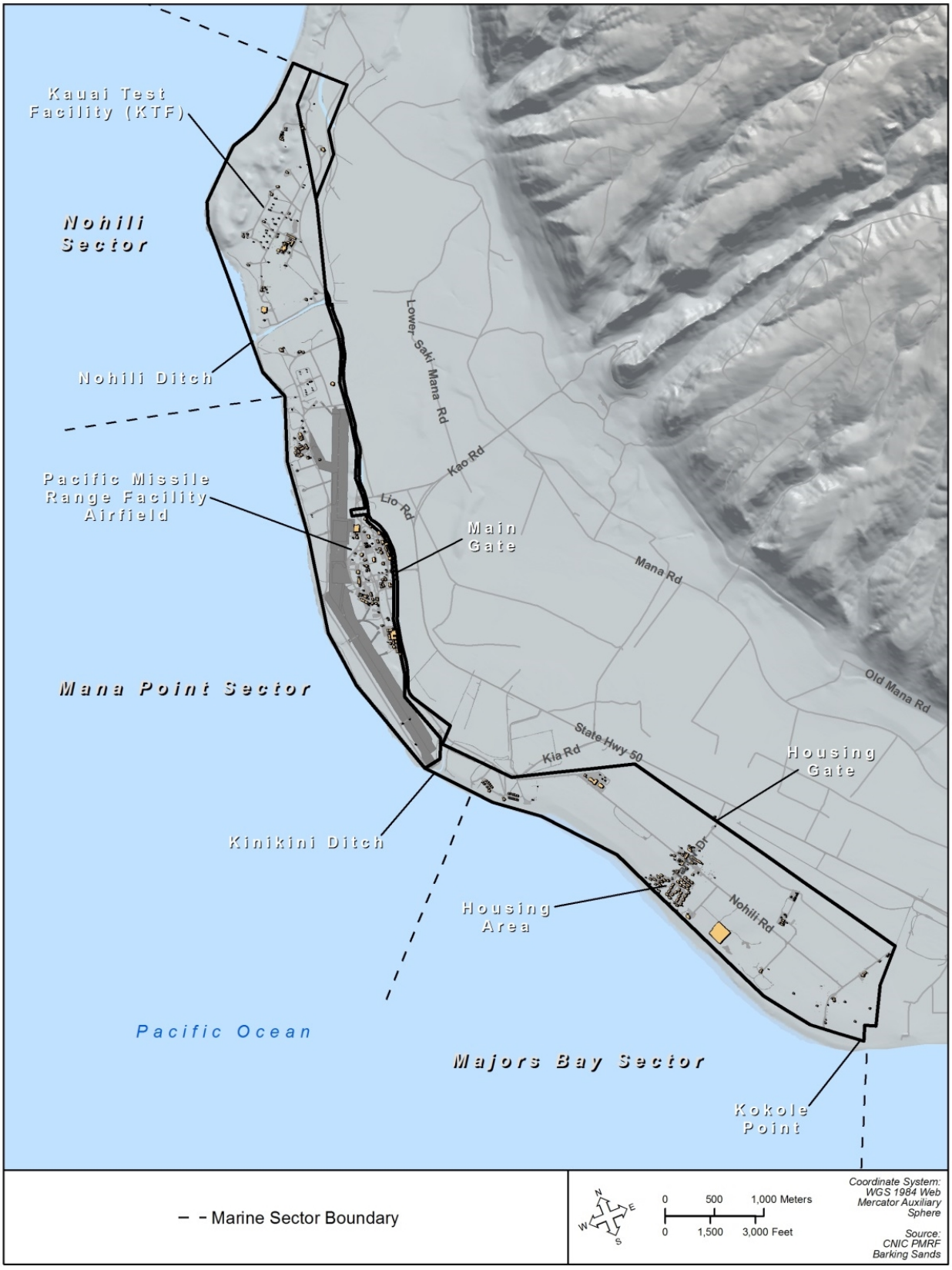

Figure 8 Marine Sector Boundaries for Barking Sands

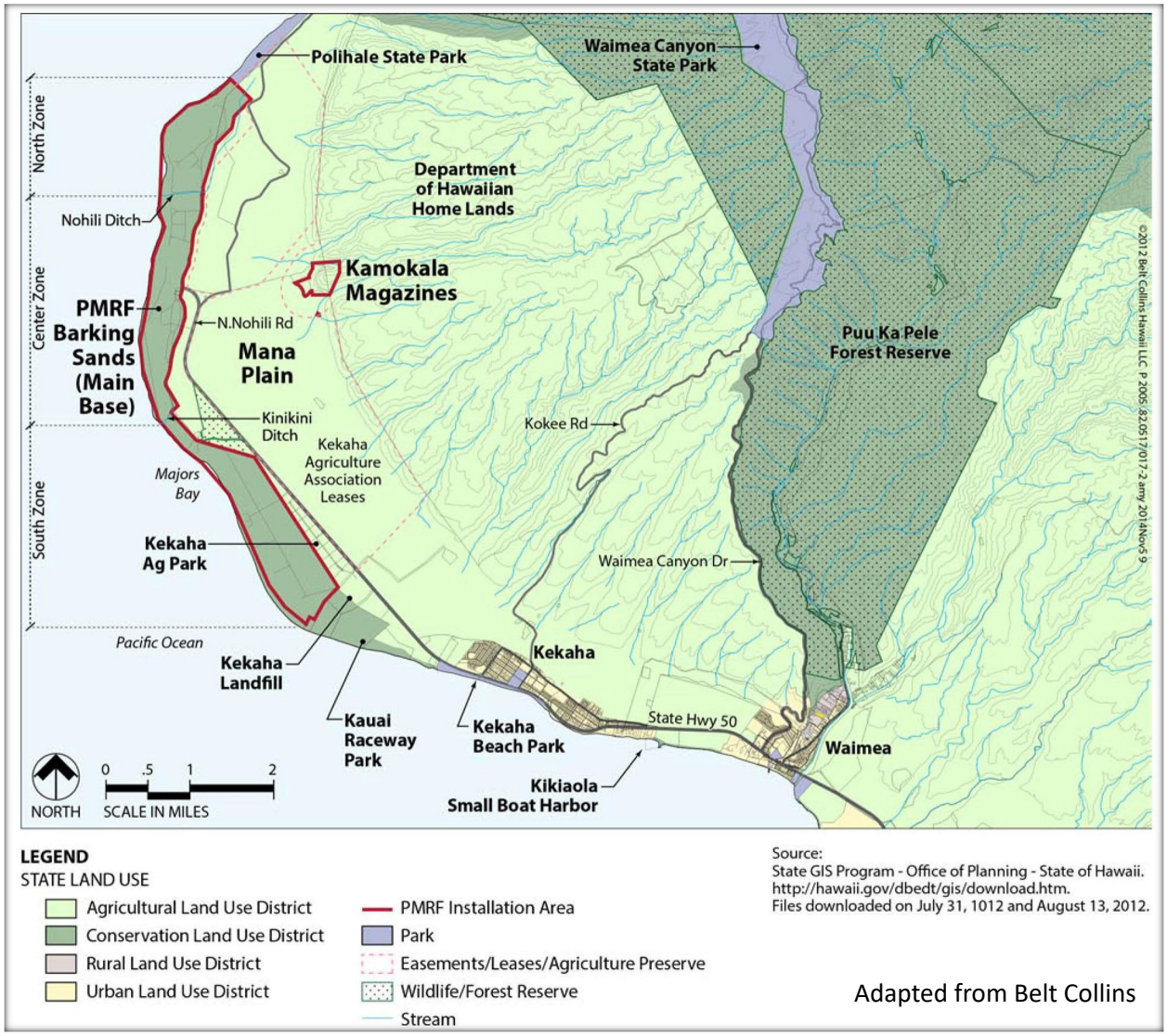

Figure 9 PMRF Barking Sands, Kamokalā Magazines, and Surrounding Land Use (DoN 2014b)

Management actions in the 2010 INRMP related to fish and EFH include:

1. *Marine Resources and Fisheries Survey Update:* Fund a follow-on survey to the 2006 marine resources and fisheries survey of the coastal/marine environment at Barking Sands.
2. *Fishing Survey:* Level of fishing activity and ecosystem health, as it relates to fish stock abundance, monk-seal hookings, and marine debris, should be monitored through surveys investigating level of fishing activity. A fee for fishing-gear rental and for fishing access to base should be instituted to cover costs.

The continued implementation of the 2010 INRMP would result in minor beneficial impact by monitoring the health of fish, EFH, and the coastal/marine environment.

Preferred Alternative

The 2023 INRMP proposes to employ a systematic approach to managing coastal and nearshore resources, using a process that includes inventory, monitoring, modeling, management, assessment, and evaluation. To achieve this objective, the following strategies are proposed:

1. Establish a monitoring program for the nearshore environment of PMRF to inform future management decisions and monitor changes over time.
2. Partner with DLNR DAR to incorporate regular monitoring site(s) in PMRF's nearshore waters into the State's regular monitoring schedule, as feasible.

In addition to the direct management actions affecting fish, EFH, and coral, there is an anticipated beneficial impact on coral reefs from reduced runoff associated with erosion control measures (Section 3.3.1.1). The lower sediment load and improved runoff quality improves water quality, which results in a beneficial impact on coral reef species (Dollar and Brock 2007).

Implementation of the actions proposed in the revised 2023 INRMP would have a beneficial impact on fish, EFH, and corals when compared to activities of the No Action Alternative due to improved erosion control and increased environmental monitoring of nearshore waters.

Macroinvertebrates

The management actions associated with macroinvertebrate species at PMRF involve general nearshore monitoring actions; therefore, there is no impact associated with the implementation of the INRMP.

3.3.3 Social and Cultural Environment

3.3.3.1 Land Use

The term land use refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas.

The SOH designates the following Land Use Categories: agricultural, conservation, rural, and urban. Additional land use categories applicable to the Barking Sands facility are defined in the Kaua'i County General Plan. Most of the lands at PMRF are ceded lands—crown lands of the Hawaiian monarchy that were "ceded" to the federal government during Hawai'i's annexation in 1898. If released from federal use, these lands are to be returned to the State to resolve Native Hawaiian claims to the land (Commander, Navy Region Hawai'i 2012). Land use controls outside the installation boundaries are critical to range operations at PMRF and are governed by various real estate agreements (HHF Planners 2016).

The Office of the Chief of Naval Operations Instruction (OPNAVINST) 11010.40 establishes an encroachment management program to ensure operational sustainment that has direct bearing on land use planning on installations. Additionally, the joint instruction OPNAVINST 11010.36C and Marine Corps Order 11010.16 provides guidance administering the Air Installation Compatible Use Zone (AICUZ) program, which recommends land uses that are compatible with noise levels, accident potential, and obstruction clearance criteria for military airfield operations. OPNAVINST 3550.1A and Marine Corps Order 3550.11 provide guidance for a similar program, Range AICUZ (RAICUZ). This program includes range safety and noise analyses and provides land use recommendations which would be compatible with Range Compatibility Zones and noise levels associated with military range operations.

Primary land use constraints on Barking Sands are related to the military operations and trainings. These constraints include:

- *AICUZ:* For the promotion of compatible development in the vicinity of airfields as well as the protection of the public safety and health as well as protection of the Navy's national defense mission.
- *Range AICUZ:* Provides land use recommendations which would be compatible with Range Compatibility Zones and noise levels associated with military range operations.
- *Explosives Safety Quantity Distance (ESQD) Arcs:* Arcs designed to protect an exposed site (e.g., inhabited building, public highway) from explosive materials to afford an acceptable degree of protection and safety for the exposed site.
- *Ground Hazard Areas (GHAs):* Arcs with a radius of 6,000 ft for Navy Vandal missile launches and 10,000 ft for Strategic Target Systems launches to exclude non-essential personnel and the public from the hazardous areas.
- *EMR Zones:* Areas placed around transmitter sites and tracking radars to negate hazards to personnel (HERP), hazards to ordnance (HERO), or hazards to fuel (HERF).
- *Antiterrorism Force Protection (AT/FP):* Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings (2013) establishes standards to protect all inhabited DoD buildings from terrorist attacks. UFC 2-100-01, Installation Master Planning (2012) lists the standoff distances during the master planning phase to meet the UFC 4-010-01 requirements. The local threat environment and construction standards would determine if these standoffs need to be increased or changed, as plans are further developed.
- *Aviation Safety Zones:* Established around the ends of active runways in order to control the activities and number of people on the ground at risk in the event of an aircraft accident during take-off or landing.
- *Clear Zone (CZ):* The area closest to the end of the runway is the most hazardous.
- *Accident Potential Zone (APZ I and II):* APZ I is an area beyond the CZ that possesses a significant potential for accidents. APZ II is an area beyond APZ I with a lower, but still significant, potential for accidents.

Affected Environment

Barking Sands occupies approximately 2,538 ac of Navy-owned and Navy-leased land and has approximately 7.6 mi of shoreline. Barking Sands is in a SOH Land Use Commission (LUC) designated Conservation District. The land uses surrounding Barking Sands include agricultural, recreational, and a landfill. The eastern border is adjacent to a State Agricultural District (SOH LUC 2012), a 5,000 ac Agricultural Preservation Initiative (API) area administered by the HDOA. North of Barking Sands is Polihale State Park. The State's 158 ac Kekaha Agricultural Park and Kekaha Landfill lie south of Barking Sands (Figure 9). The County of Kaua'i classifies Barking Sands as military land use, and its surrounding lands as open and agricultural. Kaua'i County has designated the dune area from Nohili Point to the north boundary of PMRF as a scenic ecological area (County of Kauai Planning Department 2018).

Barking Sands Main Base is the principal operations area for PMRF and supports surface, subsurface, air, and space activities. Based on the unique activities that dictate the constraints for the area, Barking Sands can be divided into three areas: North Zone, Central Zone, and South Zone (Figure 9). North Zone is used for missile assembly and launch operations and RDT&E programs and therefore has controlled access. The Central Zone houses the Main Operations Area and Airfield Operations Areas (AOA). The Main Operations Area supports functions related to flight and range operations, maintenance, supply, and storage. AOA includes a runway, airfield operations and administrative facilities, and the helicopter

landing pad and hangar. The South Zone contains personnel support, housing, community support, and recreation facilities. The most southern end provides special areas that can be used for range operations with unique needs and constraints, such as launching and antenna use. Figure 10 illustrates the generalized land use at PMRF at Barking Sands (Commander, Navy Region Hawai'i 2012).

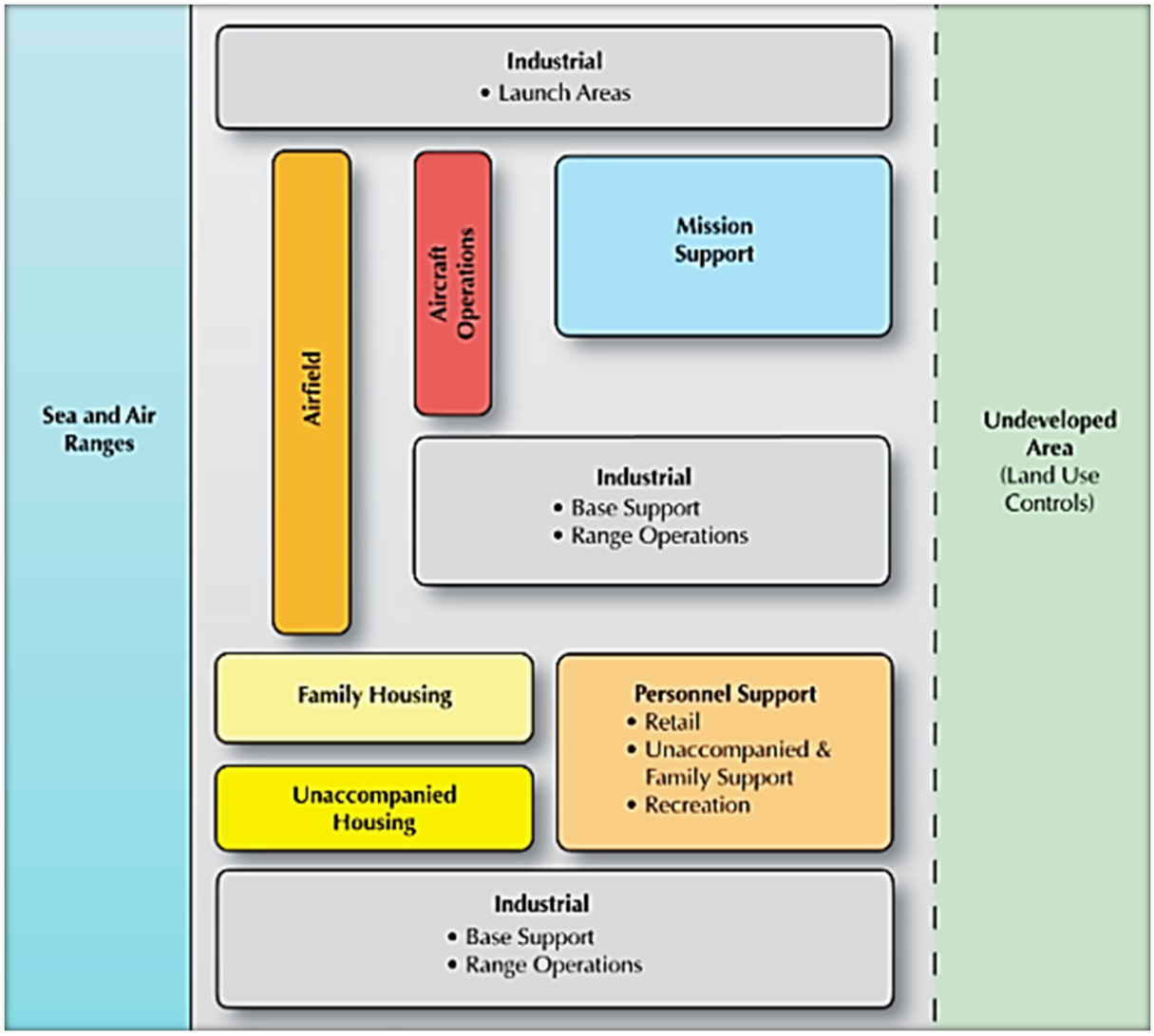

Figure 10 PMRF Barking Sands Generalized Land Use (Commander, Navy Region Hawai'i 2012)

Military operations related land use constraints present at Barking Sands include AICUZ, ESQD Arcs, GHAs, EMRs, AT/FP, Aviation Safety Zones, CZs, and APZs. Parts of the GHAs extend off base. As such, PMRF coordinates with the SOH and DLNR Division of State Parks to ensure impacted areas of Polihale Beach Park remain clear during missile launches. The ESQD arcs on Barking Sands extend beyond its borders into agricultural lands and the ocean on the northern portion of the base. Barking Sands has an MOU with the SOH to restrict land use within the ESQD arcs that extend to off base property. A portion of the Barking Sands recreation beach lies within the CZ. This area is closed to recreation purposes during daylight hours and all other times when the airfield is in use. The APZ I in the central zone extends from both the north and south ends of the runway; however, APZ II is not required for either end since the flight tracks beyond this area are over the ocean. Other development constraints are critical habitats

and wetlands, flood zones/tsunami evacuation zones, habitats for rare, threatened and endangered species, and sites on which significant cultural and historic resources occur (Figure 11).

The primary land use constraint on Barking Sands is the military mission, which restricts or constrains land use during certain operations and training events.

Land seaward of the upper wash of waves or the vegetation line is State land, except when designated for Navy use per 33 C.F.R. § 334.1390 or 33 C.F.R. § 165.1406. The Navy must limit public access to restricted beach areas for public safety during operational hours.

Barking Sands is in a SOH LUC-designated State Conservation District with its eastern border adjacent to a State Agricultural District (SOH LUC 2012). A 5,000-ac API area, which is administered by the HDOA, Agribusiness Development Corporation, lies within the agricultural district. These lands are leased to various agricultural operations, including multi-national seed corporations. This low-elevation land is drained by a ditch system, approximately 40 miles long, which traverses PMRF to discharge into the Pacific Ocean at Kinikini Outfall. The ditch system allows the water table to remain below the root zone during the growing season and diverts upland stormwater runoff from agricultural lands. Except during heavy rainfall when flow is gravity fed, the ditch system is controlled by a pump.

Modified development, construction projects, and real estate actions on Barking Sands trigger NEPA evaluation early in the site approval process. Most of these development activities are covered by existing categorical exclusions (CATEXs). A record of CATEX describing BMPs and regulatory requirements is prepared as a NEPA process and not part of INRMP management actions.

Environmental Consequences

No Action Alternative

The No Action Alternative would carry forward the management strategies from the 2010 INRMP. Procedures would continue to be implemented to assure coordination among facilities planners, resource managers, and SOH and County officials. The PMRF Installation Environmental Program Director would continue to be the point of contact to provide relevant information on issues with the potential to affect wildlife and native habitat, such as military operations and training, and tower and other construction and repair projects. Management actions in the 2010 INRMP related to land use include the following:

1. *Base Planning:* A routine procedure should continue to be implemented to assure coordination among facilities planners, resource managers, SOH, and county officials. Continue to utilize the PMRF Environmental Coordinator as the point of contact to provide relevant information on issues with potential to affect wildlife and native habitat, such as military operations and training, and tower and other construction and repair projects.
2. *Protection of Natural Resources in Undeveloped Areas:* Review construction and maintenance projects at PMRF to ensure contractors are aware of guidelines to avoid impacting sensitive vegetation.
3. *Base Planning:* Continue to follow standard methods to control erosion for all new construction projects. The proposed Maritime Directed Energy Test Center at Barking Sands should be sited to avoid protected species and their habitat.
4. *Base Planning:* Review locations and plans for any new equipment towers in order to minimize effects on protected species and their habitat.

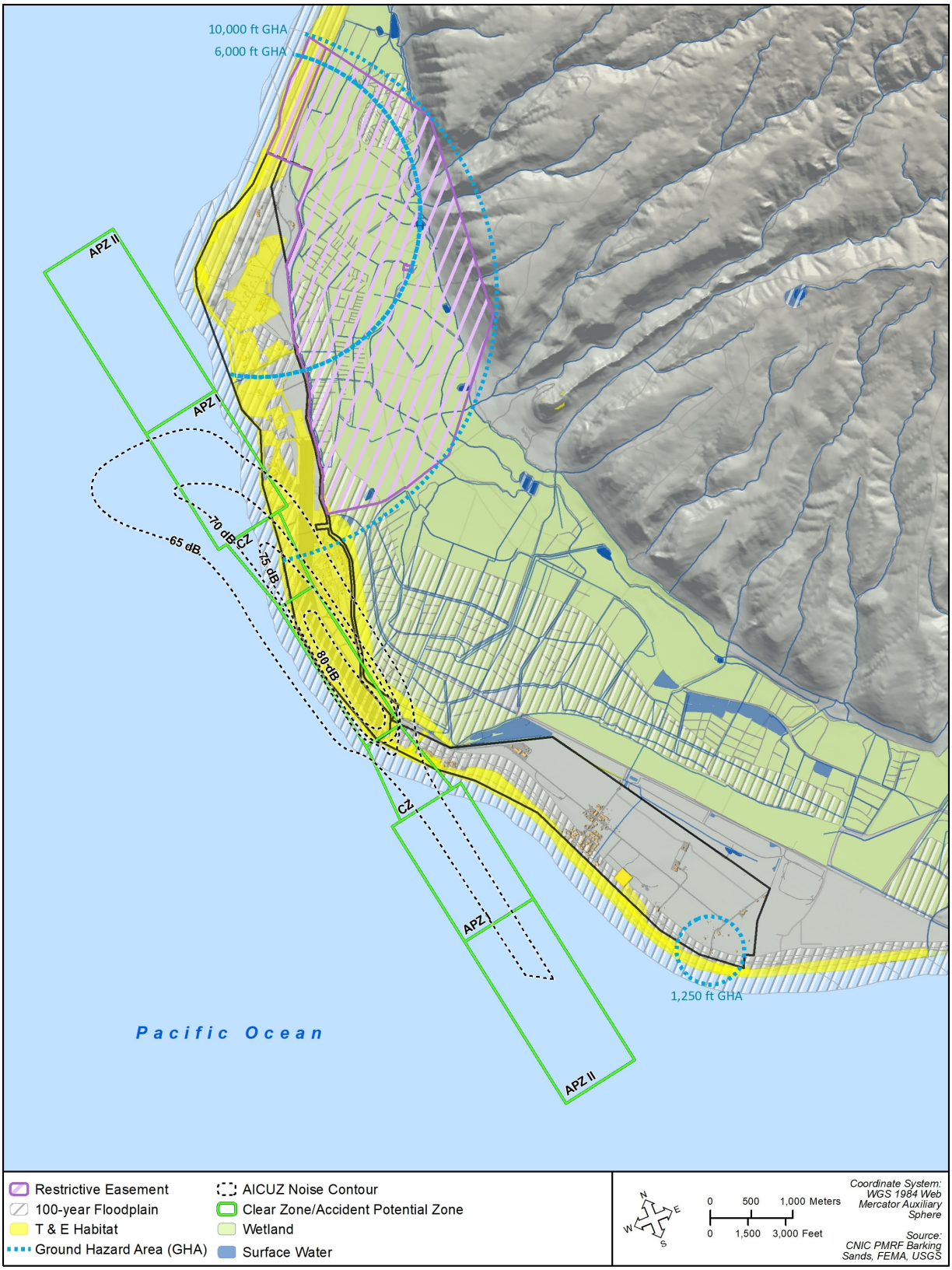

Figure 11 Barking Sands Main Base Constraints

Continued implementation of the 2010 INRMP would not include any management actions leading to land use change; therefore, the No Action Alternative would have no impacts on land use.

Preferred Alternative

The primary purpose of an INRMP is to ensure no net loss in the capability of military lands to support the military mission of the installation. In the 2023 INRMP, the management, preservation, and enhancement of land areas, such as developing oxidation pond flushing protocols, considering designating the Nohili Dunes as a Special Conservation Area, and removing invasive species from landscaped areas, would improve the ecosystem integrity of military lands. The Preferred Alternative would be compatible with existing land use at the Barking Sands Main Base and its surrounding areas.

The 2023 INRMP contains the following strategies related to land use:

1. Continue to implement coordination among facilities planners, resource managers, SOH, and county officials.
2. The PMRF IEPD and NRM should continue to be the points of contact to provide relevant information on issues with potential to affect wildlife and native habitat, such as military operations and training, and tower and other construction and repair projects.

No new land uses or land use alterations would occur as the result of the implementation of the 2023 INRMP. Therefore, no impacts on land use would occur.

3.3.3.2 Outdoor Recreation

Affected Environment

The wide sandy beaches at Barking Sands provide various types of recreational activities, such as walking, jogging, sunbathing, swimming, surfing, and fishing. PMRF employees, active duty, reserve and retired military and dependents have recreational access to approximately 2.0 mi of coastline. Historically, the public also had access to the beaches and water areas along the Barking sands shoreline. After the terrorist attacks on September 11, 2001, most civilian beach access was restricted. In 2005, the MWR Guest Card Program was initiated, allowing card-holding civilians to access PMRF through the main gate, travel unrestricted to Majors/Waiapuaʻa Bay or Shenanigans, use Majors/Waiapuaʻa Bay and Shenanigans facilities, and access the recreational beach areas (Figure 12). The areas accessible for fishing, surfing, recreation, and socializing extend from

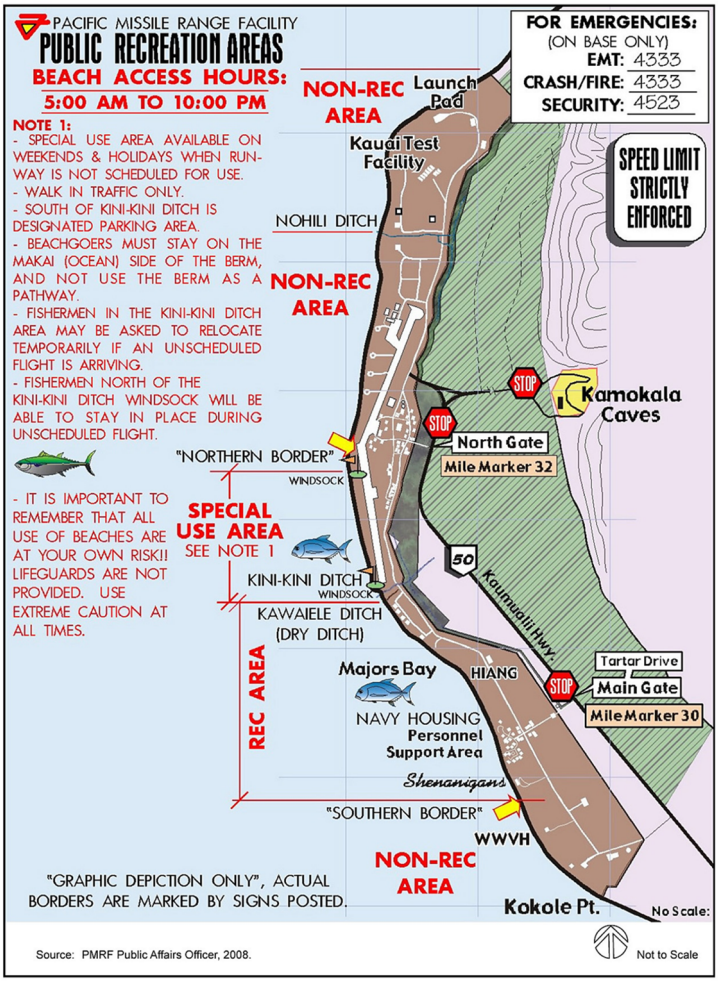

Figure 12 Barking Sands Recreational Areas

Shenanigans (All-Hands Club) to Kinikini Ditch (south end of runway), Monday through Friday, and into the Special Use Recreation Area (Kinikini to the northern windsock of the runway) on weekends and holidays, except during heightened force protection conditions or range operational periods. Beach use hours are from 5 a.m. to 10 p.m. The public can walk or drive onto the north end of the base via the beach, although security is enforced, and other deterrents are being examined.

The Navy also maintains beach cottages adjacent to Majors/Waiapuaʻa Bay, which provide recreational opportunities for visitors to Barking Sands. The cottages are available to active duty and retired military and their dependents year-round. All PMRF recreational facilities are accessible to disabled persons in accordance with Secretary of the Navy Memorandum of August 15, 2002. The Navy limits shore fishing at Barking Sands to the Recreation Area and the Special Use Area. Fishing restrictions allow only for pole, throw net, and spear fishing. Fishing and beach access restrictions are enforced by installation security details, which patrol the beach several times per day.

Environmental Consequences

No Action Alternative

The 2010 INRMP implements the following management actions related to outdoor recreation:

1. *Fishing, Surfing, Windsurfing, and Beach Activities:* Continue to provide beach access through Barking Sands for surfing and boating to PMRF employees, active duty, reserve, and retired military and dependents, as well as any U.S. citizen who possess a valid annual PMRF Recreation Pass.
2. *Dissemination of Pertinent Natural Resources Information to Recreation Pass Program Applicants:* Provide PMRF Recreation Pass Program applicants with information on invasive species, aquatic hitchhikers, and other pertinent natural resources information as part of the application process.
3. *Beach and Dune Access Restrictions:* Continue all beach and dune access restrictions. Monitor for excessive traffic at areas adjacent to the beach cottages and other high-use recreational areas and temporarily cord off areas to re-establish the vegetation, if necessary.

The outdoor recreation management actions from the 2010 INRMP would continue to provide military personnel, their dependents, and the public an opportunity to participate in outdoor recreation activities. In addition, the management actions would help to protect the natural resources and ecosystem at Barking Sands and maintain or enhance its recreational quality. Therefore, the No Action Alternative would be beneficial to the outdoor recreation resources at Barking Sands.

Preferred Alternative

The 2023 INRMP contains the following strategies related to outdoor recreation:

1. Continue to provide public opportunities for natural resource related outdoor recreation where it does not conflict with public health and safety, the military mission, or security.
2. Ensure that the degree of access allowed for outdoor recreation is consistent with conservation of natural resources.
3. Continue to promote awareness among recreational users of the importance of resource stewardship and promote a sense of pride in the natural environment of PMRF.
4. Provide PMRF Recreation Pass Program applicants with information on pertinent natural resources information as part of the application process.
5. Continue to restore and enhance natural and cultural resource assets at PMRF for public benefit and enjoyment.

6. Develop a Natural Resources Information Center to include brochures and other materials promoting self-guided nature walks and bird watching opportunities both on base and in the surrounding areas. Information on threats to native Hawaiian ecosystems and threatened and endangered species should be included, with particular emphasis on the introduction and spread of alien plant species and the negative effects of off-road vehicles in sensitive environments and measures that can be taken to avoid such impacts.

The 2023 INRMP would continue to provide military personnel, their dependents, and the public an opportunity to participate in outdoor recreation activities and would have a minor beneficial impact on outdoor recreation by developing a Natural Resources Information Center providing information on self-guided nature walks and bird watching opportunities.

3.3.3.3 Cultural Resources

DoN is aware that there may be circumstances under which the protection and enhancement of natural resources could affect cultural resources. Appendix A summarizes applicable cultural resources laws, regulations, and requirements. When natural resources projects resulting from this INRMP have been precisely defined, they will be evaluated for potential effects on cultural resources. Section 106 consultation will be initiated with the State Historic Preservation Officer and native Hawaiian organizations, if appropriate, in accordance with the National Historic Preservation Act (NHPA), 16 U.S.C. § 470 (f), as amended, and its implementing regulations, 36 C.F.R. part 800. In addition, other potentially applicable federal cultural resource statutes include the Archaeological Resources Protection Act of 1979 (16 U.S.C. §§ 470aa-470ll) and Native American Graves Protection and Repatriation Act (25 U.S.C. § 3001 et seq.). The existing ICRMP for various Navy properties that fall under PMRF shall be considered for cultural resources compliance (NAVFAC PAC 2012). The ICRMP also provides further instruction on existing Navy agreements, which may include Memorandum of Agreement, Programmatic Agreement, and Comprehensive Agreement (DoN 1999; 2011b; 2012).

Affected Environment

Cultural resources at PMRF Barking Sands include archaeological sites, historic architectural resources, and traditional cultural places. More than 90 previous archaeological and historic architectural studies have been conducted addressing PMRF Complex lands in Hawai'i. All these resource types and previous studies are addressed in detail in the 2012 *Integrated Cultural Resources Management Plan for the Pacific Missile Range Facility, Kauai Island, State of Hawai'i, FY 2012-2017* (NAVFAC PAC 2012), referred to going forward as the ICRMP. The ICRMP provides a historic context, inventory of resources, probability maps of culturally sensitivity areas, and descriptions of previously conducted studies. It also provides a gap analysis identifying future research needs as well as a series of SOPs for addressing compliance, avoidance, mitigations or impacts to cultural resources. A Historic Asset Management Process (HAMP), completed in 2011 (DoN 2011a) provides additional information about historic facilities, along with a decision-making workflow to identify the appropriate procedures for addressing historic facilities.

The site's historic context is provided in greater detail in the ICRMP (NAVFAC PAC 2012), and is summarized as follows. Barking Sands lies within the arid coastal plain traditionally known as Mānā in the ahupua'a (land division) of Waimea within the moku (district) of Kona. This area was important for habitation, agriculture, and ceremonial activities, including the presence of burial grounds in the dunes. The area was extensively occupied by early Hawaiians, and was well-known historically for its offshore fishing grounds, taro cultivation in the marshes, and upland sandalwood forests; habitations included temporary fishing camps and permanent villages (NAVFAC PAC 2012).

Traditional fishing and subsistence agriculture remained the way of life in the Mānā area after the initial arrival of Europeans in the Hawaiian Islands in 1779. After the Māhele of 1848, when Kamehameha II introduced a system of private land ownership, Mānā became Crown Lands, owned by the king. Agriculture continued to some degree, but some lands were leased, introducing cattle ranching and market agriculture such as coffee and fruit. In the late nineteenth century, the land was consolidated under a lease as part of large sugar plantation operations, with marshy areas near Barking Sands leased to Chinese farmers to grow rice (NAVFAC PAC 2012). Two plantation worker camps, Mana Camp and Saki Mana, were located close to and partially within the current Barking Sands site (Martin 2002).

During World War II, an airfield was developed at Barking Sands, and after the commencement of the Cold War, the site was used for research and development of significant missile defense programs of that era. Of all the PMRF land areas, Barking Sands has the greatest number of identified cultural resources. Most cultural and historic studies have occurred within this area. Listings of all previously inventoried sites, cultural places, and historic facilities, as well as all previous studies at PMRF, are provided in the 2012 ICRMP (NAVFAC PAC 2012).

Traditional Cultural Places/Properties

In traditional Hawaiian cultural geography, place names refer to both the landforms and to events that occurred there (NAVFAC PAC 2012). Traditional cultural places are usually identified first by the presence of a traditionally used name, and then through documented associations with historical events, traditional stories, and chants. The large number of historically named places in the Waimea district, more than 98 percent of the area's geographic features, underscores the importance of the area to early Hawaiians.

Thirteen traditional cultural places/properties (TCPs) have been identified at Barking Sands and are considered culturally sensitive. TCPs play an important role in community cultural traditions, beliefs, and activities and must be considered in planning under NEPA, NHPA, EO 13007, and other authorities. Within the TCPs, named places that contribute to their significance include, but are not limited to, the following: Nohili Dunes, Nohili Ditch, Kawaiʻele, Kūākiʻi Pōhaku, Kawaiʻele Ditch, Kinikini, Keanapuka, Kapuaʻi, Kohomahana, Kokole, Moelaoa, Palaeholani, Waiapua'a, and Wailono. For more details, see Table 4.6 in the 2012 ICRMP (NAVFAC PAC 2012).

Archaeological Sites

Of the more than 80 inventoried archaeological sites at Barking Sands identified in the ICRMP, 31 are eligible for listing in the National Register of Historic Places (NRHP). An additional 28 are not eligible for NRHP listing and 24 others remain undetermined or unevaluated.

Within PMRF Barking Sands, the highest archaeological sensitivity is on Nohili Dunes and the beach areas of the north and central coastline as far south as Waiapuaʻa Bay, where the likelihood of encountering subsurface archaeological resources remains high (NAVFAC PAC 2012). The coastal dunes are the location of numerous known burials, as well as other significant archaeological sites, mostly with a traditional Hawaiian affiliation. According to the ICRMP, these may include habitation sites, low stone walls, midden deposits, and surface scatters. There is moderate archaeological sensitivity in undeveloped areas inland of the dunes, where there is moderate likelihood of finding subsurface archaeological resources, mostly remains of habitation sites. There is a lower sensitivity based on a low probability of archaeological sites in the south end of Barking Sands and in developed inland areas, according to the probability determinations in the 2012 ICRMP (NAVFAC PAC 2012).

Plantation-era archaeological sites have not been documented in as much detail as traditional Hawaiian resources. However, nine sites are documented at Barking Sands. They include two cemeteries, road traces, debris scatters, and three plantation ditches (Kawaiʻele, Kinikini, and Nohili). Kawaiʻele Ditch is believed to have existed previously and was said to have been constructed by the Menehune (a legendary race of people, small in stature, to whom magical powers are attributed), but was later modified to support sugar cultivation (NAVFAC PAC 2012). The Saki Mana plantation camp area is also identified as a likely location of subsurface archaeological resources and lies within a restrictive easement area.

Archaeological sites related to military uses during World War II and the Cold War have been documented at PMRF, including 44 total sites, 16 of which are considered eligible for listing in the NRHP. These include remains of small concrete and wood structures, and earth-and-concrete aircraft revetments in the former airfield area in the inland portions of Barking Sands, as well as trash deposits and other small features (NAVFAC PAC 2012).

Historic Architectural Resources

Eight historic architectural studies have been undertaken at PMRF facilities, but have mostly focused on Barking Sands, since it contains the vast majority of built features of all PMRF sites. Nine facilities located at PMRF Barking Sands are considered eligible historic properties for NRHP with temporal affiliation to military history (NAVFAC PAC 2012).

Environmental Consequences

For clarity, and to avoid duplication due to the similarity of impacts from the different actions on each of the resource types, the impacts on types of cultural resources defined above—archaeological, traditional cultural places, and historic architectural—are analyzed together in the analysis that follows.

No Action Alternative

There are no management actions under the 2010 INRMP that directly address cultural resources. However, management actions for natural resources can have direct and indirect effects on cultural resources, which include the following:

- *Erosion Control Measures:* These can be beneficial to cultural resources because they retain subsurface artifacts in place, protecting them from erosion damage and exposure to the elements. However, erosion control measures involving excavation of soil or driving of stakes or posts can have adverse impacts to subsurface archaeological resources, with the potential to damage undocumented resources if appropriate mitigation measures are not observed during installation.
- *Vegetation Planting and Removal:* Dune restoration involving excavation for planting new vegetation can have adverse impacts to subsurface archaeological resources, with the potential to damage undocumented resources if appropriate mitigation measures are not observed during installation.
- *Outdoor Recreation:* Recreational access to sensitive cultural resource areas such as Nohili Dunes increases the risk of archaeological site disturbance due to pedestrian or vehicular access resulting in accidental or intentional movement of artifacts.

Under the No Action Alternative, the proposed strategies had negligible impacts on cultural resources; in some cases, impacts were beneficial.

In general, the construction of fencing, signage, irrigation systems, and interpretive displays, as well as planting and removing vegetation, can result in ground disturbance, which could adversely impact archaeological subsurface resources. This is particularly an issue of concern in the Nohili Dunes area and other coastal dunes, where burials are often found.

Many activities under the No Action Alternative are foreseen to have no impact on cultural resources, including monitoring and studies, research activities, invasive animal management (except ungulate fencing installation), all wildlife management activities (except sign installation), and marine resource management. Land management planning activities are required to coordinate with cultural resources guidance. Some activities have a beneficial impact, including restrictions of off-road vehicle use, which prevents damage to archaeological sites, particularly in sensitive, erosion-prone dune areas.

The effects on cultural resources under the No Action Alternative would be low in degree of effect, long-term in duration, and localized. Due to the mitigation measures instituted as part of ICRMP policies, the adverse effect would be negligible.

Preferred Alternative

There are no management actions under the 2023 INRMP that directly address cultural resources. However, management actions for natural resources can have direct and indirect effects on cultural resources, which include the following:

- *Erosion Control Measures:* Impacts on cultural resources are generally the same as under the No Action Alternative. The addition of annual surveys for erosion and soil compaction under this alternative is beneficial, as it would allow for identification of impacts to subsurface cultural resources and prompt mitigation in coordination with cultural resources staff.
- Activities to encourage or discourage burrowing birds, especially in the Nohili Dunes and other coastal dune areas frequented by burrowing seabirds, have the potential for a negligible adverse effect on subsurface cultural resources due to the potential for below-ground disturbance or excavation (see above).

The 2012 ICRMP provides guidance on how to protect archaeological resources, addresses the inadvertent discovery of archaeological materials and of human remains, and other SOPs intended to mitigate impacts on cultural resources by actions undertaken at PMRF. The INRMP actions are required to be implemented using the SOPs detailed in the 2012 ICRMP; and some of the actions would, in the long-term, reduce soil erosion that damages cultural resources, resulting in a beneficial impact.

Significant historic and archaeological resources are present at Barking Sands. As a steward of cultural resources, the DoN must comply with federal regulations relating to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF. Cultural resources compliance at Barking Sands shall be in accordance with the Navy Regional PA, as amended (Commander, Navy Region Hawai‘i 2024). The INRMP does not propose activities that would affect historic properties. No further analysis is required at this time.

3.3.4 Additive Impacts

Additive impacts from RFFAs at Barking Sands are summarized in Table 12. Section 3.2.1 describes the criteria for determining the level of impact, including additive impacts. Resources eliminated for analysis at this site are discussed in Section 3.2.3.

Table 12 Additive Impacts at Barking Sands

Environment	Resource	Description of Impact
Physical	Geological Resources	Additive impacts to geological and soil resources may include temporary land disturbance associated with power grid consolidation construction (including possible excavation and trenching, general environmental restoration activities, and construction of photovoltaic energy systems). Other projects with potential land disturbing activities include Mānā Forest Reserve Wetland Restoration, Kawaiʻele Bird Sanctuary restoration and sand mining, and the Navy Environmental Restoration Plan. Appropriate BMPs in accordance with CWA Section 402 would be implemented to prevent major erosion and soil loss. Actions listed above represent temporary disturbances. With appropriate mitigation BMPs implemented, impacts to soil and geological resources are minimized.
Physical	Water Resources	Additive impacts to water resources may occur from increased runoff associated with land disturbance from constructions activities, see geological resources above. Additionally, impacts to water quality may be incurred as a result of explosives and explosives by-products and other munitions, these impacts result from operations at Barking Sands. Other impacts may include all pest management actions that utilize poisons, pesticides, and/or insecticides potentially including the State Wildlife Action Plan, and the USFWS Hawaiian Bird Conservation Action Plan.
Physical	Natural Hazards	No additive impacts to Natural Hazards are anticipated. The projects listed in Table 6 do not change current use of the PMRF facilities significantly enough to produce a detrimental effect.
Physical	Climate Change	Impacts from GHG emissions are additive in nature, as individual emission sources are not large enough to have appreciable impact on global climate change. Projects with GHG emissions include any projects that involve use of heavy equipment, gas- or diesel-powered vehicles, or use of ships or aircraft. Reductions in GHG emissions long-term would result from alternative energy production, from projects including photovoltaic and battery energy storage systems, commercial wind-energy development, and power-grid consolidation. Additive impacts from SLR are anticipated in the future for land-based projects located in the SLR exposure area.
Biological	Vegetation	Additive impacts to vegetation may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, Biosecurity Plan for Micronesia and Hawaiʻi, and Mānā Plain Forest Reserve Wetland Restoration. Impacts from these projects are anticipated to be additive and beneficial.
Biological	Nuisance and Invasive Animals	No additive impacts to nuisance and invasive animal control are anticipated from projects listed in Table 6.
Biological	Bats	Additive impacts to bats at Barking Sands may result from projects including power grid consolidation, photovoltaic energy systems, and wind energy development. The principle impacts from these activities occur during clearing and grubbing activities during construction. Wind energy projects are known to impact the species—the DLNR has set forth guidance for protection of the species for wind-energy project specifically. Impacts to the Hawaiian hoary bat at the ARDEL station are addressed within the INRMP. With appropriate measures in place to protect the hoary bat, impacts to the species are anticipated to be neutral.

Table 12 Additive Impacts at Barking Sands (Continued)

Environment	Resource	Description of Impact
Biological	Birds	BASH mitigation measures for and impacts of various operational air activities including testing and training are addressed in the INRMP. Additional projects impacting birds include wind energy development, long-range missile tests, and the USAF long-range strike weapons systems evaluation program. Projects with beneficial impacts to birds in the project area include the State Wildlife Action Plan, the Hawaiian Bird Conservation Action Plan, Mānā Plain Forest Reserve Wetland Restoration, and the Kawai'ele Bird Sanctuary restoration. The BO for Newell's shearwaters estimates an average of seven fallouts per year resulting from operations, maintenance, and infrastructure at PMRF facilities (all sites). These are not part of the Proposed Action and are analyzed separately in the EIS/OEIS and BO (USFWS 2018; DoN 2008a).
Biological	Insects	Native and pollinator insects may benefit from projects including the State Wildlife Action Plan, the Hawaiian Bird Conservation Action Plan, Mānā Plain Forest Reserve Wetland Restoration, and the Kawai'ele Bird Sanctuary restoration. Additive impacts to insects are anticipated to be beneficial at Barking Sands.
Biological	Marine Mammals, Marine Reptiles and Other At-risk Marine Species	Additive impacts to marine mammals, marine reptiles, and other at-risk marine species include potential impacts from Navy sonar testing, and noise impacts from long-range missile tests, long-range strike weapons systems evaluation program. Other potential impacts to marine mammals in the vicinity of Barking Sands include bycatch, and derelict fishing debris from recreational and commercial fishing, and maritime traffic.
Biological	Coastal and Nearshore Biological Resources	Additive impacts to coastal and nearshore resources at Barking Sands include impacts from commercial and recreational fishing activities.
Social	Land Use	No additive impacts to land use are anticipated. The projects listed in Table 6 do not change current use of the PMRF facilities.
Social	Outdoor Recreation	Additive impacts to outdoor recreation are related to operation of Barking Sands facilities, long-range missile tests, long-range strike weapons systems evaluation program require additional closures to access, affecting recreation. The 2023 INRMP includes a management action to continue restoring and enhancing natural and cultural resource assets at PMRF for public benefit and enjoyment. The adoption of the State Wildlife Action Plan, the Hawaiian Bird Conservation Action Plan, the Mānā Plain Wetland Restoration Project, the continuance of wetland and coastal upland restoration would benefit public recreational activities (e.g., bird watching) at Barking Sands. Therefore, the additive impact on outdoor recreation at Barking Sands is beneficial.

Table 12 Additive Impacts at Barking Sands (Continued)

Environment	Resource	Description of Impact
Social	Cultural Resources	Projects at Barking Sands with potential impacts to cultural resources include the Navy's Power Grid Consolidation and ARDEL, Photovoltaic and Battery Energy Storage Systems, and ongoing long-range missile tests; and DOFAW Mānā Plain Forest Reserve Wetland Restoration and Kawai'ele Bird Sanctuary; as well as aspects of various plans, including the Navy Environmental Restoration Plan and Biosecurity Plan for Micronesia and Hawai'i, the DLNR State Wildlife Action Plan, and USFWS Hawaiian Bird Conservation Action Plan. Significant historic and archaeological resources are present at Barking Sands. As a steward of cultural resources, the DoN must comply with federal regulations related to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF. The analysis in this EA addresses the natural resource management program in a programmatic context. As management decisions are made and specific project designs are developed, further project and site-specific analysis and/or regulatory compliance (e.g., NEPA, NHPA, Native American Graves Protection and Repatriation Act) may be required. Cultural Resources compliance at PMRF shall be in accordance with the applicable ICRMP SOP and Navy agreements (DoN 1999; 2011b; 2012). At Barking Sands, additive impacts of the action, together with these past, present, and RFFAs would result in a negligible impact to cultural resources. This is because like the INRMP, the relevant DoD projects and other actions on installation land are required to be implemented using the SOPs detailed in the 2012 ICRMP, which include consideration and mitigation of potential impacts to cultural resources. Most of the RFFAs involve no physical alterations that would affect the area's known or potential cultural resources. Therefore, no additive impacts to cultural resources are anticipated.

3.4 Mākaha Ridge

The Mākaha Ridge Tracking Station encompasses 244 ac and serves as PMRF's secondary missile tracking and surveillance station (Figure 13). Mākaha Ridge is a finger ridge of the Nā Pali coast on the west-northwest side of Kaua'i within the SOH Forest Reserve, located approximately seven miles north of Barking Sands. Structures at the site consist of eight buildings and two lattice-support communication towers. Tracking and surveillance activities occur inside the buildings at Mākaha Ridge, including a Frequency Interference Control building, telemetry building, communications building, laboratory, power plant, maintenance facility, and guard shack (DoN 2010).

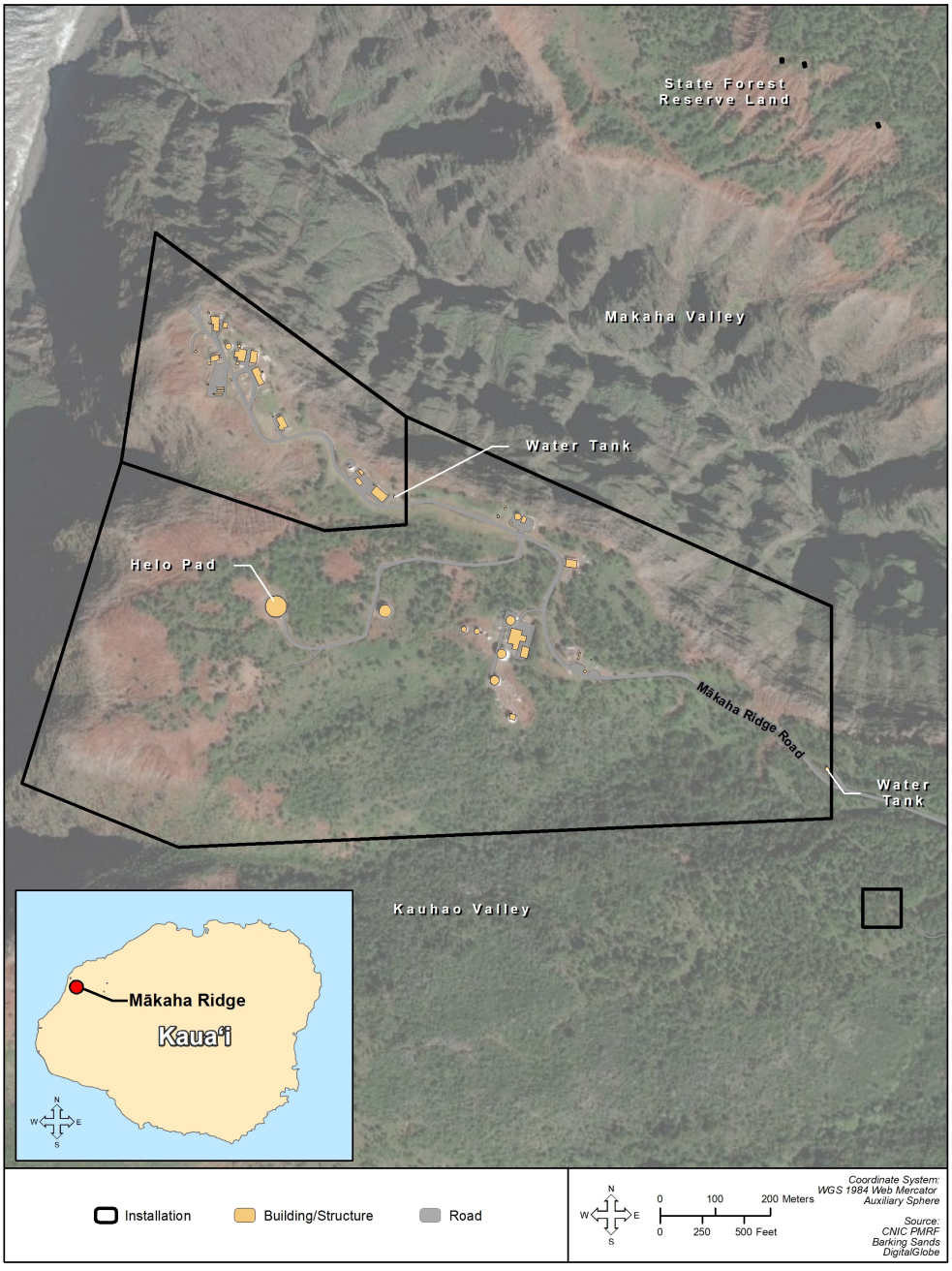

Figure 13 Overview of Facilities Located at Mākaha Ridge

Based on the location of this site, the resources identified in Table 13 are not affected and, therefore, are not further analyzed in this EA.

Table 13 Resources Eliminated from Discussion at Mākaha Ridge

Resource	Description and Justification for Elimination
Natural Hazards	Natural hazards that could affect Mākaha Ridge include hurricanes, landslides, flooding, and wildfire. However, the implementation of the INRMP would have no impact on the susceptibility of the facilities to natural hazards and would not impede evacuation activities necessary should a natural hazard such as a hurricane occur. Wildfire management would be limited to coordination with the appropriate fire department. The INRMP would not exacerbate the effect of any natural hazard.
Climate Change	The implementation of the 2023 PMRF INRMP is anticipated to have minimal GHG emissions. The Preferred Alternative is anticipated to have no to negligible impacts to climate change. SLR caused by climate change would not impact this site because of its location and elevation.
Marine Mammals, Marine Reptiles, and Other At-risk Marine Species	Mākaha Ridge is located inland away from the marine environment. INRMP activities at Mākaha Ridge would not impact at-risk marine species.
Coastal and Nearshore Biological Resources	Mākaha Ridge is located inland away from the marine environment. INRMP activities at Mākaha Ridge would not impact coastal and nearshore biological resources.
Land Use	The primary purpose of INRMP is to ensure no net loss in the capability of military lands to support the military mission of the installation. The implementation of the 2023 INRMP is not anticipated to lead to new land uses or land use alterations. Therefore, no impacts on land use would occur.
Outdoor Recreation	The 2023 INRMP does not contain strategies related to outdoor recreation at Mākaha Ridge. The 2023 INRMP would shift active hunting to further reduce goat and other ungulate populations from the Mākaha Ridge site to the Kamokalā Ridge site, maintaining recreational hunting opportunities. Therefore, the Preferred Alternative is anticipated to have no effects on outdoor recreation due to the continuing availability of recreational hunting at other sites.

3.4.1 Physical Environment

3.4.1.1 Geology and Soils

Affected Environment

Mākaha Ridge Tracking Station is located on the cliffs of the Nā Pali ridgeline, with site elevations ranging from 1,400 ft at the cliff face to 1,800 ft along the eastern perimeter, with general slope decreasing from east to west.

Soil types at Mākaha Ridge include rock outcrop (rRO), rough broken land (rRR), badlands (BL), badland-mahana complex (BM), Niu silty clay loam (NcE2, NcD), Pakala clay loam (PdA), and Pu‘u ‘Ōpae silty clay loam (PwC, PWe), shown in Figure 14. These soils generally exhibit high runoff and moderate to severe erosion hazards (USDA NRCS 2022). Areas around Mākaha Ridge facilities have been identified as highly eroded. These areas generally have little-to-no vegetation and have been targeted for restoration activities. Eroded, bare soil covers approximately 18 percent of Mākaha Ridge Tracking station. Soil erosion at Mākaha Ridge is exacerbated by feral ungulates that graze on soil stabilizing vegetation.

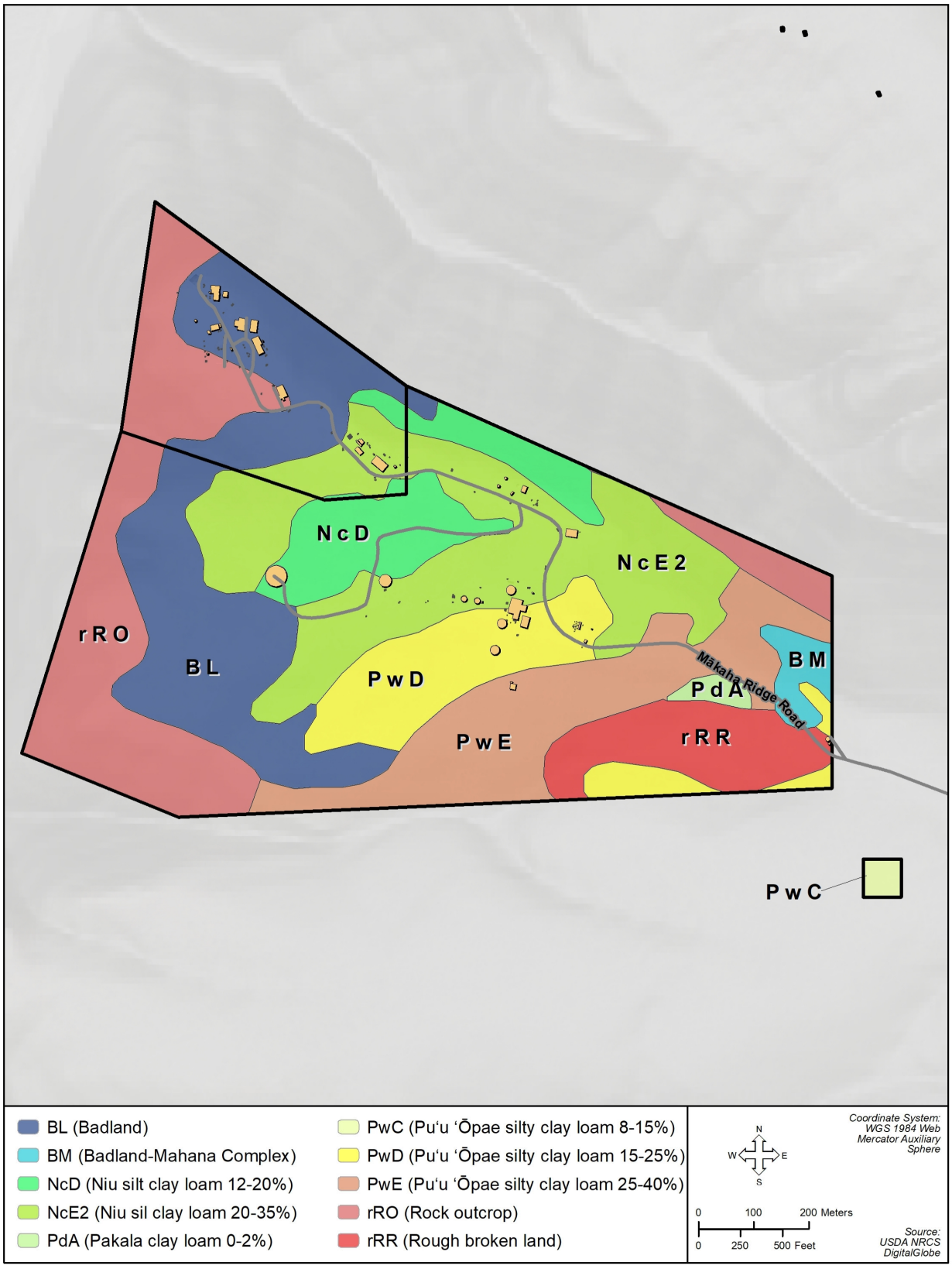

Figure 14 Soils at Mākaha Ridge

Environmental Consequences

No Action Alternative

Under the 2010 INRMP, the following strategies have been implemented to minimize soil erosion at the Mākaha Ridge Tracking Station:

1. *Base Planning:* Follow standard methods to control erosion during all new construction projects.
2. *Soil Erosion Control:* Limit vehicle access to paved roads and designated paved parking areas. Limit pedestrian traffic to established walkways. Stabilize slopes with soil-stabilizing cloth and out plantings of native drought tolerant species. Install an ungulate exclusion fence around protected plants and re-planted areas.
3. *Feral Goat Control:* Install exclusion fencing to exclude the goats from Mākaha Ridge Tracking Station to deter the consumption of erosion-inhibiting vegetation.

The continued implementation of the 2010 INRMP would result in a beneficial impact to soil at Mākaha Ridge, as the management actions improve the soil conditions and long-term availability of the resource at Mākaha Ridge.

Preferred Alternative

To minimize and restore erosion and soil compaction sites, the 2023 INRMP proposes the following strategies:

1. Conduct general surveys for erosion and soil compaction issues annually to prioritize restoration sites.
2. Monitor ungulate exclusion fence for areas vulnerable to ingress monthly and regularly monitor site for ungulate presence. Remove ungulates when identified within the fenced area. Maintain Mākaha Ridge ungulate exclusion fencing for erosion control.
3. Out-plant native, drought tolerant plants in areas identified as having erosion and soil compaction issues. Ensure that a regular monitoring schedule and a sufficient irrigation system are in place until plants are well established.

When compared to the No Action Alternative the Proposed Actions under the 2023 INRMP would have a beneficial impact on soils at Mākaha Ridge as the action would improve the soil condition in the long-term, when complete.

3.4.1.2 Water Resources

Affected Environment

The Mākaha Ridge Tracking Station has several intermittent streams both on and adjacent to the station, but no perennial water features occur at the site (NAVFAC PAC 2022). Two aquifers located beneath the station are valuable sources of drinking water. One basal, unconfined, dike aquifer (Aquifer Code 20301112) is currently used for drinking water, although no wells are located at the station. This fresh water is highly vulnerable to contamination. The other unused aquifer is a high-level (freshwater is not in contact with seawater), unconfined dike aquifer (Aquifer Code 20301212); it is a fresh drinking water source that is also highly vulnerable to contamination. Both aquifers identified at Mākaha Ridge are part of the Waimea Aquifer Sector of the Kekaha Aquifer System (John F. Mink and Lau 1992).

Environmental Consequences

No Action Alternative

Minor beneficial impacts on water resources would result from erosion control management actions (Section 3.4.1.1) and application control policies for pest management activities that utilize pesticides, herbicides, and rodenticides (Section 3.3.1.2).

Preferred Alternative

The same as under the No Action Alternative, minor beneficial impacts on water resources would result from BMPs and application control policies for pest management activities that utilize pesticides, herbicides, and rodenticides (Section 3.3.1.2), as well as from erosion control measures (Section 3.4.1.1).

When compared to the No Action Alternative, implementation of the 2023 INRMP would have a beneficial impact on water resources due to improved erosion control measures.

3.4.2 Biological Environment

3.4.2.1 Vegetation

Affected Environment

Cliff vegetation is primarily composed of native Hawaiian mixed shrub coastal cliff and mixed shrub dry coastal cliff and koa communities—a small percentage is considered non-native. Two federally listed endangered plants, the dwarf iliau and Hawai'i scaleseed , are known to occur on the dry cliffs of Mākaha Ridge (Wood 2006). Dwarf iliau is found on the dense, hard rock outcrops with nearly vertical faces. Two significant colonies of Hawai'i scaleseed grow on north facing, precipitous slopes around the Mākaha Ridge Tracking Station. Threats to native vegetation within the cliff communities include habitat degradation by feral goats and competition with non-native plants.

Plant surveys completed in 2000 and 2006, and an unmanned aerial drone survey conducted in 2019, identified 134 species of vascular plants, 100 of which are introduced (2 are believed to be Polynesian introductions) and 34 of which are indigenous (21 of the indigenous species also are endemic). The vegetation can be grouped into three general types: cliff vegetation, pine plantings/mixed scrub, and ruderal vegetation (NAVFAC PAC 2022). The vegetation cover types identified within the site are provided in Table 14 and Figure 16.

Table 14 Vegetation Cover Types at Mākaha Ridge

Cover Type	Native/Non-native	Area ac (ha)	Percent of Area
Eroded, Bare Soil	Non-native	44.2 (17.9)	18%
Hawaiian Mixed Shrub Coastal Cliff	Native	79.6 (32.2)	32%
Landscaped	Non-native	22.7 (9.2)	9%
Mixed Shrub Dry Coastal Cliff	Non-native	10.24 (4.1)	4%
Mixed Shrub Dry Coastal Cliff with Koa	Native	47.1 (19.1)	19%
Pine, Mixed Shrub	Non-native	43.6 (17.7)	18%
Total	-	**247.4 (100.1)**	**100%**

Source: NAVFAC PAC 2005.

Environmental Consequences

Invasive Plant Management

No Action Alternative

There are no actions implemented under the 2010 INRMP that could affect invasive plants resources at Mākaha Ridge; therefore, there are no impacts.

Preferred Alternative

General vegetation management strategies described in Section 3.3.2.1 are implemented at Mākaha Ridge, as applicable, to minimize and prevent the encroachment of invasive species into protected species habitats and other priority native vegetation cover types to the greatest extent practicable. The 2023 INRMP management strategies would result in a beneficial impact at Mākaha Ridge when compared to the No Action Alternative.

Native Plant Management

No Action Alternative

General vegetation management strategies described in Section 3.3.2.1 are implemented at Mākaha Ridge, as applicable. In addition, past vegetation management specific to Mākaha Ridge implemented under the 2010 INRMP is listed below:

1. *Native Plant Restoration:* The 2009 Feral Ungulate Management Plan calls for revegetation of selected eroded areas within the facility with native species expected to be found in and around Mākaha Ridge Tracking Station.

Continued implementation of the No Action alternative would have a beneficial impact on native plants at Mākaha Ridge by preventing disturbance in sensitive areas.

Preferred Alternative

General vegetation management strategies described in Section 3.3.2.1 are implemented at Mākaha Ridge, as applicable. In addition, vegetation management specific to Mākaha Ridge implemented under the 2023 INRMP is listed below:

1. Out-plant native, drought tolerant plants in areas identified as having erosion and soil compaction issues. Ensure that a regular monitoring schedule and a sufficient irrigation system are in place until plants are well established.

The above actions would have beneficial impacts on native plants and native plant habitat at Mākaha Ridge when compared to the No Action Alternative, as they increase the viability and population numbers of native plants and inhabitable vegetation space.

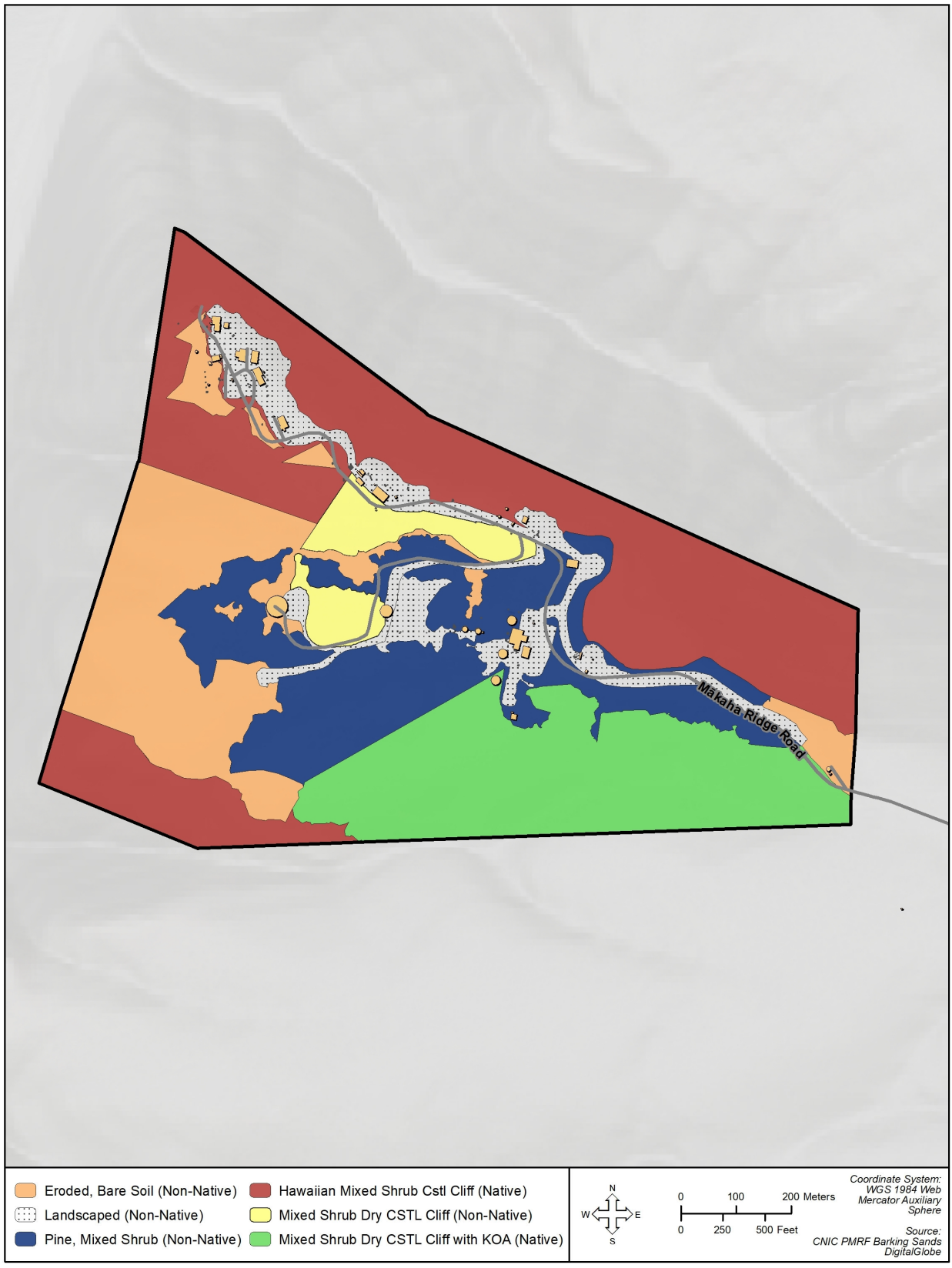

Figure 15 Vegetation Cover Types Present at Mākaha Ridge

Dwarf Iliau and Hawai'i Scaleseed

No Action Alternative

The 2010 INRMP implemented the following management actions for the conservation of dwarf iliau and Hawai'i scaleseed:

1. *Protected Species Monitoring and Reporting:* Conduct annual monitoring and status of protected species (dwarf iliau and Hawai'i scaleseed) .
2. *Botanical Surveys and Mapping:* Update the status of protected species (dwarf iliau and Hawai'i scaleseed) in preparation for the next INRMP.

The continued implementation of the 2010 INRMP would result in a beneficial impact to conservation efforts of unique plant populations present at Mākaha Ridge.

Preferred Alternative

The activities proposed under the 2023 INRMP include:

1. Implement erosion control efforts that directly benefit areas where protected species are present.
2. Conduct a reassessment of the status and condition of listed plant species on the cliffsides of Mākaha Ridge Tracking Station populations every five years and collaborate with partners to grant them access for further research and conservation efforts.

These actions would have beneficial impacts on populations of dwarf iliau and Hawai'i scaleseed compared to the No Action Alternative due to new targeted erosion control measures.

3.4.2.2 Nuisance and Invasive Animals

Affected Environment

All mammal species, except for the Hawaiian hoary bat, are non-native to Mākaha Ridge. Feral goats, feral cats, roof (black) rats, Polynesian rats, and common house mice were documented during 2000 wildlife studies. Signs also indicated the presence of feral pigs and black tailed deer. Feral goats are considered common at Mākaha Ridge Tracking Station (NAVFAC PAC 2022).

Environmental Consequences

No Action Alternative

The 2010 INRMP outlines specific measures to combat disturbances from nuisance and invasive animal species at Mākaha Ridge Tracking Station. These management actions are listed below:

1. *Feral Goat Control:* Install exclusion fencing to exclude the goats from Mākaha Ridge Tracking Station.
2. *Trial Goat Hunting:* Institute a trial goat hunting program with the Barking Sand Archery Club or other organization in coordination with the DLNR DOFAW to reduce the presence of goats at the Mākaha Ridge Tracking Station.

Continued implementation of feral goat control would have a beneficial impact on the control of nuisance animal species at the Mākaha Ridge Tracking Station.

Preferred Alternative

Under the 2023 INRMP, the general strategies for controlling nuisance and invasive animals described in Section 3.3.2.2 would be implemented at Mākaha Ridge, as applicable. These management strategies would have a beneficial impact on the control of nuisance and invasive animals at Mākaha Ridge, as compared to the No Action Alternative.

3.4.2.3 Bats

Affected Environment

The only native terrestrial mammal in the SOH is the Hawaiian hoary bat or ʻōpeʻapeʻa. The Hawaiian hoary bat is listed as endangered under the ESA. It has been documented year-round on the base and is most commonly found in the winter. The ʻōpeʻapeʻa roosts, forages, and may breed at Mākaha Ridge. Breeding season occurs during the months of September through December, and pupping occurs from June through September. During studies conducted at all PMRF facilities, the bat exhibited highest occupancy from September through February. Mākaha Ridge Tracking Station supports suitable habitat for roosting and foraging, and is likely used for breeding, pupping and rearing. Threats to the bat include habitat loss and mortality from barbed wire fences and radar transmissions.

Environmental Consequences

No Action Alternative

The 2010 INRMP includes the following management action related to Hawaiian hoary bats at Mākaha Ridge:

1. *Protected Species Monitoring and Reporting-Hawaiian Hoary Bats Surveys:* If Hawaiian hoary bats are observed up at Mākaha Ridge Tracking Station, evaluate the results to determine if regular monitoring is required.

The continued implementation of the 2010 INRMP would result in a beneficial impact on bats at Mākaha Ridge, as the management action improves understanding of the Hawaiian hoary bat populations.

Preferred Alternative

The Hawaiian hoary bat management strategies proposed under the 2023 INRMP (Section 3.3.2.3), including restriction on the season of vegetation trimming, follow-up acoustic surveys, and development of SOPs for bat roosting surveys, would have a beneficial impact on the Hawaiian hoary bat at Mākaha Ridge when compared to the No Action alternative.

3.4.2.4 Birds

Affected Environment

Three federally listed bird species are known to occur in or flyover Mākaha Ridge Tracking Station. The threatened nēnē is the only ESA listed bird species that has been documented on facility grounds. The two endangered seabird species (Newell's shearwater and Hawaiian petrel) have not been documented on site; however, active colonies are located in the region and the species may fly over the region. Other special status species documented include bird species protected under the MBTA—the white-tailed tropicbird (*Phaethon lepturus*) and the Pacific golden plover (*Pluvialis fulva*).

Nēnē populations at Mākaha Ridge have declined in recent years; however, they are still commonly observed on site.

Environmental Consequences

No Action Alternative

Under the 2010 INRMP, general endangered seabird and migratory bird management actions (Section 3.3.2.4) would be implemented at Mākaha Ridge, as applicable. In addition, the 2010 INRMP contains the following nēnē management action specific to Mākaha Ridge:

1. *Predator Control:* Update funding annually to protect nēnē if it is determined that predators are affecting nēnē nests at the Mākaha Ridge Tracking station.

Continued implementation of the 2010 INRMP would result in a beneficial impact to birds at Mākaha Ridge, as the management actions improve monitoring and protection of endangered seabirds, migratory birds, and nēnē.

Preferred Alternative

The 2023 INRMP management strategies for endangered seabirds, migratory birds, and nēnē (Section 3.3.2.4) would be implemented at Mākaha Ridge, as applicable. Implementation of the actions proposed in the 2023 INRMP would have a beneficial impact on endangered seabirds, migratory birds, and nēnē compared to the No Action Alternative due to improvements to the Dark Skies Program, improved management of habitat creation and protection, and increased monitoring of at-risk species.

3.4.2.5 Insects

See Section 3.3.2.5 for an analysis of native insects and protected pollinator species at PMRF. Although no native terrestrial invertebrate species have been identified at Mākaha Ridge specifically, native vegetation cover types may support native insect populations and future surveys may identify native insects at the site.

No Action Alternative

See Section 3.3.2.5 for an analysis of native insect and pollinator management actions applicable to all PMRF facilities, including enhancement of habitat supportive of native insects and policies to control and manage the use of pesticides and herbicides. Continued implementation of the 2010 INRMP would result in a beneficial impact to insects as the resource management actions benefit pollinators, which are ecologically important.

Preferred Alternative

General management strategies to protect native insects and pollinators described in Section 3.3.2.5 would be implemented at Mākaha Ridge, as applicable. All management actions involving the protection of native and/or pollinator species would comply with the existing MOU between the DoD and the pollinator partnership. Implementation of the 2023 INRMP would have a beneficial impact on native insects and protected pollinator species in the area, as the management strategies include species inventory at additional PMRF sites and prohibition of chemicals and pesticides (e.g., neonicotinoids) harmful to protected pollinators.

3.4.3 Social and Cultural Environment

3.4.3.1 Cultural Resources

Affected Environment

Mākaha Ridge is located in the ahupua‘a of Waimea in the moku of Kona on the island of Kaua‘i, located high on the steep finger ridges of the Nā Pali coast. It has not been identified as a traditional cultural place.

Significant architectural resources have not been identified at this facility. Buildings and structures in this site are of recent construction. No significant historic and archeological resources are present at Mākaha Ridge. As a steward of cultural resources, the DoN must comply with federal regulations relating to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF. The INRMP does not propose activities that would affect historic properties. No further analysis is required at this time.

Environmental Consequences

No Action Alternative

There are no management actions under the 2010 INRMP that directly address cultural resources. However, management actions for natural resources can have direct and indirect effects on cultural resources, which include the following:

- *Erosion Control Measures:* At Mākaha Ridge, these include similar activities to Barking Sands, and additionally, the installation of retaining walls; construction of walls involves excavation of soil for footings or grading, which can have adverse impacts to subsurface archaeological sites. Impacts of this activity at Mākaha Ridge are negligible due to the low potential for subsurface cultural resources.
- *Ungulate Control Measures:* These can be beneficial to cultural resources because they are protected from damage by ungulates. However, installation of fence posts requiring excavation can have adverse impacts to subsurface archaeological resources, with the potential to damage undocumented resources if appropriate mitigation measures are not observed. Impacts of this activity at Mākaha Ridge are negligible due to the low potential for subsurface cultural resources.

The effects on cultural resources under the No Action Alternative would be low in degree of effect, temporary during construction activities and varying from temporary to long-term throughout operation and maintenance, localized, and unlikely to affect important cultural resources. Some impacts would be beneficial. No significant historic and archaeological resources are present at Mākaha Ridge. As a steward of cultural resources, the DoN must comply with federal regulations relating to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF. Cultural resources compliance at Mākaha Ridge shall be in accordance with the Navy Regional Programmatic Agreement, as amended (DoN 2024). The INRMP does not propose activities that would affect historic properties. No further analysis is required at this time.

Preferred Alternative

There are no management actions under the 2023 INRMP that directly address cultural resources. However, management actions for natural resources can have direct and indirect effects on cultural resources, which include the following:

1. *Ungulate control measures:* Similar to the No Action Alternative, the impacts of this activity at Mākaha Ridge would be negligible due to the lack of identified cultural resources and low potential for subsurface cultural resources.

The effects on cultural resources under the Preferred Alternative would be low in degree of effect, temporary during construction activities and varying from temporary to long-term throughout operation and maintenance, localized, and unlikely to affect important cultural resources owing to the lack of identified cultural resources and low potential for them to occur. Some impacts would be beneficial. In addition, the INRMP actions are required to be implemented using the SOPs described in the ICRMP, as noted earlier in the Barking Sands section. Therefore, the overall impact to cultural resources would be adverse but negligible.

3.4.4 Additive Impacts

Additive impacts at Mākaha Ridge are summarized in Table 15. Resources eliminated for analysis at this site are discussed in Section 3.4 and a description of the analysis criteria used is described in Section 3.2.2.

Table 15 Additive Impacts at Mākaha Ridge

Environment	Resource	Description of Impact
Physical	Geological Resources	No additive impacts to geological resources are anticipated from projects listed in Table 6.
Physical	Water Resources	Additive impacts that may occur at Mākaha Ridge would result from pest management actions that utilize poisons, pesticides, and/or insecticides potentially including the State Wildlife Action Plan, and the USFWS Hawaiian Bird Conservation Action Plan. Appropriate measures would be taken to prevent impacts to water resources associated with the application of pest management poisons, pesticides, or insecticides.
Biological	Vegetation	Additive impacts to vegetation may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, and Biosecurity Plan for Micronesia and Hawai'i. Impacts from these projects are anticipated to be additive and beneficial.
Biological	Nuisance and Invasive Animals	No additive impacts to nuisance and invasive animal control are anticipated from projects listed in Table 6.
Biological	Bats	Additive impacts to bats may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, Biosecurity Plan for Micronesia and Hawai'i. Impacts from these projects are anticipated to be additive and beneficial.
Biological	Birds	BASH from various operational air activities including testing and training is addressed in the INRMP. Additional projects impacting birds include wind energy development, long-range missile tests, and the USAF long-range strike weapons systems evaluation program. Projects with beneficial impacts to birds in the project area include the State Wildlife Action Plan and the Hawaiian Bird Conservation Action Plan.
Biological	Insects	Native and pollinator insects may benefit from projects including the State Wildlife Action Plan, the Hawaiian Bird Conservation Action Plan, Mānā Plain Forest Reserve Wetland Restoration, and the Kawai'ele Bird Sanctuary restoration. Additive impacts to insects are anticipated to be beneficial at Mākaha Ridge.
Social	Cultural Resources	Projects at Mākaha Ridge with potential impacts to cultural resources include the Electric Power Source Mākaha Ridge Tracking Station; and aspects of various plans, including the Navy Environmental Restoration Plan and Biosecurity Plan for Micronesia and Hawai'i; the DLNR State Wildlife Action Plan; and USFWS Hawaiian Bird Conservation Action Plan. However, most of the relevant projects are planning projects that would not affect the site's potential cultural resources. Planning projects would also consider mitigating cultural resource impacts within their own project actions, limiting the possibility of any increased level of impact. This is because like the INRMP, the relevant DoD projects and other actions on installation land are required to be implemented using the SOPs detailed in the 2012 ICRMP, which include consideration and mitigation of potential impacts to cultural resources. Therefore, no additive impacts to cultural resources are anticipated.

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3.5 Kōkeʻe Sites

The Kōkeʻe sites are located on five small parcels (Sites A–E) that total 22.4 ac of land along the coastal ridgeline of Kaunuohua, near the northwestern terminus of Waimea Canyon (Figure 17). The sites are bordered by Kōkeʻe State Park on all sides and forest areas extend within the property boundaries.

- **Kōkeʻe Site A**
  Support buildings for tracking and command, training and administration, and logistics support (4.6 ac).
- **Kōkeʻe Site B**
  Power plant and fuel storage facility (2.1 ac).
- **Kōkeʻe Site C**
  Boresight (firearm adjustment) equipment, operations and maintenance support, microwave antenna, radar facilities and support buildings (2.1 ac).
- **Kōkeʻe Site D**
  Transmitter building and antenna support facilities (2.8 ac).
- **Kōkeʻe Site E**
  National Aeronautics and Space Administration Kōkeʻe Geophysical Observatory with large antenna arrays (6.7 ac).
- Based on the location of this site, the resources identified in Table 16 are not affected and therefore are not further analyzed in this EA.

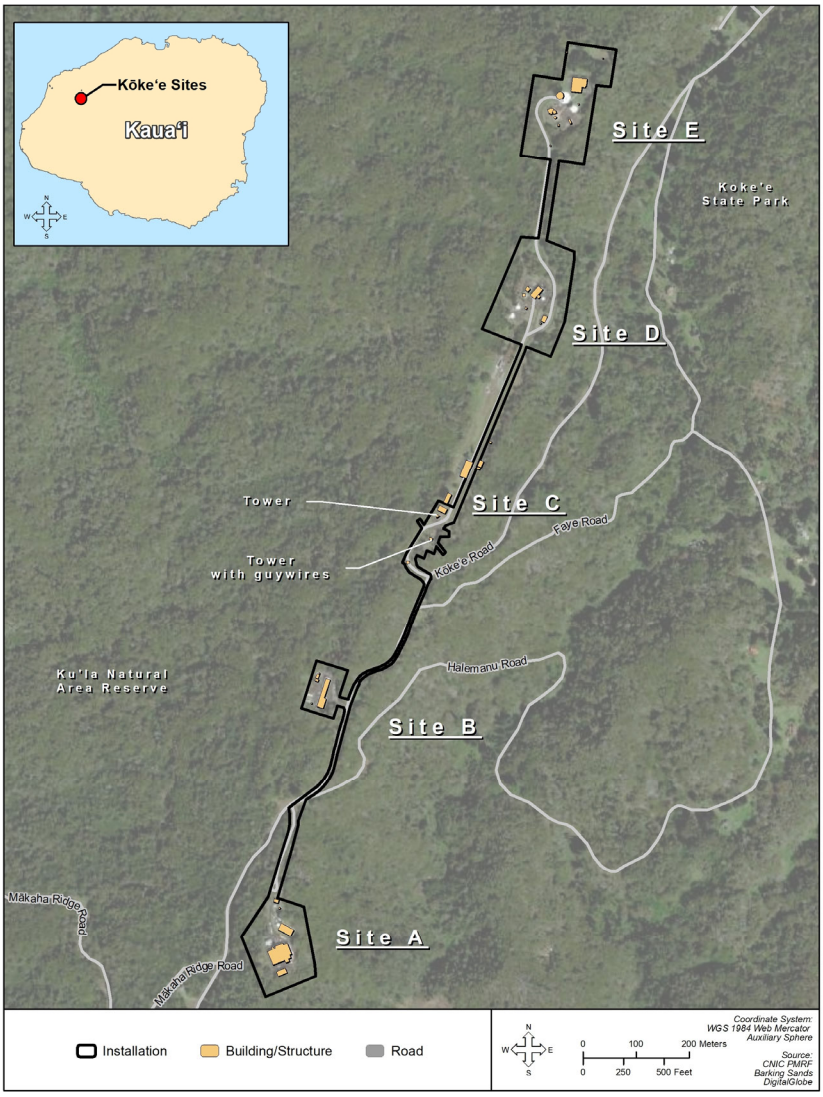

Figure 16 Kōkeʻe Sites Overview Map

Table 16 Resources Eliminated from Discussion at Kōkeʻe Sites

Resource	Description and Justification for Elimination
Natural Hazards	Natural hazards that could affect Kōkeʻe Sites include hurricanes, landslides, and wildfire. However, the implementation of the INRMP would have no impact on the susceptibility of the facilities to natural hazards and would not impede evacuation activities necessary should a natural hazard such as a hurricane occur. Wildfire management would be limited to coordination with the appropriate fire department. The INRMP would not exacerbate the effect of any natural hazard.
Climate Change	The implementation of the 2023 PMRF INRMP is anticipated to have minimal GHG emissions. The Preferred Alternative is anticipated to have no to negligible impacts to climate change. SLR caused by climate change would not impact this site because of its location and elevation.
Marine Mammals, Marine Reptiles, and Other At-risk Marine Species	Kōkeʻe sites are located inland; there are no management actions proposed by the 2010 or 2023 INRMP affecting marine species at Kōkeʻe Sites.
Coastal and Nearshore Biological Resources	Kōkeʻe sites are located inland; there are no management actions proposed by the 2010 or 2023 INRMP affecting coastal and nearshore resources at Kōkeʻe Sites.
Land Use	The primary purpose of INRMP is to ensure no net loss in the capability of military lands to support the military mission of the installation. The implementation of the 2023 INRMP is not anticipated to lead to new land uses or land use alterations. Therefore, no impacts on land use would occur.
Outdoor Recreation	The Kōkeʻe Sites are restricted areas and generally do not offer any outdoor recreation opportunities.

3.5.1 Physical Environment

3.5.1.1 Geology and Soils

Affected Environment

Elevations at the Kōkeʻe sites range from 3,710 to 3,800 ft above MSL. The sites are located on a coastal ridge, composed of lava formations from the Waimea Canyon series. The dominant soil type is Kōkeʻe silty clayey loam (KSKE) (0 to 35 percent slope), characterized by medium runoff and moderate erosion. A small section of Site A contains Kōkeʻe silty clayey loam (KSKF), (35 to 70 percent slope), which is very similar to KSKE, but is characterized by severe erosion hazards and rapid runoff (Figure 17). Despite soil characteristics exhibiting vulnerability to erosion, no significant erosion concerns have been identified at these sites.

Environmental Consequences

No Action Alternative

The continued implementation of the 2010 INRMP would result in no impact on soil and geological resources at the Kōkeʻe sites, as the INRMP does not include erosion control measures for these sites beyond standard construction erosion control BMPs that would be implemented independently of the INRMP, as described under the Base Planning management action:

1. *Base Planning:* Follow standard methods to control erosion during all new construction projects.

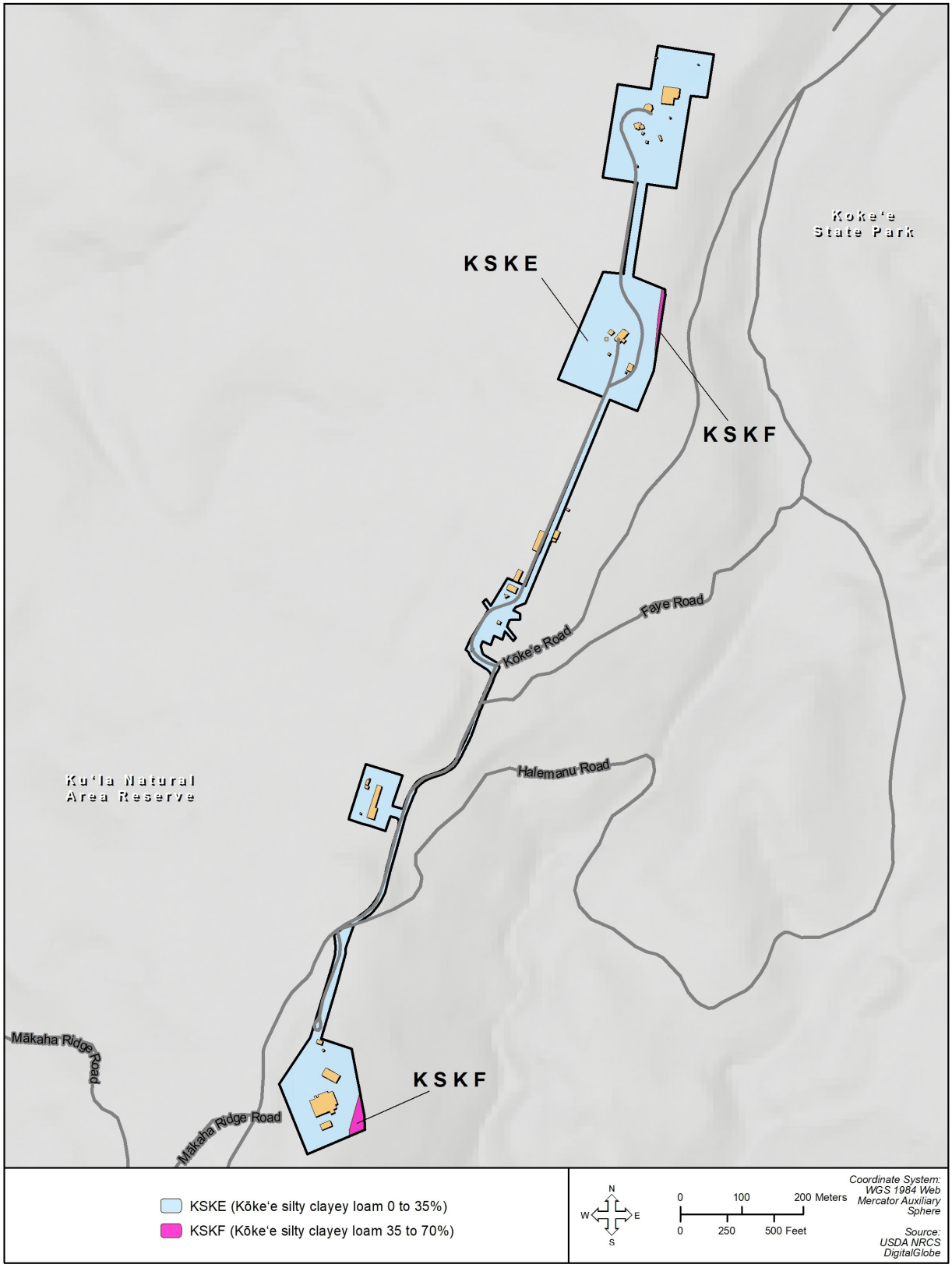

Figure 17 Soils at Kōkeʻe Sites

Preferred Alternative

Erosion management practices, including construction BMP implementation, would continue under the 2023 INRMP, resulting in no impact compared to the No Action alternative.

3.5.1.2 Water Resources

Affected Environment

There are no surface waters or wetland resources located at the Kōkeʻe Sites, though numerous streams lie at the bases of the surrounding canyons. Beneath the Kōkeʻe sites is one aquifer that is part of Waimea Aquifer Sector (John F. Mink and Lau 1992). This high-level, unconfined dike aquifer (Aquifer Code 20301212) is considered an irreplaceable fresh water source and is highly vulnerable to contamination.

Environmental Consequences

No Action Alternative

There are no actions implemented under the 2010 INRMP that could affect water resources at the Kōkeʻe sites; therefore, there are no impacts.

Preferred Alternative

The 2023 INRMP proposes the following management action to protect water resources from pesticide contamination at the Kōkeʻe Sites:

1. Coordinate all use of pesticides by natural resources staff with the NAVFAC PAC PMC and ensure that all applicators have received appropriate certifications.

In comparison to the no action implementation under the 2010 INRMP, implementation of the 2023 INRMP would have a beneficial impact on water resources at the Kōkeʻe sites.

3.5.2 Biological Environment

3.5.2.1 Vegetation

Affected Environment

There are substantial populations of invasive plant species intermixed with native forest species at the Kōkeʻe sites. Invasive species historically observed include Asian melastome , strawberry guava (*Psidium cattleianum*), and prickly blackberry (*Rubus argustus);* these species are classified as priority invasive species by the KISC (Figure 18).

Native trees including koa (*Acacia koa*), ohia ʻōlapa (*Cheirodendron trigynum*), and ʻohe‘ohe (*Tetraplasandra kavaiensis*), which are known or suspected host species for the endangered Hawaiian picture-wing flies, have been documented at the Kōkeʻe sites. Past botanical surveys have determined that there are no federally listed or endangered species present at the Kōkeʻe sites (DoN 2010; NAVFAC PAC 2022). The endangered understory shrub halemanu ʻakoko (*Euphorbia halemanui*) has been documented outside of site D in past botanical studies, though none has been documented on site (NAVFAC PAC 2022).

Environmental Consequences

Invasive Plant Management

No Action Alternative

In addition to the site-specific actions, invasive vegetation management strategies described in Section 3.3.2.1 are implemented at the Kōkeʻe sites, as applicable. Past invasive vegetation management specific to the Kōkeʻe sites implemented under the 2010 INRMP are listed below:

1. *Melastome Eradication:* Provide KISC, Navy or SOH biologists access to a small patch of Asian melastome found near the roadside at Kōkeʻe Site D in order to eradicate this population.

The continued implementation of the 2010 INRMP would result in a beneficial impact to vegetation at the Kōkeʻe sites, as the management actions support the eradication of invasive vegetation populations at the Kōkeʻe sites.

Preferred Alternative

General vegetation management strategies are described in Section 3.3.2.1. The overarching goal of these management strategies is to reduce populations of priority invasive species and allow for the reestablishment of native plant species.

New general invasive species management strategies, described in Section 3.3.2.1, would cover the full range of potential invasive species found on site. In addition, the following management strategy would address invasive plants at the Kōkeʻe sites specifically:

1. Conduct invasive plant removals annually in areas near known Hawaiian Picture-wing Fly habitat to promote native tree health and propagation and reduce introductions of invasive species into adjacent habitat due to Navy operations.

In comparison to the implementation actions under the 2010 INRMP, implementation of the 2023 INRMP would have a beneficial impact on vegetation habitat at the Kōkeʻe sites.

Native Plant Management

No Action Alternative

General native vegetation management strategies described in Section 3.3.2.1 are implemented at the Kōkeʻe sites, as applicable. Additionally, past native vegetation management specific to Kōkeʻe sites implemented under the 2010 INRMP are listed below:

1. *Native Plant Habitat Improvement:* Conduct invasive vegetation removal, particularly in areas around existing native vegetation.

The continued implementation of the 2010 INRMP would result in a beneficial impact to vegetation at the Kōkeʻe sites, as the management actions support native vegetation growth at the Kōkeʻe sites.

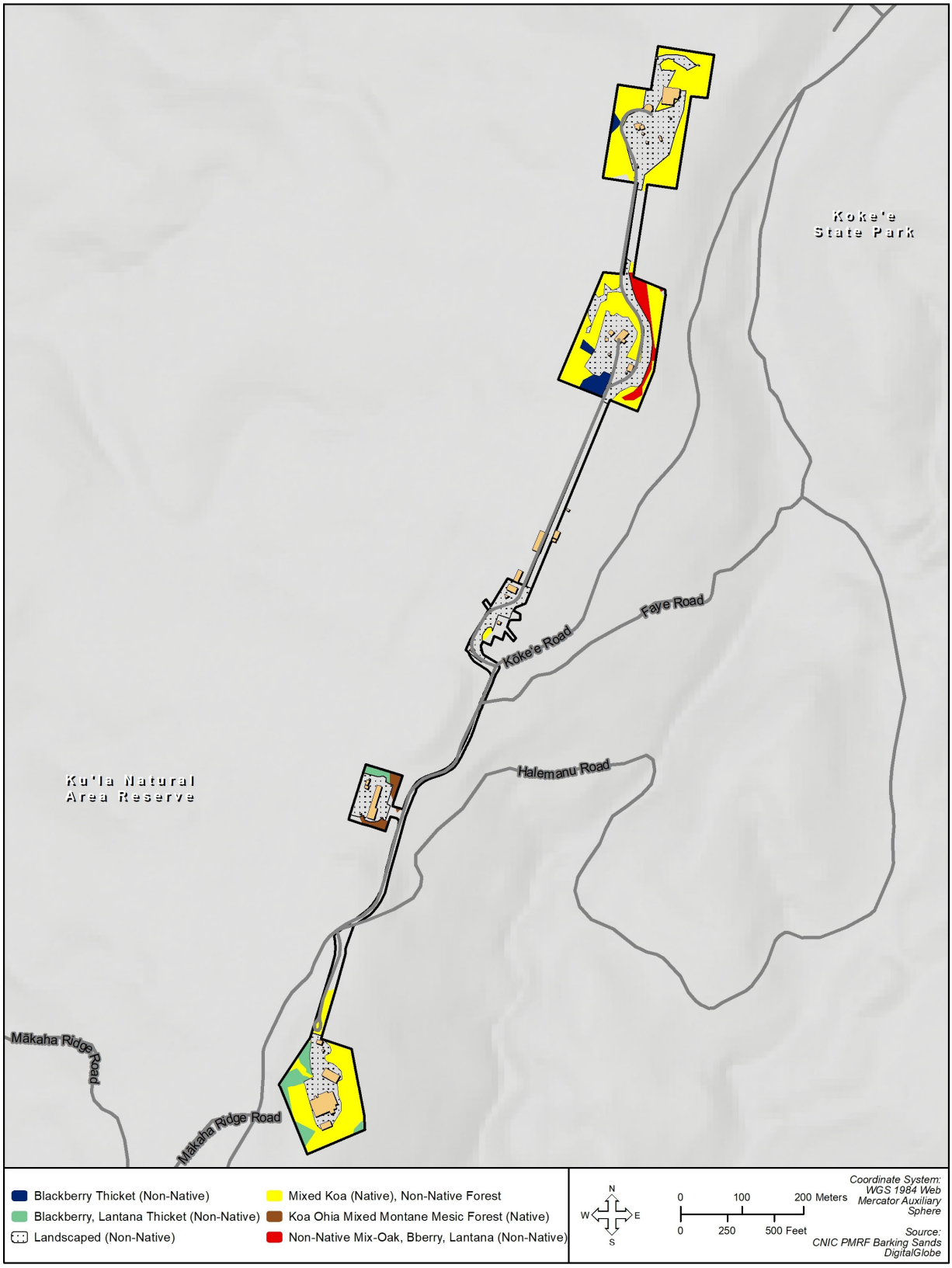

Figure 18 Vegetation Cover Types Present at Kōkeʻe Sites

Preferred Alternative

General native vegetation management strategies described in Section 3.3.2.1 are implemented at the Kōkeʻe sites, as applicable. The 2023 INRMP also includes site specific native vegetation management strategies:

1. Conduct invasive plant removals annually in areas near known Hawaiian Picture-wing Fly habitat to promote native tree health and propagation and reduce introductions of invasive species into adjacent habitat due to Navy operations.

In comparison to the implementation actions under the 2010 INRMP, implementation of the 2023 INRMP would have a beneficial impact on vegetation habitat at the Kōkeʻe sites, specifically within Hawaiian Picture-wing Fly habitat.

3.5.2.2 Nuisance and Invasive Animals

Affected Environment

Nuisance and invasive animal species identified at the Kōkeʻe sites include non-native feral cats, rat species (Norwegian rat and roof rat), and feral pigs.

Environmental Consequences

No Action Alternative

There are no actions implemented under the 2010 INRMP that could affect nuisance and invasive animal species at the Kōkeʻe sites; therefore, there are no impacts.

Preferred Alternative

More aggressive nuisance and invasive animal management strategies proposed in the 2023 INRMP, described in Section 3.3.2.2, would be implemented at the Kōkeʻe sites, as applicable. These strategies would have a beneficial impact on nuisance and invasive animal control, as compared to the No Action Alternative.

3.5.2.3 Bats

Affected Environment

The federally listed endangered Hawaiian hoary bat was documented at the Kōkeʻe sites during each survey, in 2000, 2010, and sampling from 2010 to 2011 (Bruner 2000; Bonaccorso and Pinzari 2011).

Environmental Consequences

No Action Alternative

Management actions for the Hawaiian hoary bat implemented under the 2010 INRMP are described in Section 3.3.2.3, and are implemented at the Kōkeʻe sites, as applicable. The continued implementation of the 2010 INRMP would result in a beneficial impact to bats at the Kōkeʻe sites as the management actions improve the viability of the Hawaiian hoary bat populations at the Kōkeʻe sites.

Preferred Alternative

Management actions for the Hawaiian hoary bat proposed under the 2023 INRMP are described in Section 3.3.2.3 and are implemented at the Kōkeʻe sites, as applicable. The activities proposed under the 2023 INRMP would have a minor beneficial impact on the Hoary Bat compared to the No Action Alternative, as the actions involve additional species monitoring actions.

3.5.2.4 Birds

Affected Environment

Five ESA-listed bird species were identified in past surveys at the Kōkeʻe sites or are known to fly over the sites. These species include the nēnē, the scarlet honeycreeper or ʻiʻiwi (*Vestiaria coccinea*), Newell's shearwater, Hawaiian petrel, and band-rumped storm petrels (*Oceanodroma castro*). MBTA species documented at the sites include the ʻamakihi (*Chlorodrepanis stejnegeri*), ʻapapane (*Himatione sanguinea*), and the pueo.

Environmental Consequences

No Action Alternative

Under the 2010 INRMP, general endangered seabird, nēnē, and migratory bird management actions (Section 3.3.2.4) would be implemented at the Kōkeʻe sites, as applicable.

Continued implementation of the 2010 INRMP would result in a beneficial impact to birds at the Kōkeʻe sites, as the management actions improve monitoring and protection of endangered seabirds, migratory birds, and nēnē.

Preferred Alternative

The 2023 INRMP management strategies for endangered seabirds, migratory birds, and nēnē (Section 3.3.2.4) would be implemented the Kōkeʻe sites, as applicable. In addition, the 2023 INRMP proposes the following management actions to protect, enhance, and improve understanding of Newell's shearwater at Kōkeʻe Site C:

1. Continue to fund and implement surveys to assess mortality from tower strikes at Kōkeʻe Site C to include scavenger trials, searcher efficiency trials, and carcass searches in accordance with USFWS communication tower monitoring protocols (PMRF BO, 2018).
2. Continue to fund and implement acoustic and visual monitoring programs of communication towers at Kōkeʻe Site C for seabird strikes to inform management and provide data to be used in the re-evaluation of the Newell's shearwater portion of the PMRF Base-wide BO.
3. Minimize the potential for death or injury of Newell's shearwater due to collisions with PMRF communication towers located at Kōkeʻe Site C (PMRF BO, 2018).

Implementation of the actions proposed in the 2023 INRMP would have a beneficial impact on endangered seabirds, migratory birds, and nēnē compared to the No Action Alternative due to improvements to the Dark Skies Program, improved management of habitat creation and protection, and increased monitoring of at-risk species.

3.5.2.5 Insects

Affected Environment

High elevation ʻohia and koa forest at the PMRF Kōkeʻe likely support native populations of native insect species. As discussed earlier, two species of endangered Hawaiian picture-wing fly can also be found on or near the Kōkeʻe sites. These picture-wing flies are single-island endemic to Kauaʻi and have USFWS designated critical habitat near the Kōkeʻe sites (Figure 19). *D. musaphilia* was identified near Site B in a 2010 survey (DoN 2010). Major threats to the island endemic picture-wing fly include: habitat degradation by feral ungulates and as a result of wildfire; spread and competition from non-native species into their habitat; soil disturbance (enhancing spread of non-native species); loss of host plants (koa); predation by non-native insects such as yellow jacket wasps and ants; and parasites (NAVFAC PAC 2022; USFWS 2008a; 2012). Current base operations and maintenance activities at the Kōkeʻe sites are low-impact and do not occur in the forested areas surrounding the sites and are therefore not likely to affect the federally listed Hawaiian picture-wing fly species.

Environmental Consequences

No Action Alternative

See Section 3.3.2.5 for an analysis of native insect and pollinator management actions applicable to all PMRF facilities, including enhancement of habitat supportive of native insects and policies to control and manage the use of pesticides and herbicides. In addition, the 2010 INRMP contains the following management action for native insects specific to the Kōkeʻe sites:

1. *Hawaiian Picture-Wing Fly:* Perform surveys for the recently listed *D. sharpi*. When these surveys occur, *D. musaphilia* should also be included.

Continued implementation of the 2010 INRMP would result in a beneficial impact to insects as the resource management actions benefit pollinators and improve understanding of listed species at the Kōkeʻe sites.

Preferred Alternative

General management strategies to protect native insects and pollinators described in Section 3.3.2.5 would be implemented at the Kōkeʻe sites, as applicable. All management actions involving the protection of native and/or pollinator species would comply with the existing MOU between the DoD and the pollinator partnership. In addition to general native insect and protected pollinator management strategies, the 2023 INRMP includes the following native insect management strategies specific to the Kōkeʻe sites:

1. Conduct periodic surveys every 5 years to assess presence/absence of endangered Hawaiian picture-wing fly species at and directly adjacent to PMRF Kōkeʻe sites.
2. Conduct invasive plant removals in areas near known Hawaiian picture-wing fly habitat to promote native tree health and propagation and reduce introductions of invasive species into adjacent habitat due to Navy operations.

Implementation of the 2023 INRMP would have a beneficial impact on native insects and protected pollinator species in the area, as the management strategies include habitat restoration, species inventory at additional PMRF sites, and prohibition of chemicals and pesticides (e.g., neonicotinoids) harmful to protected pollinators.

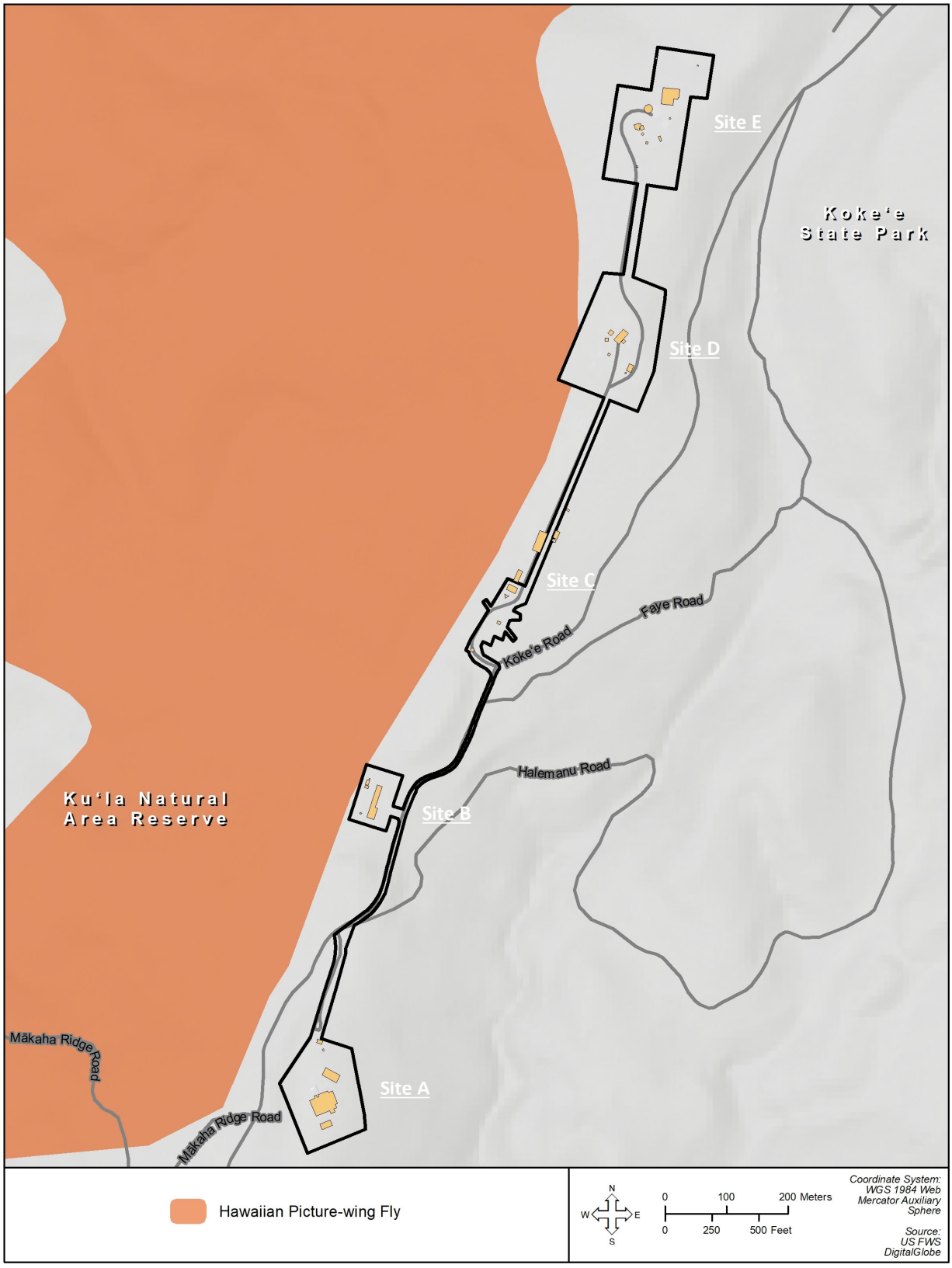

Figure 19 Federally Designated Critical Habitat for Hawaiian Picture-wing Fly

3.5.3 Social and Cultural Environment

3.5.3.1 Cultural Resources

Affected Environment

Kōkeʻe is located in the ahupuaʻa of Waimea in the moku of Kona on the island of Kauaʻi, located high on the uplands above Waimea Canyon within Kōkeʻe State Park. It has not been identified as a traditional cultural place.

Only one archaeological study has occurred in this area (Dowden and Rosendahl 1993), and it did not identify any sites. No significant historic and archaeological resources are present at Kōkeʻe sites. As a steward of cultural resources, the DoN and National Aeronautics and Space Administration must comply with federal regulations relating to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF. Cultural resources compliance at Kōkeʻe sites shall be in accordance with the Navy Regional PA, as amended (Commander, Navy Region Hawaiʻi 2024). The INRMP does not propose activities that would affect historic properties. No further analysis is required at this time.

Significant architectural resources have not been identified at this facility. Buildings and structures in this area are of recent construction. In the 2011 HAMP, the Kōkeʻe Sites were classified as a "tertiary zone" with low historic resource sensitivity.

Environmental Consequences

No Action Alternative

There are no management actions under the 2010 INRMP that directly address cultural resources. However, management actions for natural resources can have direct and indirect effects on cultural resources, which include the following:

1. Native plant management activities implemented at the Kōkeʻe Sites may have a negligible impact on cultural resources due to potential for ground disturbance when removing or planting vegetation. Because of the lack of identified cultural resources and low probability of subsurface archaeological resources, the impact of this activity would be negligible.

The effects on cultural resources under the No Action Alternative would be low in degree of effect, temporary during construction activities and varying from temporary to long-term throughout operation and maintenance, localized, and unlikely to affect important cultural resources owing to the lack of identified cultural resources and low potential for them to occur. Some impacts would be beneficial. The overall impact to cultural resources would be adverse but negligible.

Preferred Alternative

There are no management actions under the 2023 INRMP that directly address cultural resources. However, management actions for natural resources can have direct and indirect effects on cultural resources, which include the following:

1. Surveys for soil compaction may have a beneficial impact, as described in previous sections.
2. Native plant management and erosion control activities, as described in previous sections, may have a negligible impact on cultural resources due to ground disturbance. Because of the low probability of subsurface archaeological resources, the impact of this activity would be negligible.

The effects on cultural resources under the Preferred Alternative would be low in degree of effect, temporary during construction activities and varying from temporary to long-term throughout operation and maintenance, localized in extent, and unlikely to affect important cultural resources owing to the lack of identified cultural resources and low potential for them to occur. Some impacts would be beneficial. In addition, the INRMP actions are required to be implemented using the SOPs described in the ICRMP, as noted earlier in the Barking Sands section. The overall impact to cultural resources would be adverse but negligible.

3.5.4 Additive Impacts

Additive impacts at Kōkeʻe Sites are summarized in Table 17. Resources eliminated for analysis at this site are discussed in Section 3.4 and a description of the analysis criteria used is described in Section 3.2.2.

Table 17 Additive Impacts at Kōkeʻe Sites

Environment	Resource	Description of Impact
Physical	Geological Resources	Additive impacts to geological resources are not anticipated from projects listed in Table 6.
Physical	Water Resources	Additive impacts to water resources are not anticipated from projects listed in Table 6.
Biological	Vegetation	Additive impacts to vegetation may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, and the Biosecurity Plan for Micronesia and Hawaiʻi. Impacts from these projects are anticipated to be additive and beneficial.
Biological	Nuisance and Invasive Animals	No additive impacts to nuisance and invasive animal control are anticipated from projects listed in Table 6.
Biological	Bats	Additive impacts to bats may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, Biosecurity Plan for Micronesia and Hawaiʻi. Impacts from these projects are anticipated to be additive and beneficial.
Biological	Birds	Operational additive impacts to birds at Kōkeʻe sites include potential tower and antenna strikes, addressed in the INRMP and BO (USFWS 2018). Projects with beneficial impacts to birds in the project area include the State Wildlife Action Plan, and the Hawaiian Bird Conservation Action Plan.
Biological	Insects	The Hawaiian Picture wing-fly was identified near Kōkeʻe sites and has designated critical habitat adjacent to the site. Additive impacts to the picture wing fly may result from Navy environmental restoration activities, the State Wildlife Action Plan, and the Biosecurity Plan for Micronesia and Hawaiʻi. Impacts from these projects are anticipated to be additive and beneficial.
Social	Cultural Resources	Projects at the Kōkeʻe Sites with the potential to impact cultural resources include aspects of various plans, including the Navy Environmental Restoration Plan and Biosecurity Plan for Micronesia and Hawaiʻi, the DLNR State Wildlife Action Plan, and USFWS Hawaiian Bird Conservation Action Plan. All the relevant projects are planning projects which also take into account mitigating cultural resource impacts within their own project actions, limiting the possibility of any increased level of impact. This is because like the INRMP, the relevant DoD projects and other actions on installation land are required to be implemented using the SOPs detailed in the 2012 ICRMP, which include consideration and mitigation of potential impacts to cultural resources. Therefore, no additive impacts to cultural resources are anticipated.

3.6 Kamokalā Ridge

The Kamokalā Ridge Magazines are located approximately 1.5 miles east of Barking Sands on the western edge of the Pu'u Ka Pele upland area and occupy an area of 104 ac (Figure 20). Facilities at the site provide ordnance storage for the Navy, Hawai'i Air National Guard, Department of Energy, and for other military commands with temporary requirements for training and storage, as necessary. The site consists of two earth-covered magazines, 10 ordnance storage magazines that have been excavated into the cliff face of Kamokalā Ridge, and a missile assembly building. The magazines provide secure storage for Class 1.1 explosives.

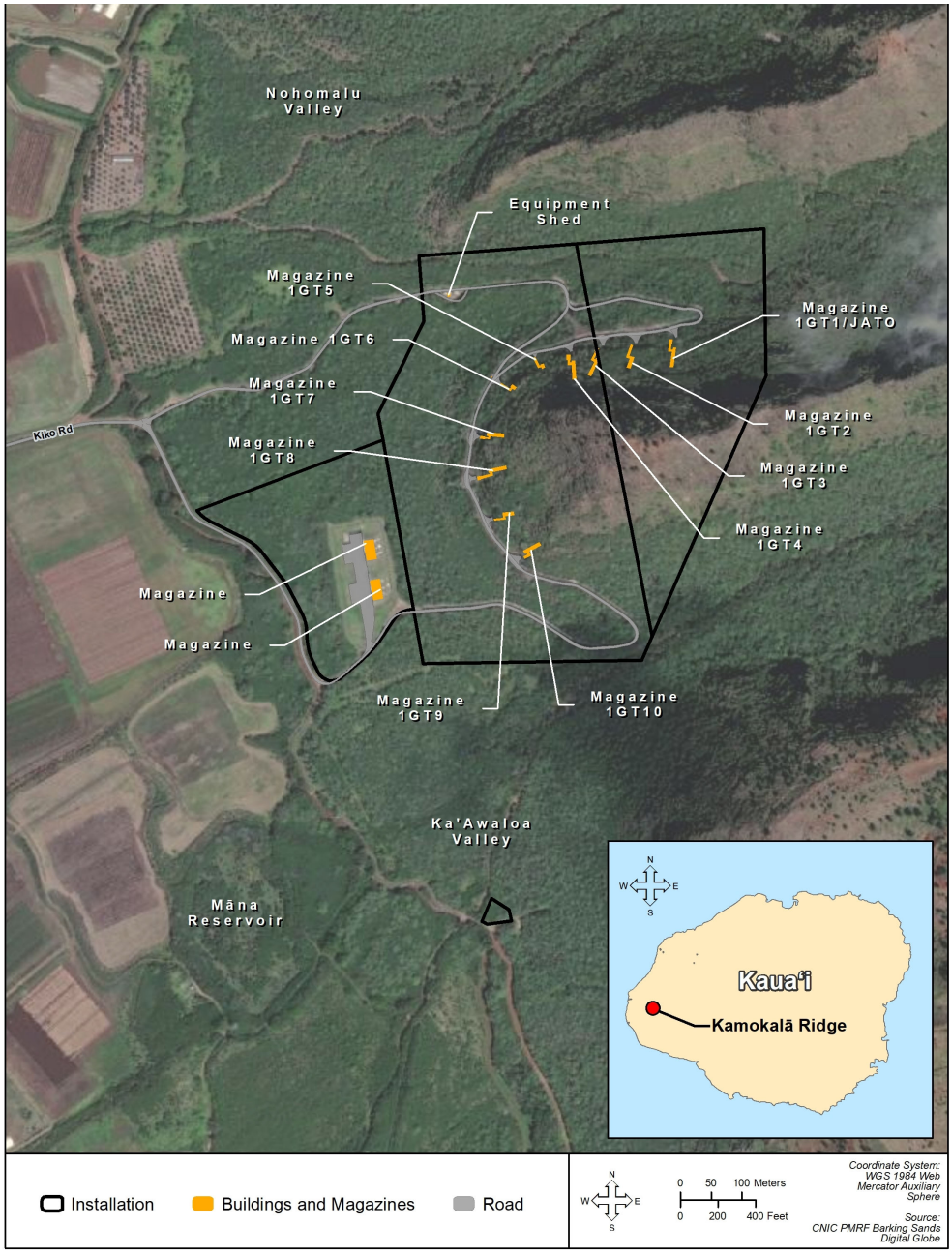

Figure 20 Kamokalā Ridge Overview Map

Based on the remote location of this site, the resources identified in Table 18 are not affected and therefore, are not further analyzed in this EA.

Table 18 Resources Eliminated from Discussion at Kamokalā Ridge

Resource	Description and Justification for Elimination
Climate Change	The implementation of the 2023 PMRF INRMP is anticipated to have minimal GHG emissions. The Preferred Alternative is anticipated to have no to negligible impacts to climate change. SLR caused by climate change would not impact this site because of its location and elevation.
Birds	There are no management actions at Kamokalā Ridge, past or present, which would impact birds at the facility.
Insects	There are no management actions at Kamokalā Ridge, past or present, which would impact insects at the facility.
Marine Mammals, Marine Reptiles, and Other At-risk Marine Species	Kamokalā Ridge is located inland; there are no management actions proposed by the 2010 or 2023 INRMP affecting marine species at Kamokalā Ridge.
Coastal and Nearshore Biological Resources	Kamokalā Ridge is located inland; there are no management actions proposed by the 2010 or 2023 INRMP affecting coastal and nearshore resources at Kamokalā Ridge.
Land Use	The primary purpose of INRMP is to ensure no net loss in the capability of military lands to support the military mission of the installation. The implementation of the 2023 INRMP is not anticipated to lead to new land uses or land use alterations. Therefore, no impacts on land use would occur.
Outdoor Recreation	The Kamokalā Ridge Magazines is a restricted area and generally does not offer any outdoor recreation opportunities.
Cultural Resources	Kamokalā Ridge lies within the area historically known as Mānā; there was extensive occupation and activity in this vicinity by early Hawaiians, including heiau and agricultural terracing. The munitions storage magazines were built in the World War II period to support the Barking Sands airfield operations. The area's historic context is detailed in the 2012 ICRMP. Previous studies include two archaeological surveys that cover a portion of the Kamokalā Ridge site (Gonzalez and Peyton 1999; McGerty and Spear 1997). Kamokalā Ridge has not been identified as a traditional cultural place, and four traditional archaeological sites identified in the area during these studies have been determined not eligible for listing in the NRHP (NAVFAC PAC 2012). The 2011 Cultural Landscape Report documented the 10 NRHP-eligible World War II-era munitions storage magazines (DoN 2011a). Kamokalā Ridge is within the HAMP secondary (moderate) sensitivity zone (DoN 2011a). No present or future management actions implemented under the 2010 and 2023 INRMPs take place at the Kamokalā Ridge facility that would impact significant cultural resources. Significant historic and archaeological resources are present at Kamokalā Ridge. As a steward of cultural resources, the DoN must comply with federal regulations relating to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF and other areas. Cultural resources compliance at Kamokalā Ridge shall be in accordance with the Navy Regional PA, as amended (DoN 2024) and ICRMP. The INRMP does not propose activities that would affect historic properties. No further analysis is required at this time.

3.6.1 Physical Environment

3.6.1.1 Geology and Soils

Affected Environment

The Kamokalā Ridge Magazines elevation ranges from 80 to 760 ft above MSL. The area is composed of lava formations from the Nā Pali formation and is characterized by highly eroded volcanic terrain. The site lies at bottom of the Kamokalā ridgeline, and the edge of the Mānā Plain. Soils are primarily silty clay types and include the Kekaha (KOYE and KoB) Series, Rubble Land (rRU), Rock outcrop (rRO), and the Waiawa (WJF) series (Figure 21). Some of the soils present at Kamokalā Ridge Magazines (WJF and rRO), are characterized by severe erosion hazard and rapid runoff. Other soil types (Kekaha series) are characterized by medium runoff and lower erosion hazards.

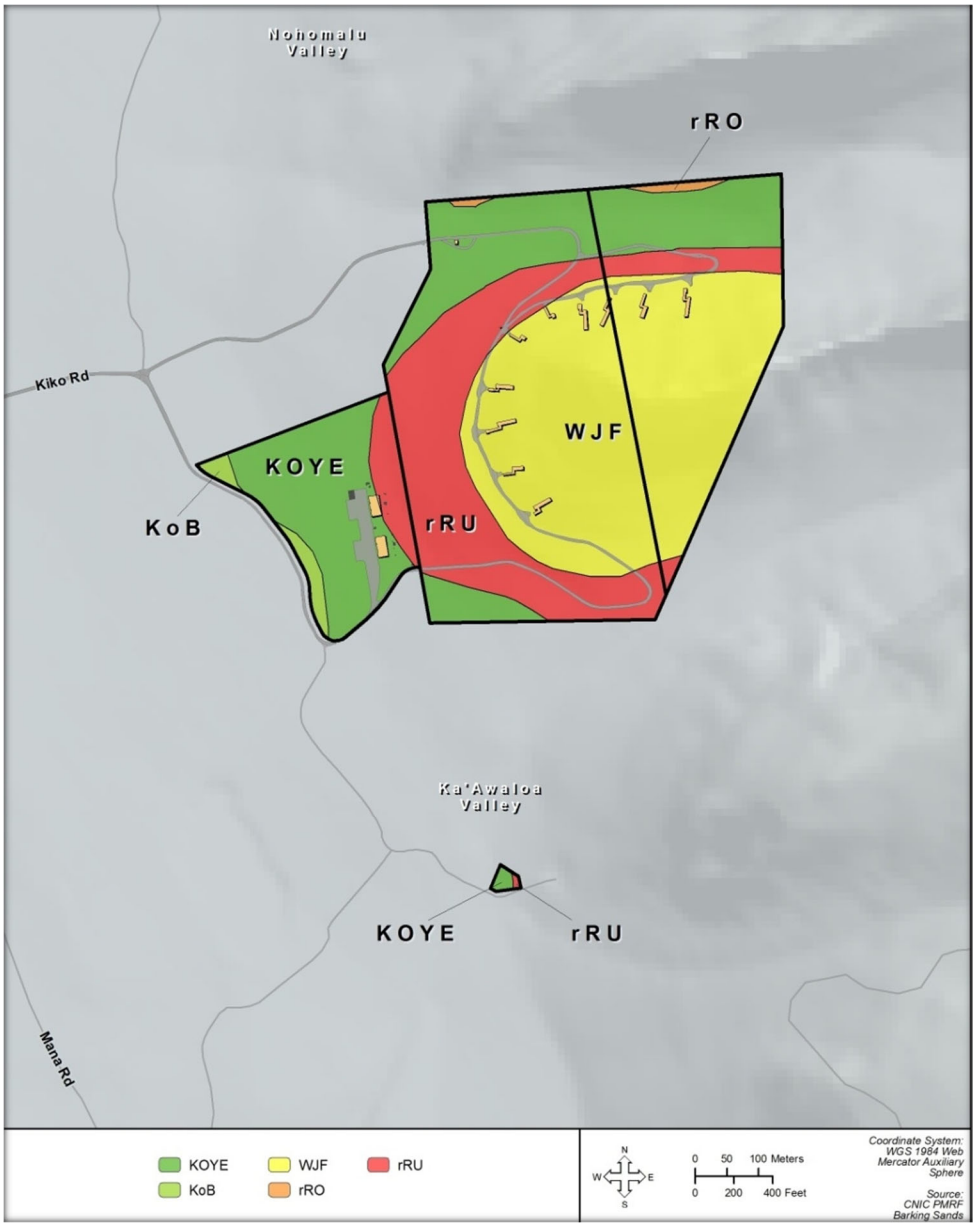

Figure 21 Soils at Kamokalā Ridge

Environmental Consequences

No Action Alternative

The continued implementation of the 2010 INRMP would result in no impact on soil and geological resources at Kamokalā Ridge, as the INRMP does not include erosion control measures for these sites beyond standard construction erosion control BMPs that would be implemented independently of the INRMP, as described under the Base Planning management action:

1. *Base Planning:* Follow standard methods to control erosion during all new construction projects.

Preferred Alternative

Erosion management practices, including construction BMP implementation, would continue under the 2023 INRMP, resulting in no impact compared to the No Action alternative.

3.6.1.2 Water Resources

Affected Environment

Surface waters flow from north to south into ephemeral streams of the Nahomalu and Ka‘awaloa Valleys and eventually reach the Mānā Plain. The only surface water identified at this site is a boulder-strewn stream that is usually dry, but floods during heavy rains. One aquifer on site (Aquifer Code 20301112) is currently used for drinking water (John F. Mink and Lau 1992).

Environmental Consequences

No Action Alternative

There are no actions implemented under the 2010 INRMP that could affect water resources at the Kamokalā Ridge; therefore, there are no impacts.

Preferred Alternative

There are no actions implemented under the proposed 2023 INRMP management actions that would impact water resources at the Kamokalā Ridge Magazines; therefore, there are no impacts.

3.6.1.3 Natural Hazards

Affected Environment

Kamokalā Ridge is vulnerable to natural hazards including wildland fires, hurricanes, landslides, and flooding. Kamokalā Ridge is located in an area currently designated as high hazard for fire risk by the HWMO (NAVFAC PAC 2022). With increasing temperatures and high fuel levels from non-native grasses and other vegetation, wildland fire intensity and frequency can be expected to increase.

Environmental Consequences

No Action Alternative

In the 2010 INRMP, management of natural hazards at Kamokalā Ridge, including wildland fire, is limited to coordination with the appropriate fire department and therefore continued implementation of the 2010 INRMP would have no impact on natural hazards at Kamokalā Ridge.

Preferred Alternative

In addition to coordination with the PMRF Fire Department to develop updates to the existing Fire Management Plan (Section 3.3.1.3), the 2023 INRMP contains the following natural hazard management strategy specific to Kamokalā Ridge:

1. Remove deadfall in high-risk areas including near the Barking Sands missile launch site and the Kamokalā Ridge Magazines and replant with native, low fire risk species.

The above actions are more extensive than the No Action Alternative as they require updates to the Fire Management Plan and clearing of deadfall in high-risk areas. These actions would have a beneficial impact on the facilities and surrounding resources by further reducing the threat of wildfire.

3.6.2 Biological Environment

Little natural resource management occurs at the Kamokalā Ridge site as few special status species are present. Nuisance wildlife and predators at the Kamokalā Ridge Magazines include deer, feral cats, pigs, and goats and could be targeted for control in the future, if funding allows. The Hawaiian hoary bat is the only special status species listed under the ESA that has been identified at the Kamokalā Ridge Magazines site.

3.6.2.1 Vegetation

Affected Environment

Kamokalā Ridge consists of lowland dry and mesic forest, woodland, and shrubland (Juvik, Juvik, and Paradise 1998). However, the site is composed of 50 percent vegetation and 50 percent rock outcrop. The site is highly disturbed and is dominated by introduced species. The vegetation cover types identified within the site are provided in Table 19 and Figure 22.

Environmental Consequences

No Action Alternative

General vegetation management strategies described in Section 3.3.2.1 are implemented at Kamokalā Ridge, as applicable. In addition, past vegetation management specific to Kamokalā Ridge implemented under the 2010 INRMP is listed below:

1. *Native Plant Habitat Improvement:* Conduct invasive vegetation removal, particularly in areas around existing native vegetation.

The continued implementation of the 2010 INRMP would result in a beneficial impact on the conservation of native plants.

Table 19 Vegetation Cover Types at Kamokalā Ridge

Cover Type	Native/Non-native	Area ac (ha)	Percent
Aalii Scrub	Native	3.9 (1.6)	4%
Cliff, Boulder Field	Non-native	0.8 (0.3)	1%
Grass, Herb, Shrub	Non-native	0.5(0.2)	0%
Greater Than 25% Wiliwili	Native	4.1 (1.6)	4%
Koa Haole Scrub, Forest	Non-native	73.4 (29.7)	75%
Koa Haole Scrub, Less Than 25% Wiliwili	Non-native	5.8 (2.4)	6%
Pili Grass	Native	4.4 (1.8)	4%
Ruderal	Non-native	4.9 (2.0)	5%
Total		97.7 (39.5)	100%

Source: NAVFAC PAC 2005.

Preferred Alternative

General vegetation management strategies described in Section 3.3.2.1 are implemented at Kamokalā Ridge, as applicable, to minimize and prevent the encroachment of invasive species into protected species habitats and other priority native vegetation cover types to the greatest extent practicable. The 2023 INRMP management strategies would result in a beneficial impact at Kamokalā Ridge when compared to the No Action Alternative.

3.6.2.2 Nuisance and Invasive Animals

Affected Environment

Due to the lack of protected species present at Kamokalā Ridge, little natural resource management occurs at the site. Nuisance wildlife and predators at the Kamokalā Ridge Magazines include deer, feral cats, pigs, and goats. Mammal surveys that were conducted in 2006 found black-tailed deer, pigs, cows (family Bovidae) and feral cats at the Kamokalā Ridge Magazines (NAVFAC PAC 2022).

Environmental Consequences

No Action Alternative

There are no actions implemented under the 2010 INRMP that could affect nuisance and invasive animal species at the Kamokalā Ridge; therefore, there are no impacts.

Preferred Alternative

The 2023 INRMP would implement the following strategies for control of nuisance and invasive species at Kamokalā Ridge:

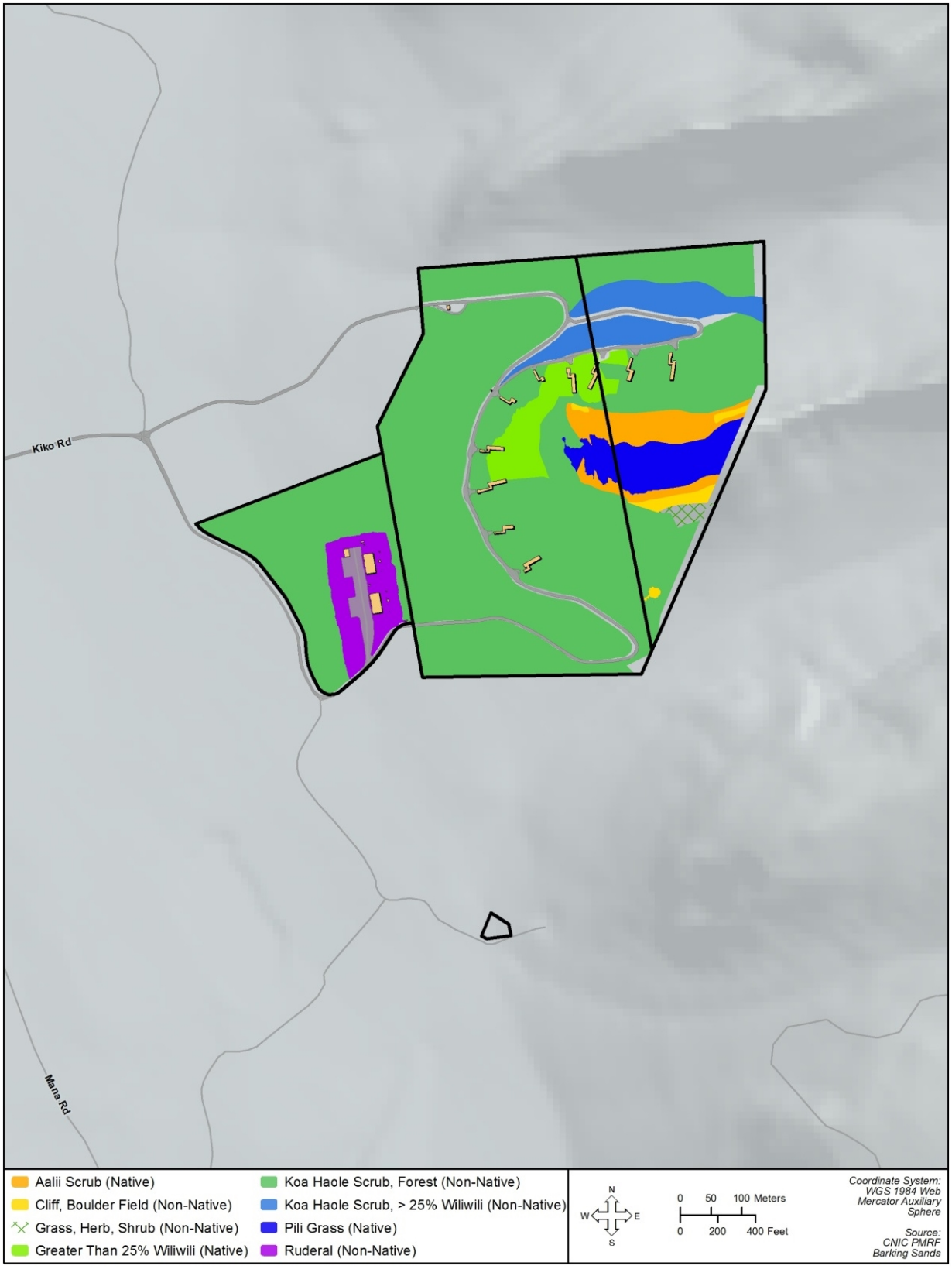

Figure 22 Vegetation at Kamokalā Ridge

1. Work with the PMRF Archery Club to control ungulate populations at the Kamokalā Ridge site by implementing trapping and baiting stations if the animals become a nuisance to Navy operations or pose a risk to protected species.
2. Conduct observations to identify feral cat presence at Kamokalā Ridge and consider expanding cat trapping if presence is consistent or becomes a nuisance.

This approach will have a beneficial impact at Kamokalā Ridge, as compared to the No Action Alternative by controlling for nuisance and invasive animal disruptions on site.

3.6.2.3 Bats

Affected Environment

Only one special status species, Hawaiian hoary bat, has been identified in the Kamokalā Ridge Magazines. The Hawaiian hoary bat has been identified at all past biological surveys at Kamokalā Ridge (Bruner 2000; Bonaccorso and Pinzari 2011; NAVFAC PAC 2022).

Environmental Consequences

No Action Alternative

There are no actions implemented under the 2010 INRMP that could affect bat species at the Kamokalā Ridge; therefore, there are no impacts.

Preferred Alternative

The Hawaiian hoary bat management strategies proposed under the 2023 INRMP (Section 3.3.2.3), including restriction on the season of vegetation trimming, follow-up acoustic surveys, and development of SOPs for bat roosting surveys, would have a beneficial impact on the Hawaiian hoary bat at Kamokalā Ridge when compared to the No Action alternative.

3.6.3 Social and Cultural Environment

All Social and Cultural resources for Kamokalā Ridge have been eliminated for further analysis for the reasons stated above in Table 18.

3.6.4 Additive Impacts

Additive impacts at Kamokalā Ridge are summarized in Table 20. Resources eliminated for analysis at this site are discussed in Section 3.6 and a description of the analysis criteria used is described in Section 3.2.2.

Table 20 Additive Impacts at Kamokalā Ridge

Environment	Resource	Description of Impact
Physical	Geological Resources	No additive impacts to geological resources or soils are anticipated from projects listed in Table 6.
Physical	Water Resources	No additive impacts to water resources are anticipated from projects listed in Table 6.
Physical	Natural Hazards	No additive impacts to Natural Hazards are anticipated. The projects listed in Table 6 do not change current use of the PMRF facilities significantly enough to produce a detrimental effect.
Biological	Vegetation	Additive impacts to vegetation may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, and the Biosecurity Plan for Micronesia and Hawai'i. Impacts from these projects are anticipated to be additive and beneficial.
Biological	Nuisance and Invasive Animals	No additive impacts to nuisance and invasive animal control are anticipated from projects listed in Table 6.
Biological	Bats	Additive impacts to bats may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, and Biosecurity Plan for Micronesia and Hawai'i. Impacts from these projects are anticipated to be additive and beneficial.

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3.7 Port Allen

The Port Allen site is located on the southern shore of Kaua'i, approximately 17 miles from the Main Base. The Navy leases the west side of the pier and west side of the pier building. The lease site is 1.0 ac. This site provides berthing facilities for three weapons recovery boats and a building for warehousing and support facilities, including communications, maintenance/repair, and engineering. Navy Seaborne Powered Target boats are moored at Port Allen as required for training exercises.

The Port Allen facility is limited to a leased portion of a pier and a small, paved area for parking and storage; its inclusion in the INRMP was restricted to a discussion of potential impacts of outdoor lighting on protected nocturnal Hawaiian seabirds. The analysis in this EA will be limited to these activities as well. The physical environment will not be discussed as no management actions will occur that affect geology and soil resources as land cover at the Port Allen facility is paved, and there are no surface water resources on site. Water resources are limited to the embayment surface waters in the harbor, which are not impacted by INRMP management actions.

Based on the location of this site, the resources identified in Table 21 are not affected and therefore, are not further analyzed in this EA.

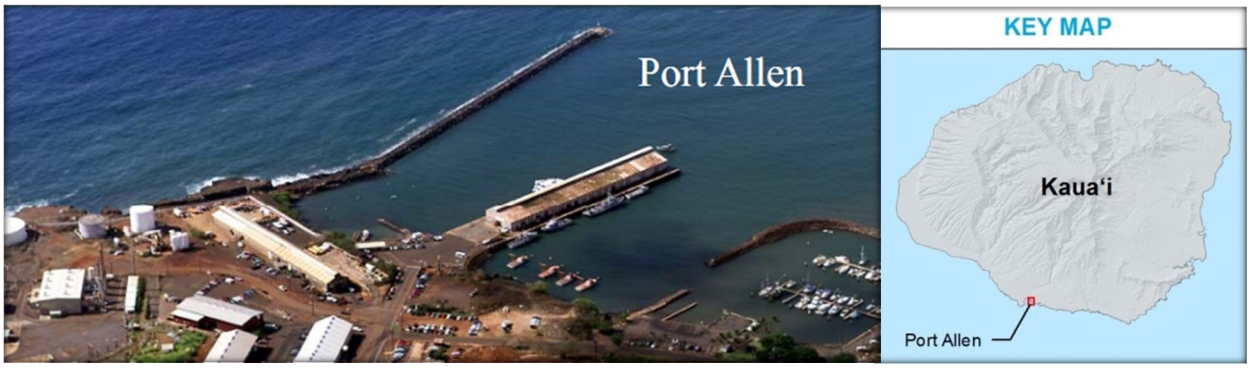

Figure 23 Port Allen Aerial Photo (DoN 2008b)

Table 21 Resources Eliminated from Discussion at Port Allen

Resource	Description and Justification for Elimination
Geology and Soils	There are no management actions at Port Allen, past or present, which would impact geology and soils in the facility vicinity.
Water Resources	There are no management actions at Port Allen, past or present, which would impact water resources in the facility vicinity.
Natural Hazards	The implementation of the No Action or the Preferred Alternatives would have no impact on the susceptibility of the facilities to natural hazards and would not impede evacuation activities necessary should a natural hazard, such as a hurricane, occur. Wildfire management would be limited to coordination with the appropriate fire department. The INRMP would not exacerbate the effect of any natural hazard and is therefore eliminated from further analysis.
Climate Change	The implementation of the 2023 INRMP is anticipated to have minimal GHG emissions. The Preferred Alternative is anticipated to have no to negligible impacts to climate change. The west side of the pier and west side of the pier building that the Navy leases is not anticipated to be impacted by SLR caused by climate change due to the elevation of the pier.

Table 21 Resources Eliminated from Discussion at Port Allen (Continued)

Resource	Description and Justification for Elimination
Vegetation	There are no past management actions at Port Allen, and 2023 INRMP management actions are limited to survey updates and general native plant restoration BMPs, which would not affect vegetation in the facility vicinity.
Nuisance and Invasive Animals	Although there are feral cats at Port Allen and PMRF funds pest control staff as part of the BOS contract, there is no impact such on animals associated with past or present management actions implemented under the 2010 or 2023 INRMP at the Port Allen facility; it is therefore not further evaluated in this EA.
Bats	There are no known bat species to be present at the Port Allen Facility; therefore, bats are not further evaluated in either INRMP or this EA.
Insects	There are no management actions at Port Allen, past or present, which would impact insects in the facility vicinity.
Marine Mammals, Marine Reptiles, and Other At-risk Marine Species	There are no management actions at Port Allen, past or present, which would impact marine species in the facility vicinity.
Coastal and Nearshore Biological Resources	There are no management actions at Port Allen, past or present, which would impact marine species in the facility vicinity. The Navy leases, but does not control, a portion of the pier and conducts INRMP actions for that leased area (i.e., reducing lighting impacts). A Navy SOP is in place to prevent fueling release. PMRF also complies with Section 7 consultations and other federal regulations in-water and offshore, however marine operations are not covered under the INRMP.
Land Use	Because of the limited land area and natural resources present at Port Allen, natural resources management actions are limited to measures focused on minimizing potential impacts to federally protected nocturnal seabirds by coordinating with facilities owner and USFWS to address lighting issues at the port. This management strategy would not impact land use. Therefore, no impacts to land use would occur.
Outdoor Recreation	The management actions from the 2023 INRMP would not decrease or increase the military use of the leased building and pier and the surrounding waters of Port Allen. Therefore, the recreational fishing and boating activities at and around Port Allen would not be impact by the Preferred Alternative.
Cultural Resources	Port Allen is located at a small boat harbor on Hanapēpē Bay, in the ahupua‘a of ‘Ele‘ele, in the moku of Waimea on the southwestern coast of Kaua‘i. Traditionally an area of salt pans, Port Allen was used as a sugar plantation shipping facility in the late nineteenth and early twentieth centuries. No archaeological surveys have occurred in this area, and no archaeological sites or traditional cultural places have been identified within it. According to the 2012 ICRMP, the lack of undeveloped land in the small area results in a probability of very low to none for cultural resources (NAVFAC PAC 2012). Port Allen has one historic architectural resource, Facility 387A, built in 1939 as a warehouse pier for sugar plantation use; it is designated by the Navy as Category II, and is determined eligible for NRHP listing. No present or future management actions implemented under the 2010 and 2023 INRMPs take place at the Port Allen facility that would impact cultural resources. Therefore, it is not further evaluated in the EA.

3.7.1 Physical Environment

All resources in Port Allen's physical environment have been eliminated for further analysis for the reasons stated above in Table 21.

3.7.2 Biological Environment

3.7.2.1 Birds

Affected Environment

Endangered seabirds are known to fly over the Port Allen facilities. While there have been no documented fallouts of seabirds at the Port Allen facility, seabirds have been known to fallout in the vicinity. These fallouts are not known to be a result of attraction or disorientation to lighting on Navy-leased property (NAVFAC PAC 2014). The Newell's shearwater is the endangered seabird species of particular concern at the Port Allen facility.

Environmental Consequences

No Action Alternative

The 2010 INRMP does not contain management actions specific to Port Allen. The lack of any management actions would result in negative impacts to birds.

Preferred Alternative

To minimize direct and indirect impacts to federally listed, endangered Hawaiian seabird species and migratory birds while providing maximum flexibility for training and operations, the 2023 INRMP proposes the following strategy:

1. Coordinate with facilities owner and USFWS to address lighting issues and continue to implement the Dark Skies program to the extent possible at the facility.
2. Train staff to recognize, respond and report to any circling or downed seabirds seen at the facility.

The Proposed Actions under the 2023 INRMP would have a beneficial impact on endangered seabird species and migratory birds, when compared to No Action Alternative.

3.7.3 Social and Cultural Environment

All Social and Cultural resources for Port Allen have been eliminated for further analysis for the reasons stated above in Table 21.

3.7.4 Additive Impacts

Additive impacts at Port Allen are summarized in Table 22. Resources eliminated for analysis at this site are discussed in Section 3.7 and a description of the analysis criteria used is described in Section 3.2.2.

Table 22 Additive Impacts at Port Allen

Environment	Resource	Description of Impact
Biological	Birds	Additive impacts to birds would result from lighting associated with any foreseeable construction activities. This concern is addressed in the USFWS BO for Newell's shearwaters (USFWS 2018). Continued reduction of night lighting at Port Allen would prevent additive impacts to seabirds flying over Port Allen.

3.8 Ka‘ula Island

Ka‘ula Island is located southwest of the island of Ni‘ihau (Figure 24). The island is uninhabited and totals 108 ac in area. The training area is approximately 10 ac on the southern tip of the island. Ka‘ula Island is used as a target range for aircraft using inert ordnance or gunnery activities. For safety purposes, the Navy has established a 3 mi radius around Ka‘ula Island as a Danger Zone to prevent vessels or other crafts from entering or remaining in the Danger Zone except those that have been authorized by the Navy (33 C.F.R. Section 334.1340(a)). Fishing boats are permitted in the Danger Zone when training exercises are not being conducted. Land access for surveys of Ka‘ula Island have been prohibited since 1998. Seabirds, whales, dolphins, seals, and other marine wildlife are the primary users of the island and its surrounding waters. Primary threats to these species at Ka‘ula Island are from military training exercises. Strict SOPs are implemented as a part of these exercises to mitigate impact to the species, the impacts on these species resulting from training exercises are evaluated in the HRC EIS/OEIS (DoN 2008a).

Based on the location of this site, the resources identified in Table 23 are not affected and therefore, are not further analyzed in this EA.

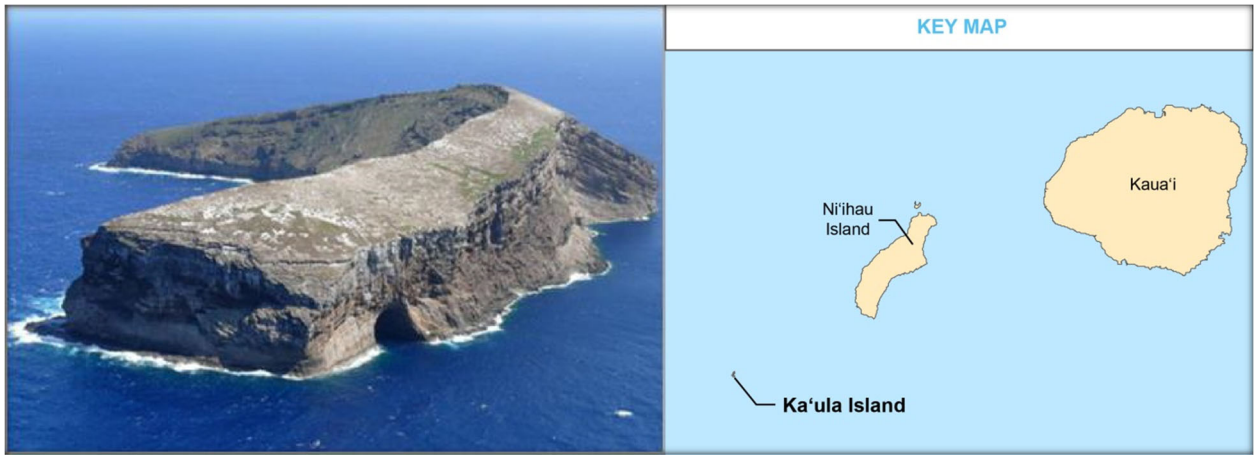

Figure 24 Ka‘ula Island Aerial Photo

3.8.1 Physical Environment

3.8.1.1 Climate Change

Affected Environment

Ka‘ula Island, also called Ka‘ula Rock, is a small (108 ac [44 ha]), crescent-shaped volcanic islet located approximately 55 mi (88 kilometers [km]) southwest of Kaua‘i and 22 mi (35 km) west-southwest of Ni‘ihau. This uninhabited island is on a 27 mi^2 (70 km^2) shoal surrounded by the 100-fathom (0.2 km) depth contour.

Environmental Consequences

No Action Alternative

The 2010 INRMP contains no management actions at Ka‘ula Island that could affect climate change, therefore there would be no impacts on climate change associated with continued implementation of the 2010 INRMP.

Table 23 Resources Eliminated from Discussion at Ka‘ula Island

Resource	Description and Justification for Elimination
Geology and Soils	There are no management actions, past or present, implemented under the 2010 and 2023 INRMPs that could impact geology and soils at Ka‘ula Island.
Water Resources	There are no management actions, past or present, implemented under the 2010 or 2023 INRMPs that would impact water resources.
Natural Hazards	Natural hazards that could affect Ka‘ula Island include hurricanes, landslides, and wildfire. Wildfire management would be limited to coordination with the appropriate fire department. The No Action and Preferred Alternatives would not exacerbate the effect of any natural hazards and are therefore eliminated from further analysis.
Vegetation	There are no past management actions at Ka‘ula Island, and 2023 INRMP management actions are limited to survey updates.
Bats	There are no known bat species to be present at Ka‘ula Island; therefore, bats are not further evaluated in either INRMP or this EA.
Insects	There are no management actions at Ka‘ula Island, past or present, which would impact insects at the site.
Land Use	The primary purpose of INRMP is to ensure no net loss in the capability of military lands to support the military mission of the installation. The implementation of the 2023 INRMP is not anticipated to lead to new land uses or land use alterations. Therefore, no impacts on land use would occur.
Outdoor Recreation	Ka‘ula Island is a restricted area; terrestrial access is off-limits at all times. Outdoor recreation opportunities are not applicable.
Cultural Resources	Ka‘ula Island is uninhabited by humans and located to the west of Kaua‘i. Historic and archaeological resources may be present at Ka‘ula Island. As a steward of cultural resources, the DoN must comply with federal regulations relating to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF and other areas. Cultural resources compliance at Ka‘ula shall be in accordance with the Navy Regional PA, as amended (Commander, Navy Region Hawai‘i 2024) and ICRMP. The INRMP does not propose activities that would affect historic properties. No further analysis is required at this time. No present or future management actions implemented under the 2010 and 2023 INRMPs take place at Ka‘ula Island that would impact cultural resources.

Preferred Alternative

Impacts from GHG emissions are additive by nature, as individual emission sources are generally not large enough to have an impact on global climate change. GHG emissions resulting from implementation of the 2023 INRMP would be primarily from ships conducting surveys around the island and, as individual sources, would not be large enough to have an appreciable effect on climate change.

3.8.2 Biological Environment

3.8.2.1 Nuisance and Invasive Animals

Affected Environment

Six of the 27 bird species identified on Kaʻula Island during bird surveys from 1932 to 2011 are non-native. Of these, the barn owl, house finch, and Warbling (Japanese) white-eyes were the only species consistently recorded in multiple surveys (Pepi et al. 2009). Non-native rodent species, including Polynesian rats and common house mice, have also been documented on Kaʻula Island (Pepi et al. 2009).

Environmental Consequences

No Action Alternative

The 2010 INRMP contains no management actions related to nuisance and invasive species control at Kaʻula Island and therefore no impact would occur with continued implementation of the 2010 INRMP.

Preferred Alternative

Under the 2023 INRMP, the following management strategy is proposed to control nuisance and invasive species at Kaʻula Island:

1. Partner with DOFAW and other partners to coordinate barn owl and other predator control efforts on Kaʻula Island if access is safe and allowable and control methods are practicable.

Implementation of the 2023 INRMP would have a beneficial impact on control of nuisance and invasive species at Kaʻula Island.

3.8.2.2 Birds

Affected Environment

During surveys at Kaʻula Island conducted from 1932 to 2021, no ESA listed bird species have been recorded (NAVFAC PAC 2022). From the surveys conducted in 2009, 2011, 2017, and 2021 all of the birds identified are protected under the MBTA (Fujimoto 2011; Pepi et al. 2009; Normandeau Associates, Inc. and APEM, Ltd. 2016). Most of the MBTA identified species are considered breeding or winter visitors. The most abundant species included the sooty tern (*Onychoprion fuscatus*), the great frigatebird (*Frigata minor*), the brown noddy (*Anous stolidus*), the red-footed booby (*Sula sula*), and the wedge-tailed shearwater (Normandeau Associates, Inc. and APEM, Ltd. 2016; 2021; Fujimoto 2011; Pepi et al. 2009).

Of the seabirds present at Kaʻula Island, some of the seabird species may include burrow nesting species, including the endangered Hawaiian petrel, the threatened Newell's shearwater, and the wedge-tailed shearwater. However, because it is too dangerous to conduct land-based surveys on the island it is difficult to determine their presence on the island, as aerial surveys are unable to count burrow nests. It should be noted that historical surveys (conducted from 1932-1998) did not record the presence of these species; however, their populations may have reestablished on island since surveys were conducted. See Appendix C of the 2023 INRMP to view a complete list of species present (NAVFAC PAC 2022).

Environmental Consequences

No Action Alternative

The 2010 INRMP includes the following management actions to minimize adverse effect on endangered seabirds and MBTA-protected species at Ka‘ula Island:

1. *Fauna Surveys Update/Initiate:* Update fauna surveys and mapping, including protected bird species, in preparation for subsequent INRMP updates.
2. *MBTA Compliance:* Continue to limit inert ordnance target training to the predetermined area (~9 percent of the land area) at the southern tip of Ka‘ula Island.

The continued implementation of the 2010 INRMP would result in a beneficial impact on birds at Ka‘ula Island, as the management actions improve understanding of protected bird populations and limit the ordnance target training to specific areas to reduce adverse effects on birds at Ka‘ula Island.

Preferred Alternative

Boat based seabird surveys were conducted from 2009–2012 in support of U.S. Pacific Fleet’s Coastal Zone Management Act (CZMA) consultations with the SOH on the HRC EIS/OEIS (Navy 2008). Boat surveys were replaced by aerial imagery surveys starting in 2013 with the goal of achieving better counts of seabirds, including those on the top of the island and Ka‘ula-focused cetacean surveys were discontinued. Survey reports are provided to the SOH’s Office of Planning and Sustainable Development and the frequency of the surveys may be modified through the U.S. Pacific Fleet’s CZMA consultation process. Under the 2023 INRMP, the following actions are proposed to protect seabirds and MBTA-protected bird species at Ka‘ula Island:

1. Continue implementing all military training SOPs.
2. Conduct aerial seabird surveys of Ka‘ula Island as needed for management planning to inform species presence, location, and numbers.
3. Seek authorization to conduct land-based updates to faunal surveys on Ka‘ula Island.

The preferred alternative actions would have a minor beneficial impact on the bird species present at Ka‘ula Island when compared to the No Action Alternative, as the actions involve regular monitoring of protected species.

3.8.2.3 Marine Mammals, Marine Reptiles, and Other At-risk Marine Species

Affected Environment

Federally listed marine mammals are known to occur in the waters near or adjacent to Ka‘ula Island (see Table 11). The endangered Hawaiian monk seal frequents the shoreline and ledges along the high-water mark (Pepi et al. 2009; Uyeyama et al. 2011; Richie, Uyeyama, and Fujimoto 2012; Normandeau Associates, Inc. and APEM, Ltd. 2021), and nearby waters support at least three ESA-listed cetacean species: the fin whale, the sperm whale, and the MHI insular false killer whale. A further 16 MMPA-protected cetacean species have been observed nearby, including 11 dolphins: the bottlenose dolphin (*Delphinus delphis*), spinner dolphin, rough-toothed dolphin (*Steno bredanensis*), striped dolphin (*Stenella coeruleoalba*), pantropical spotted dolphin (*Stenella attenuata*) , Fraser’s dolphin (*Lagenodelphis hosei*), Risso’s dolphin (*Grampus griseus*), short-finned pilot whale (*Globicephala macrorynchus*), pygmy killer whale (*Feresa attenuta*), killer whale (*Orcinus orca*) and melon-headed whale (*Peponocephala electra*); and five whale species: pygmy sperm whale (*Kogia breviceps*), dwarf sperm whale (*Kogia sima*), humpback whale, Blainville’s beaked whale (*Mesoplodon densirostris*), and

Cuvier's beaked whale (*Ziphius cavirostris*) (Baird et al. 2019; 2021; 2022; Baird, Mahaffy, and Lerma 2021; Pepi et al. 2009; Uyeyama et al. 2011; Richie, Uyeyama, and Fujimoto 2012; DoN 2014a).

The oceanic whitetip shark, the giant manta ray, the green sea turtle, and the Hawksbill sea turtle are species known to occur in the offshore waters at Ka'ula Island. There are no beaches on Ka'ula Island for basking nor have sea turtles been observed during shipboard or aerial surveys.

All marine mammals known to occur on or in the waters adjacent to Ka'ula Island are protected by the ESA and/or the MMPA. Specific concerns for these species include: stranding, entanglement in marine debris, vessel strikes, and threats from military training and testing exercises—evaluated in the HSTT EIS/OEIS (DoN 2018).

Environmental Consequences

No Action Alternative

The 2010 INRMP contains the following management actions related to marine mammals, marine reptiles, and other at-risk marine species:

1. *Hawaiian Monk Seal Protection:* Prohibit vessel landing on Ka'ula Island due to UXO concerns. Limit fishing at Ka'ula Island to maintain a marine environment with ample fish biomass and reduced stray fishing lines and nets, providing a benefit to the seals. Continue to check in all sorties to the Fleet Area Control and Surveillance Facility to ensure the absence of a monk seals within the drop zone.

The continued implementation of the 2010 INRMP would result in a beneficial impact to marine mammals at Ka'ula Island, as the management actions involve protection of the marine environment and SOPs to prevent adverse effects from military training activities.

Preferred Alternative

To maintain and enhance habitat and populations of marine mammals, marine reptiles, and other at-risk marine species on Ka'ula Island and better understand the population dynamics of those species, the 2023 INRMP contains the following management strategies:

1. Continue implementing all military training SOPs with regards to marine mammal and marine turtle interactions.
2. Seek authorization to conduct land-based updates to faunal surveys on Ka'ula Island.
3. Continue to report all observations of marine mammal strandings or deaths to NMFS and assist in response efforts.
4. Improve coordination and communication regarding marine mammal strandings and other observations of note with NAVFAC PAC and COMPACFLT.
5. Implement and collaborate with partners on studies regarding toxoplasmosis at PMRF to inform predator control efforts and conduct outreach about the disease and its effects on wildlife and human health.

The above actions would have a beneficial impact on the Hawaiian monk seal, marine mammals, and sea turtles at Ka'ula Island when compared to the No Action Alternative as the actions involve increased monitoring and studies about disease for the monk seal, marine mammals, and sea turtles present at Ka'ula Island.

There is no anticipated impact of INRMP activities on the giant manta ray or the oceanic whitetip shark at Ka'ula Island.

3.8.2.4 Coastal and Nearshore Biological Resources

Fish and Essential Fish Habitat

Affected Environment

Ka‘ula Island is surrounded by Ka‘ula Bank, which supports some coral reefs; the entire bank has been identified as a habitat area of particular concern (HAPC) in the Coral Reef Ecosystem Fisheries Management Plan. HAPCs are designated high priority areas for conservation, management, and/or research; these areas are established to focus and prioritize conservation efforts in areas that are rare, sensitive, stressed, or important to ecosystem function. The entire bank around Ka‘ula Island is designated as a coral reef ecosystem HAPC, based on its ecological function, its susceptibility to human impact, and its existing protective status (WPRFMC 2001).

Environmental Consequences

No active management occurs at Ka‘ula under the No Action and Preferred Alternatives. Due to the military activities, fishing activities are limited, lessening fishing pressure. Due to the lack of past and present management actions under the INRMP for fish and EFH, there is no impact associated with the Proposed Action.

3.8.3 Social and Cultural Environment

All Social and Cultural resources for Ka‘ula Island have been eliminated for further analysis for the reasons stated above in Table 23.

3.8.4 Additive Impacts

Additive impacts at Ka‘ula Island are summarized in Table 24. Resources eliminated for analysis at this site are discussed in Section 3.8 and a description of the analysis criteria used is described in Section 3.2.2.

Table 24 Additive Impacts at Ka‘ula Island

Environment	Resource	Description of Impact
Physical	Climate Change	Impacts from GHG emissions are additive in nature, as individual emission sources are not generally large enough to have an appreciable impact on global climate change. Projects with GHG emissions include any projects that involve use of heavy equipment, gas- or diesel-powered vehicles, or use of ships or aircraft including long range missile tests, and the long-range strike weapons systems evaluation program. The impacts from the No Action and Preferred Alternatives, while added to the impacts from these projects, are not large enough to have an appreciable effect on GHG emissions and global climate change.
Biological	Nuisance and Invasive Animals	No additive impacts to nuisance and invasive animal control are anticipated from projects listed in Table 6.
Biological	Birds	BASH from various operational air activities including testing and training is addressed in the INRMP. Additional projects impacting birds include wind energy development, long-range missile tests, and the USAF long-range strike weapons systems evaluation program. The INRMP recognizes that operations have a negative impact on bird species present at Ka‘ula Island. Infrastructure, operations, and maintenance activities, and the effect of these activities on Newell’s shearwaters is further evaluated in the BO.
Biological	Marine Mammals, Marine Reptiles and Other At-risk Marine Species	Additive impacts to marine mammals, marine reptiles, and other at-risk marine species include potential impacts from Navy sonar testing, and noise impacts from long-range missile tests, long-range strike weapons systems evaluation program. Other potential impacts to marine mammals in the vicinity of Ka‘ula Island include bycatch, and derelict fishing debris from recreational and commercial fishing, and maritime traffic.
Biological	Coastal and Nearshore Biological Resources	Additive impacts to coastal and nearshore resources at Ka‘ula Island include impacts from commercial and recreational fishing activities, which are limited around the island.

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3.9 Mauna Kapu

The Mauna Kapu facility is located on 2.0 ac within the Honouliuli Forest Reserve in West O‘ahu in the Waianae Mountain Range. The area includes a communications and radar tracking facility and frequency monitoring station building (0.4-ac site) and utility easements (1.5 ac). The property boundary is fenced.

While there are relatively few natural resource management actions at the Mauna Kapu facility, the site lies adjacent the Honouliuli and Nānākuli Forest Reserves, which supports several state and federally listed bird, snail, and plant species, management actions at the Mauna Kapu site have potential to impact these species and must be assessed through the NEPA process.

Based on the location of this site, the resources identified in Table 25 are not affected and therefore, are not further analyzed in this EA.

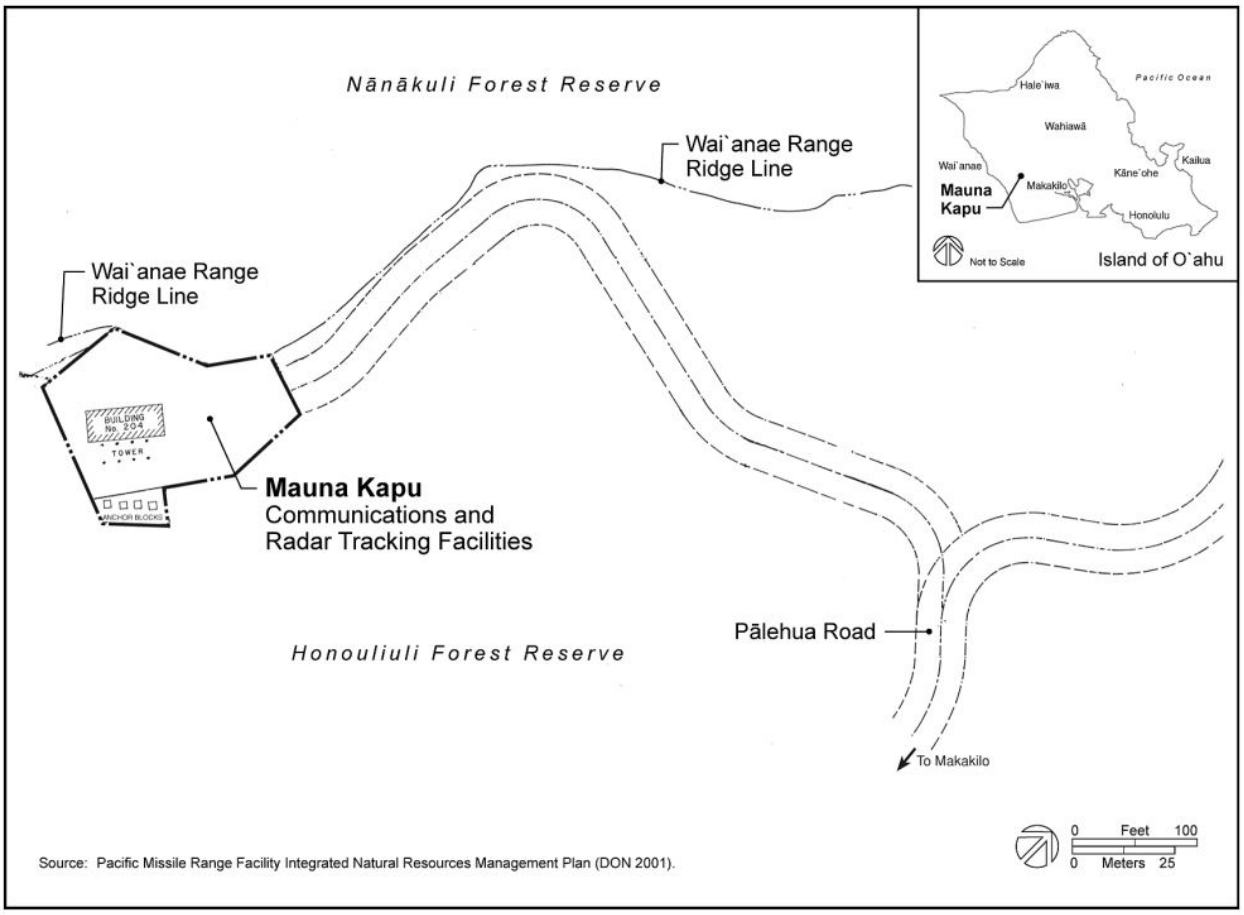

Figure 25 Mauna Kapu Location Map (DoN 2001)

Table 25 Resources Eliminated from Discussion at Mauna Kapu

Resource	Description and Justification for Elimination
Geology and Soils	No specific actions involving erosion control would be implemented at Mauna Kapu. PMRF would continue to follow standard methods to control erosion during all new construction projects. There is no impact associated with this action; therefore, it is not evaluated further in this EA.
Water Resources	The Mauna Kapu facility has no surface water or wetlands. The site overlies a high-level unconfined dike aquifer, which is part of the ʻEwa Aquifer System of the Pearl Harbor Aquifer Sector. The aquifer is an irreplaceable fresh water source with high vulnerability to contamination (J. F. Mink and Lau 1990). No present or future management actions implemented under the 2010 and 2023 INRMPs take place at the Mauna Kapu facility that would impact water resources. Therefore, it is not further evaluated in the EA.
Natural Hazards	Natural hazards that could affect Mauna Kapu include hurricanes, landslides, flooding, and wildfire. However, the implementation of the No Action and Preferred Alternatives would have no impact on the susceptibility of the facilities to natural hazards and would not impede evacuation activities necessary should a natural hazard occur, so is therefore eliminated from further analysis for this site. Wildfire management would be limited to coordination with the appropriate fire department.
Climate Change	The implementation of the 2023 PMRF INRMP is anticipated to have minimal GHG emissions. The Preferred Alternative is anticipated to have no to negligible impacts to climate change. SLR caused by climate change would not impact this site because of its location and elevation.
Vegetation	There are no past management actions at Mauna Kapu, and 2023 INRMP management actions are limited to survey updates and general native plant restoration BMPs, which would not affect vegetation in the facility vicinity.
Nuisance and Invasive Animals	There are neither nuisance nor invasive animals known to be present at Mauna Kapu. There is no impact such on animals associated with past or present management actions implemented under the 2010 or 2023 INRMP at Mauna Kapu; it is therefore not further evaluated in this EA.
Birds	Formal animal and bird surveys were not conducted for the 2010 or 2023 INRMPs, due to the small land area. Areas surrounding the facility provide habitat for threatened and endangered species including the ESA listed Oʻahu ʻelepaio (*Chasiempis sandwichensis gayi*), and the Hawaiian short-eared owl or pueo, which is State listed as endangered on the island of Oʻahu. There are no active management actions implemented at Mauna Kapu facility that could impact the federally listed ESA species present in the facility's vicinity. Proposed 2023 INRMP management actions at the facility are not anticipated to impact ESA or MBTA species potentially present at Mauna Kapu and in the facility vicinity, therefore it is not further evaluated in the EA.
Insects	There are no management actions at Mauna Kapu, past or present, which would impact insects at the site.
Marine Mammals, Marine Reptiles, and Other At-risk Marine Species	Mauna Kapu is located inland; there are no management actions proposed by the 2010 or 2023 INRMP affecting marine species at Mauna Kapu.
Coastal and Nearshore Biological Resources	Mauna Kapu is located inland; there are no management actions proposed by the 2010 or 2023 INRMP affecting coastal and nearshore resources at Mauna Kapu.

Table 25 Resources Eliminated from Discussion at Mauna Kapu (Continued)

Resource	Description and Justification for Elimination
Land Use	The primary purpose of INRMP is to ensure no net loss in the capability of military lands to support the military mission of the installation. The implementation of the 2023 INRMP is not anticipated to lead to new land uses or land use alterations. Therefore, no impacts on land use would occur.
Outdoor Recreation	The Mauna Kapu Facility is a restricted area and generally does not offer any outdoor recreation opportunities.
Cultural Resources	No significant historic and archaeological resources are present at Mauna Kapu. As a steward of cultural resources, the DoN must comply with federal regulations relating to those resources (e.g., NRHP). The presence of cultural resources increases costs associated with staffing, planning, and mitigation of effects to cultural resources throughout PMRF. Cultural resources compliance at Mauna Kapu shall be in accordance with the Navy Regional PA, as amended (DoN 2024). The INRMP does not propose activities that would affect historic properties. No further analysis is required at this time.

3.9.1 Physical Environment

All resources related to Mauna Kapu's physical environment have been eliminated for further analysis for the reasons stated above in Table 25.

3.9.2 Biological Environment

Little natural resource management occurs at the Mauna Kapu site as it encompasses only a small, enclosed area. The site is located upland approximately 3 mi from the shoreline, and thus actions do not affect the coastal or nearshore environment, or marine species.

3.9.2.1 Bats

Affected Environment

Monitoring surveys for bats were not prepared for the 2010 or 2023 INRMP. There are no known federally listed threatened or endangered species or critical habitat at the Mauna Kapu facility.

Environmental Consequences

No Action Alternative

The 2010 INRMP includes no active management of natural resources at the Mauna Kapu facility. Therefore, there are no impacts on bats present at the project site.

Preferred Alternative

To assess the occurrence of bats and other wildlife populations utilizing the facilities, the 2023 INRMP proposes the following strategy:

1. Conduct baseline fauna surveys.

The above management action is anticipated to have a minor beneficial impact on the Hawaiian hoary bat, if present at the facility, as it involves developing baseline survey monitoring actions to better understand species presence.

3.9.3 Social and Cultural Environment

All social and cultural resources for Mauna Kapu have been eliminated for further analysis for the reasons stated above in Table 25.

3.9.4 Additive Impacts

Additive impacts at Mauna Kapu are summarized in Table 26 below. Resources eliminated for analysis at this site are discussed in Section 3.9 and a description of the analysis criteria used is described in Section 3.2.2.

Table 26 Additive Impacts at Mauna Kapu

Environment	Resource	Description of Impact
Biological	Bats	Additive impacts to bats may result from the following projects: Navy environmental restoration, State Wildlife Action Plan, and Biosecurity Plan for Micronesia and Hawai'i. Impacts from these projects are anticipated to be additive and beneficial.

3.10 Ni‘ihau Island

Ni‘ihau Island is a privately-owned island that is 44,800 ac (18,130 ha) in size and lies approximately 17 mi (27 km) southwest of Kaua‘i (DLNR 2015). The dimensions of the island are approximately 18 mi (29 km) in length by 8 mi (13 km) in width stretching from the southwest to the northeast (C. H. Fletcher and Feirstein 2009). The Navy leases approximately 1,170 ac on the northeastern corner of Ni‘ihau, an island located southwest of Kaua‘i. PMRF operates radar units, optics, and electronic warfare sites on Ni‘ihau. PMRF also flies drone targets for the Aegis Ballistic Missile Defense System, a ship-based combat system, along the east coast of the island. Navy activities at Ni‘ihau include island-wide downed pilot training, helicopter terrain flight operations, electronic warfare exercises, special warfare operations training, target and interceptor launches, amphibious landings, helicopter landing areas, and unmanned aerial vehicle contingency landing support. These activities may take place on land, in the nearshore environments, and low-level altitudes above land or sea.

This EA focuses on the Navy lease area in the northeast corner of the island and coastal area where Navy vessels come ashore on a regular basis for maintenance and resupply, and areas where beach landing may occur (non-cliff coastal areas that have a beach or accessible flat, rocky area outside of the reserved areas). The width of the coastal area covered includes the distance from 4.9 ft in depth at low tide, through the water edge, and into the terrestrial environment 16.4 ft inland.

Based on the location of this site (DoN 2008b), the resources identified in Table 27 are not affected and, therefore, are not further analyzed in this EA.

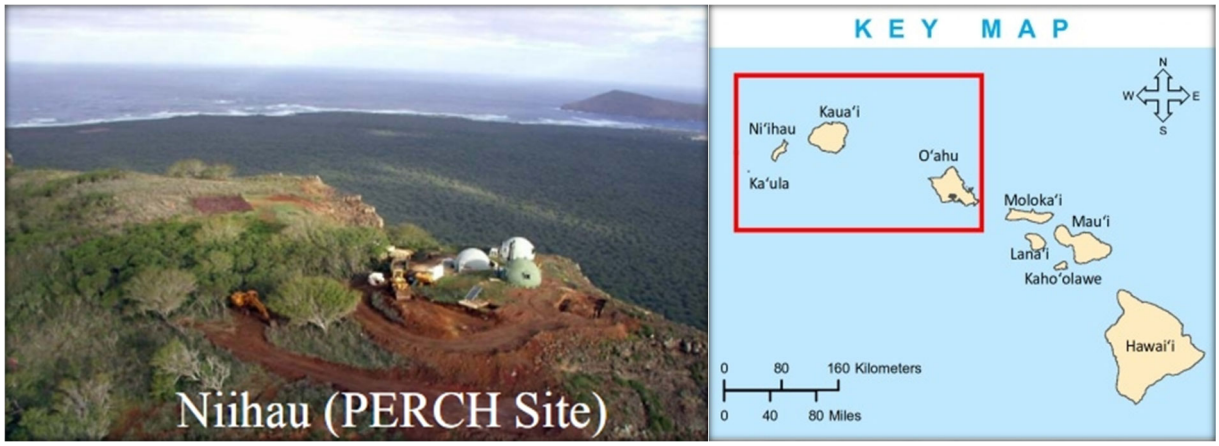

Figure 26 Ni‘ihau Aerial Photo and Key Map

Table 27 Resources Eliminated from Discussion at Niʻihau Island

Resource	Description and Justification for Elimination
Geology and Soils	Niʻihau Island ranges in elevation from sea level to approximately 1,281 ft above MSL along the volcanic uplands of Paniau on the northeast side of the island. The island consists of remnant of a single volcano, and is composed of basalt rock, with extensive alluvial deposits. Beaches include boulder beaches, sandy coasts of calcium carbonate sand, and sand dunes as high as 98 ft. The main landowner, the Robinson family, has not allowed soil surveys on the island, therefore soil data is unavailable from the Natural Resources Conservation Service Web Soil Survey (USDA NRCS 2022). Management actions at Niʻihau Island are limited due to restrictions set by the landowners. Therefore, there are no past or proposed erosion control measures to be implemented at Niʻihau; therefore, there is no impact on geology or soils associated with the Proposed Action, and it is not evaluated further in this EA.
Water Resources	There is little surface water available on the island of Niʻihau, there are no perennial streams, and the lakes that form typically evaporate during dry seasons. Two of the natural freshwater lakes on the island include Halulu Lake—approximately 182 ac in size, and Halāliʻi Lake—an intermittent lake approximately 841 ac in size. Much of the groundwater previously tested has salinity, which is too high for drinking. Water catchment serves as the primary drinking water source for most island residents. Management actions at Niʻihau Island are limited due to restrictions set by the landowners. Therefore, there are no past or proposed measures to be implemented at Niʻihau that would affect water resources; therefore, there is no impact on water resources associated with the Proposed Action, and it is not evaluated further in this EA.
Natural Hazards	Natural hazards that could affect Niʻihau Sites include hurricanes, landslides, flooding, SLR, and wildfire. However, the implementation of the No Action and Preferred Alternatives would have no impact on the susceptibility of the facilities to natural hazards and would not impede evacuation activities necessary should a natural hazard, such as a hurricane, occur. Therefore, it will be eliminated from further analysis at this site. Wildfire management would be limited to coordination with the appropriate fire department.
Vegetation	Vegetation at Niʻihau consists primarily of non-native plant species, with dominant vegetation cover types including kiawe forest, grasslands, and ruderal koa haole shrublands. Small areas of eucalyptus (*Eucalyptus robusta*) and common ironwood (*Casuarina equisetifolia*) occur throughout the island (DoN 2008a). Native false sandalwood (*Myoporum sandwicense*) can be found at higher elevation in mixed kiawe/koa haole forests. Northeastern coastlines, within the site contain herb and grassland communities. Within the area of concern there has been no documentation of federally threatened or endangered plant species. On the island of Niʻihau, south of the site there is federally designated critical habitat for the plant alula or ʻōlulu (*Brighamia insignis*). The endangered Nihoa pritchardia or loʻulu (*Pritchardia aylmer-robinsonii*) has also been documented on Niʻihau, although its range is also outside of areas used by the Navy. Management actions at Niʻihau are limited due to restrictions and land-use agreements with the landowners. There are no past management actions at Niʻihau, and 2023 INRMP management actions are limited to survey updates and general native plant restoration BMPs, which would not affect vegetation in the facility vicinity.
Nuisance and Invasive Animals	There are neither nuisance nor invasive animals known to be present at Niʻihau. There is no impact such animals associated with past or present management actions implemented under the 2010 or 2023 INRMP at Niʻihau; it is therefore not further evaluated in this EA.
Bats	There are no known bat species to be present at Niʻihau; therefore, bats are not further evaluated in either INRMP or this EA.

Table 27 Resources Eliminated from Discussion at Niʻihau Island (Continued)

Resource	Description and Justification for Elimination
Birds	Endangered Hawaiian waterbirds are known to occur on Niʻihau Island although they have not been documented in the project area. Included are the Hawaiian duck, Hawaiian coot, and Hawaiian stilt (Pyle and Pyle 2017; USFWS 2011). The federally protected Laysan albatross also occurs on the island during its breeding and fledging season from November to July. Up to 190 pairs have been observed during surveys. The Navy's natural resources management actions are limited in scope due to agreements with the landowner. Management strategies for birds under the 2023 INRMP would be limited to surveys to better understand potential impacts to waterbirds. The Navy's INRMP activities, both past and present are anticipated to have no impact on bird species present at Niʻihau.
Insects	There are no management actions at Niʻihau Island, past or present, which would impact insects at the site.
Land Use	The primary purpose of INRMP is to ensure no net loss in the capability of military lands to support the military mission of the installation. The implementation of the 2023 INRMP is not anticipated to lead to new land uses or land use alterations. Therefore, no impacts on land use would occur.
Outdoor Recreation	Although the owners of the island provide helicopter tour and safari tour for tourists, the Navy does not use Niʻihau Sites for recreational activities.
Cultural Resources	Traditional Hawaiian language and lifestyles have been preserved on Niʻihau to a great degree due to limitations on access and development. Cultural resource information is limited to notes in the Bishop Museum and cultural resource surveys conducted for the Navy. The Navy has undertaken archaeological investigations in areas of operations and determined that they contained no prehistoric or historic archaeological sites; nonetheless, coastal dune and sandy areas may contain sensitive sites. A few previously identified sites were noted in the 2010 INRMP: a pre-contact area of agricultural features and shelters on the northwestern corner of the island, and a former Coast Guard navigation feature and nearby ruin of a B-25 aircraft on the southwestern side of the island; and a few scattered buildings and structures that relate to early ranching activities. The No Action and Preferred Alternatives include studies and monitoring; however, there are no actions that could affect cultural resources at Niʻihau. Therefore, it is not further evaluated in the EA.

3.10.1 Physical Environment

3.10.1.1 Climate Change

Affected Environment

Niʻihau Island is a privately owned island that is 44,800 ac in size. With prior permission from the landowner and upon undergoing environmental review via the NEPA process and NHPA, the Navy can conduct training activities throughout the island, its nearshore environments, and at low level altitudes above land or sea.

Environmental Consequences

No Action Alternative

Impacts from GHG emissions are additive by nature, as individual emission sources are generally not large enough to have an impact on global climate change. GHG emissions resulting from continued implementation of the 2010 INRMP would be primarily from vehicles and vessels for the purpose of

surveying Hawaiian monk seals and sea turtles (large vessel, small boat, helicopter, and jeep) and, as individual sources, would not be large enough to have an appreciable effect on climate change.

Preferred Alternative

GHG emissions from the implementation of the 2023 PMRF INRMP also primarily come from the use of vehicles and vessels (large vessel, small boat, helicopter, and jeep) for survey purposes. These emissions sources would not be large enough to have an appreciable effect on climate change.

3.10.2 Biological Environment

Information on species distribution on Niʻihau Island is relatively limited. There are no known wildlife species that are considered endemic to Niʻihau, and species known to be present include the Hawaiian monk seal, the green sea turtle, endangered seabird species, migratory shorebirds, and Hawaiian waterbirds. There is federally designated critical habitat for one plant on the island, ʻōlulu (*Brighamia insignis*). The endangered plant Nihoa pritchardia or loʻulu (*Pritchardia aylmer-robinsonii*) has also been identified on the island. No threatened, endangered, or candidate plant species are known within the Navy-used sites.

3.10.2.1 Marine Mammals, Marine Reptiles, and Other At-Risk Marine Species

Affected Environment

Hawaiian Monk Seal

The Hawaiian monk seal uses the Niʻihau coastline to haul out, bask, and pup. It is thought that Niʻihau has some of the best coastal habitats available in the State for the Hawaiian monk seal. In coordination with the landowners of Niʻihau, Navy conducted the first comprehensive monk seal survey around the shoreline of the island in 2013. The Navy has been funding ongoing surveys with NOAA Fisheries since that time.

Whales and Dolphins

The endangered MHI insular false killer whale has been documented in the area by ship-board surveys (Carretta et al. 2018), and endangered sperm whale and fin whale have rarely been observed in adjacent waters. Dolphins that can occur in nearby or adjacent waters are: Short-finned pilot whale, pygmy killer whale, Fraser's dolphin, melon-headed whale, pantropical spotted dolphin, striped dolphin, spinner dolphin, rough-toothed dolphin, and bottlenose dolphin. Other whales recorded in the area include the pygmy sperm whale, dwarf sperm whale, humpback whale, Blainville's beaked whale, and Cuvier's beaked whale (Baird et al. 2019; 2021; 2022; Baird, Mahaffy, and Lerma 2021).

Sea Turtles

The green sea turtle frequents the beaches and nearshore waters of Niʻihau Island. The turtle has been observed resting and occasionally nesting on select beaches. The hawksbill sea turtle is also likely present in nearshore waters, although it has not been documented.

Giant Manta Ray and Oceanic Whitetip Shark

ESA-listed threatened species, including the giant manta ray and oceanic whitetip shark, are likely present in offshore waters surrounding the island. There have been no surveys conducted to determine their current occurrences around the island. INRMP actions would not impact these at-risk species.

Environmental Consequences

Hawaiian Monk Seal

No Action Alternative

Due to the potential for Navy operations on Niʻihau to occur near Hawaiian monk seal habitat, the Navy currently takes the following actions under the 2010 INRMP:

1. *Hawaiian Monk Seal Protection:* Continue to maintain training and contacts with NOAA's Marine Mammal Stranding Network and execute a quick response to any monk seal beaching or entanglement events on PMRF beaches or nearshore waters
2. *Monk Seal Monitoring:* Identify and monitor individual monk seals to establish tracking trends such as abundance, survival, birth rate and movements between islands. Support a photography and data collection program to document where and when monk seals are observed. Train Niʻihau residents on monk seal monitoring, photography, and data collection at a location determined by Niʻihau Ranch.

The continued implementation of the 2010 INRMP would result in beneficial impacts on Hawaiian monk seals at Niʻihau Island, as the management actions involve implementation of monitoring measures, and support regional conservation and assist in effective management of the species.

Preferred Alternative

The 2023 INRMP proposed the following management strategies for Hawaiian monk seals on Niʻihau Island:

1. Continue to adhere to management strategies implemented by Niʻihau Ranch on Niʻihau, including restricted access, feral animal control, and not allowing dogs or ATVs on the island.
2. Continue to conduct twice yearly surveys through partnership with NOAA Fisheries for Hawaiian monk seals on Niʻihau.

Implementation of the 2023 INRMP is anticipated to have no impact on Hawaiian monk seals as it is a continuation of previous management strategies under the 2010 INRMP.

Whales and Dolphins

No Action Alternative

The 2010 INRMP contains no management actions related to whales and dolphins on Niʻihau and therefore the continued implementation of the 2010 INRMP would have no impact on these species.

Preferred Alternative

The 2023 INRMP proposed the following management strategies to protect whales and dolphins and their habitat on and near Niʻihau Island:

1. Continue to report all observations of marine mammal strandings or deaths to NMFS and assist in response efforts.
2. Improve coordination and communication regarding marine mammal strandings and other observations of note with NAVFAC PAC and COMPACFLT.

The above actions would have a beneficial impact on whales and dolphins at Niʻihau Island when compared to the No Action Alternative as the actions involve increased monitoring and studies about disease for marine mammals present at Niʻihau Island.

Sea Turtles

No Action Alternative

Due to the potential for Navy operations on Niʻihau to occur near sea turtle habitat, the Navy currently takes the following action under the 2010 INRMP:

1. *Sea Turtle Monitoring:* Support a program to document where and when sea turtles are observed on land, as well as in sea turtle nests. Train Niʻihau residents on sea turtle monitoring and sea turtle nest data collection at a location determined by Niʻihau Ranch.

The continued implementation of the 2010 INRMP would result in beneficial impacts on sea turtles at Niʻihau Island, as the management action improves understanding of the sea turtle population and supports effective management of the species.

Preferred Alternative

The 2023 INRMP proposed the following management strategies for sea turtles on Niʻihau Island:

1. If proposed Navy operations have the potential to impact sea turtles or habitat, conduct surveys for listed sea turtles and nesting activity on Niʻihau to understand habitat use and trends.

Implementation of the 2023 INRMP is anticipated to have no impact on sea turtles as it is a continuation of previous management strategies under the 2010 INRMP.

Giant Manta Ray and Oceanic Whitetip Shark

No INRMP management actions are anticipated to affect or exacerbate threats to the species. Therefore, there will be no impact to the species.

3.10.2.2 Coastal and Nearshore Biological Resources

Affected Environment

There have been no coastal or nearshore biological surveys conducted as a part of the past INRMP activities. The NOAA conducts regular monitoring assessments as a part of their Pacific Reef Assessment and Monitoring Program. During their surveys from 2010, 2013, and 2015, they found that coral cover ranges from 0–10 percent for most areas around the island, and turf algae dominates most benthic communities (Heenan et al. 2014; McCoy et al. 2016). Niʻihau's reefs are generally poorly developed due to extreme wave energy, and lack of substantial bays that shelter coral development (Hollingsworth 2008).

Waters surrounding Niʻihau are considered EFH. Fish biomass at Niʻihau is on average higher than that of the other MHIs, averaging between 50-60 g/m^2 for all fishes, with primary consumers generally exhibiting the highest abundance when compared to other consumer groups (Heenan et al. 2014; McCoy et al. 2016). Fishing is limited on Niʻihau, which likely attributes to the higher fish biomass exhibited at Niʻihau.

Environmental Consequences

There are no actions implemented under the past 2010 INRMP or the proposed 2023 INRMP that could affect the coastal and nearshore environment (including fish, EFH, or corals) at Niʻihau, therefore no impact would occur as a result of INRMP management actions at Niʻihau.

3.10.3 Social and Cultural Environment

All Social and Cultural resources for Niʻihau Island have been eliminated for further analysis for the reasons stated above in Table 27.

3.10.4 Additive Impacts

Additive impacts at Niʻihau Island are summarized in Table 28. Resources eliminated for analysis at this site are discussed in Section 3.10 and a description of the analysis criteria used is described in Section 3.2.2.

Table 28 Additive Impacts at Niʻihau Island

Environment	Resource	Description of Impact
Physical	Climate Change	Impacts from GHG emissions are additive in nature, as individual emission sources are not large enough to have appreciable impact on global climate change. Projects with GHG emissions include any projects that involve the use of heavy equipment, gas- or diesel-powered vehicles, or the use of ships or aircraft including long range missile tests, and the long-range strike weapons systems evaluation program. The impacts from the No Action and Preferred Alternatives, combined with the abovementioned projects, are not large enough to have an appreciable effect on GHG emissions and global climate change.
Biological	Marine Mammals, Marine Reptiles and Other At-risk Marine Species	Additive impacts to marine mammals, marine reptiles, and other at-risk marine species include potential impacts from Navy sonar testing, and noise impacts from long-range missile tests, long-range strike weapons systems evaluation program. Other potential impacts to marine mammals in the vicinity of Niʻihau Island include bycatch, and derelict fishing debris from recreational and commercial fishing, and maritime traffic.
Biological	Coastal and Nearshore Biological Resources	Additive impacts to coastal and nearshore resources at Niʻihau include impacts from commercial and recreational fishing activities, which are limited around the island.

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4. Irreversible and Irretrievable Commitments of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the Preferred Alternative would involve human labor; the consumption of fuel, oil, and lubricants for vehicles used in conducting surveys and projects; and loss of natural resources such as invasive species from resource management activities. However, the Preferred Alternative would incorporate updated protection and conservation measures for the natural resources found at the PMRF Complex. These types of activities and labor are not in short supply and their continued use would not adversely impact the availability of these resources. Implementing the Preferred Alternative would not result in a significant irreversible or irretrievable commitment of resources.

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5. Agency and Individual Consultations

Regulations from the CEQ direct agencies to involve the public in preparing and implementing their NEPA procedures. In compliance with the Sikes Act, the Navy developed the revised INRMP cooperatively with the USFWS, DLNR, and NMFS. Entities from other local and State agencies, Native Hawaiian organizations, as well as private landowners in the project vicinity, and the public were invited to provide comments on the Revised 2023 INRMP and the associated Draft EA. The comments were considered in the preparation of the Final Revised 2023 INRMP and this EA.

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Appendix A – Key Documents and Relevant Laws, Regulations, and Memorandums of Understanding

Key Documents

Analysis of other PMRF sites as part of prior studies and NEPA assessments were used in preparing this EA. Key documents include the following:

- *INRMP:* The 2023 PMRF INRMP provides management recommendations for natural resources actions that protect federally protected species, prevent designation of additional critical habitat, reduce soil erosion; protect and restore land and waterways from invasive nonnative species infestation; and promote the protection and enhancement of wetlands and floodplains (NAVFAC PAC 2022).
- *ICRMP:* The PMRF ICRMP (NAVFAC PAC 2012) is intended to provide procedural guidance for identifying, evaluating, and managing historic properties located at PMRF. The ICRMP is a management resource tool used to achieve compliance with Sections 106 and 110 of the National Historic Preservation Act (NHPA), and other federal preservation laws. The ICRMP also provides further instruction on existing Navy agreements, which may include Memorandum of Agreement, Programmatic Agreement, and Comprehensive Agreement (DoN 1999; 2011b; 2012). The INRMP accounts for the ICRMP when planning and performing natural resource management activities that may affect cultural resources.
- *Hawai'i Range Complex (HRC) Final EIS/OEIS (DoN 2008a):* Addresses environmental impact of ongoing and proposed activities with the Navy's existing HRC, which included PMRF.
- *PMRF Master Plan:* The PMRF Master Plan is included as Chapter 4 of the Navy's Final Regional Integration Plan (2012). The PMRF Master Plan directs land use and land management at PMRF. It identifies facility and land use constraints, controls, issues (e.g., facility shortfalls, compatibly with surrounding land uses), and needs (Commander, Navy Region Hawai'i 2012). The INRMP is consistent with the PMRF Master Plan.

Relevant Laws, Regulations, and Memorandums of Understanding

The Navy has prepared this EA based on federal laws, statutes, regulations, and policies pertinent to the implementation of the Proposed Action.

The Coastal Zone Management Act (CZMA) of 1972, 16 U.S.C. § 1451-1468 sets up a national framework for states and territories to consider and manage coastal resources and establishes national policy to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone. The CZMA requires that all federal actions, including those on federal lands, that may have reasonably foreseeable effects on the uses or resources of a state's coastal zone be consistent with the enforceable policies of the State's coastal management program (NOAA, 2018).

In 1977, the Coastal Zone Management (CZM) Program was instituted in Hawai'i under HRS Chapter 205A. This program mandates that federal projects on State-owned land undergo a review to ensure

their alignment with the Hawai‘i CZM Program. As per this program, all lands within the State are subject to a federal consistency review. The SOH Office of Planning and Sustainable Development issued a concurrence letter on July 9, 2009, for De Minimis Activities that “are expected to have insignificant direct or indirect (cumulative and secondary) coastal effects, and should not be subject to further review by the Hawai‘i CZM Program on the basis and condition that the listed activities are subject to and bound by full compliance with the corresponding "Project Mitigation/ General Conditions."” requiring that the Navy or Marine Corps staff shall notify State CZM of de minimis list usage for projects which require an Environmental Assessment (EA). A copy of the Draft INRMP will be sent to the State CZM Program for review. Since the management plan is a programmatic document, the Navy did not seek a Federal Consistency determination. In the future, as specific natural resource projects are proposed, it will be submitted to the State CZM Program for consistency review if the Proposed Action requires an EA.

The following are the pertinent federal laws, statutes, regulations, and policies:

- NEPA (42 U.S.C. sections 4321-4370h)
- Procedural Provisions of NEPA (40 C.F.R. parts 1500-1508)
- Navy regulations for implementing NEPA (32 C.F.R. part 775)
- Sikes Act (16 U.S.C. §§ 670a-670o, 74 Stat. 1052)
- ESA (16 U.S.C. section 1531 et seq.)
- MMPA (16 U.S.C. section 1361 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (16 U.S.C. section 1801 et seq.)
- MBTA (16 U.S.C. section 703-712)
- CZMA (16 U.S.C. section 1451 et seq.)
- CWA (33 U.S.C. section 1251 et seq.)
- NHPA (54 U.S.C. section 306108 et seq.)
- Archaeological Resources Protection Act
- Executive Order (EO) 13089, Coral Reef Protection
- EO 11988, Floodplain Management
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 13007, Indian Sacred Sites
- EO 13352, Facilitation of Cooperative Conservation
- EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management
- EO 13693, Planning for Federal Sustainability in the Next Decade
- EO 13751, Safeguarding the Nation from the Impacts of Invasive Species
- EO 13990, Climate Crisis: Efforts to Protect Public Health and Environment and Restore Science
- Secretary of the Navy Instruction 5090.8A, Policy for Environmental Protection, Natural Resources, and Cultural Resources Programs
- 65 Federal Register 62565 – Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management

Memorandums of Understanding (MOUs):

- MOU between DoD and USFWS and the Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resources Management Program on Military Installations (Tripartite Agreement)
- MOU between DoD and the Pollinator Partnership
- MOU between DoD and USFWS to Promote the Conservation of Migratory Birds
- MOU between DoD and Bat Conservation International

Appendix B – List of Preparers

This EA was prepared collaboratively between the Navy and contractor preparers.

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