U.S. NAVY PACIFIC MISSILE RANGE FACILITY AND NASA KŌKE'E PARK GEOPHYSICAL OBSERVATORY REAL ESTATE

FINAL ENVIRONMENTAL IMPACT STATEMENT

August 2026

VOLUME 1









EISX-007-17-USN-1749043386

This page intentionally left blank.

FINAL ENVIRONMENTAL IMPACT STATEMENT

for

PACIFIC MISSILE RANGE FACILITY AND KŌKEʻE PARK GEOPHYSICAL OBSERVATORY REAL ESTATE

KAUAʻI, HAWAIʻI

August 2026

UID: EISX-007-17-USN-1749043386

NOTE ABOUT USE OF HAWAIIAN DIACRITICAL MARKINGS:
This document strives to honor the proper use and presentation of Hawaiian language including use of diacritical marks, the glottal stop and the macron (ʻokina and kahakō). When Hawaiian words are used in a proper name of an agency or organization that does not utilize diacritical marks, official titles are shown without diacritical marks. Diacriticals may not appear in direct quotes or public comments. Elsewhere in this document, diacritical markings are used for Hawaiian terminology, proper names, and place names.

This page intentionally left blank.

Project Information Summary (Abstract)

Project Name:	Pacific Missile Range Facility and Kōkeʻe Park Geophysical Observatory Real Estate Environmental Impact Statement	
Applicants (Joint Lead Agencies under NEPA):	Commander, Navy Region Hawaii Naval Facilities Engineering Systems Command, Environmental OPHEV2 850 Ticonderoga St., Building 150 Honolulu, HI 96860 Contact: William Manley Email: info@PMRF-KPGO-EIS.com	National Aeronautics and Space Administration Goddard Space Flight Center 34200 Fulton Street Wallops Island, VA 23337 Contact: Shari Miller Email: GSFC-DL-NEPA@mail.nasa.gov
Approving Authority:	State of Hawaiʻi Board of Land and Natural Resources 1151 Punchbowl Street, Room 220 Honolulu, HI 96813 Phone: 808-587-0419 Email: dlnr.land@hawaii.gov	
Accepting Authority:	State of Hawaiʻi Board of Land and Natural Resources	
Planning Consultant:	Cardno GS-AECOM Pacific Joint Venture Local Office: Stantec GS Inc. (formerly Cardno GS, Inc.) 737 Bishop Street, Suite 3050 Honolulu, HI 96813 Contact: Michele Lefebvre Phone: 808-791-9872 Email: info@PMRF-KPGO-EIS.com	
Location:	County of Kauaʻi, Hawaiʻi	
District:	Waimea	
Tax Map Keys:	(4) 1-2-001:006 (por.), (4) 1-2-001:010, (4) 1-2-002:001 (por.), (4) 1-2-002:010 (por.), (4) 1-2-002:024 (por.), (4) 1-2-002:025, (4) 1-2-002:026, (4) 1-2-002:027, (4) 1-2-002:028, (4) 1-2-002:029, (4) 1-2-016:011 (por.), (4) 1-4-001:002 (por.), (4) 1-4-001:013 (por.), (4) 1-4-001:014 (por.)	
Land Area:	Navy leasehold area and easement lands: 8,172 acres	NASA leasehold area and easement lands: 23 acres
Recorded Fee Owner:	State of Hawaiʻi	
Existing Use:	Navy Uses: antenna and related structures, ordnance storage/assembly facilities, missile tracking and surveillance facilities, water well, undeveloped land used for safety zone buffers, drainage management, roadways, and access to utilities	NASA Uses: Kōkeʻe Park Geophysical Observatory, antenna structures, data collection systems, and supportive infrastructure
State Land Use District:	Agricultural, Conservation	
Zoning:	Agricultural, Conservation, Open Space, Special Treatment – Ecological	
Flood Zone Designation:	A, AE, D, VE, X	

Proposed Action:	The Navy proposes to retain the use of 8,172 acres of State lands on Kaua'i, Hawai'i, for operational continuity and sustainment, in support of continued military training, testing, and facility operations at the Pacific Missile Range Facility (PMRF). The National Aeronautics and Space Administration (NASA) proposes to retain the use of 23 acres of State lands on Kaua'i, Hawai'i, in support of continued operations including measurements of the Earth's rotation and local land motion at Kōke'e Park Geophysical Observatory (KPGO).
HRS Chapter 343 Trigger(s):	Propose the use of State or County lands, HRS section 343-5(1); Propose any use within any land classified as a conservation district, HRS section 343-5(2).

Project Summary:

The United States (U.S.) Department of the Navy (Navy) and the National Aeronautics and Space Administration (NASA), have prepared this Environmental Impact Statement (EIS) in accordance with the following: the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] section 4321 et seq.); Hawai'i Revised Statutes (HRS) Chapter 343 (referred to as "HEPA") and Hawai'i Administrative Rules (HAR) Chapter 11-200.1. The Navy and NASA are each applicants in the HEPA process, and are joint lead agencies[1] for the purpose of this NEPA process. The Navy proposes to retain the use of 8,172[2] acres[3] of State lands on Kaua'i, Hawai'i, for operational continuity and sustainment, in support of continued military training, testing, and facility operations at the Pacific Missile Range Facility (PMRF). NASA proposes to retain the use of 23[4] acres of State lands on Kaua'i, Hawai'i, in support of continued operations including measurements of the Earth's rotation and local land motion at Kōke'e Park Geophysical Observatory (KPGO). The Proposed Action is needed because the existing real estate agreements for these lands are set to expire between 2027 and 2030. The Navy and NASA have jointly prepared this EIS because both historical and current uses of State lands at KPGO include the Navy and NASA. The Navy and NASA are considering two action alternatives and the No Action Alternative. The EIS evaluates potential environmental effects associated with these alternatives. The following resource areas are evaluated[5]: archaeological and architectural resources, cultural practices, biological resources, land use and access, socioeconomics, water resources, utilities, public health and safety, air quality and greenhouse gases, transportation, hazardous materials and wastes, and visual resources.

[1] Joint lead agencies are federal agencies that share lead responsibility for preparing a NEPA environmental review document due to shared project involvement or jurisdiction.

[2] The actual acreage is 8,171.516 acres and has been rounded to 8,172 acres for readability in the EIS.

[3] The acreage presented during scoping and in the Environmental Impact Statement Preparation Notice (EISPN) double-counted one easement area (Easement 106 (Tax Map Key [TMK]: 1-2-002-001 (por.)) and ESQD Easement S-5604 (TMK: 1-2-002-001 (por.)), which cover the same area). Therefore, upon correction, the total acreage has been reduced from 8,348 acres to 8,172 acres (176-acre reduction in the easement area).

[4] The actual acreage is 22.9 acres and has been rounded to 23 acres for readability in the EIS.

[5] The EISPN identified environmental justice as a resource to be analyzed. However, Executive Order (EO) 14148 "Initial Rescissions of Harmful Executive Orders and Actions" (90 *Federal Register* 8237) and EO 14173 "Ending Illegal Discrimination and Restoring Merit-Based Opportunity" revoked prior EOs requiring the analysis of environmental justice under NEPA. Therefore, a discussion of environmental justice is not carried forward as a resource section in the EIS. To meet HEPA requirements and allow for a complete analysis by the Hawai'i Board of Land and Natural Resources (BLNR), the EIS examines environmental justice impacts in the context of the resources carried forward.

Reader's Guide

This EIS has been prepared to fulfill federal and State environmental requirements for the Navy's and NASA's proposed continued use of State lands on Kaua'i. The document provides detailed assessments of potential impacts to the human and natural environment from the Proposed Action and alternatives. Once the EIS process is complete, the document will support subsequent real estate negotiations.

How to Use this Document

The Navy's and NASA's goal is to provide a document that presents a thorough, accurate analysis of the current environment, the Proposed Action, and the potential environmental effects[6] of reasonable alternatives to undertake the Proposed Action.

This EIS addresses a real estate Proposed Action. A glossary of frequently used real estate terms is provided in Table RG-1. A glossary of non-common words or actions is included in Appendix A.

Table RG-1 Glossary of Real Estate Terms

Term	***Definition***
Acquisition	Buying or obtaining an interest in land.
Appraisal	The process by which a qualified appraiser determines the market value of real estate.
Easement	An agreement that gives one party the right to use or access another party's land for a specific purpose and time period. An easement does not allow the easement holder to permanently occupy the land or exclude others from the land unless they interfere with the easement holder's use.
Fair Market Value	The value of property as determined by the marketplace.
Fee simple	Title (ownership) of real property in perpetuity, including the land and all improvements thereon. Also referred to as "fee simple absolute" or "owned in fee."
In perpetuity	Continuing indefinitely.
Lease	A land use agreement when one party allows another party to possess and use land for a specific amount of time in return for payment. A lease can exclude others from the land.
Leasehold	Property held in lease.
Restrictive use easement	An agreement that includes specific limitations (restrictions) on the use.
Retain	The ability to keep a property interest that would allow the continued existing use of that property.
Succeeding Real Estate Agreement(s)	New real estate agreement(s) to replace the existing agreements with new terms and conditions.
Unencumbered State lands	State lands that are free from any obligations such as deed restrictions, restrictive easements, and public liens.

The organization of this EIS is described below. All references cited in the EIS are included in Appendix B.

[6] The terms "effects" and "impacts" are used interchangeably in this document.

Document Organization

Executive Summary

This section contains a shortened description of the findings disclosed in the Environmental Impact Statement (EIS) for ease of review.

Abbreviations and Acronyms

This section contains a key to abbreviations and acronyms used in the EIS.

Chapter 1. Purpose of and Need for the Proposed Action

This chapter provides an introduction and overview of the project, describes the project location, and provides background context, purpose and need, scope of analysis, relevant laws and regulations, and public and agency participation. This section also includes a brief history of land use in the Project Area (for more details see the context in the Archaeological Inventory Survey, Appendix F). Figure RG-1 shows the Project Area.

Chapter 2. Proposed Action and Alternatives

This chapter describes the Proposed Action (Section 2.1), the alternatives screening process (Section 2.2) including alternatives considered but not carried forward for analysis, and the action alternatives considered for this EIS (Section 2.3), which include:

- Alternative 1 (Succeeding Current Real Estate Agreements): The Navy and National Aeronautics and Space Administration (NASA) apply to the Department of Land and Natural Resources (DLNR) to secure new real estate agreements with no change to the current uses that are described in this EIS and contained in the existing agreements (Appendix C). The duration of the new real estate agreements would be a minimum of 25 years and up to a maximum duration as negotiated with the Hawai'i DLNR.
- Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds): The Navy and NASA pursue fee simple acquisition of up to 700 acres (684 acres–Navy, 16 acres–NASA) of leaseholds, and otherwise obtain use of the remaining acreage as described in Alternative 1.
- Alternative 3 (No Action Alternative): The State of Hawai'i does not issue any new real estate agreements to the Navy and NASA for the State lands on Kaua'i after expiration of the leases and easements between 2027 and 2030.

Section 2.4 describes the alternatives considered but eliminated from detailed analysis. Section 2.5 includes a list of best management practices that are incorporated into the Proposed Action and are addressed as such in each resource analysis.

Figure RG-1 shows a Project Area overview with locations of current Navy and NASA leasehold and easement lands.

Chapter 3. Affected Environment and Environmental Consequences

This chapter examines the area that may be impacted by the alternatives under consideration, known as the affected environment, and then describes the environmental effects associated with implementing the alternatives. This chapter, beginning with an approach to analysis in Section 3.1, examines the following 12 resources within the affected environment (Sections 3.2 through 3.13): Archaeological and Architectural Resources, Cultural Practices, Biological Resources, Land Use and Access, Socioeconomics, Water Resources, Utilities, Public Health and Safety, Air Quality and Greenhouse Gases, Transportation, Hazardous Materials and Waste, and Visual Resources.

These sections provide the baseline for evaluating the effects of the Proposed Action and describes potential environmental effects of the alternatives.

Section 3.14 includes a summary table of potential effects to the 12 environmental resources by alternative.

Chapter 4. Cumulative Effects

This chapter defines cumulative effects and also identifies and describes past, present, and reasonably foreseeable future actions relevant to cumulative effects associated with the Proposed Action. This chapter, beginning with the introduction to the cumulative impact analysis in Section 4.1, examines the 12 resources identified in Chapter 3 with the cumulative effects potentially resulting from the incremental interaction of the Proposed Action with other identified actions. This section supports analysis for the BLNR as may be necessary under HEPA, including evaluation of the cumulative effects (Hawai'i Administrative Rules [HAR] section 11-200.1-24(l)) and determination of whether these effects are significant (HAR section 11-200.1-13(b)(8)).

Chapter 5. Existing and Continuing Mitigation Measures and Proposed Enhanced Engagement

This chapter includes actions the Navy and NASA are currently taking to avoid and minimize impacts from the Proposed Action, and would continue to implement under the action alternatives. Additionally, this chapter includes Enhanced Engagement the Navy and NASA propose to implement to promote protections for the ʻāina. These enhancements were developed in response to feedback received from the public during the scoping and public comment periods. Comments indicated that increased communication with the public and regulatory agencies regarding several ongoing programs could improve mutual understanding and cooperation. Additionally, comments also pointed to programs that, moving forward, could bridge the gap between the military and the community. This Enhanced Engagement is meant to be this bridge.

Chapter 6. Other Required Considerations

This chapter provides the Proposed Action's relationship to environmental reviews, laws, and executive orders.

Section 6.1 discusses the possible conflicts between the Proposed Action and the objectives of federal, regional, State, and local land use plans, policies, and controls (laws, regulations, and permits). A list of permits and approvals from federal, State, and County agencies necessary for implementation of the Proposed Action is included.

Sections 6.2 and 6.3 contain a list of any unresolved issues and adverse effects that cannot be avoided. Unresolved issues include: Land Retention Estate(s) and Method(s) as well as Lease Performance and Surrender Conditions.

Section 6.4 identifies the irreversible and irretrievable commitment of resources associated with the Proposed Action; and Section 6.5 discusses the trade-off between short-term use of the environment and the maintenance and enhancement of long-term productivity.

Relevant Websites

Two recently prepared NEPA documents associated with activities at PMRF have websites with additional information:

- 2025 PMRF Land-Based Training and Testing Final EA: https://www.nepa.navy.mil/pmrflbttea/
- 2025 Hawaii-California Training and Testing Final EIS/OEIS https://www.nepa.navy.mil/hctteis/

The PMRF Kaua'i website for communication between the military and the community:

- https://pmrfkauai.com/

The website for this EIS:

- https://www.PMRF-KPGO-EIS.com

The website for the PMRF installation:

- https://cnrh.cnic.navy.mil/Installations/PMRF-Barking-Sands/

The websites for the NASA Space Geodesy Project:

- https://earth.gsfc.nasa.gov/geo/networks/sgp
- https://earth.gsfc.nasa.gov/geo/networks/sgp/sites/kokee-park

List of Appendices

- **Appendix A: Glossary** (includes a reference for technical terms used in the EIS)
- **Appendix B: References** (includes the list of citations referenced in the EIS)
- **Appendix C: Current Real Estate Agreements (Leases, Easements, Use Permit)** (includes copies of the PMRF and KPGO real estate agreements)
- **Appendix D: Detailed List of Activities and Operational Elements Under Current Real Estate Agreements** (includes detailed maps of each leasehold and easement lands and a list of activities and operational elements for each leasehold and easement area)
- **Appendix E: Regulatory Setting** (includes the federal and State regulatory framework for the EIS, Navy and NASA Correspondence with Department of Land and Natural Resources, Office of Conservation and Coastal Lands, and Coastal Zone Management Act Consistency Determination, CZM Consistency Conditional Concurrence)
- **Appendix F: Cultural Resource Investigations** (includes the PMRF and KPGO Archaeological Inventory Survey reports, and the Cultural Impact Assessment, prepared in support of this EIS) (These reports have been redacted where necessary to protect sensitive information.)
- **Appendix G: Public Scoping and Draft EIS Comment Meeting Materials** (includes the list of interested parties contacted during scoping and during the comment period on the Draft EIS, postcards mailed, as well as posters, comment form, and handout from the public meeting)
- **Appendix H: EIS Notices** (includes scoping notices, Notice of Intent, and EIS Preparation Notice, Draft EIS notices and Notice of Availability)
- **Appendix I: EIS Comments and Responses** (includes original scoping comments and responses to scoping comments, as well as comments received on the Draft EIS and responses to Draft EIS comments)
- **Appendix J: Scoping Summary Report and Draft EIS Comment Summary Report** (includes the summary of scoping comments and comments received on the Draft EIS)
- **Appendix K: Natural Resource Surveys** (includes the PMRF and KPGO Flora, Fauna, and Hoary Bat Survey Reports prepared in support of this EIS, PMRF Integrated Natural Resources Management Plan, and PMRF Biological Opinions)
- **Appendix L: Wetland Survey Report** (includes a wetland survey that was prepared in support of this EIS)

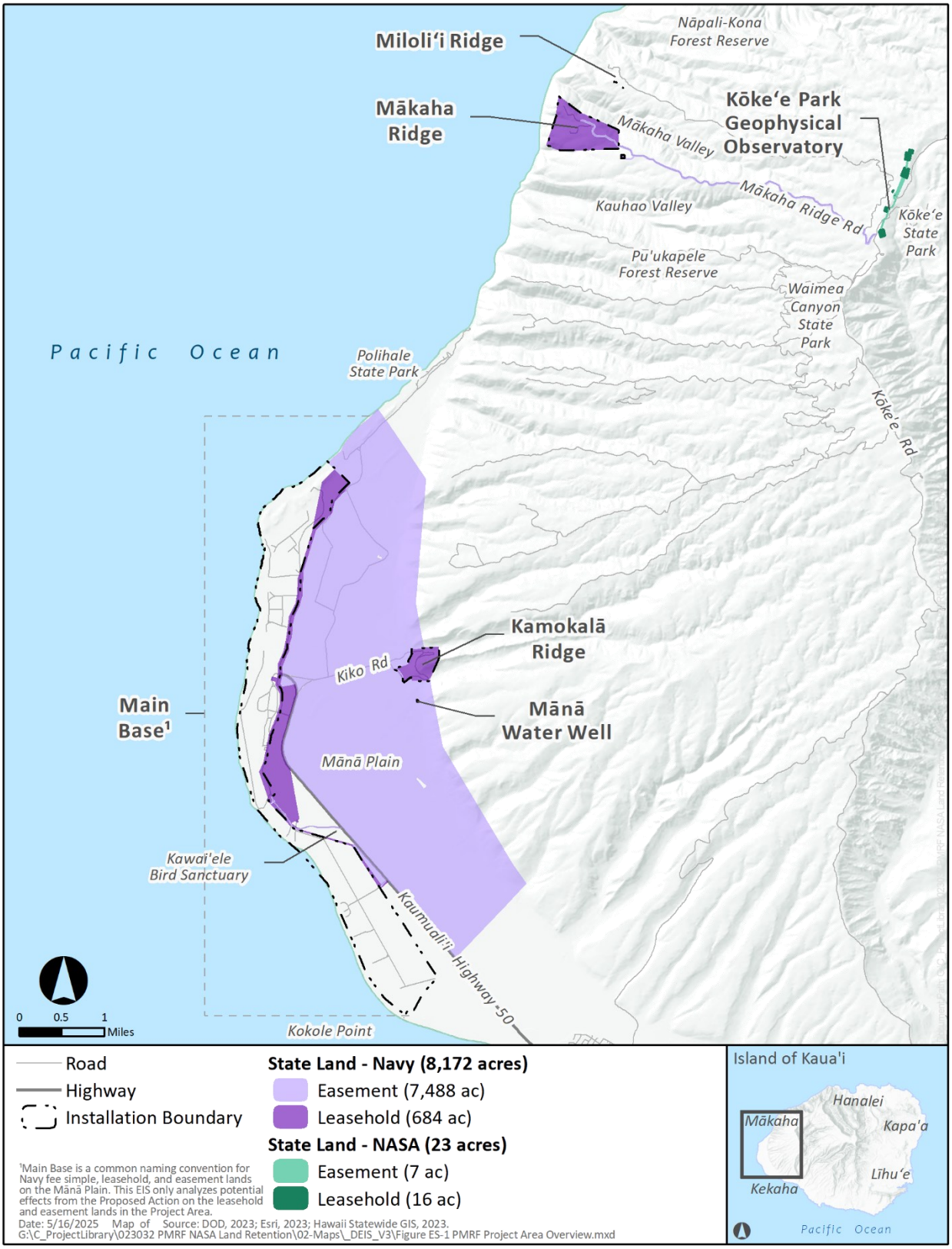


Figure RG-1 Project Area: Overview

This page intentionally left blank.

Executive Summary

This Environmental Impact Statement (EIS) has been prepared to fulfill federal and State environmental requirements for the Navy's and National Aeronautics and Space Administration's (NASA's) proposed continued use of State lands on Kaua'i. The document provides detailed assessments of potential impacts to the human and natural environment from the Proposed Action and alternatives. Once complete, the document will support subsequent real estate negotiations.

ES.1 Proposed Action

The Navy proposes to retain the use of 8,172 acres[7,8] of State lands (684 acres of leaseholds; 7,488 acres of easement lands) on Kaua'i, Hawai'i, in support of continued and ongoing military training, testing, and facility operations at the Pacific Missile Range Facility (PMRF). NASA proposes to retain the use of 23 acres of State lands (16 acres of leaseholds; 7 acres of easement lands) on Kaua'i in support of maintaining data collection efforts of global significance at Kōke'e Park Geophysical Observatory (KPGO). Analysis of the Proposed Action includes existing activities that occur on leasehold and easement lands. Figure ES-1 depicts the Project Area.

ES.2 Purpose of and Need for the Proposed Action

The Navy's purpose of the Proposed Action is to maintain Department of Defense (DoD) use of 8,172 acres of State lands on Kaua'i for a period of 25 years or longer, for operational continuity and sustainment of the military readiness mission. NASA's purpose of the Proposed Action is to maintain use of 23 acres of State lands on Kaua'i for a period of 25 years or longer for continued operations of KPGO. The Proposed Action is needed because the existing real estate agreements for these State lands are set to expire between 2027 and 2030. Navy use of these State lands is required to maintain technological and safety capabilities supporting PMRF training and testing. Navy training and testing operations do not occur on these State lands. The environmental effects of PMRF training and testing operations are fully analyzed in previous, focused environmental documents referenced in Section 1.5. For NASA, these State lands are critical to maintain data collection efforts of global significance. It also ensures the continued conservation management by the Navy and NASA of natural and cultural resources on these lands.

ES.3 Alternatives Considered

The Navy and NASA are considering two action alternatives that meet the purpose of and need for the Proposed Action. Alternatives are differentiated by the type of real estate agreement and are depicted in Figure ES-2.

- Alternative 1: The Navy and NASA would apply to the Department of Land and Natural Resources (DLNR) to secure new real estate agreements with no change to the current uses contained in existing agreements for a minimum duration of 25 years up to a maximum duration as negotiated with Hawai'i DLNR (Section 2.3.1).

[7] The actual acreage is 8,171.516 acres, and has been rounded to 8,172 acres for readability in the EIS.

[8] The acreage presented during scoping and in the Environmental Impact Statement Preparation Notice (EISPN) double-counted one easement area (Easement 106 (Tax Map Key [TMK]: 1-2-002-001 (por.)) and ESQD Easement S-5604 (TMK: 1-2-002-001 (por.)), which cover the same area). Therefore, upon correction, the total acreage has been reduced from 8,348 acres to 8,172 acres (176-acre reduction in the easement area).

- Alternative 2: The Navy and NASA would acquire the land currently held in leaseholds with no change to existing footprint or use and obtain use of the same easements[9]. This alternative would result in the acquisition of up to 700 acres of previously leased land.
- Alternative 3 (No Action Alternative): The State of Hawai'i would not grant the Navy and NASA any new real estate agreements after expiration of the leases and easements between 2027 to 2030.

Alternative 3, the No Action Alternative, would not meet the purpose and need for the Proposed Action; however, as required by NEPA and HEPA, the No Action Alternative is carried forward for analysis in this EIS to provide a clear basis for choice among options by the decision-maker (42 United States Code [U.S.C.] section 4321 et seq., Hawai'i Administrative Rules [HAR] Title 11 Chapter 200.1 section 24). While in most environmental documents the No Action Alternative typically maintains the status quo to serve as a baseline for comparison, the No Action Alternative in this EIS would change existing land tenancies, responsibilities, and uses because the real estate agreements would expire.

ES.4 Summary of Environmental Resources Evaluated in the Environmental Impact Statement

Table ES-1 (see also Table 3.14-1) includes a summary of potential effects to resources analyzed in this EIS, with consideration of applicable best management practices (BMPs) and standard operating procedures (SOPs). Acronyms used in tables are defined in notes following the tables. The Navy and NASA have incorporated BMPs and SOPs into the alternatives and the effects analysis takes these into account.

In addition to practicable measures to avoid and minimize adverse environmental effects from the Proposed Action, including BMPs and SOPs, the Navy and NASA considered mitigation measures from other environmental analyses already in place that reduce and offset effects from ongoing activities. Additionally, the Navy and NASA propose to implement Enhanced Engagement under the alternatives. These enhancements were developed in response to feedback received from the public during the scoping and public comment periods. Comments indicated that increased communication with the public and regulatory agencies regarding several ongoing programs could improve mutual understanding and cooperation. Additionally, comments also pointed to programs that, moving forward, could bridge the gap between the military and the community. This Enhanced Engagement is meant to be this bridge. A summary of the Enhanced Engagement is provided in Section ES.5.

[9] The Navy would not pursue new real estate agreements for easements B-1 and B-2 under the action alternatives as these were temporary construction permits granted in 1977 and are no longer needed.

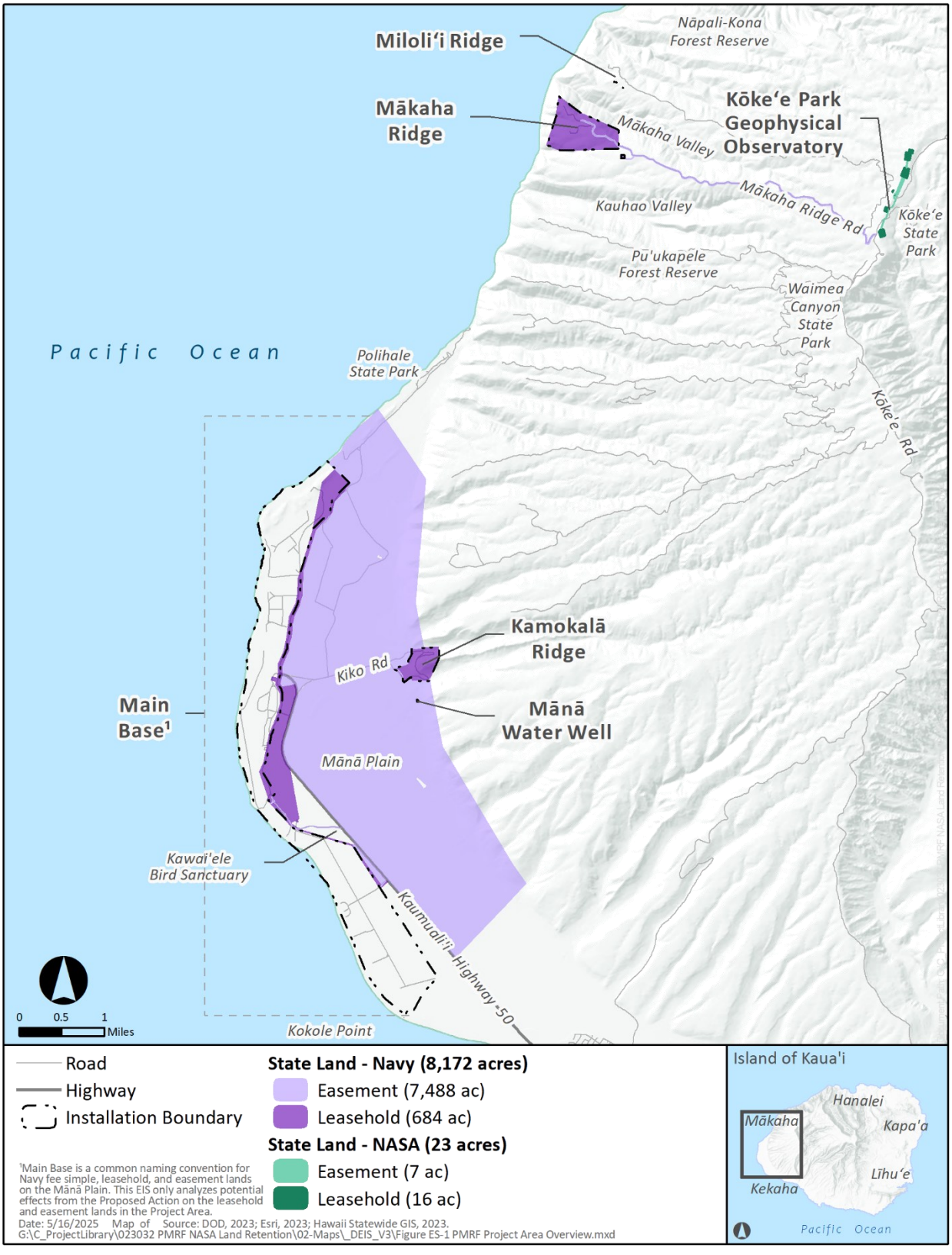
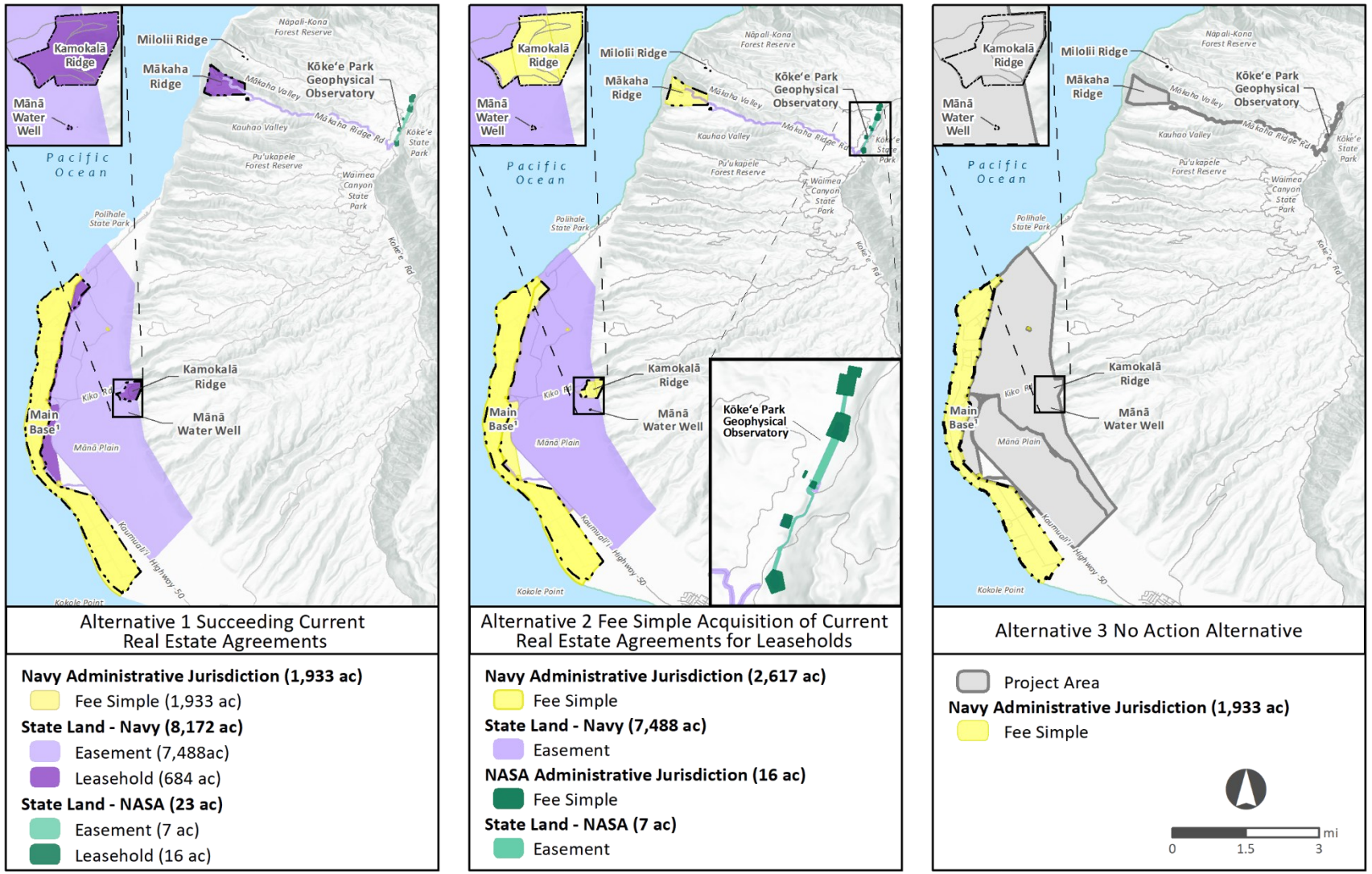


Figure ES-1 Project Area: Overview



¹Main Base is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.
Date: 12/17/2025 Source: DOD, 2023; Esri, 2023; Hawaii Statewide GIS, 2023. Note ac = acres
G:\C_ProjectLibrary\023032 PMRF NASA Land Retention\02-Maps__FEIS V2\Figure ES-2 All Alternatives.mxd

Figure ES-2 Alternatives

Table ES-1 Summary of Potential Effects to Resources Analyzed in this Environmental Impact Statement

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
Archaeological and Architectural Resources	Alternative 1 would not result in effects to archaeological and architectural resources because all activities with the potential to affect them are subject to review under Section 106 of the NHPA prior to approval, as well as all existing consultations, agreements, and conservation measures. Regulatory protections remain unchanged under Alternative 1. **Therefore, effects are not significant as Alternative 1 includes neither new activities that would affect archaeological and architectural resources, nor would it alter existing regulatory protections for any future actions with the potential to affect these resources.**	Alternative 2 would not result in effects to archaeological and architectural resources because all activities with the potential to affect them are subject to review under Section 106 of the NHPA prior to approval, as well as all existing consultations, agreements, and conservation measures. Regulatory protections remain unchanged under Alternative 2. **Therefore, effects are not significant as Alternative 2 includes neither new activities that would affect archaeological and architectural resources, nor would it alter existing regulatory protections for any future actions with the potential to affect these resources.**	The No Action Alternative may result in effects to archaeological and architectural resources on leaseholds and easements at Main Base, Kamokalā Ridge, and KPGO due to the change from federal protections under the Navy's and NASA's historic preservation programs to State protections.
Cultural Practices	Alternative 1 would not result in adverse effects to cultural practices or wahi pana on leaseholds and easements at Main Base[11] and Kamokalā Ridge and would have no effects at Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO. The Navy and NASA acknowledge that for some Native Hawaiians, the	Alternative 2 would not result in adverse effects to cultural practices or wahi pana on former leaseholds and easements at Main Base and Kamokalā Ridge and would have no effects at Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO. The Navy and NASA acknowledge that for some Native Hawaiians, the acquisition of ceded lands by the U.S. Government could be perceived as a long-term,	The No Action Alternative could result in short-term, minor to moderate adverse effects to access during periods of potential demolition and/or removal activities in areas of former leaseholds and easements at Main Base and Kamokalā Ridge. No effects would be expected at Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO. Additionally, the Navy and NASA acknowledge that for some Native

[10] Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.

[11] Note that "Main Base" is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	continued possession of ceded lands[12] by the U.S. Government could be perceived as a long-term, moderate, adverse effect. Moderate restrictions on access to leasehold and easement lands where cultural practices and associated resources occur would continue to be managed by the Navy and NASA to accommodate requests for access to locations under their jurisdiction for cultural practices and wahi pana. There would be no change to ongoing implementation of current management practices (Table ES-2), or BMPs (Section 2.5). In addition, Enhanced Engagement-2 (Table ES-3), would improve access for Cultural Practices in the Project Area. **Therefore, the potential effects of Alternative 1 to cultural practices could be adverse but not significant. If actions are determined to have potential adverse effects, they would be subject to regulatory oversight to avoid, minimize, or mitigate the effects consistent with federal regulations.**	moderate, adverse effect. Moderate restrictions on access to former leasehold and easement lands where cultural practices and associated resources occur would continue to be managed by the Navy and NASA to accommodate requests for access to locations under their jurisdiction for cultural practices and wahi pana. There would be no change to ongoing implementation of current management practices (Table ES-2), or BMPs (Section 2.5). In addition, Enhanced Engagement-2 (Table ES-3) would improve access for Cultural Practices in the Project Area. **Therefore, the potential effects of Alternative 2 to cultural practices could be adverse but not significant. If actions are determined to have potential adverse effects, they would be subject to regulatory oversight to avoid, minimize, or mitigate the effects consistent with federal regulations.**	Hawaiians, returning ceded lands into the State's possession could be perceived as a long-term beneficial effect. The potential benefit of the areas reverting to the State's possession would be determined by future land use designations and activities determined by the State, not as a part of this EIS as they are not Navy nor NASA actions.
Biological Resources	Alternative 1 could result in the continued potential for long-term, minor, adverse effects to biological resources on leaseholds and easements	Alternative 2 could result in the continued potential for long-term, minor, adverse effects to biological resources on former leaseholds and	The No Action Alternative could result in potential long-term, moderate, adverse effects to biological resources on leaseholds and easements at Main

[12] The term "ceded lands" is used to refer to the government lands of the Kingdom of Hawai'i and the Crown lands that were the property of the Hawaiian monarch, which the Republic of Hawaii transferred or "ceded" to the United States government in the Joint Resolution of Annexation approved by President William McKinley on July 7, 1898 (30 Stat. 750). Upon statehood in 1959, the federal government returned to the State of Hawai'i all ceded lands not set aside for its own use in Section 5(f) of the Admission Act. The use of the term "ceded land" is consistent with usage by other State agencies (e.g., https://www.oha.org/about/abouthistory/).

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge, and KPGO. Potential effects to general vegetation, general wildlife, special status species, and critical habitat would continue to occur, similar to current conditions. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would continue under Alternative 1. Alternative 1 includes the ongoing implementation of PMRF INRMP and NASA's SENSE Environmental Management Plan, implementation of REPI projects, and current mitigation measures (Table ES-2). In addition, Enhanced Engagement-3 (Table ES-3) would increase public transparency of natural resource management activities at PMRF and KPGO. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. State, federal, and military regulations, including SOPs and BMPs, would continue to be implemented, and there would be no change to biological resources. Alternative 1 would have no effects to listed species that have not been previously analyzed. As a result, there would be no anticipated change to populations of special status species, no further restrictions of wildlife	easements at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge, and KPGO. Potential effects to general vegetation, general wildlife, special status species, and critical habitat would continue to occur, similar to current conditions. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would continue under Alternative 2. Alternative 2 includes the ongoing implementation of PMRF INRMP and NASA's SENSE Environmental Management Plan, implementation of REPI projects, and current mitigation measures (Table ES-2). In addition, Enhanced Engagement-3 (Table ES-3) would increase public transparency of natural resource management activities at PMRF and KPGO. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 2. State, federal, and military regulations, including SOPs and BMPs, would continue to be implemented, and there would be no change to biological resources. Alternative 2 would have no effects to listed species that have not been previously analyzed. There would be no anticipated change to populations of special status species, no further	Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge and KPGO. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would not continue and the DLNR would assume such responsibilities. The Navy and NASA would no longer conduct regularly scheduled surveys and monitoring efforts of special status species, invasive species control, or native plant restoration efforts. Additionally, the No Action Alternative would result in the loss of conservation and habitat management programs, efforts, and funding from the Navy and NASA. Due to the loss of vegetation and wildlife management programs, conservation efforts, funding by the Navy and NASA, and potential loss of REPI projects, the responsibility of the management of these important biological resources would fall solely on the State. The population of special status species could remain constant due to mandatory requirements by federal agencies. As a result of the loss of conservation management resources and funding currently provided by Navy and NASA, there could be restrictions of wildlife corridors reducing, disturbing, or altering behavior, survival, or reproduction ability. There also could be

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	corridors, no further degradation of general habitat or critical habitat, and no increase of invasive species prevalence. **Therefore, the effects of Alternative 1 to biological resources would be adverse but would not be significant**.	restrictions of wildlife corridors, no further degradation of general habitat or critical habitat, and no increase of invasive species prevalence. **Therefore, the effects of Alternative 2 to biological resources would be adverse but would not be significant.**	degradation of general habitat and an increase in invasive species prevalence.
Land Use and Access	Alternative 1 would result in beneficial effects to land use from fair market value lease and easement payments to the State. These payments could be used in support of the State's public trust obligations. The Navy and NASA acknowledge that some Native Hawaiians who feel a sense of loss and injustice from continued control of ceded lands by the U.S. Government could perceive moderate, adverse effects from Alternative 1. Land use by the Navy and NASA would continue to be consistent with State laws and regulations and County zoning ordinances. Alternative 1 would not result in any change or pose new restrictions on access to State lands within the ROI. In addition, implementation of BMPs (Table ES-2) would continue to occur, and there would be no change to current activities on the leasehold and easement lands under Alternative 1. In addition, Enhanced Engagement-6 (Table ES-3) would help to minimize encroachment or accidental trespass. In summary, land	Alternative 2 would result in short-term, beneficial effects to land use through the purchase of currently leased lands and long-term beneficial effects from fair market value payments for the new easements, but also moderate adverse effects from the removal of these lands from the public land trust. Any income received by the State from the purchase could be used in support of the State's public trust obligations. The Navy and NASA acknowledge that some Native Hawaiians and other members of the public who feel a sense of loss and injustice from the sale of ceded lands by the State could perceive moderate adverse effects from Alternative 2. There would be no adverse effects related to consistency with regulatory standards because use of the former leaseholds would continue to be consistent with federal laws and regulations, and use of the easements would continue to be consistent with federal and State laws and regulations and County zoning ordinances.	The No Action Alternative could result in potential short-term, minor, adverse effects and long-term beneficial effects to land use and access. The No Action Alternative would have no effect on the public trust obligation because the State would continue to be responsible for fulfilling that requirement. The State lands would be subject to State land use regulations and County of Kaua'i zoning restrictions. Short-term restrictions to access during demolition and removal of facilities could occur, but in the long term, restricted access to KPGO lands, and the occasional access restrictions due to PMRF activities would cease. Additionally, the return of the lands within the ROI to State control from the U.S. Government could be perceived as a beneficial effect by some Native Hawaiians. As a result, no new restrictions on access to State lands would result from the No Action Alternative.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	use would be consistent with public trust requirements, consistent with regulatory requirements, and would not create changes or new restrictions to land use or access to State land. **Therefore, the effects of Alternative 1 to land use and access would be adverse but would not be significant.**	Alternative 2 would not result in any new access restrictions to State lands within the Project Area. In addition, implementation of BMPs (Table ES-2) would continue to occur, and there would be no change to current use of the leasehold and easement lands under Alternative 2. In addition, Enhanced Engagement-6 (Table ES-3) would help to minimize encroachment or accidental trespass. In summary, land use would continue to be consistent with the State's exercise of its public trust obligations, consistent with regulatory standards, and would not create changes or new restrictions to land use or access to State land. **Therefore, the effects of Alternative 2 to land use and access would be adverse but would not be significant.**	
Socioeconomics	Alternative 1 would have moderate, long-term, beneficial effects to socioeconomics. Since lease payments to DLNR would be at fair market value, they would be higher than under current conditions and benefit the State and the ROI economically depending on how the payments are distributed. Furthermore, continued operation of PMRF would continue to benefit the ROI economically by providing employment (approximately 900 personnel) and expenditures of approximately $150 million annually in salaries, contract goods, and services.	Alternative 2 would result in continued long-term, beneficial effects to socioeconomics that would likely be significant. The socioeconomic effects for Alternative 2 would be dependent on the terms of the real estate agreement. As there are no details available on the size of the payments, it is not possible to precisely determine the significance of the socioeconomic effects. However, the amount would be greater than under existing conditions and, therefore, would benefit the State and the ROI. Furthermore, continued operation of PMRF and KPGO would	The significance of the adverse socioeconomic effects for the No Action Alternative would depend on the number and timing of jobs eliminated at PMRF and KPGO as well as the size of spending reductions associated with these operational changes. All jobs at KPGO would be lost under this alternative. As many of the employees at PMRF are contractors, they might be able to find employment at other locations on Kaua'i. As a result, the potential reductions to Navy and NASA operations under the No Action Alternative would result in the loss of

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	Continued long-term, moderate, beneficial effects on socioeconomics would result from local jobs and income from employment at KPGO. Under Alternative 1, current job levels and spending at PMRF would be unchanged and therefore would not affect job opportunities and associated spending in West Kaua'i or islandwide. Under Alternative 1, there would be a major increase in value of lease payments to DLNR as compared to current conditions which could be considered beneficial. Additionally, there would be no change to areas within the Project Area used for recreational and tourism activities. Finally, the development and continuation of the PMRF Kaua'i would establish regular communication channels to strengthen relationships with the Native Hawaiian community and other interested stakeholders as described in Enhanced Engagement-4 (Table ES-3). **Therefore, the effects of Alternative 1 to socioeconomics would not be adverse or significant.**	benefit the ROI economically by continuing employment, contract spending, and community program support. Under Alternative 2, current job levels and spending at PMRF and KPGO would be unchanged and therefore would not affect job opportunities and associated spending in West Kaua'i or islandwide. As a result, there would be a substantial increase in value of real estate agreements and lease payments to DLNR as compared to current conditions which could be considered beneficial. Additionally, there would be no change to areas within the Project Area used for recreational and tourism activities. Finally, the development and continuation of the PMRF Kaua'i would establish regular communication channels to strengthen relationships with the Native Hawaiian community and other interested stakeholders as described in Enhanced Engagement-4 (Table ES-3). **Therefore, the effects of Alternative 2 to socioeconomics would not be adverse or significant.**	jobs at KPGO as well as other jobs associated with the potential loss of activities associated with leaseholds and easement areas. Additionally, the disruption of PMRF-supported access to sites within the ROI used for recreational and tourism activities may be lost and/or limited for a period of time until the State decides to grant access to these areas. The activities that could be eliminated at PMRF and the associated number of jobs that could be lost are not known at this time; however, the potential reduction in spending and employment could result in a significant loss to the local community.
Water Resources	Alternative 1 would not cause any effect to the groundwater, surface water, floodplains, or wetlands on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, or KPGO. The Navy would continue to work with ADC (a State agency) and	Alternative 2 would not cause any effect to the groundwater, surface water, floodplains, or wetlands on former leaseholds and easements at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, or KPGO. The Navy would continue to work with KAA and ADC to	On leasehold and easement lands at Main Base, the No Action Alternative could result in potential minor to moderate, long-term, adverse effects to groundwater, surface water, floodplains, and wetlands. The potential loss of operation and maintenance of the Mānā Water Well could change the

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	KAA (a tenant agricultural cooperative) via ADC to monitor water quality, manage the agricultural ditches, and help prevent flooding during large rain events on the Mānā Plain. The Mānā Water Well would continue to be utilized by PMRF as a source of drinking water and would continue to undergo regular inspections and comply with all necessary water quality sampling and standards. The Navy would continue to pay operation and maintenance costs for the Kawaiʻele Pump Station, located on the south end of the Main Base leaseholds, to manage groundwater levels for agricultural purposes and localized flood protection of low-lying areas on the Mānā Plain. At Mākaha Ridge, the Navy would also continue to implement management strategies to minimize soil erosion to improve surface water quality downstream of the Ridge. The ongoing implementation of current mitigation measures (Table ES-2), SOPs, and BMPs (Table 3.7-2) would continue to occur. In addition, Enhanced Engagement-5 (Table ES-3) would improve collaboration between stakeholders (Navy-DLNR-DHHL-KAA-ADC-Kauaʻi County) that manage water resources in West Kauaʻi and Enhanced Engagement-7 would continue the establishment of success criteria for erosion management on Mākaha Ridge.	monitor water quality, manage the agricultural ditches, and help prevent localized flooding during large rain events on the Mānā Plain. The Mānā Water Well would continue to be utilized by PMRF as a source of drinking water and would continue to undergo regular inspections and comply with all necessary water quality sampling and standards. The Navy would continue to pay operation and maintenance costs for the Kawaiʻele Pump Station to manage groundwater levels for agricultural purposes and localized flood protection on the low-lying areas of the Mānā Plain. At Mākaha Ridge, the Navy would also continue to implement management strategies to minimize soil erosion to improve surface water quality downstream of the Ridge. The ongoing implementation of current mitigation measures (Table ES-2), SOPs, and BMPs (Table 3.7-2) would continue to occur. In addition, Enhanced Engagement-5 (Table ES-3) would improve collaboration between stakeholders (Navy-DLNR-DHHL-KAA-ADC-Kauaʻi County) that manage water resources in West Kauaʻi and Enhanced Engagement-7 would continue the establishment of success criteria for erosion management on Mākaha Ridge. There would be no change to current activities on the former leasehold and	groundwater quality and access to groundwater at Main Base. The Navy could no longer pay operation and maintenance costs for the Kawaiʻele Pump Station which is used to alleviate flooding on the Mānā Plain during and after large rain events to help control surface water levels on the Mānā Plain. Should the State choose to not continue to operate the Kawaiʻele Pump Station during or after significant storm events, increased surface water levels could lead to increased localized flooding on the low-lying areas of the Mānā Plain, which could decrease the amount of available land used for viable agricultural purposes on the Mānā Plain. The loss of operation of the Kawaiʻele Pump Station could also increase water levels in wetland areas adjacent to Main Base, which could change the location and size of the available wetland habitat. Therefore, there could be a change and effect to groundwater, surface water, wetlands, and floodplains at leasehold and easement lands at Main Base due to potential increased levels of surface and groundwater from the potential cessation of operations at Kawaiʻele Pump Station during and after significant storm events. At Kamokalā, there would be no effects to groundwater, surface water, wetlands, or floodplains as a result of the No Action Alternative. The No Action

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	There would be no change to current activities on the leasehold and easement lands under Alternative 1. As a result, Alternative 1 would not degrade water quality, affect beneficial uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. **Therefore, effects of Alternative 1 to water resources would not be adverse or significant.**	easement lands under Alternative 2. As a result, Alternative 2 would not degrade water quality, affect beneficial uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. **Therefore, effects of Alternative 2 to water resources would not be adverse or significant.**	Alternative would not degrade water quality, affect beneficial uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. At the Mānā Water Well, the No Action Alternative could result in potential short- and long-term, moderate adverse effects to groundwater. The Navy would no longer maintain and operate the Mānā Water Well or pump groundwater from the well. The subsequent impact would be loss of access to this groundwater at Main Base and therefore increased demand from Kaua'i County Water Department wells or other wells in the area. The Mānā Water Well and associated parts would no longer continue to be inspected regularly by PMRF personnel including no longer performing regular maintenance on the distribution equipment, as well as monitoring, water testing and analysis, and water disinfection. If the State does not maintain the well or provide Navy access to the water, there could be a change to the quality, quantity, and accessibility of groundwater resources as a result of the implementation of the No Action Alternative. Therefore, a potential moderate, short-and long-term, adverse effect to groundwater could occur.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
			There would be no effects to surface water, wetlands, or floodplains at Mānā Water Well under the No Action Alternative. At Mākaha Ridge, the No Action Alternative could result in potential short- and long-term, minor to moderate, adverse effects to surface water. There could be a change to surface water quality as the increase in dust and debris during potential demolition and removal of existing infrastructure could result in a decrease in downstream water quality; however, these effects would be short term and minimized by the use of appropriate construction BMPs, such as silt socks and dust control. The Navy could no longer support conservation actions for erosion control at this site, which could lead to increased erosion and a decrease in surface water quality in the area. There would be no effects to groundwater, wetlands, or floodplains at Mākaha Ridge under the No Action Alternative. At Miloliʻi Ridge and KPGO, the No Action Alternative could result in potential short-term, minor, adverse effects to surface water as the increase in dust and debris during potential demolition and removal of existing infrastructure could result in a decrease in downstream water quality. These potential effects would be short term

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
			and minimized by the use of appropriate construction BMPs, such as silt socks and dust control. There would be no effects to groundwater, floodplains, or wetlands at Miloliʻi Ridge and KPGO under the No Action Alternative.
Utilities	Alternative 1 would not result in any changes to utility infrastructure or ongoing use of water and electricity that is used to support current operations. Under this alternative, wastewater would continue to be managed pursuant to existing environmental management plans. Potable water from the Mānā Water Well would continue to undergo regular disinfection and testing. Electricity would continue to be conserved as much as possible. Alternative 1 would not result in any change to utilities. As a result, there would be no exceedance of capacity or an unreasonable demand on a utility, loss or reduction of utility capacity such that demand exceeds capacity, and no resulting noncompliance with a permit or regulation. **Therefore, effects of Alternative 1 to utilities would not be adverse or significant.**	Alternative 2 would not result in any changes to utility infrastructure or ongoing use of water and electricity that is used to support current operations. Under this alternative, wastewater would continue to be managed pursuant to existing environmental management plans. Potable water from the Mānā Water Well would continue to undergo regular disinfection and testing. Electricity would continue to be conserved as much as possible. Alternative 2 would not result in any change to utilities. As a result, there would be no exceedance of capacity or an unreasonable demand on a utility, loss or reduction of utility capacity such that demand exceeds capacity, and no resulting noncompliance with a permit or regulation. **Therefore, effects of Alternative 2 to utilities would not be adverse or significant.**	On leasehold and easement lands at Main Base and Mānā Water Well, the No Action Alternative could result in moderate, adverse, short-term to long-term effects to potable water, because there could be a reduction of potable water capacity for PMRF and increased demand on the Kauaʻi County Water Department. The No Action Alternative could result in adverse, short-term to long-term effects to electrical utility and communications services because there could be a temporary reduction in available service capacity. However, these effects may be less than significant because alternate sources of electrical and communication services may be obtained to offset the loss of capacity. No effects to wastewater utilities would be anticipated because the wastewater infrastructure at Main Base has sufficient service capacity. There is no wastewater service at the Mānā Water Well and, therefore, no impacts to wastewater would occur there. At Kamokalā Ridge, the No Action Alternative could result in short-term to long-term, moderate, adverse effects to

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
			the electric utility system and the non-potable waterlines that support the fire hydrants at the missile magazine area because there could be a reduction in service capacity. At Mākaha Ridge, the No Action Alternative could result in short-term to long-term, minor, adverse effects to electric and communication utilities because utility capacity may be reduced. If alternative sources of electrical services are obtained, the effect could be less than significant. No effects to wastewater utilities would be anticipated as the septic systems may remain in place and could still meet capacity needs for wastewater service. At KPGO, the No Action Alternative could result in short- and long-term, moderate, adverse effects to utilities because there may be a reduction in electrical services at KPGO and the campsites in the area. However, alternative utility resources could be obtained to offset the loss of capacity and would not put unreasonable demand or exceed capacity of these utilities.
Public Health and Safety	Alternative 1 would result in long-term, minor, potential adverse effects to public health and safety from the ongoing use and storage of fuels and oils, missile assembly, ordnance storage and movement, and radar operations on leasehold and easement lands at Main	Alternative 2 would result in minor, long-term, adverse effects to public health and safety from the ongoing use and storage of small amounts of hazardous materials, storage of fuels and oils, missile assembly, ordnance storage and movement, and radar	The No Action Alternative could result in potential minor to moderate, short-term adverse effects to public health and safety on leasehold and easement lands at Main Base, Kamokalā Ridge, and KPGO as hazardous materials such as fuel, oil, and ordnance would no

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	Base, Kamokalā Ridge, Mākaha Ridge, and KPGO. There would be no effects at Mānā Water Well or Miloliʻi Ridge. Alternative 1 would also result in minor, short- and long-term beneficial effects to public health and safety as NASA would continue to collect critical weather data. The ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.9-1) would occur under Alternative 1. In addition, Enhanced Engagement-6 (Table ES-3) would increase public health and safety by improving closure protocol and public notification during launch activities and minimize accidental trespass from adjacent land. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, applicable regulations and policies designed to prioritize public health and safety would continue to be implemented so that there would be no change to imminent or chronic human health and safety risks or increased wildfire risk within the ROI. **Therefore, effects of Alternative 1 on public health and safety would be adverse but would not be significant.**	operations at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge, and KPGO. There would be no effects at Mānā Water Well or Miloliʻi Ridge. Effects to public health and safety under Alternative 2 would be identical to those described for Alternative 1 as they are not changed by land acquisition method. The ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.9-1) would occur under Alternative 2. In addition, Enhanced Engagement-6 (Table ES-3) would increase public health and safety by improving closure protocol and public notification during launch activities and minimize accidental trespass from adjacent land. There would be no change to current operations or activities on the former leasehold and easement lands under Alternative 2. As a result, applicable regulations and policies designed to prioritize public health and safety would continue to be implemented so that there would be no change to imminent or chronic human health and safety risks or increased wildfire risk within the ROI. **Therefore, effects of Alternative 2 on public health and safety would be adverse but would not be significant.**	longer be stored or used on leasehold or easement land and would need to be transported to another appropriate holding site. The removal and transportation of ordnance from both Kamokalā Magazines and the missile assembly building on Tract E-1 (TMK: 1-2-002-025) to fee simple land or another appropriate holding site could temporarily increase the risk to public health and safety during transport; however, this could be greatly reduced by BMPs, and the possibility of unintentional detonation is extremely unlikely. There would be no effects at the Mānā Water Well. Without access to the telemetry and missile tracking infrastructure on Mākaha Ridge, missile launches could be substantially decreased. Radar operations and associated hazards with EMR could also decrease on leasehold and easement lands at Main Base, Mākaha Ridge, and KPGO. NASA could no longer collect geodetic data at this site, so early warning data on global (and Hawaiian) sea level change, earthquakes, volcano deformation, flooding patterns, and glacier dynamics could be impacted. The Navy would no longer manage wildfire risk, assess daily fire danger, or reduce natural fuels (such as dry grasses) on the leasehold and easement lands. As details regarding the State's potential management of these lands are not

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
			known, the potential risk to public health and safety cannot be quantified.
Air Quality and Greenhouse Gases[13]	Alternative 1 could result in potential long-term, minor, adverse impacts to air quality and GHGs in the ROI. The ongoing implementation of current mitigation measures (Table ES-2) and no change to current operations or activities on the leasehold and easement lands under Alternative 1 mitigate these potential effects. As a result, there are no changes to ambient air quality conditions and no exceedances of federal or State ambient air quality standards that would occur from the continuation of these air emissions under Alternative 1. **Therefore, effects of Alternative 1 to air quality and GHGs would be adverse but would not be significant.**	Alternative 2 could result in potential long-term, minor, adverse impacts to air quality and GHGs in the ROI. The ongoing implementation of current mitigation measures (Table ES-2) and no change to current operations or activities on the former leasehold and easement lands under Alternative 2 mitigate these potential impacts. As a result, there are no changes to ambient air quality conditions and no exceedances of federal or State ambient air quality standards that would occur from the continuation of these air emissions under Alternative 2. **Therefore, effects of Alternative 2 to air quality and GHGs would be adverse but would not be significant.**	The No Action Alternative would result in potential short-term, minor, adverse effects, as well as minor, long-term, beneficial effects to air quality and GHGs. Per the lease agreements, any structures or infrastructure could be removed or could remain in place. Short-term, adverse effects could occur during demolition activities associated with the decommissioning of any facilities. Emissions of criteria pollutants and GHGs would be directly produced from: • Operation of heavy equipment; • Operation of construction generator sets; • Heavy duty diesel vehicles hauling construction materials and debris to and from the ROI; • Dust generated during demolition and hauling activities; • Workers commuting daily to and from the ROI and personal vehicles; and • Ground disturbance. All such emissions would be temporary in nature and produced only when activities are occurring. Additionally, the discontinuation of operations would result in minor, long-

[13] The consideration of greenhouse gases is included for compliance with HEPA.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
			term, beneficial effects to air quality. As details of the potential reduction of operations are not known, the level of reduction cannot be quantified. However, any reduction in operations would result in a reduction in all air-emitting activities associated with these activities and long-term air quality effects would be slightly reduced compared to existing levels.
Transportation	Alternative 1 would not result in adverse effects to the transportation network within the ROI. Alternative 1 would not result in a significant change in traffic volumes accessing the facilities and on the existing roadway network in the ROI. Site personnel access to the facilities would continue. The ongoing implementation of current mitigation measures (Table ES-2) would be maintained and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, there would be minimal, if any, effects on the roadway and intersection LOS. **Therefore, the effects of Alternative 1 to transportation would not be adverse or significant.**	Alternative 2 would not result in adverse effects to the transportation network within the ROI. Alternative 2 would not result in a significant change in traffic volumes accessing the facilities and on the existing roadway network in the ROI. Site personnel access to the facilities would continue. Any State- or County-owned road that would become a federal road would be maintained according to all applicable local, State, and federal regulations pertaining to road maintenance. There would be no change to the maintenance and use of the remainder of the roads situated on former leasehold and easement lands. The ongoing implementation of current mitigation measures (Table ES-2) would be maintained and there would be no change to current operations or activities on the former leasehold and easement lands under Alternative 2, regardless of the land tenure mechanisms. As a result, there would	The No Action Alternative could result in minor, short-term, adverse effects to transportation, but would not result in any long-term adverse effects to transportation in the ROI. Under the No Action Alternative, the ownership, management, and maintenance of Navy- and NASA-managed roadways and access ROWs would revert to the State of Hawai‘i. Per the lease agreements, any structures or infrastructure could be removed or could remain in place. Potential demolition activities could result in the temporary closure of roads and a temporary increase in traffic volumes on the roadways within the ROI. The road closures and any additional vehicles added into the roadway network for the demolition work would be short term and should not affect the roadway and intersection LOS in the long term. To address any potential effects resulting from the potential demolition activities, additional evaluation would be

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
		be minimal, if any, effects on the roadway and intersection LOS. **Therefore, effects of Alternative 2 to transportation would not be adverse or significant.**	conducted with more detailed information of demolition activities to develop traffic control plans and/or traffic management plans to detail how the traffic and roadways will be managed during the work. The roadways and access easements currently support a minor volume of vehicular traffic. The State may decide to re-route or provide alternative access methods to maintain public and military access to the fee simple properties. If a re-route or alternative methods are implemented, the existing traffic patterns and volumes would adjust accordingly. As a result, this change would not affect the roadway or intersection LOS due to the minor volume of vehicles that would be affected.
Hazardous Materials and Waste	Alternative 1 would continue to result in potential minor, long-term, adverse effects to hazardous materials and waste management in the ROI. Hazardous materials, such as missile components, ordnance, fuels, oils, pesticides, “cabinet-scale” aerosols, and other small quantity cleaning agents and lubricants would continue to be utilized and managed under site-specific management plans and BMPs. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous	Alternative 2 would continue to result in potential minor, long-term, adverse effects to hazardous materials and waste management in the ROI. Hazardous materials, such as missile components, ordnance, fuels, oils, pesticides, “cabinet-scale” aerosols, and other small quantity cleaning agents and lubricants would continue to be utilized and managed under site-specific management plans and BMPs. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of	The No Action Alternative could result in potential minor, short-term, adverse effects to the management of hazardous materials and waste in the ROI. The transportation of hazardous materials such as missile components, ordnance, fuels, oils, pesticides, “cabinet-scale” aerosols and other small quantity cleaning agents, lubricants and chemicals from leasehold land to fee simple land or another appropriate holding facility could increase the risk of a spill or release of a hazardous material. However, the ongoing implementation of current mitigation

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible. The ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.12-1) would continue to occur, and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, there would be no increase in the use or generation of hazardous materials or wastes, or an increased risk of a spill or unintentional release that exceed the capabilities of current management plans and BMPs. **Therefore, effects of Alternative 1 to hazardous materials and waste management would be adverse but would not be significant.**	hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible. Ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.12-1) would occur, and there would be no change to current operations or activities on the former leasehold and easement lands under Alternative 2, regardless of land acquisition mechanism. As a result, there would be no increase in the use or generation of hazardous materials or wastes, or an increased risk of a spill or unintentional release that exceed the capabilities of current management plans and BMPs. **Therefore, effects of Alternative 2 to hazardous materials and waste management would be adverse but would not be significant.**	measures (Table ES-2), adherence to SOPs and BMPs (Table 3.12-1), and management under site-specific management plans would significantly reduce these potential risks. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible. The No Action Alternative could also result in potential minor, long-term, beneficial effects to the management of hazardous materials and waste as hazardous materials would no longer be stored or used on leaseholds or easement lands. While the amount of waste produced on leasehold and easement lands is not significant, there could also be a small decrease in the amount of hazardous waste (including universal waste) and solid waste that is produced. As a result, there is the potential that there could be a small decrease in the amount of solid waste disposed of at the Kekaha landfill coming from leasehold and easement lands.
Visual Resources	Alternative 1 could result in continued long-term, minor, adverse effects to visual resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the	Alternative 2 could result in continued long-term, minor, adverse effects to visual resources on former leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO	The No Action Alternative could result in long-term beneficial effects to visual resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[10]
	continued presence of Navy- and NASA-use infrastructure. Many of these buildings are not generally visible to the public, and there would be no change to the existing scenic viewpoints. As a result, there would be no change to visual resources under Alternative 1. **Therefore, effects of Alternative 1 to visual resources would be adverse but would not be significant.**	due to the continued presence of Navy- and NASA-use infrastructure. Many of these buildings are not generally visible to the public, and there would be no change to the existing scenic viewpoints. As a result, there would be no change to visual resources under Alternative 2. **Therefore, effects of Alternative 2 to visual resources would be adverse but would not be significant.**	removal of facilities and infrastructure. As the continued presence of Navy- and NASA-use infrastructure could be considered a potential long-term, minor, adverse effect to visual resources, the removal of these buildings could be a minor, long-term beneficial impact. Depending on the level of facility removal and restoration to a more natural state, the effects could be most beneficial if all facilities were to be removed. However, many of these buildings are not generally visible to the public, and there would be no change to the existing scenic viewpoints. As a result, there would be no significant change to visual quality, scenic viewpoints, and visual resources under the No Action Alternative.

Key: ADC = Agribusiness Development Corporation; BMP = Best Management Practice; CWA = Clean Water Act; DLNR = Department of Land and Natural Resources; EMR = Electromagnetic Radiation; GHG = greenhouse gas; INRMP = Integrated Natural Resources Management Plan; KAA = Kekaha Agricultural Association; KPGO = Kōkeʻe Park Geophysical Observatory; LOS = Level of Service; NASA = National Aeronautics and Space Administration; NHPA = National Historic Preservation Act; PMRF = Pacific Missile Range Facility; REPI = Readiness and Environmental Protection Integration; ROI = Region of Influence; ROW = right-of-way; SENSE = Space Exploration Network Services and Evolution; SLUD = State Land Use District; SOP = Standard Operating Procedure; TMK = Tax Map Key; U.S. = United States.

ES.5 Summary of Existing and Continuing Mitigation Measures and Proposed Enhanced Engagement

Descriptions of the affected environment and potential effects also rely on previous NEPA and HEPA documentation prepared for actions at PMRF and KPGO. Table ES-2 presents a list of relevant past NEPA and HEPA documents at PMRF and KPGO and summarizes effects resulting in the identification of mitigation measures. For a more comprehensive list of relevant past NEPA and HEPA documents and a summary of key issues including effects and mitigation measures analyzed in previous documents, see Section 3.1.6, *Relevant NEPA and HEPA Documents Considered in the Analysis*.

The Navy and NASA propose to implement Enhanced Engagement to provide additional protections for the ʻāina (Table ES-3). These enhancements, originally identified as Enhanced Management Measures (EMMs) in the Draft EIS, were developed in response to feedback received from the public during the scoping and Draft EIS public comment periods. This table contains the same information as Table 5.2-1.

Under the No Action Alternative and pursuant to the existing real estate agreements, any return of State property would involve complex negotiations with the State of Hawaiʻi for the transfer of various environmental and cultural responsibilities now performed by the Navy and NASA back to the State. Determination of any mitigation measures for the No Action Alternative would occur at a later time; therefore, these measures are not discussed herein.

Table ES-2 List of Relevant Mitigation Measures from Previous Environmental Review Documents for Activities in the Project Area

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
1993 Final EIS for the Restrictive Easement	HEPA	Main Base	Hazardous Materials and Waste	Hazardous materials and waste may be introduced from missiles that have landed in the GHA as a result of early flight termination[14].	Hazardous waste resulting from early flight termination is cleared from the area in accordance with the cleanup procedures described in the 1992 Final EIS for the Strategic Target System[15].
1993 Final EIS for the Restrictive Easement	HEPA	Main Base	Land Use and Access	Use of the southern end of Polihale State Park would be interrupted 20 minutes prior to launch. The interruptions would occur up to 30 times per year and would include access to and from the State Park. No significant effects to recreational resources would occur because the total closure time for the southern end of the State Park would be approximately 15 hours per year. No persons within the developed camping or picnicking areas would be affected and people entering and exiting the park would only be delayed during the short closure period.	People within the easement are notified 3 hours prior to launch.

[14] Early flight termination is defined as the purposeful, controlled termination of a missile launch. The missile flight safety officer controls early flight termination. The missile flight safety officer maintains positive control over the missile at all times and continuously monitors the flight trajectory in relation to the predicted impact area for debris. If the missile approaches an unsafe trajectory, the flight will be terminated.

[15] https://pmrf-kpgo-eis.com/media/z2rbc1ea/1992-strategic-target-system-feis-volume-1.pdf

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
1993 Final EIS for the Restrictive Easement	HEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from missile launch activities, such as exposure to hazardous wastes or fire if safety procedures are not followed.	Road closure and surveillance flights occur prior to launch to ensure GHAs are clear. Fire crews will be on stand-by in case of fire.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Archaeological and Architectural Resources	Potential effects, such as accidental damage, to archaeological resources from ground disturbance if work occurs in a culturally sensitive area.	Personnel are briefed that they are working in a culturally sensitive area and on the federal laws protecting the resources within that area.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Archaeological and Architectural Resources	Fire damage to archaeological or cultural resources could occur from missile launch if fire management mitigations are not followed.	Water is sprayed on vegetation within the immediate vicinity surrounding the launch vehicle prior to launch. In the event ignition of vegetation does occur, fire suppression personnel are instructed to use an open spray nozzle, whenever possible, rather than a directed stream to quell the fire. This minimizes erosion damage to areas (such as the sand dunes) and prevents possible destruction of potential cultural resources.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Kamokalā Ridge	Archaeological and Architectural Resources	Risk of incidental removal of cultural materials or destruction of sites by personnel during construction or operation.	Adherence to ICRMP procedures, NAGPRA, and briefings to construction and operational personnel.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Biological Resources	Noise from launches may startle nearby wildlife but no significant effects would occur due to the infrequency and short duration of launch events. Project floodlights	The use of shielded lighting mitigates impacts to the Newell's shearwater.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
				could disorient the threatened Newell's shearwater	
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Biological Resources	Vegetation fires near launch pad may occur during launches.	The installation of a portable blast deflector on the launch pad could protect the vegetation of the adjacent sand dunes. The potential for starting a fire would be further reduced by clearing dry vegetation from around the launch pad. Spraying the vegetation adjacent to the launch pad with water just before launch would reduce the risk of ignition. Emergency fire crews are available during all Strategic Target system launches to quickly extinguish any fire and minimize its effects. An open (spray) nozzle is used, when possible, rather than a directed stream when extinguishing fires, to avoid erosion damage to the sand dunes and to prevent possible destruction of cultural resources.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Accidental spill or misuse of oil or fuels could occur if existing plans were not followed.	PMRF outlines procedures in SPCC Plan and the Installation Spill Contingency Plan. The Installation Spill Contingency Plan contains immediate procedures (in flow chart form) to be carried out by personnel once a discharge is detected, notification and reporting requirements, response equipment, hazard analysis, recommended spill actions and cleanup, training, environmental protection, and SDS.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Hazardous waste at PMRF can include batteries, contaminated soil, asbestos, gasoline, paint-related material, oil, methanol, ammonia solution, sand blast material, otto fuel, isopropyl alcohol, and sea water/otto fuel. Exposure to hazardous waste can be harmful to humans.	Hazardous waste is not stored beyond a 90-day collection period on Main Base.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and disposed of properly.	Navy's CHRIMP is a DoD program which reduces the hazardous materials that are procured, stored, distributed, and disposed of as waste by using a centralized control and inventory point. This program also provides tracking and environmental reporting.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Unintended release of PCBs poses potential effects to water quality, human health, and the environment. PCBs found at PMRF/Main Base were contained in fluorescent lamp ballasts and capacitors in certain electronic equipment.	Components are labeled according to TSCA, 40 CFR part 761, requirements for shipping, and disposed of through the Defense Reutilization Marketing Office or a contractor within 1 year of the waste's initial storage.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Mākaha Ridge	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and reduced in usage properly. Hazardous materials used at Mākaha	PMRFINST 5100.2J, Hazardous Material Control and Management Program[16] and CHRIMP.

[16] https://pmrf-kpgo-eis.com/media/v1thhdtv/pmrfinst-51002j.pdf

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
				Ridge include lubricating oils and solvents.	
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if the public is not cleared from appropriate areas.	Implementation of defined explosive safety quantity distance arcs.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, from premature, unintentional, or unauthorized detonation of ordnance.	Implementation of Explosive Safety Approval. Ordnance transported by trained ordnance personnel and within special vehicles for transit and in accordance with U.S. DOT regulations 49 CFR parts 100–109.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from accidental release of liquid fuels during transportation of liquid fuels to Main Base that could result in exposure to liquid fuels.	Transportation of these materials is conducted in compliance with U.S. DOT regulation 49 CFR parts 100–109 and 49 CFR sections 171.1–172.558.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from electromagnetic radiation to people within the radiation area. Exposure risk would be negligible outside of the radar beam.	All operations conducted in accordance with COMPMTCINST 5100.15, Radiological Safety Manual, and establishment of safety zones and conducting sector blanking (a feature that prevents radar from transmitting to unwanted angles/reflections and improves accuracy) in occupied areas (current management procedures documented by the NSWCDD, Electromagnetic Measurements and Engineering Branch [Dahlgren, 2020]). Warning lights are also illuminated when radar is operational.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury, during missile launch activities if the public is not cleared from missile launch area.	SOPs implemented for all ground hazard areas. Members of the public and personnel are excluded from the ground hazard area during launch. These SOPs include establishing road control points and clearing the area using vehicles and helicopters (if necessary). The road control points are established 3 hours prior to launch to allow security forces to monitor traffic as it passes through the GHA. At 20 minutes prior to launch, the area is determined to be clear of the public and personnel to ensure that, in the unlikely event of early flight termination, no injuries or damage to persons or property would occur. After the Range Safety Officer declares the area safe, the security force gives the all-clear signal, and the public is allowed to reenter the area.
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Mākaha Ridge	Public Health and Safety	Potential effects to public health and safety from electromagnetic radiation to people within the radar area. Exposure risk is negligible outside of the radar beam.	The site is regularly surveyed for radiation hazards, and all systems have warning lights to inform personnel when radar units are operating.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Potential accidental release of oil or fuels if prevention procedures are not followed.	The PMRF SPCC outlines procedures that prevent and control discharge of oil or oil products and outlines the immediate response plan should an unintentional discharge occur. The Installation Spill Contingency Plan contains immediate

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
					procedures (in flow chart form) to be carried out by personnel once a discharge is detected, notification and reporting requirements, response equipment, hazard analysis, recommended spill actions and cleanup, training, environmental protection, and SDS.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Exposure to hazardous waste can be harmful to humans.	Hazardous waste is not stored beyond a 90-day collection period on Main Base.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials, including oil and fuels, can pose risks to humans if not controlled, tracked, and disposed of properly.	PMRF outlines procedures in the Hazardous Waste Management Plan and holds a Used Oil transporter/processor permit through DOH.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and disposed of properly.	Navy's CHRIMP is a DoD program which reduces the hazardous materials that are procured, stored, distributed, and disposed of as waste by using a centralized control and inventory point. This program also provides tracking and environmental reporting.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Mākaha Ridge	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and reduced in usage properly. Hazardous materials used at Mākaha Ridge include lubricating oils, low sulfur diesel fuel, and solvents.	PMRFINST 5100.2C, Hazardous Material Control and Management Program.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Mākaha Ridge	Hazardous Materials and Waste	Potential effects from accidental release of oil or fuels, including risk to the environment.	All tanks are above ground with appropriate containment devices.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Potential effects from unintentional release of hazardous materials, such as fire or environmental pollution.	No solid propellant missile launches occur during rainy conditions, and the launch system will not use a water deluge system for cooling and noise suppression. Activation of the PMRF Fire Department and Spill Response Team.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if safety procedures are not followed.	Employment of system safety concepts and risk assessment methodology.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if SOPs were not in place.	SOPs implemented for all GHAs and use of PMRF Missile Accident Emergency Team. These SOPs include establishing road control points and clearing the area using vehicles and helicopters (if necessary). Road control points are established 3 hours prior to launches. This allows security forces to monitor traffic that passes through the GHAs. At 20 minutes before a launch, the GHA is cleared of the public to ensure that, in the unlikely event of early flight termination, no injuries or damage to persons or property would occur. After the Range Safety Officer declares the area safe, the security force gives the all-clear signal, and the public is allowed to reenter the area. Public and personnel are excluded from the GHA during launch. Implementation of defined ESQD arcs.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, from premature, unintentional, or unauthorized detonation of ordnance.	Implementation of Explosive Safety Approval, PMRFINST 8020.5C, Explosive Safety Criteria for Range Users Ordnance Operations[17]. Defined ESQD arcs are implemented.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Kamokalā Ridge	Public Health and Safety	Potential effects to public health and safety, such as injury to people, from premature, unintentional, or unauthorized detonation of ordnance during transportation.	PMRFINST 8023.G, implementation of defined ESQD arcs, ordnance is transported in accordance with U.S. DOT regulations.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from transportation of liquid fuels to leasehold and easement lands at Main Base that could result in exposure to liquid fuels.	Transportation of these materials is conducted in compliance with U.S. DOT regulations 49 CFR parts 100–109.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if the public is not cleared from appropriate areas.	Flight termination and clearance of specified regions. Before a launch is allowed to proceed, the range is determined cleared using input from ship sensors, visual surveillance from aircraft and range safety boats, radar data, and acoustic information.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Archaeological and Architectural Resources	Inadvertent ignition of vegetation during launch activities and subsequent fire suppression activities could damage archaeological resources.	Water is sprayed on vegetation within the immediate vicinity surrounding the launch vehicle prior to launch. In the event ignition of vegetation does occur, fire suppression personnel are instructed to use an open spray nozzle, whenever possible, rather than a

[17] https://pmrf-kpgo-eis.com/media/vhkhufz2/pmrfinst-80205c.pdf

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
					directed stream to quell the fire, to avoid erosion damage to the sand dunes, and to prevent possible destruction of cultural resources.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Archaeological and Architectural Resources	Potential effects to archaeologically sensitive areas, such as damage from increased human presence as a result of training or maintenance activities.	Briefing personnel working in culturally sensitive areas, including providing information on federal laws protecting cultural resources.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Mākaha Ridge	Archaeological and Architectural Resources	Unexpected discovery of archaeological or Native Hawaiian resources.	Hawai‘i SHPO and Native Hawaiian stakeholders are notified in accordance with the Programmatic Agreement.
2008 Hawaii Range Complex FEIS/OEIS	NEPA	Main Base	Biological Resources	Unintentional introduction of invasive species.	Military Customs Inspectors are responsible for implementing federal customs statutes and agricultural regulations for transfers of military goods and personnel from overseas into U.S. jurisdiction. Military inspectors do not inspect goods and personnel transferred to Hawai‘i from the U.S. mainland, because inspections apply only to shipments entering Hawai‘i from foreign sources or those bound to the mainland from Hawai‘i. Military inspectors are trained to look for prohibited animals, soil, seeds, and other pests. Inbound flights carrying cargo from the mainland and landing at PMRF are advised to inspect and secure their cargo prior to shipment to ensure it is free of invasives. To prevent

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
					transport of invasive seeds from Main Base to Kōkeʻe, ground crews are tasked to blow/wash down vehicles and equipment prior to movement.
2008 Hawaii Range Complex FEIS/OEIS (VOL 2) Ch. 4–11	NEPA	Main Base	Cultural Practices	Restricted access to traditional religious and cultural properties (Nohili Dune).	Access to identified cultural resources within PMRF Barking Sands is managed through written requests processed and approved by the PMRF Cultural Resources Manager and the installation Commanding Officer.
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base and Mākaha Ridge	Archaeological and Architectural Resources	Unanticipated encounter of cultural resources (particularly human remains) may occur during any activity.	All activities cease in the immediate vicinity of the find; subsequent actions and notifications follow the guidance provided in the PMRF ICRMP.
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Archaeological and Architectural Resources	Post flight anomalies, such as fire, may occur during launches and this may damage archaeological resources.	Water is sprayed on vegetation within the immediate vicinity surrounding the launch vehicle prior to launch. In the event ignition of vegetation does occur, fire suppression personnel are instructed to use an open spray nozzle, whenever possible, rather than a directed stream to quell the fire, to avoid erosion damage to the sand dunes, and to prevent possible destruction of cultural resources.
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Unintentional introduction of invasive species.	The Navy prepares a Hazard Analysis and Critical Control Point Plan or a similar invasive species risk assessment plan that addresses viable concerns that are or may be applicable to this project.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Newell's shearwater and other night-flying migratory birds may be impacted from lighting at PMRF. Light at night can disrupt flight and migratory paths of these species.	Full cutoff, shielded exterior lighting is installed following USFWS guidelines to minimize reflection and effects on light-sensitive wildlife to protect the Newell's shearwater and other night-flying migratory birds. PMRF works directly with SOS to minimize effects on the birds from its activities. If avoidance of activities during bird fallout season is not practicable, monitoring for downed birds near the new towers would be conducted as appropriate per PMRF Dark Skies Program.
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Wedge-tailed shearwater and albatross may be disrupted by construction activities or could be involved in bird-aircraft strikes.	PMRF manages the PMRF wedge-tailed shearwater colony through the clearing of invasive vegetation and monitoring by qualified, professional field biologists to produce detailed reports that document shearwater nesting success and health and growth of the colony. PMRF will continue its permitted relocation of albatross and albatross eggs from the KTF area to inhibit nesting there as part of its BASH program.
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Wedge-tailed shearwaters may be disrupted by construction activities.	To the extent practicable, construction activities are scheduled so that as much as possible will occur outside of the nesting season (Nesting: March–May; Egg Laying, Hatching, Chick Rearing: June–October; Fledging: November).

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
2010 PMRF Intercept Test Support EA/OEA	NEPA	Kamokalā Ridge	Hazardous Materials and Waste	Potential effects to public health and safety, such as injury to people, from premature, unintentional, or unauthorized detonation of ordnance during transportation.	Materials are contained in required devices with proper ventilation, marking, and placarding.
2010 PMRF Intercept Test Support EA/OEA	NEPA	Kamokalā Ridge	Public Health and Safety	Potential effects to health and safety, such as injury to people, due to transfer and storage of ordnance.	Safety arcs and storage standards are implemented in accordance with DoD and Navy standards as well as PMRFINST 8023.G.
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from transportation of liquid fuels to Main Base, such as exposure to fuel.	The following transportation procedures are implemented to minimize the potential for liquid fuel mishap: Trained spill response teams are on standby for the transportation of all missile liquid propellants. Truck shipments on Kaua'i have trained escorts. All shipments are scheduled to avoid peak traffic periods for roads and to avoid high-use times for harbors. Local fire and police, and local area State transportation officials are notified in advance of shipments, and informed by experienced personnel (and trained, if necessary) of existing safety procedures to be used during transportation on Kaua'i. Notice of shipment to State and local officials. Propellant vapor leak check and liquid propellant container inspection prior to offloading propellant from ship and after loading propellant into trucks.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities.	Flight termination and clearance of specified regions.
2013 Final EA for Hawai'i Joint Services Solar Power Generation	NEPA	Main Base	Water Resources	Photovoltaic ground mount systems could result in minor increase in rainwater runoff due to increase in impervious surface area.	As appropriate, the project implements BMPs to capture and retain stormwater on site and allow it to infiltrate into the soil or to be discharged at a rate that would not exceed the predevelopment hydrology to adjacent surface waters. A permit is obtained for sites with construction exceeding 1 acre (0.4 hectare).
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Archaeological and Architectural Resources	Archaeological or architectural resources could be damaged or disturbed from construction.	A cultural resources professional monitors construction activities and would contact SHPO and Native Hawaiian stakeholders to address any potential effects.
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Archaeological and Architectural Resources	Potential effects on soil from contamination from fuel, lubricant, paint, and solvent spills.	Implementing policies such as handling all products in accordance with manufacturer's recommendations; refueling on impermeable surfaces; inspecting equipment regularly for safety, cleanliness, and leaks; removing leaking equipment from service; and performing rapid cleanup if such releases were to occur.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if exposure occurs.	Controlled access for authorized personnel through gates, badging, and designated public access points.
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Public Health and Safety	Potential for unintentional discharge of oil, and risks to human health if exposure occurs.	PMRF SPCC Plan.
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Biological Resources	Potential for seabird fallout as a result of nighttime lighting and night operations during fledging season.	2018 Biological Opinion of the USFWS for the Proposed Base-wide Infrastructure, Operations, and Maintenance Activities at the Pacific Missile Range Facility, Island of Kaua'i, Hawai'i.
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia	NEPA	Main Base	Hazardous Materials and Waste	Potential for unintentional discharge of oil.	PMRF SPCC Plan.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
National Laboratories Kaua'i Test Facility)					
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Hazardous Materials and Waste	Unintentional release of hazardous materials could occur if safety measures are not followed.	EPCRA, Toxic Release Inventory, Federal Insecticide, Fungicide, and Rodenticide Act, Toxic Substances Control Act, and CWA.
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Hazardous Materials and Waste	Waste can be generated during routine maintenance or modification to a facility. Hazardous waste can pose risks to humans if exposure occurs.	Implementation of Site Sustainability plan, Federal Facility Compliance Act, RCRA, Pollution Prevention and Waste Minimization, and Pollution Prevention Act.
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, including injury to people, if proper handling processes for explosives are not followed.	All processes involving high-energy source use and storage are performed in accordance with DOE Explosives Order and 10 CFR part 851.

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Potential Effects from Ongoing Activities*	*Existing Mitigation Measures*
2019 FONSI Continued Operation of the Kaua'i Test Facility (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities.	During launch activities, all authorized personnel not at an assigned duty station are evacuated to a point outside the explosive safety distance and GHAs.

Key: BASH = Bird/Wildlife Aircraft Strike Hazard; BMP = Best Management Practice; CFR = Code of Federal Regulations; CHRIMP = Consolidated Hazardous Material Reutilization and Inventory Management Program; COMPMTCINST = Commander Pacific Missile Test Center Instruction; CWA = Clean Water Act; dB = decibel; DoD = Department of Defense; DOE = Department of Energy; DOH = Hawai'i Department of Health; DOT = Department of Transportation; DRMO = Defense Reutilization Marketing Office; EA = Environmental Assessment; EIS = Environmental Impact Statement; EPA = United States Environmental Protection Agency; EPCRA = Emergency Planning and Community Right-to-Know Act; ESQD = Explosive Safety Quantity Distance; FEIS = Final Environmental Impact Statement; FONSI = Finding of No Significant Impact; GHA = Ground Hazard Area; HEPA = Accepted Term for Hawai'i Revised Statutes Chapter 343; ICRMP = Integrated Cultural Resources Management Plan; kg = kilogram; KTF = Kaua'i Test Facility; lbs = pounds; N/A = Not Applicable; NAGPRA = Native American Graves Protection and Repatriation Act; NEPA = National Environmental Policy Act; NPDES = National Pollutant Discharge Elimination System; NSWCDD = Naval Surface Warfare Center, Dahlgren Division; OEA = Overseas Environmental Assessment; OEIS = Overseas Environmental Impact Statement; PCB = polychlorinated biphenyl; PMRF = Pacific Missile Range Facility; PMRFINST = Pacific Missile Range Facility Instruction; RCRA = Resource Conservation and Recovery Act; SDS = Safety Data Sheet; SHPO = State Historic Preservation Office; SOP = Standard Operating Procedure; SOS = Save our Shearwaters; SPCC = Spill Prevention, Control, and Countermeasure; TSCA = Toxic Substances Control Act; U.S. = United States; USFWS = United States Fish and Wildlife Service.

Table ES-3 Summary of PMRF and KPGO Proposed Enhanced Engagement

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
Enhanced Engagement-1	Archaeological and Architectural Resources	In addition to continuing existing historic preservation compliance, increase access to information about archaeological and architectural resources. Ensure stakeholders have access to the ICRMP, subject to the confidentiality restrictions placed on the dissemination of information about archaeological sites and certain NHO resources. Provide educational materials about these resources to schools and libraries, and post on the PMRF Kaua'i (https://pmrfkauai.com/), PMRF (https://cnrh.cnic.navy.mil/Installations/PMRF-Barking-Sands/), and EIS websites (https://www.PMRF-KPGO-EIS.com).	Navy management of leasehold lands.	Integrated with ongoing activities and historic preservation program.	See SOPs from ICRMP in Table 2-7.	PMRF staff will contact stakeholders from ICRMP via phone calls and email.	See SOPs from ICRMP in Table 2-7.
Enhanced Engagement-2	Cultural Practices, Land Use and Access, Socioeconomics (Recreation)	Streamline access through development of a PMRF Access Management Plan that balances public access and PMRF's mission requirements. As part of the development of this Access Management Plan, the PMRF staff will meet with stakeholders to address improved process for	Access for Cultural Practices, Land Use and Access, and Socioeconomics (Recreation) in the Project Area.	Integrated with PMRF's responses to current access requests.	The Plan would also include community surveys which would serve as a feedback process to	PMRF staff will contact stakeholders from ICRMP, NHOs, and from ongoing community coordination (Section 1.7.5)	Navy publication of the Access Management Plan on the PMRF website (https://cnrh.cnic.navy.mil/Installations/PMR

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
		access, including requests to use Kiko Road to access the Kekaha Game Management Area through the Mānā Tunnels hunter check-in station. After BLNR makes its decision and real estate agreements are issued, the Navy and NASA will develop their respective access management plans in consultation with DLNR, OHA, NHOs, and other stakeholders.			gauge whether the access program for cultural practitioners is sufficient to meet community needs and interests in accessing significant cultural sites within the PMRF footprint (both federal and State lands).	via phone calls and email.	F-Barking-Sands/). Update annually.
Enhanced Engagement-3	Biological Resources	Provide the public with annual wildlife summaries, including status updates and data reports and research studies. This could increase public transparency of natural resource management activities at PMRF and KPGO.	Natural resource management activities on the leasehold/ easement and fee simple parcels.	Quarterly updates provided on the ʻOhana Kilo Hōkū and PMRF Kauaʻi websites (https://pmrfkauai.com/) and newsletters.	See 2023 PMRF INRMP (Appendix K), also see Table 2-7.	PMRF staff will contact Sikes Act Partners including DOFAW from 2023 PMRF INRMP (Appendix K) via phone calls and email.	Projects from 2023 PMRF INRMP (Appendix K), pending funding and mission capability.
Enhanced Engagement-4	Socioeconomics	Development and continuation of PMRF Kauaʻi to establish regular communication channels	The leasehold/ easement/fee simple parcels.	Ongoing.	N/A	Continue distributions of the Quarterly	Consistent delivery of quarterly

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
		to strengthen relationships with the community, and other interested stakeholders. PMRF has a strong relationship with stakeholders and the community and is viewed as a good neighbor and community partner, and the Navy highly values the support of its host community. It is critical that these relationships are maintained and enhanced, stakeholders and the community are kept informed of the actions being proposed at PMRF, and the Navy continues to be viewed as a good neighbor and strong community partner. PMRF Kaua'i will provide a means of providing a proactive method for two-way communication, promoting greater dialogue, working collaboratively toward common goals, and developing solutions. PMRF Kaua'i will include: • PMRF Kaua'i Newsletter • Open House Events • Wide Area Gatherings • Base Tours • Within Range magazine – wider distribution				Newsletters and website updates to inform and communicate with stakeholders, including the public and regulatory agencies. Newsletter notifications will be distributed via email.	newsletters and website updates (https://pmrfkauai.com/).

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
		• PMRF Kaua'i Website (https://pmrfkauai.com/), including: ▪ Announcements ▪ Information about NEPA/HEPA analysis related to PMRF ▪ Calendar of events ▪ Historical, cultural, natural resources, REPI, and other resiliency protection efforts ▪ Marine resource mitigation and protective measures ▪ Marine research and monitoring projects at PMRF ▪ Pollution prevention actions (e.g., no plastic discharged at sea), cleanup events ▪ Tenants at PMRF (e.g., MDA) with hyperlinks to agency websites ▪ Partnerships with federal and State agencies, nongovernmental organizations, etc.					

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
Enhanced Engagement-5	Management of Water Resources	Establish a Navy-DLNR-DHHL-KAA-ADC-Kaua'i County Working Group to collaboratively manage water resources in West Kaua'i.	Water resources in the leasehold easement/fee simple parcels.	Quarterly working group meetings.	To be developed as part of the working group.	PMRF staff will coordinate via phone calls and email with contacts at DLNR, DHHL, KAA, ADC, and Kaua'i County.	Navy to publish written meeting minutes including action items quarterly on the PMRF Kaua'i website (https://pmrfkauai.com/).
Enhanced Engagement-6	Public Health and Safety	Improve closure protocol and public notification of the activation of restrictive easements during launch activities at fee simple lands at Main Base and consider adding non-barbed wire fencing and signage on leasehold and easement lands to minimize encroachment and accidental or intentional trespass from adjacent land.	Main Base and Easement-1 GHA.	Notification on the 'Ohana Kilo Hōkū and PMRF Kaua'i websites (https://pmrfkauai.com/) and newsletter; radio broadcasts to inform public of closures.	N/A	PMRF staff will coordinate with neighboring land owners via phone calls and email.	Navy to publish new protocol on the PMRF website (https://cnrh.cnic.navy.mil/Installations/PMRF-Barking-Sands/), including quarterly updates.
Enhanced Engagement-7	Water Resources, Biological Resources	Establish success criteria for ongoing erosion control management actions at Mākaha Ridge for habitat restoration and improved downslope water quality.	Water resources in the leasehold easement/fee simple parcels.	Integrated into current PMRF INRMP management actions and facility maintenance at Mākaha Ridge.	Control erosion	PMRF staff will coordinate with DLNR staff at OCCL, Land Division, and DOFAW, as well as other stakeholders identified via phone calls and email.	Quantify success of native plant outplanting through survival and/or native vegetation recruitment rates and number of

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
							ungulates detected entering the fence.
Enhanced Engagement-8	Biological Resources	Establish success criteria for ongoing invasive species management actions at KPGO for habitat restoration.	Biological resources in the leasehold easement/fee simple parcels.	Integrated into current PMRF INRMP management actions and facility maintenance at KPGO.	Habitat restoration	NASA and PMRF staff will coordinate with DLNR staff at OCCL, Land Division, and DOFAW, as well as other stakeholders identified via phone calls and email.	Quantify success of invasive species removal and habitat restoration through survival and/or native vegetation recruitment rates.

Key: ADC = Agribusiness Development Corporation; BLNR = Board of Land and Natural Resources; DHHL = Department of Hawaiian Home Lands; DLNR = Department of Land and Natural Resources; DOFAW = Division of Forestry and Wildlife; EIS = Environmental Impact Statement; GHA = Ground Hazard Area; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan; KAA = Kekaha Agricultural Association; KPGO = Kōkeʻe Park Geophysical Observatory; MDA=Missile Defense Agency; N/A = Not Applicable; NASA = National Aeronautics and Space Administration; NHO = Native Hawaiian Organization; OCCL = Office of Conservation and Coastal Lands; OHA = Office of Hawaiian Affairs; PMRF = Pacific Missile Range Facility; REPI = Readiness and Environmental Protection Integration; SOP = Standard Operating Procedure.

ES.6 Public and Agency Participation and Intergovernmental Coordination

Public Scoping

The Navy and NASA solicited public and agency comments during the scoping period from May 8, 2024, through June 17, 2024. The Navy and NASA informed the public about the Proposed Action and how to provide feedback via notifications such as mailed postcards and letter invitations, stakeholder letters, newspapers, social media-related pages, the EIS website (https://www.PMRF-KPGO-EIS.com), and public meetings. Public scoping meetings during the scoping period for this EIS were held on Kauaʻi on June 4, 5, and 6, 2024, from 5:00 p.m. to 8:00 p.m. (Hawaiʻi Standard Time) in Līhuʻe, Kekaha, and Kapaʻa, respectively. Scoping comments were accepted verbally and/or in writing during the public scoping meetings, via the EIS website, email, and postal mail at Naval Facilities Engineering Systems Command (NAVFAC), Hawaiʻi.

Comments received during the scoping period were considered in preparing the Draft EIS. Table ES-4 summarizes substantive comments received by topic (some commentors addressed more than one topic). Scoping materials are provided in Appendix G and scoping comments and responses are provided in Appendix I. The Scoping Summary Report is included in Appendix J.

Table ES-4 Substantive Scoping Comments by Category

Topic Category	*Count of Category*
Archaeological and Architectural Resources	14
Cultural Practices	46
Biological Resources	49
Land Use and Access	65
Socioeconomics	33
Water Resources	38
Utilities	4
Public Health and Safety	17
Air Quality and Greenhouse Gases	14
Transportation	8
Hazardous Materials and Waste	21
Visual Resources	2

Public Comment Period on Draft EIS

The Navy and NASA solicited public and agency comments during the Draft EIS public comment period from June 20[18] and June 23, 2025[19] through August 7, 2025. The Navy and NASA informed the public about the availability of the Draft EIS and how to provide feedback via notifications such as mailed postcards and letter invitations, stakeholder letters, newspapers, social media-related pages, the EIS website (https://www.PMRF-KPGO-EIS.com), and public meetings. Public meetings during the Draft EIS comment period were held on Kauaʻi on July 15, 16, and 17, 2025, from 5:00 p.m. to 8:00 p.m. (Hawaiʻi Standard Time) in Līhuʻe, Kekaha, and Kapaʻa, respectively. Comments were accepted verbally and/or in writing during the public meetings, via the EIS website, email, and postal mail at NAVFAC, Hawaiʻi.

[18] Date of publication in the Federal Register and start of NEPA public comment period on the Draft EIS.

[19] Date of publication in The Environmental Notice and start of HEPA public comment period on the Draft EIS.

Comments received during the Draft EIS comment period were considered in preparing the Final EIS. Table ES-5 summarizes substantive comments received by topic (some commentors addressed more than one topic). Public meeting materials are provided in Appendix G and public comments on the Draft EIS and responses are provided in Appendix I. The Draft EIS Comment Summary Report is included in Appendix J.

Table ES-5 Substantive Draft EIS Comments by Category

Topic Category	*Count of Category*
Archaeological and Architectural Resources	25
Cultural Practices	84
Biological Resources	70
Land Use and Access	95
Socioeconomics	33
Water Resources	45
Utilities	4
Public Health and Safety	26
Air Quality and Greenhouse Gases	13
Transportation	3
Hazardous Materials and Waste	58
Visual Resources	0

Intergovernmental Coordination

The Navy and NASA are consulting with the United States (U.S.) Environmental Protection Agency (EPA), Hawai‘i Department of Land and Natural Resources (DLNR), and Hawai‘i Department of Health (DOH) regarding the Proposed Action. With regard to cultural resources, the Navy and NASA are consulting with the Hawai‘i State Historic Preservation Officer (SHPO), Aha Moku Council (Kaua‘i and State), Native Hawaiian Organizations (NHOs) (including Office of Hawaiian Affairs [OHA]), and other interested parties. Applicable laws, regulations, and policies are described in Appendix E.

This page intentionally left blank.

Pacific Missile Range Facility and Kōkeʻe Park Geophysical Observatory Real Estate Final Environmental Impact Statement

Table of Contents

PROJECT INFORMATION SUMMARY (ABSTRACT) ..... Abstract-i
READER'S GUIDE ..... RG-i
EXECUTIVE SUMMARY ES-1
ABBREVIATIONS AND ACRONYMS xi
1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION 1-1
1.1 Project Introduction and Overview 1-1
1.2 Project Area 1-4
1.3 Background 1-8
1.3.1 Historic Land Use at PMRF 1-8
1.3.2 Historic Land Use at KPGO 1-10
1.3.3 Navy Mission at PMRF 1-13
1.3.4 NASA KPGO Space Geodesy Mission 1-14
1.3.5 Navy and NASA Use of State Lands 1-15
1.3.6 Environmental Management and Protection 1-18
1.4 Purpose of and Need for the Proposed Action 1-19
1.5 Scope of Environmental Analysis 1-20
1.6 Relevant Laws and Regulations 1-30
1.7 Public and Agency Participation and Intergovernmental Coordination 1-31
1.7.1 Public Engagement and Scoping 1-31
1.7.2 Release of Public Review Draft Environmental Impact Statement 1-36
1.7.3 Final EIS 1-45
1.7.4 Intergovernmental Coordination 1-45
1.7.5 Ongoing Community Coordination 1-45
2 PROPOSED ACTION AND ALTERNATIVES 2-1
2.1 Proposed Action 2-1
2.2 Alternative Screening Process 2-1
2.3 Alternatives Carried Forward for Detailed Analysis 2-2
2.3.1 Alternative 1: Succeeding Current Real Estate Agreements 2-8
2.3.2 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds 2-9
2.3.3 Alternative 3: No Action Alternative 2-15

2.4 Alternatives Considered but Not Carried Forward for Detailed Analysis 2-30
2.4.1 Succeeding Leases and Easements (Except at Mākaha Ridge and KPGO) 2-31
2.4.2 Succeeding Leases Only (No Succeeding Easements) 2-31
2.4.3 Shorter Duration Alternative 2-31
2.5 Best Management Practices 2-32
3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES 3-1
3.1 Introduction to the Affected Environment and Environmental Consequences 3-1
3.1.1 Affected Environment 3-1
3.1.2 Predictable Environmental Trends 3-1
3.1.3 Region of Influence 3-5
3.1.4 Effects Analysis 3-8
3.1.5 Resources Analyzed 3-11
3.1.6 Relevant NEPA and HEPA Documents Considered in the Analysis 3-13
3.2 Archaeological and Architectural Resources 3-37
3.2.1 Affected Environment 3-37
3.2.2 Environmental Consequences 3-48
3.3 Cultural Practices 3-51
3.3.1 Affected Environment 3-52
3.3.2 Environmental Consequences 3-59
3.4 Biological Resources 3-64
3.4.1 Affected Environment 3-64
3.4.2 Environmental Consequences 3-89
3.5 Land Use and Access 3-100
3.5.1 Affected Environment 3-100
3.5.2 Environmental Consequences 3-110
3.6 Socioeconomics 3-114
3.6.1 Affected Environment 3-114
3.6.2 Environmental Consequences 3-118
3.7 Water Resources 3-122
3.7.1 Affected Environment 3-123
3.7.2 Environmental Consequences 3-136
3.8 Utilities 3-153
3.8.1 Affected Environment 3-153
3.8.2 Environmental Consequences 3-161
3.9 Public Health and Safety 3-165
3.9.1 Affected Environment 3-165

3.9.2 Environmental Consequences 3-175
3.10 Air Quality and Greenhouse Gases 3-180
3.10.1 Affected Environment 3-181
3.10.2 Environmental Consequences 3-187
3.11 Transportation 3-192
3.11.1 Affected Environment 3-192
3.11.2 Environmental Consequences 3-204
3.12 Hazardous Materials and Waste 3-207
3.12.1 Affected Environment 3-208
3.12.2 Environmental Consequences 3-218
3.13 Visual Resources 3-226
3.13.1 Affected Environment 3-227
3.13.2 Environmental Consequences 3-234
3.14 Summary of Potential Environmental Effects 3-236
4 CUMULATIVE EFFECTS 4-1
4.1 Introduction to Analysis 4-1
4.1.1 Identify Appropriate Level of Analysis for Each Resource 4-1
4.1.2 Scope and Area of Cumulative Effects Analysis 4-2
4.1.3 Describe Current Resource Conditions and Trends 4-2
4.1.4 Analyze Potential Cumulative Effects 4-2
4.1.5 Past, Present, and Reasonably Foreseeable Future Actions 4-2
4.2 Cumulative Effects Analysis 4-7
4.2.1 Archaeological and Architectural Resources 4-7
4.2.2 Cultural Practices 4-7
4.2.3 Biological Resources 4-8
4.2.4 Land Use and Access 4-8
4.2.5 Socioeconomics 4-9
4.2.6 Water Resources 4-9
4.2.7 Utilities 4-9
4.2.8 Public Health and Safety 4-10
4.2.9 Air Quality and Greenhouse Gases 4-10
4.2.10 Transportation 4-10
4.2.11 Hazardous Materials and Waste 4-10
4.2.12 Visual Resources 4-11
5 EXISTING AND CONTINUING MITIGATION MEASURES AND PROPOSED ENHANCED ENGAGEMENT 5-1

5.1 Existing and Continuing Mitigation Measures 5-1
5.2 Proposed Enhanced Engagement 5-2
6 OTHER REQUIRED CONSIDERATIONS 6-1
6.1 Consistency with Government Plans and Policies 6-1
6.1.1 Land Use Laws 6-1
6.1.2 Hawai‘i State Plan and Hawai‘i State Functional Plans 6-1
6.1.3 Kaua‘i County General Plan, West Kaua‘i Community Plan, Kaua‘i Island Plan 6-4
6.1.4 List of Current and Potentially Required Permits, Consultations, Reviews, and Approvals 6-5
6.2 Unresolved Issues 6-8
6.3 Unavoidable Adverse Effects 6-8
6.4 Irreversible or Irretrievable Commitments of Resources 6-9
6.5 Relationship Between Short-Term Use of the Environment and Long-Term Productivity 6-9
7 LIST OF PREPARERS 7-1
7.1 Government Contributors: Department of the Navy 7-1
7.2 Government Contributors: NASA 7-1
7.3 Navy Consultant Contributors 7-1
7.4 NASA Consultant Contributors 7-3

List of Figures

Figure RG-1 Project Area: Overview ..... RG-vii
Figure ES-1 Project Area: Overview ES-3
Figure ES-2 Alternatives ES-4
Figure 1-1 General Location 1-3
Figure 1-2 Project Area: Overview 1-5
Figure 1-3 Project Area: Main Base, Kamokalā Ridge, and Mānā Water Well 1-6
Figure 1-4 Project Area: Mākaha Ridge, Miloli‘i Ridge, and Kōke‘e Park Geophysical Observatory 1-7
Figure 1-5 EIS Process 1-31
Figure 2-1 Alternative 1: Succeeding Current Real Estate Agreements 2-4
Figure 2-2 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds 2-5
Figure 2-3 Alternative 3: No Action Alternative 2-6
Figure 2-4 Alternative 1: Main Base: Aerial View 2-10
Figure 2-5 Alternative 1: Kamokalā Ridge and Mānā Water Well 2-11
Figure 2-6 Alternative 1: Miloli‘i Ridge 2-12

Figure 2-7 Alternative 1: Mākaha Ridge....2-13
Figure 2-8 Alternative 1: KPGO....2-14
Figure 2-9 Leases and Easements at Main Base (Northern Part)....2-24
Figure 2-10 Leases and Easements at Main Base (Center)....2-25
Figure 2-11 Leases and Easements at Main Base (Southern Part)....2-26
Figure 2-12 Leases and Easements at Kamokalā Ridge and Mānā Water Well....2-27
Figure 2-13 Leases and Easements at Mākaha Ridge and Miloliʻi Ridge....2-28
Figure 2-14 Leases and Easements at Kōkeʻe Park Geophysical Observatory....2-29
Figure 3.1-1 Sea Level Rise Exposure Area....3-3
Figure 3.1-2 Regions of Influence....3-7
Figure 3.2-1 Archaeological and Architectural Resources Region of Influence....3-38
Figure 3.3-1 Cultural Practices Region of Influence....3-53
Figure 3.4-1 Biological Resources Region of Influence....3-65
Figure 3.4-2 Vegetation Communities: Main Base, Kamokalā Ridge, and Mānā Water Well....3-70
Figure 3.4-3 Vegetation Communities: Mākaha Ridge and Miloliʻi Ridge....3-71
Figure 3.4-4 Vegetation Communities: KPGO....3-72
Figure 3.4-5 Critical Habitat for Special Status Plants....3-77
Figure 3.4-6 Endangered Species Act-Listed Wildlife Species Observations in 2022–2024: Main Base, Kamokalā Ridge, Mānā Water Well, and KPGO....3-81
Figure 3.4-7 Hawaiian Hoary Bat Survey Locations and Detections in 2024 in the Region of Influence....3-86
Figure 3.4-8 Critical Habitat for Special Status Wildlife in the Region of Influence....3-90
Figure 3.5-1 State Land Use Districts and Subdistricts....3-102
Figure 3.5-2 County of Kauaʻi Zoning....3-103
Figure 3.5-3 Hunting and Fishing Areas....3-107
Figure 3.7-1 Pacific Plate Movement and Formation of Hawaiian Islands....3-125
Figure 3.7-2 Groundwater Recharge Diagram....3-127
Figure 3.7-3 Annual Rainfall, Flood Hazard Areas, and Aquifers within the Region of Influence....3-128
Figure 3.7-4 Surface Water Features....3-132
Figure 3.7-5 National Wetlands Inventory and Freshwater Systems in the Region of Influence....3-137
Figure 3.7-6 Wetland Delineation Survey, Potential Wetland Area, and Open Floodable Space....3-138
Figure 3.9-1 Ordnance Transport, Emergency Medical Services Route, and Landfill....3-171
Figure 3.10-1 Windrose Plot for Kekaha....3-184
Figure 3.11-1 Transportation Routes North....3-196
Figure 3.11-2 Transportation Routes Central....3-197
Figure 3.11-3 Transportation Routes South....3-198
Figure 3.11-4 Transportation Routes Kamokalā....3-200

Figure 3.11-5 Transportation Routes Mākaha 3-203
Figure 3.11-6 Transportation Routes KPGO 3-205
Figure 4-1 Proximate Project Areas 4-6
Figure 6-1 Terrestrial Land Holdings 6-6

List of Tables

Table ES-1 Summary of Potential Effects to Resources Analyzed in this Environmental Impact Statement ES-5
Table ES-2 List of Relevant Mitigation Measures from Previous Environmental Review Documents for Activities in the Project Area ES-23
Table ES-3 Summary of PMRF and KPGO Proposed Enhanced Engagement ES-40
Table ES-4 Substantive Scoping Comments by Category ES-46
Table ES-5 Substantive Draft EIS Comments by Category ES-47
Table 1-1 Historic Military Timeline of Leasehold and Easement Lands at PMRF 1-9
Table 1-2 NASA's Historic Uses of KPGO 1-11
Table 1-3 Navy and NASA Activities on Leasehold and Easement Lands 1-15
Table 1-4 Navy Programs on State Lands 1-18
Table 1-5 Previous Pacific Missile Range Facility Environmental Review Documents 1-21
Table 1-6 Public Engagement under NEPA and HEPA 1-32
Table 1-7 Newspaper Publications for Public Engagement under NEPA and HEPA During Scoping 1-32
Table 1-8 Summary of Scoping Comments 1-33
Table 1-9 Newspaper Publications for Public Engagement under NEPA and HEPA During Draft EIS Comment Period 1-37
Table 1-10 Summary of Draft EIS Public Comments 1-37
Table 1-11 Ongoing Community Coordination Conducted by the Navy and NASA 1-46
Table 2-1 Description of Alternatives Identified 2-1
Table 2-2 Alternatives Screening Evaluation 2-3
Table 2-3 Comparison of Alternatives: Navy and NASA Land Status and Acreages by Location 2-7
Table 2-4 Effects to PMRF Training and Testing Mission from the No Action Alternative 2-16
Table 2-5 No Action Alternative: Activities and Operational Impacts to the Navy 2-18
Table 2-6 Effects to NASA Activities from the No Action Alternative 2-30
Table 2-7 PMRF and KPGO Best Management Practices and Resource Management Strategies 2-33
Table 2-8 PMRF Applicable Plans, Instruction Memoranda, and Operating and Maintenance Procedures 2-52
Table 3.1-1 Existing Conditions of Hawai'i 3-2

Table 3.1-2 Predictable Environmental Trends 3-4
Table 3.1-3 Regions of Influence 3-5
Table 3.1-4 List of Relevant Potential Effects and Mitigation Measures from Previous Environmental Review Documents for Activities in the Project Area 3-14
Table 3.2-1 Predictable Environmental Trends for Archaeological and Architectural Resources 3-40
Table 3.2-2 Summary of Archaeological Resources within the Region of Influence 3-43
Table 3.2-3 Summary of Architectural Resources within the Region of Influence 3-44
Table 3.2-4 Summary of Traditional Cultural Places within the Region of Influence 3-45
Table 3.3-1 Predictable Environmental Trends for Cultural Practices 3-54
Table 3.3-2 Participants in Cultural Impact Assessment Interviews 3-56
Table 3.3-3 Cultural Practices and Resources Located Within or Accessed via the Project Area (Leasehold and Easement Lands) 3-57
Table 3.4-1 Predictable Environmental Trends for Biological Resources 3-67
Table 3.4-2 Special Status Plant Species Known to or with Potential to Occur within the Region of Influence 3-74
Table 3.4-3 ESA-Listed and State of Hawai‘i-Listed Wildlife Known to or with Potential to Occur within the Region of Influence 3-80
Table 3.5-1 Predictable Environmental Trends for Land Use and Access 3-104
Table 3.6-1 Population in the Region of Influence 3-114
Table 3.6-2 Housing in the Region of Influence (2017–2022 5-year average) 3-115
Table 3.6-3 Economic Indicators 3-115
Table 3.6-4 Predictable Environmental Trends for Socioeconomics 3-116
Table 3.7-1 Definition and Description of Water Resources 3-122
Table 3.7-2 List of Best Management Practices and Standard Operating Procedures for Water Management 3-123
Table 3.7-3 Predictable Environmental Trends for Water Resources 3-124
Table 3.8-1 Predictable Environmental Trends for Utilities 3-153
Table 3.8-2 Utility Easements and Infrastructure on Main Base 3-156
Table 3.8-3 Utility Easements and Infrastructure on Kamokalā Ridge 3-157
Table 3.8-4 Utility Easements and Infrastructure on Mānā Water Well 3-158
Table 3.8-5 Utility Leases and Infrastructure on Mākaha Ridge 3-159
Table 3.9-1 List of Standard Operating Procedures Relevant to Public Health and Safety 3-166
Table 3.9-2 Predictable Environmental Trends for Public Health and Safety 3-167
Table 3.10-1 Federal and State Ambient Air Quality Standards 3-182
Table 3.10-2 Predictable Environmental Trends for Air Quality and Greenhouse Gases 3-183
Table 3.10-3 Estimated Annual Stationary Source Emissions at KPGO 3-186

Table 3.11-1 Predictable Environmental Trends for Transportation....3-193
Table 3.11-2 Transportation Leases and Easements at Main Base....3-194
Table 3.11-3 Transportation Easements at Kamokalā Ridge....3-199
Table 3.11-4 Transportation Leases and Easements at Mānā Water Well....3-201
Table 3.11-5 Transportation Leases and Easements at Mākaha Ridge....3-202
Table 3.12-1 Standard Operating Procedures and Instructions Utilized in Management of Hazardous Materials and Waste at PMRF and KPGO....3-208
Table 3.12-2 Predictable Environmental Trends for Hazardous Materials and Wastes....3-210
Table 3.12-3 Fuel and Oil Storage on Tract E-1 (TMK: 1-2-002-025)....3-212
Table 3.12-4 Fuel and Oil Storage on Mākaha Ridge Leasehold Lands....3-216
Table 3.12-5 Fuel and Oil Storage at KPGO....3-217
Table 3.13-1 Predictable Environmental Trends for Visual Resources....3-227
Table 3.14-1 Summary of Potential Environmental Effects....3-237
Table 4.1-1 Cumulative Action Evaluation....4-3
Table 5.2-1 PMRF and KPGO Proposed Enhanced Engagement....5-3
Table 6-1 Current Permits for Activities in the Project Area....6-7
Table 6-2 Potential Required Permits, Consultations, Reviews, and Approvals for the Proposed Action....6-7

Appendices

Appendix A **Glossary**

Appendix B **References**

Appendix C **Current Real Estate Agreements (Leases, Easements, Use Permit)**

Appendix D **Detailed List of Activities and Operational Elements Under Current Real Estate Agreements**

Appendix E **Regulatory Setting, Navy and NASA Correspondence with Department of Land and Natural Resources, Office of Conservation and Coastal Lands, and Coastal Zone Management Act Consistency Determination, CZM Consistency Conditional Concurrence**

Appendix F **Cultural Resource Investigations**

PMRF Archaeological Inventory Survey – August 2024, revised September 2025

Cultural Impact Assessment – October 2024, revised June 2026

KPGO Archaeological Inventory Survey – May 2025

(These reports have been redacted where necessary to protect sensitive information)

Appendix G **Public Scoping and Draft EIS Comment Meeting Materials**

Public Scoping Meetings

List of Interested Parties Contacted During Scoping

Direct Scoping Postcard

Posters

Project Information Sheet

Comment Form

Draft EIS Public Meetings

List of Interested Parties Contacted During Comment Period

Direct Mailing Postcard

Posters

Project Information Sheet

Comment Form

Appendix H **EIS Notices**

Scoping Notifications

EIS Scoping Notices

Notice of Intent

EIS Preparation Notice

Draft EIS Notifications

Notice of Public Meetings

Notice of Availability

Publication of Draft EIS in The Environmental Notice

Appendix I **EIS Comments and Responses**

Scoping Comments and Responses

Original Scoping Comments

Navy and NASA Letters in Response to Agency Scoping Comments

Public Comments on Draft EIS and Responses

Original Public Comments on Draft EIS

Navy and NASA Letters in Response to Agency Comments on Draft EIS

Appendix J **Scoping Summary Report and Draft EIS Comment Summary Report**

Appendix K **Natural Resource Surveys and Biological Opinions**

PMRF Flora Survey Report – 2024

PMRF Fauna Survey Report – 2024

PMRF Hoary Bat Survey Report – 2025

KPGO Flora Survey Report – 2025

KPGO Fauna Survey Report – 2025

KPGO Hoary Bat Survey Report – 2025

PMRF Biological Opinions (2014, 2018, and 2025)

PMRF INRMP – 2023

Appendix L **Wetland Survey Report**

Wetland Survey Report – January 2024

Abbreviations and Acronyms

%	percent
µg/m^3	microgram per cubic meter
°F	Degree Fahrenheit
ACHP	Advisory Council on Historic Preservation
ACBM	asbestos-containing building material
ADC	Agribusiness Development Corporation
APE	Area of Potential Effects
ARPA	Archaeological Resources Protection Act
ATFP	Anti-Terrorism/Force Protection
BASH	Bird/Wildlife Aircraft Strike Hazard
BLNR	Board of Land and Natural Resources
BMP	Best Management Practice
BOS	Base Operating Support
CA	Comprehensive Agreement
CAA	Clean Air Act
CAB	Clean Air Branch
CEQ	Council of Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHRIMP	Consolidated Hazardous Material Reutilization and Inventory Management Program
CIA	Cultural Impact Assessment
CNRH	Commander, Navy Region Hawai'i
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COMPMTCINST	Commander Pacific Missile Test Center Instruction
CRB	Coconut Rhinoceros Beetle
CRM	Cultural Resources Management
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DAB	Department of Agriculture and Biosecurity
DAR	Division of Aquatic Resources
DBEDT	Department of Business, Economic Development, and Tourism
DHHL	Department of Hawaiian Home Lands
DIPB	Department of Internal Procedure Barking Sands
DLNR	Department of Land and Natural Resources
DoD	Department of Defense
DOE	Department of Energy
DOFAW	Division of Forestry and Wildlife
DOH	Hawai'i Department of Health
DON	Department of the Navy
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
DOT	Department of Transportation
DPW	Department of Public Works
DREN	Defense Research and Engineering Network
EA	Environmental Assessment
ECP	Environmental Condition of Property
EDRR	Early Detection and Rapid Response
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EMM	Enhanced Management Measure
EMR	Electromagnetic Radiation
EO	Executive Order
EPA	United States Environmental Protection Agency
ERP	Environmental Review Program
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
FE	Federally Endangered
FEMA	Federal Emergency Management Agency
FES	Fire and Emergency
FONSI	Finding of No Significant Impact
FT	Federally Threatened
FTS	Flight Termination System
GAPE	Great Alaska Pacific Experiments
GHA	Ground Hazard Area

GHG	greenhouse gas
GNSS	Global Navigation Satellite System
gpm	Gallons Per Minute
GPS	Global Positioning System
HAMP	Historic Asset Management Process
HAP	Hazardous Air Pollutant
HAR	Hawai‘i Administrative Rules
HCCMAC	Hawai‘i Climate Change Mitigation and Adaptation Commission
HCTT	Hawaii-California Training and Testing
HEPA	Accepted Term for Hawai‘i Revised Statutes Chapter 343
HERF	Hazards of Electromagnetic Radiation to Fuels
HERO	Hazards of Electromagnetic Radiation to Ordnance
HERP	Hazards of Electromagnetic Radiation to Personnel
HRS	Hawai‘i Revised Statutes
HSTT	Hawaii-Southern California Training and Testing
ICRMP	Integrated Cultural Resources Management Plan
IM	Instruction Memoranda
INRMP	Integrated Natural Resources Management Plan
ISI	Integrated Services Interface
ITRF	International Terrestrial Reference Frame
ITS	Incidental Take Statement
JAXA	Japanese Aerospace Exploration Agency
KAA	Kekaha Agricultural Association
kg	kilogram
KISC	Kaua‘i Invasive Species Council
KIUC	Kaua‘i Island Utility Cooperative
KPGO	Kōke‘e Park Geophysical Observatory
KTF	Kaua‘i Test Facility
kW	kilowatt
lb	pound
LBP	lead-based paint
LOS	Level of Service
MBTA	Migratory Bird Treaty Act
MILCON	Military Construction
MIT	Massachusetts Institute of Technology
MOA	Memorandum of Agreement
N/A	Not Applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
NEPA	National Environmental Policy Act
NHO	Native Hawaiian Organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPR	NASA Procedural Requirement
NRHP	National Register of Historic Places
NSWCDD	Naval Surface Warfare Center, Dahlgren Division
O_3	ozone
OCCL	Office of Conservation and Coastal Lands
OEA	Overseas Environmental Assessment
OEIS	Overseas Environmental Impact Statement
OHA	Office of Hawaiian Affairs
OMP	Operating and Maintenance Procedure
OPNAV M	Office of the Chief of Naval Operations Manual
OPNAVINST	Office of the Chief of Naval Operations Instruction
P.L.	Public Law
PA	Programmatic Agreement
PACDERMA	Pacific Deep Electromagnetic Research Measurement Array

Pb	lead
PCB	polychlorinated biphenyl
PEACESAT	Pan-Pacific Education and Communication Experiments by Satellite
PFAS	Per-and polyfluoroalkyl substances
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
PMC	Pest Management Consultant
PMRF	Pacific Missile Range Facility
PMRFINST	Pacific Missile Range Facility Instruction
POL	petroleum, oil, and lubricants
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PVC	polyvinyl chloride
PWS	Public Water Supply
QZSS	Quasi-Zenith Satellite System
RCRA	Resource Conservation and Recovery Act
RDT&E	Research, development, test, and evaluation
REPI	Readiness and Environmental Protection Integration
RFI	Radio Frequency Interference
ROI	Region of Influence
ROW	right-of-way
SDS	Safety Data Sheet
SE	State Endangered
SECNAVINST	Secretary of the Navy Instruction
SENSE	Space Exploration Network Services and Evolution
SGP	Space Geodesy Project
SHPD	State Historic Preservation Division (DLNR)
SHPO	State Historic Preservation Office(r)
SIHP	State Inventory of Historic Places
SLUD	State Land Use District
SOP	Standard Operating Procedure
SOS	Save Our Shearwaters
SO_x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
ST	State Threatened
STDN	Spacecraft Tracking and Data Network
SWTR	Shallow Water Training Range
T&E	Test and Evaluation
TCP	Traditional Cultural Place
TDRSS	Tracking and Data Relay Satellite System
TMK	Tax Map Key
tpy	tons per year
TSS	Total Suspended Solids
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USNO	United States Naval Observatory
UT1	Universal Time 1
UTC	Coordinated Universal Time
VLBI	Very Long Baseline Interferometry
VGOS	VLBI Global Observing System
VOC	volatile organic compound
WS	Wildlife Services

This page intentionally left blank.

1 Purpose of and Need for the Proposed Action

This chapter provides the following: an introduction and overview of the project; the project location, background, purpose of and need for the Proposed Action; scope of analysis; relevant laws and regulations; and public and agency participation.

1.1 Project Introduction and Overview

The United States (U.S.) Department of the Navy (Navy) and the National Aeronautics and Space Administration (NASA) are joint lead agencies and have prepared this Environmental Impact Statement (EIS) consistent with the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] section 4321 et seq.) and Hawai'i Revised Statutes (HRS) Chapter 343. This EIS evaluates the potential environmental consequences of the Navy's and NASA's proposal to retain the use of 8,172[20,21] acres and 23[22] acres, respectively, of State lands including leasehold and easement lands on Kaua'i, Hawai'i, for the Navy's operational continuity and sustainment (in support of the military's continued and ongoing military training, testing, and facility operations) at the Pacific Missile Range Facility (PMRF), and NASA's continued operations including measurements of the Earth's rotation and local land motion at Kōke'e Park Geophysical Observatory (KPGO). Navy use of these State lands is required to maintain technological and safety capabilities supporting PMRF training and testing. Navy training and testing operations do not occur on these State lands. The environmental effects of PMRF training and testing operations are fully analyzed in previous, focused environmental documents referenced in Section 1.5, *Scope of Environmental Analysis*. All of NASA's facilities are located on State lands at KPGO. The State of Hawai'i Board of Land and Natural Resources (BLNR) is the approving agency and as such, its approval of the EIS is needed prior to considering the issuance of the leases and easements (Hawai'i Administrative Rules [HAR] section 11-200.1-2, 11-200.1-7(c)).

The Navy's current real estate agreements with the BLNR include 684 acres of leaseholds and 7,488 acres of easement lands for a total of 8,172 acres (Appendix C). These existing Navy real estate agreements are set to expire between 2027 and 2030. The Navy's current leases and easements are primarily used for passive encroachment buffers, as well as for mission readiness (see Section 1.2, *Project Area* and Appendix D), access, and utilities at the following five general locations: leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Miloli'i Ridge, and Mākaha Ridge. Approximately 95 percent of the easement lands are passively used for encroachment buffers and mission readiness; the remaining 5 percent of easement lands are used for access and utility easements. No training occurs on these leasehold and easement lands.

The Navy currently holds a lease to a submerged cable right-of-way (ROW) covering 7,680 acres of submerged lands at PMRF, which is also set to expire in 2030. The Navy is not pursuing a new real estate agreement for this area, and the submerged cable ROW is not part of the Proposed Action. The Navy will continue to use this area pursuant to the retained rights in, and powers of regulation and control of, such land by the United States for constitutional purposes as codified in the U.S. Constitution, Article I, Section 8, Clause 3; Section 1314(a) of the Submerged Lands Act, 43 U.S.C. sections 1301 et seq.; and the

[20] The actual acreage is 8,171.516 acres and has been rounded to 8,172 acres for readability in the EIS.

[21] The acreage presented during scoping and in the Environmental Impact Statement Preparation Notice (EISPN) double-counted one easement area (Easement 106 (Tax Map Key [TMK]: 1-2-002-001 (por.)) and ESQD Easement S-5604 (TMK: 1-2-002-001 (por.)), which cover the same area). Therefore, upon correction, the total acreage has been reduced from 8,348 acres to 8,172 acres (176-acre reduction in the easement area).

[22] The actual acreage is 22.9 acres and has been rounded to 23 acres for readability in the EIS.

Hawai'i Admissions Act, 48 U.S.C. section 5(i). In accordance with these laws, the Navy acknowledges that it does not have exclusive use, and that the State retains jurisdiction, of these submerged lands. The Navy's use of submerged lands within the ROW area will remain consistent with current usage for navigation and national defense purposes (i.e., for underwater cables supporting at-sea training ranges[23]). The Navy will continue to comply with applicable laws with associated notification requirements to the State as to these submerged lands. If the Navy's use of this area significantly changes, the Navy will take appropriate actions in accordance with NEPA, and inform other stakeholders as appropriate.

NASA's current real estate agreements with DLNR include 16 acres of leaseholds and 7 acres of easement lands for a total of 23 acres (Appendix C). These existing NASA real estate agreements are set to expire in 2030. NASA uses the land for operations at KPGO for collecting geodetic data that contribute to daily measurements of the Earth's rotation and orientation in space, the terrestrial reference frame, and the motion of the Island of Kaua'i. NASA issued the Navy a Use Permit[24] in 2016 for portions of KPGO to conduct radar, telemetry, and communications services in support of PMRF activities. In addition to their mission operations, the Navy and NASA also conduct environmental management and protection activities on these lands.

These leaseholds and easements collectively comprise the Project Area that is analyzed in the EIS. Figure 1-1 depicts an overview of general locations for PMRF and KPGO (Main Base[25], Kamokalā Ridge, Mānā Water Well, Miloli'i Ridge, Mākaha Ridge, and KPGO) on the Island of Kaua'i. The Project Area includes leasehold and easement lands within these locations; it does not include the 1,933 acres of fee simple lands. The Navy and NASA have jointly prepared this document and published a separate Notice of Intent (NOI) to prepare this EIS and Notice of Availability (NOA) for the Draft EIS in accordance with federal and State law including: the NEPA (42 U.S.C. sections 4321 et seq.); all applicable federal environmental laws and agency guidance listed in Appendix E; HRS Chapter 343 (the State law governing preparation of an EIS and commonly referred to as "HEPA"); and HAR Chapter 11-200.1 (implementing HRS Chapter 343).

The Navy and NASA determined that an EIS is the appropriate level of analysis for the Proposed Action. This determination was made because the EIS process provides for a comprehensive analysis, including opportunities for public input, for the decision makers before issuance of any real estate agreement. HAR section 11-200.1-14(d)(2) supports this determination, which provides "[if the] proposing agency or approving agency determines, through its judgment and experience that an EIS is likely to be required, then the proposing agency may choose to prepare, or an approving agency may authorize an applicant to prepare, an EIS in accordance with subchapter 10, beginning with preparation of an EISPN[26]."

[23] All data transmitted from the undersea cables are received by facilities on Navy fee simple land, where the data is then recorded and processed. These activities operate independently from the leased parcels in the Project Area.

[24] The Use Permit was issued by NASA, the land management authority, to the Department of the Navy, identifying a specific land use for a set period of time (included in Appendix C).

[25] Leasehold and easement lands located at Main Base.

[26] Environmental Impact Statement Preparation Notice.

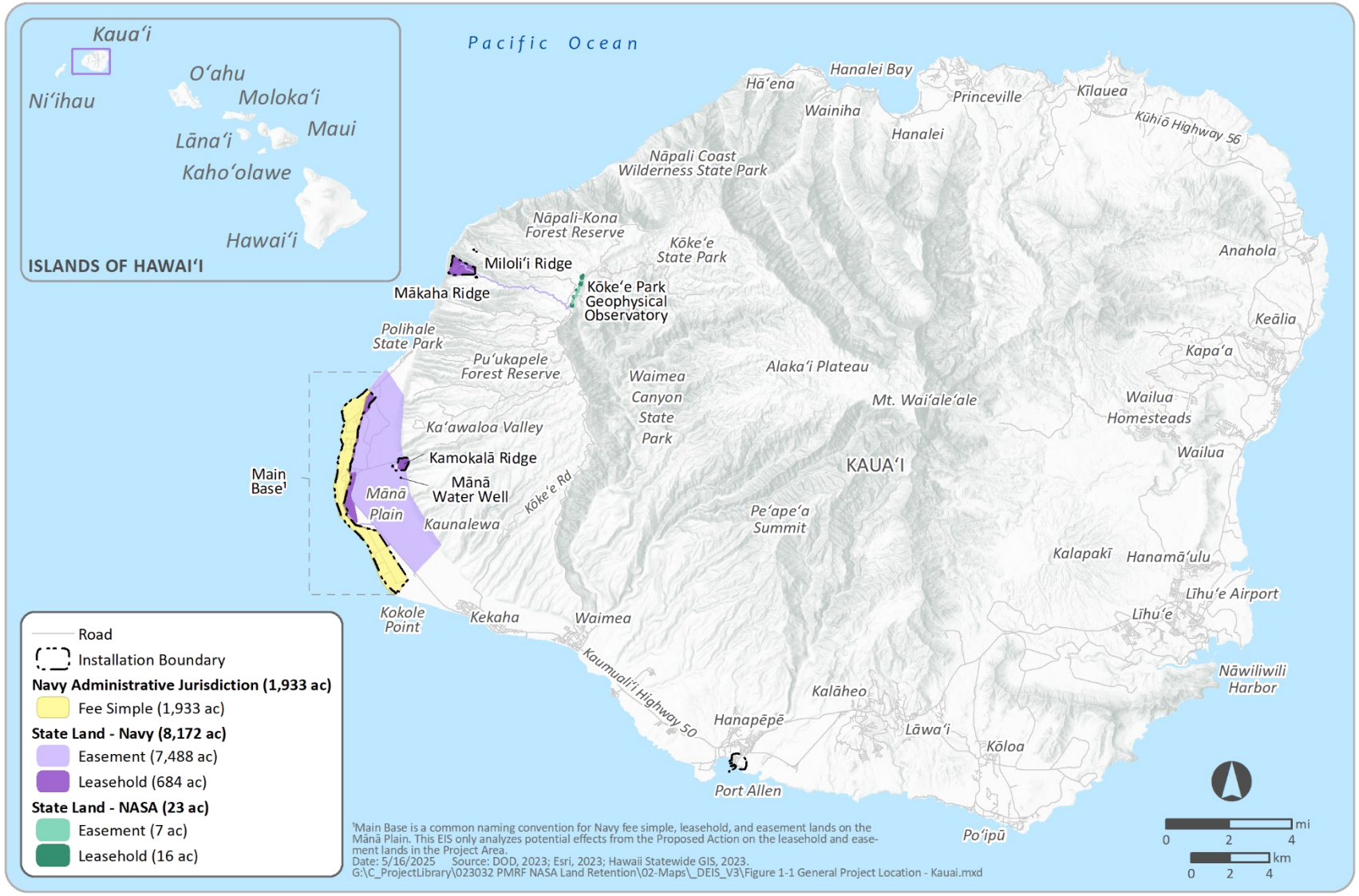


Figure 1-1 General Location

The Department of Land and Natural Resources (DLNR's) mission is to "[e]nhance, protect, conserve and manage Hawai'i's unique and limited natural, cultural and historic resources held in public trust for current and future generations of the people of Hawai'i nei, and its visitors, in partnership with others from the public and private sectors" (DLNR, 2024a). DLNR is responsible for issuing and managing leases of State lands (agricultural, pasture, commercial, industrial, governmental, and resort leases). DLNR's responsibilities include managing and maintaining the State's coastal lands and waters, water resources, conservation and forestry lands, historic sites, small boat harbors, parks, and recreational facilities. DLNR also performs public safety duties (e.g., flood and rockfall prevention), maintains unencumbered State lands, and enforces the agency's rules and regulations.

BLNR is required to conduct an environmental review of this Proposed Action because the Navy and NASA are proposing the continued use of State lands (HRS section 343-5(a)(1), (2), (4)). Pursuant to HRS section 343-5(h): "[w]henever an action is subject to both the National Environmental Policy Act (Public Law [P.L.] 91-190) and the requirements of this chapter, [BLNR] shall cooperate with federal agencies to the fullest extent possible to reduce duplication between federal and State requirements. Such cooperation, to the fullest extent possible, shall include joint environmental impact statements with concurrent public review and processing at both levels of government. Where federal law has environmental impact statement requirements in addition to but not in conflict with this chapter, [BLNR] and agencies shall cooperate in fulfilling these requirements so that one document shall comply with all applicable laws." Under HAR section 11-200.1-28, BLNR, as the accepting authority for HEPA, evaluates whether the EIS fulfills the intent of HRS Chapter 343. In addition, during review of the EIS, BLNR will consider HRS Title 12, Chapter 171 (Hawai'i's law governing management and disposition of public lands).

1.2 Project Area

PMRF and KPGO are located approximately 100 miles from O'ahu on the northwest coast of the Hawaiian island of Kaua'i (refer to Figure 1-1). KPGO is located within Kōke'e State Park on the island of Kaua'i, at an elevation of approximately 3,600 feet above sea level near Waimea Canyon. Elevation at PMRF varies from sea level (PMRF leasehold and easement lands at Main Base) to over 1,800 feet above sea level (Mākaha Ridge).

The Project Area overview is shown in Figure 1-2. The general locations of leasehold and easement lands at Main Base, Kamokalā Ridge, and Mānā Water Well portions of the Project Area are shown in Figure 1-3. Mākaha Ridge, Miloli'i Ridge, and KPGO portions of the Project Area are shown in Figure 1-4. Detailed figures showing the location of the individual leaseholds and easements are provided in Appendix D. Tax Map Key (TMK) parcel numbers are also shown on Figures 1-3 and 1-4.

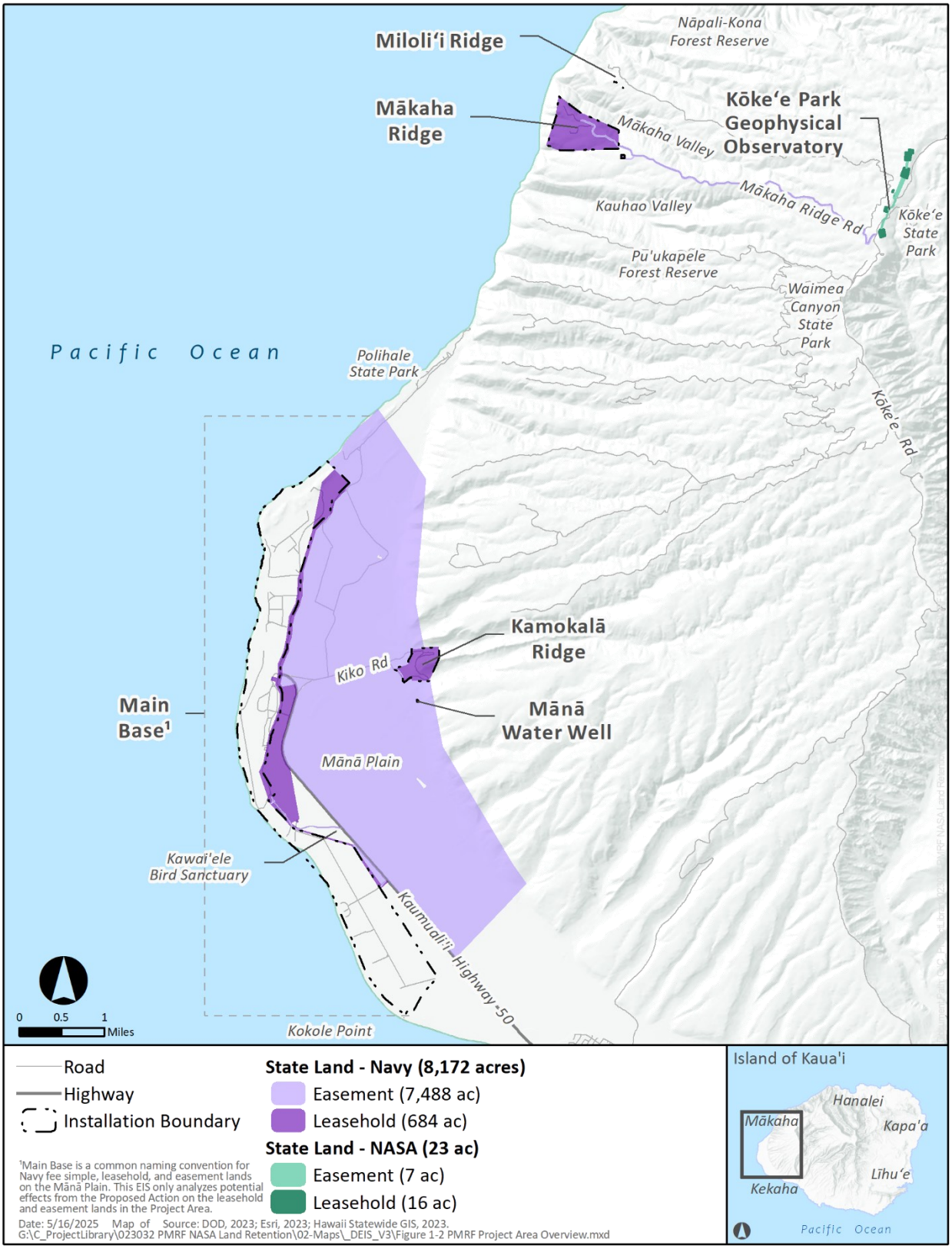


Figure 1-2 Project Area: Overview

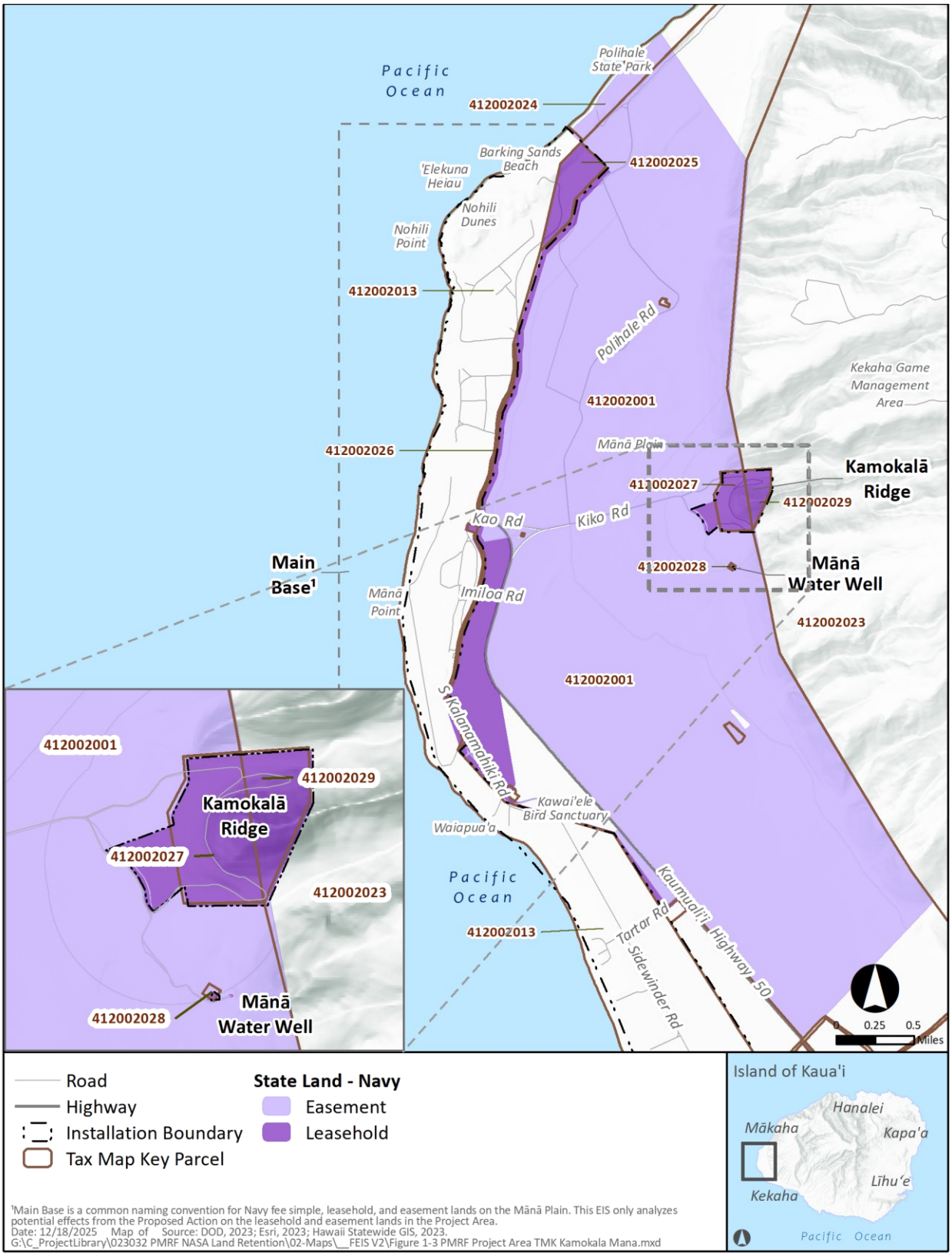


Figure 1-3 Project Area: Main Base, Kamokalā Ridge, and Mānā Water Well

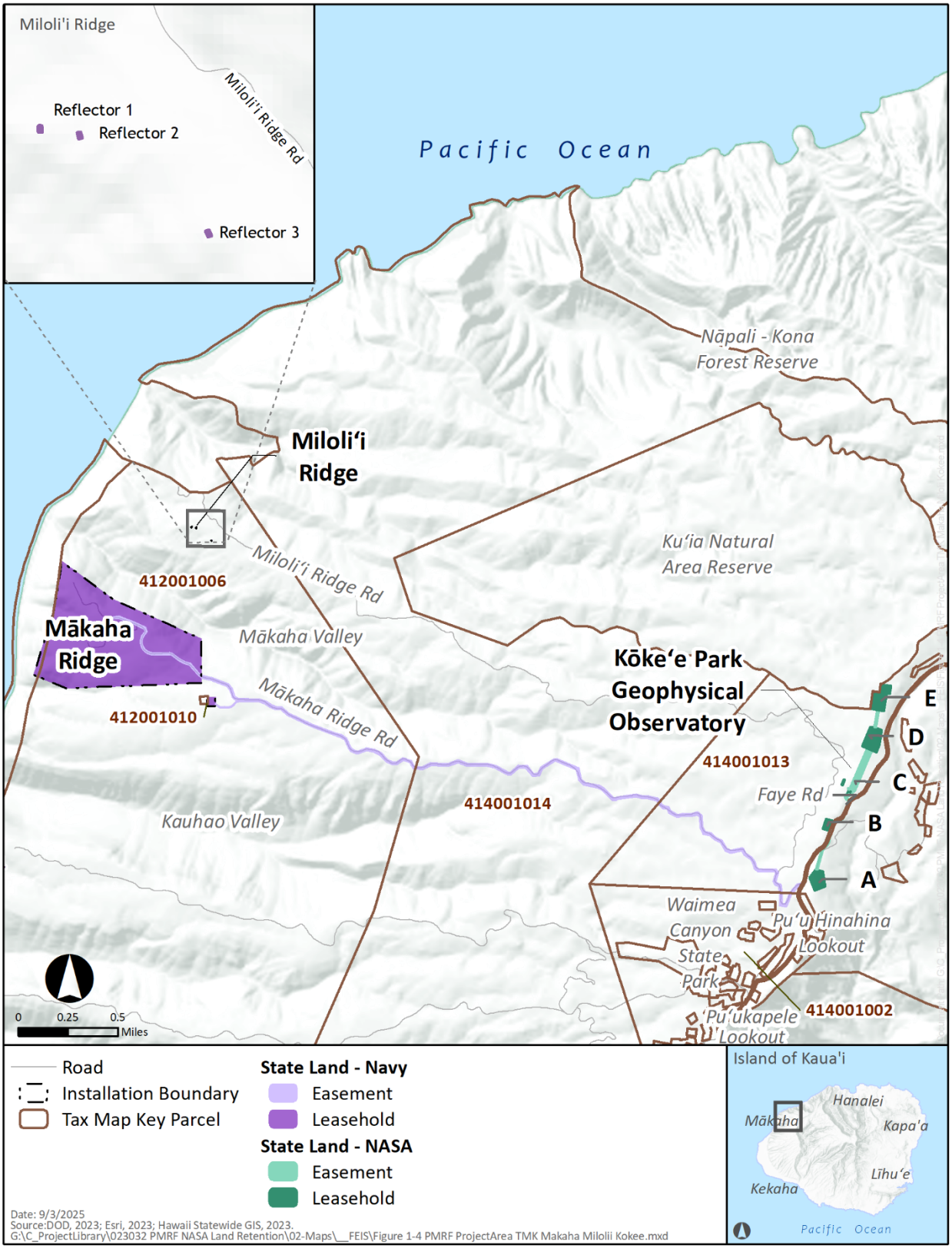


Figure 1-4 Project Area: Mākaha Ridge, Miloli'i Ridge, and Kōke'e Park Geophysical Observatory

The Project Area (depicted in Figures 1-3 and 1-4) consists of the following:

- Main Base[27]: leaseholds (392 acres) and easement lands (7,267 acres[28]), located adjacent to the fee simple lands at the installation, used for PMRF operational support, as well as utilities and flood control, and as safety buffers and to preclude encroachment on the Mānā Plain (TMKs: 1-2-002-001 (por.), 1-2-002-024 (por.), 1-2-002-025, 1-2-002-026 (por.));
- Kamokalā Ridge: leaseholds (89 acres) used for ordnance storage, utilities access, and tsunami evacuation and easement lands (179 acres)[29] used as safety buffers and to preclude encroachment (TMKs: 1-2-002-001 (por.), 1-2-002-027, 1-2-002-029);
- Mānā Water Well: leaseholds (0.29 acre) used as the primary potable water source for PMRF (TMKs: 1-2-002-001 (por.), 1-2-002-028);
- Mākaha Ridge: leaseholds (203 acres) and easement lands (42 acres) used for missile tracking and surveillance (TMKs: 1-2-001-006 (por.), 1-4-001-014 (por.), 1-2-001-010, 1-4-001-002 (por.), 1-4-001-013 (por.));
- Miloliʻi Ridge: leaseholds (0.015 acre) used for radar and telemetry activities (TMK: 1-2-001-006 (por.)); and
- KPGO: leaseholds (16 acres) and easement lands (7 acres) used for NASA geodetic data collection and backup power generation, to provide consistent power during critical Navy missions as well as PMRF surveillance and tracking (TMK: 1-4-001:013 (por.)).

1.3 Background

1.3.1 Historic Land Use at PMRF

The Project Area is located on the Mānā Plain, in the traditional ahupuaʻa (a land division typically extending from the mountains to the sea) of Mānā within the moku (traditional Hawaiian district) of Kona (Flores and Kaohi, 1992:2). The history of the Mānā Plain is complex, with the earliest known traditional Hawaiian archaeological site at PMRF dating to the eleventh century. The following brief overview of the historic land use at PMRF is condensed from the 2012 PMRF Integrated Cultural Resources Management Plan (ICRMP) (U.S. Navy PMRF, 2012). For a more detailed examination and additional references, please see Sections 3.2.1.4, 3.3.1.4, and 3.5.1.4, the Archaeological Inventory Survey at PMRF completed in August 2024 in Appendix F, and the 2012 PMRF ICRMP (U.S. Navy PMRF, 2012).

Traditionally, the people of Mānā were noted fishermen. It is likely that permanent settlements were concentrated at the inland edge of the Mānā Plain, where houses, temples, and agricultural complexes were built in the foothills at the base of the cliffs, on high ground overlooking the wetlands and coastline. Small seasonal fishing communities were scattered along the coast. There they developed and maintained brackish water loko puʻuone fishponds in the wetlands of the Mānā Plain. Inland of the wetlands, they grew sweet potatoes and gourds on the fertile strip of land at the foot of the pali (cliffs). The coastal dunes of the Mānā Plain, particularly at Nohili, were the burial grounds of ancient Hawaiians. Several important heiau were located within the Mānā Plain. These heiau include Polihale,

[27] Note that "Main Base" is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.

[28] Approximately 95 percent of the easement lands at Main Base are passively used for encroachment buffers and mission readiness; the remaining 5 percent of easement lands are used for access and utility easements.

[29] Easement 106 and ESQD Easement S-5604 cover the same area (176 acres).

where rites associated with departing souls were conducted, and ʻElekuna, which King Kalākaua and his priests visited many times in the nineteenth century, and others such as Kahelu heiau and Hoʻoneʻenuʻu heiau. These heiau played significant roles in the cultural and religious practices of the ancient Hawaiians in the region and continue to be important sites for present-day traditional cultural practitioners.

The Māhele of 1848 was a significant land redistribution event in Hawaiian history, which placed many lands, including the ahupuaʻa of Waimea and the Mānā Plain, into the possession of King Kamehameha III. Following this, the king and his successors leased these lands for various commercial agricultural activities such as livestock grazing, rice production, and sugarcane cultivation. As these agricultural ventures grew over the next three decades, contract laborers from China, then Japan, and finally the Philippines were brought to the area. Plantation camps were built to house the laborers. Mānā Camp eventually included a school, three stores, a company office, and a post office. Much of the wetlands were drained or filled to create more arable land for sugarcane cultivation under the Kekaha Sugar Company, Ltd., which was formed in 1898. Commercial sugarcane cultivation continued through the twentieth century.

In the 1920s, the Territory of Hawaiʻi built an airstrip. Beginning in 1940, the U.S. military acquired the airstrip and surrounding land to develop Barking Sands Army Air Base. During World War II, units from all branches of the armed forces and the Hawaiʻi National Guard were assigned to the base. The base was transferred to the Air Force in 1948. During the 1950s, the facility was redesignated Bonham Air Force Base, and the Navy, as a tenant of the base, began testing, evaluating, and training sailors on using guided missile systems. In 1958, the Navy's activity was named the Pacific Missile Range Facility as part of a newly designated larger Pacific Missile Range used by the DoD and NASA (U.S. Navy PMRF, 2012). It was during this period that the Air Force transferred Bonham Air Force Base (which had been redesignated Bonham Auxiliary Landing Field) to the Navy. The transfer was finalized in 1966, after Statehood, at which time the entire installation became PMRF. A more detailed history of land use at PMRF is included in Section 3.2, *Archaeological and Architectural Resources* and Section 3.3, *Cultural Practices*, and in Appendix F. Table 1-1 is a timeline of the military events, including the construction of various areas, from 1940 to 2016 at PMRF.

Table 1-1 Historic Military Timeline of Leasehold and Easement Lands at PMRF

Year/Timeframe	*Event/Use*
1938	Mānā Water Well dug by the Kekaha Sugar Company.
1940	Territory of Hawaiʻi transfers Barking Sands Landing Field to U.S. Army.
1941-1945	Barking Sands Army Air Base used for flight training and combat crew replacement.
1943	Magazines are constructed at Kamokalā Ridge to support Barking Sands Army Air Base.
1948-1956	Army transfers base to U.S. Air Force. Hawaiʻi Air National Guard trains at base.
1956	U.S. Navy begins training with Regulus Missile on fee simple lands at Bonham Air Force Base.
1958	U.S. Navy names their activity Pacific Missile Range Facility.
1960s	Kauaʻi Test Facility is operated on fee simple land at PMRF by Sandia National Laboratories, conducting high-altitude atmospheric sampling during nuclear tests elsewhere in the Pacific.
1964	August: State issues General Lease No. S-3852[1] to add parcels and easements for roadways and utilities at Main Base.
1965	December: State issues General Lease No. S-3952[1] to add Mākaha Ridge.

Year/Timeframe	*Event/Use*
1966	Air Force transfers base to U.S. Navy. Navy constructs radar and telemetry facilities at Mākaha Ridge.
1969	Navy constructs Missile Assembly Building in Tract E-1 (TMK: 1-2-002-025) at Main Base (leasehold lands) to support drone launches over the range.
1973	October: State amends General Lease No. S-3952 to add Boresight Tower parcel (TMK: 1-2-001-010) and access ROW at Mākaha Ridge (TMK: 1-2-001-006 (por.)).
1977	January: State grants non-exclusive ROW and road easement (Easement B-1 and B-2[1], TMK: 1-2-002-001 (por.)) at Main Base.
1979	April: State grants Easement No. S-4597 for drainage easements at Main Base.
1989	February: State issues General Lease No. S-5184 to add reflector sites (TMK: 1-2-001-006 (por.)) at Miloliʻi Ridge. Navy constructs frequency shift reflectors at Miloliʻi Ridge.
1995	December: State amends General Lease No. S-3952 to provide for installation of private cellular telephone equipment at Boresight Tower parcel (TMK: 1-2-001-010) at Mākaha Ridge.
2000	August: State amends General Lease No. S-3852 to add a lease parcel at Main Base.
2002	June: State grants non-exclusive restrictive use Easement S-5604 (TMK: 1-2-002-001 (por.)) at Kamokalā Ridge in support of high explosive storage magazines and ESQD arcs. Navy constructs two earth-covered missile magazines at Kamokalā Ridge.
2003	March: State amends General Lease No. S-3852 to allow subletting for private cell tower sites at Main Base. All rent proceeds to be paid to the State of Hawaiʻi.
2005	January: DHHL conveys Tract E-3 Parcel 1 (TMK: 1-2-002-029) at Kamokalā Ridge to the State of Hawaiʻi in exchange for land of equal value at Hanapēpē, which becomes part of the Hanapēpē Homestead project.
2007	February: State amends General Lease No. S-3852 to add ATFP setback, relocate guard shack and Pass and ID office, and facilitate flood protection at Main Base. June: State grants non-exclusive restrictive use Easement S-5804 at Main Base in support of uses compatible with PMRF activities on leases and fee simple lands. Easements include agricultural preservation, roadways, and utilities. September: State amends General Lease No. S-3852 to add ATFP setback at Main Base and a water lot at Mānā Water Well (TMK: 1-2-002-001 (por.)). Unknown month: Small shed structure constructed at Mānā Water Well.
2012-2013	Navy constructs additional earth-covered magazines at Kamokalā Ridge.
2016	July: Navy acquires sublease from NASA for KPGO facilities.

Note: [1]See Appendix C.

Key: ATFP = Anti-Terrorism/Force Protection; DHHL = Department of Hawaiian Home Lands; ESQD = Explosive Safety Quantity Distance; KPGO = Kōkeʻe Park Geophysical Observatory; NASA = National Aeronautics and Space Administration; PMRF = Pacific Missile Range Facility; ROW = right-of-way; TMK = Tax Map Key; U.S. = United States.

1.3.2 Historic Land Use at KPGO

This section provides a brief overview of the historic land use at KPGO; for a more detailed examination, please refer to the Archaeological Inventory Survey completed in February 2025 included as Appendix F to this EIS.

KPGO is located on the remote Kaunuohua Ridge in Kōkeʻe State Park and shares a similar pre-contact history with PMRF, as both sites are located within the ancient ʻokana (now modern ahupuaʻa) of Waimea in the moku of Kona (Anae et al., 2024). It is believed the early Polynesians who settled the island used the uplands for resource gathering zones rather than establishing permanent habitations or converting the lands to cropland (State of Hawaiʻi DLNR, DOFAW, 2009). The area including and surrounding KPGO was affected by the same historical events (e.g., European settlement, the Māhele of

1848, commercial sugarcane cultivation) as PMRF, though its elevated location likely prevented conversion of the area to cropland.

While NASA originally leased the KPGO sites in 1965, NASA has been operational in this location since July of 1960 (Letter No. 2.4055, 1960). In order to meet construction and operational schedules for Project Mercury (the U.S.'s first human spaceflight program), the Hawai'i Commissioner of Public Lands granted the Navy and NASA right-of-entry to a total of approximately 22 acres spread across five parcels of land and ROWs. By letter No. 2.4055 of February 5, 1960, the State of Hawai'i granted the Navy an immediate right-of-entry to certain parcels of land, together with required connecting rights-of-way, for the construction of the Pacific Missile Range Instrumentation Facility at Kōke'e, Kaua'i. The right-of-entry was granted as an interim measure to permit construction necessary to meet the world-wide coordinated construction and operational schedules to support NASA's Mercury Program. The location and area of the land parcels were required to support PMRF in its contribution to NASA's Mercury Program.

Kaua'i's location in the middle of the Pacific Ocean made it a logical choice to become part of the global Spacecraft Tracking and Data Network (STDN), thereby leading to the establishment of Kōke'e Park Station that has since provided support for numerous experiments and missions. Table 1-2 is a timeline detailing NASA's historical use of KPGO.

Table 1-2 NASA's Historic Uses of KPGO

Year/Timeframe	*Event/Use*
1960	Summer/Fall: Construction of Kōke'e Instrumentation Park is completed in support of Project Mercury. The Station included two radar centers and one telemetry-control communications center, as well as other structures and utilities.
1961	June: PMRF establishes structures and utilities on the NASA parcels which become operational.
1964	April: Kōke'e Park Station is reconfigured to support the Gemini Program from April 1964 to November 1966, with additional restructuring occurring again to support the Apollo flight program.
1965	February: The original lease between the State of Hawai'i and NASA is executed for the 23-acre of what is now known as KPGO.
1979	Summer: An FAA ADS-B suite was added to the antenna on Site C (TMK: 1-4-001:013 (por.)) to provide advanced surveillance technology that combines an aircraft's positioning source, aircraft avionics, and a ground infrastructure to create an accurate surveillance interface between aircraft and the air traffic control.
1984	Summer: A 9-meter S-band VLBI is brought to KPGO with the first GAPE, representing the first participation in VLBI operations by NASA at the Kōke'e Park Station. At this time, the station is part of NASA's STDN. The 9-meter VLBI system is modified by installing a focal point receiver, hydrogen maser, data acquisition terminal, tape drive, and computer system. The system is operational during the summer of 1984, but is removed upon completion of GAPE 1984 experiments.
1985	Summer: The modified 9-meter system is reinstalled again for Kōke'e Park Station's role in the VLBI operations.
1986	Kōke'e Park Station becomes a continuous participant in VLBI operations.
1987	The 3028-S geodetic marker is installed as part of the GNSS.

Year/Timeframe	*Event/Use*
1989	With the arrival of the TDRSS to support human flights, the need for a tracking station in Kōkeʻe Park is eliminated. NASA begins to ramp down the Kōkeʻe Park Station, with closure impending. October: NASA's Crustal Dynamics Project is searching for a location to establish a Pacific VLBI and selects the Kōkeʻe Park Station as its new home. With an influx of funding from NASA and the USNO for staff and new equipment, the Kōkeʻe Park Station is renamed KPGO. KPGO begins weekly operations for the USNO as part of the Naval Network Warfare Command efforts.
1990	A GPS antenna is installed on the 3028-S geodetic marker that was previously installed in 1987. September: The DORIS KOKA station Alcatel antenna is installed.
1992	Construction of the USNO's 20-meter antenna begins. August: Foundation work is completed for the 20-meter antenna. September: Construction of 20-meter antenna structure itself begins before being delayed by Hurricane Iniki.
1993	Spring: Installation of the USNO 20-meter antenna is completed. June: The 20-meter antenna has its first light, with NASA providing major support and maintenance of the USNO-owned antenna. Fall/Winter: The 9-meter VLBI operations are discontinued.
2000	July: KPGO begins daily participation in Intensive experiments schedule for USNO, averaging 1.5 experiments a day.[1] An S-2 recorder system is installed.
2001	The Mark IV system is installed to run parallel with recording tape drive during daily Intensive sessions.
2002	May: KPGO receives a Mark 5 system, which is first run in parallel with tape drive during the daily Intensive sessions before using in stand-alone mode. Installation of the Mark 5 system greatly simplifies the process of switching between Intensive sessions and other experiments. November: The previously installed DORIS beacon antenna is replaced with a new DORIS KOLB beacon antenna to move the source away from VLBI. Daily experiments increase to an average of 2 experiments of 24 hours each week, with Daily Intensive experiments beginning this year and continuing until 2008.
2004	Mid-2004: A new replacement Gear Reducers is received and installed with sufficient time for the Continuous VLBI Campaign of 2005.
2007	October: Representatives from NASA, USNO, State Departments, and Japanese interests meet at KPGO to discuss possible installation of a project called QZSS.
2008	Advances are made at KPGO toward making the accessing of real-time VLBI data a reality.
2010	The QZSS antenna is installed on Parcel E (TMK: 1-4-001:013 (por.)) as part of the JAXA initiative to have a QZSS system on the ground in the Hawaiʻi region.
2011	March: KPGO serves as backup station for the Tsukuba station operations when the latter is impacted by the Tohoku earthquake. KPGO begins supporting weekend Intensive experiments while data from the Tsukuba VLBI station was being analyzed for experiment support.
2012	March: KPGO and NOAA staff personnel perform the de-orbit maneuvers of the GOES-7 spacecraft to formally end the PEACESAT support at KPGO.
2013	May: NASA's support of the weekend Intensive experiments concludes after repairs are completed at the Tsukuba VLBI. KPGO begins supporting the Saturday INT2 weekend Intensive experiments.
2015	May: Installation of the InterTronic Solutions 12-meter VGOS radio telescope begins and is completed in October. November: MIT-designed 12-meter broadband signal chain installation starts and is completed in February 2016.

Year/Timeframe	*Event/Use*
2016	February: USNO, MIT, NASA, and DREN work together to upgrade the KPGO e-transfer network and restore e-transfer capability at the site. August: Staff conducted a major site cleanup effort and electrical upgrade at KPGO, including removal of the NASA 9-meter Unified S-band antenna and any supporting sub-systems and cabling.
2022	The 20-meter system begins supporting a new Intensive experiment referred to as the "midnight" Intensives with 1-hour sessions centered on the change of UTC day. KPGO averages two sessions of 24-duration each week, two midnight Intensive experiments of on-hour duration each week, and weekday INT1 sessions in 2021 and 2022.
2023	April: DORIS beacon and remote-control system upgrades were completed for KPGO. KPGO staff worked with ISI and MIT to retrofit the system with some improved design components with recently built systems.

Note: [1]Intensive sessions refer to the daily observation sessions that provide near real-time estimates of Universal Time 1 (UT1), which is a precise measurement of time based on the Earth's rotation. These sessions are performed to fill the gaps between the 24-hour sessions that occur regularly.

Key: DORIS = Doppler Orbitography and Radiopositioning Integrated by Satellite; DREN = Defense Research and Engineering Network; GAPE = Great Alaska Pacific Experiments; GNSS = Global Navigation Satellite System; GPS = Global Positioning System; ISI = Integrated Services Interface; JAXA = Japanese Aerospace Exploration Agency; KPGO = Kōkeʻe Park Geophysical Observatory; MIT = Massachusetts Institute of Technology; NASA = National Aeronautics and Space Administration; NOAA = National Oceanic and Atmospheric Administration; PEACESAT = Pan-Pacific Education and Communication Experiments by Satellite; QZSS = Quasi-Zenth Satellite System; STDN = Spacecraft Tracking and Data Network; TDRSS = Tracking and Data Relay Satellite System; TMK = Tax Map Key; U.S. = United States; USNO = U.S. Naval Observatory; UTC = Coordinated Universal Time; VGOS = VLBI Global Observing System; VLBI = Very Long Baseline Interferometry.

Sources: IVS Annual Report, 2005, 2006, 2008, 2012, 2016; IVS Newsletter, 2005; NASA, 2018, 2012; DON, 1991.

A more detailed history of land use at KPGO is included in Section 3.2, *Archaeological and Architectural Resources*, Section 3.3, *Cultural Practices*, and in Appendix F.

1.3.3 Navy Mission at PMRF

PMRF is the world's largest instrumented multi-environment range, capable of simultaneously supporting surface, subsurface, air, and space operations (Navy Region Hawai'i Public Affairs, 2024). As a Major Range and Test Facility Base, PMRF is part of the designated core set of DoD Test and Evaluation (T&E) infrastructure and associated workforce components that must be preserved as a national asset to provide T&E capabilities to support the DoD acquisition system[30]. PMRF's unique location includes broad ocean areas to the north, south, and west with a relatively isolated and encroachment-free environment that safely and effectively supports these operations, as well as Navy Fleet training.

The Navy's primary military mission at PMRF is to provide integrated range services in a modern, multi-threat, multi-dimensional environment that ensures the safe evaluation and execution of research, development, test, and evaluation (RDT&E) missions. These capabilities are critical for DoD's ability to achieve its statutory Title 10 military readiness requirements[31], to provide commercial entities with the ability to conduct commercial T&E activities (see 10 U.S.C. section 4175 providing for the use of T&E installations by commercial entities), and Title 51 national and commercial space program requirements

[30] The mission of the DoD acquisition system is to acquire products and services that satisfy user needs with measurable and timely improvements to mission capability, material readiness, and operational support, at a fair and reasonable price.
[31] The legal basis for the roles, missions, and organization of each of the services are set forth in 10 U.S.C. section 7062 (Army), 10 U.S.C. section 8062 (Navy), 10 U.S.C. section 8063 (Marine Corps), 10 U.S.C. section 9062 (Air Force), and 10 U.S.C. section 9082 (Space Force).

by supporting commercial space activities (see 51 U.S.C. sections 50504, 50901–50909 authorizing commercial space launch and reentry activities).

Activities at PMRF are monitored with real-time tracking and command/control capabilities located at or connected to the land-based PMRF facilities. This unique facility provides a realistic environment for training and testing in the use of surface, subsurface, air, and space weapons systems as well as land-based weapons systems located on leasehold and easement lands at the Main Base. The Navy conducts missile systems tests and has supporting facilities to track and evaluate these tests from the ocean floor to the outer atmosphere.

PMRF's space, air, surface, and subsurface tracking are accomplished from radar sites at multiple elevations. PMRF is linked to other range and data-processing facilities and can transmit real-time training and testing data anywhere in the world. The Navy, Air Force, Army, Marine Corps, allied foreign forces' RDT&E programs, and non-DoD agencies (including NASA and commercial entities), all utilize PMRF's unique capabilities.

On Kaua'i, the Navy is the largest high-tech and third largest overall employer. It employs approximately 900 military and civilian personnel and contributes approximately $150 million annually in salary, contract goods, and services to the local economy. Moreover, as described in Section 1.3.6, *Environmental Management and Protection*, the Navy actively manages the natural and cultural resources at PMRF for the leasehold and easement lands.

1.3.4 NASA KPGO Space Geodesy Mission

The KPGO is an essential component of the NASA Space Geodesy Network of stations that produce publicly available data that is used to enable and support modern positioning, navigation, and satellite observations as well as scientific and societal applications. Geodesy is the science of Earth's shape, orientation in space, gravity, and their changes over time, and underpins modern navigation technology such as the Global Positioning System (GPS) used every day in a wide variety of devices, from handheld smartphones to satellites. The NASA Space Geodesy Network is composed of geodetic sites around the world that use four primary measurement techniques: Very Long Baseline Interferometry (VLBI), Satellite Laser Ranging, Global Navigation Satellite System (GNSS), and Doppler Orbitography by Radiopositioning Integrated on Satellite (DORIS). The data from these and other global international stations are used to maintain modern coordinate systems used for mapping and navigation. One such data product is the International Terrestrial Reference Frame (ITRF) that is the foundation for virtually all Earth observations and modern georeferenced data used by society. These systems are also used to monitor changes in the Earth's rotation.

NASA and other space agencies rely on the KPGO data to support space missions studying our planet. Many of these missions help the scientific community study ecosystems, water cycles, geological hazards, sea-level change, crustal dynamics, and many other Earth science topics. Continuity of the long dataset from KPGO is essential to ensure these data-related operations of global and local importance can continue, allowing multiple agencies' missions to persist without interruption. Due to its unique location in the Pacific and long measurement history, KPGO is the primary and most accurate U.S. site for daily measurements of the Earth's rotation and provides essential input for spacecraft navigation and systems like GPS.

The NASA measurements at KPGO also provide the foundational data needed to maintain modern coordinate systems used for mapping and navigation. These measurements are particularly important in regions such as Hawai‘i where the land is moving. KPGO enables NASA to tie Kaua‘i into a global coordinate system that helps improve positioning and navigation accuracy on and around Hawai‘i. The measurements also feed into natural hazard monitoring and early warning systems such as those for tsunamis and volcano activity.

KPGO sits at an elevation of approximately 3,600 feet above sea level near Waimea Canyon within the Kōke‘e State Park. KPGO is composed of five sites (Sites A through E), all of which have differing technologies and supportive infrastructure to collectively aid in the observatory’s responsibilities. KPGO hosts three of the four primary geodetic techniques: VLBI, DORIS, and GNSS (see Figure 1-4).

KPGO consists of 16 acres of State leaseholds and 7 acres of easement lands. The Navy holds a Use Permit and Memorandum of Understanding with NASA for portions of KPGO to utilize NASA’s facilities for the purpose of conducting PMRF mission support with radar, telemetry, and communications services at the NASA facilities. The Use Permit between Navy and NASA is provided in Appendix C.

1.3.5 Navy and NASA Use of State Lands

While the Navy and NASA were granted use of certain parcels of land on Kaua‘i as early as 1960, a formal lease with the State of Hawai‘i was not executed until 1964 (Navy) and 1965 (NASA). The Navy conducts missile systems tests from the fee simple parcels at PMRF, and supporting Naval facilities that track and evaluate these tests are located on the leasehold and easement lands at Mākaha Ridge and KPGO. These tracking operations, and other activities on the leasehold and easement lands are covered in this EIS analysis.

The Navy originally acquired the land to develop sophisticated testing, evaluation, and training of military weapons systems at PMRF. Since the original land acquisition, PMRF’s mission has expanded in response to new technologies and geopolitical threats. NASA’s lease began in 1965 when KPGO was part of the NASA Manned Space Flight Network. Since that time, KPGO has supported many NASA and other projects with a variety of equipment. It is a highly versatile and multifunctional geodetic site.

The Navy and NASA’s current activities on the leasehold and easement lands that are analyzed in this EIS are summarized in Table 1-3 and depicted in Figures 1-3 and 1-4. Appendix D includes a detailed list and figures showing all the current leases and easements at PMRF and KPGO, as well as acreage associated with each lease and easement.

Table 1-3 Navy and NASA Activities on Leasehold and Easement Lands

Area[1]	*Agency*	*Description of Activities*	*Figure Number*
Main Base	Navy	Main Base consists of 1,933 acres of fee simple land as well as leasehold and easement lands. At Main Base, the Navy has 392 acres of leaseholds and 7,267 acres of easement lands. Main Base is the principal operations area for PMRF and supports surface, subsurface, air, and space activities. Activities on the leased parcels at Main Base include ordnance assembly, maintenance facilities, material storage, Pass and ID office, operation and maintenance of drainage ditches and pumps to protect adjacent land from flooding, travel along roadways, and accessing utilities.	1-3

Area[1]	*Agency*	*Description of Activities*	*Figure Number*
		Additionally, undeveloped land serves as safety zone buffers for missile/target launch operations and explosives safety. The majority of easement lands (95 percent) at Main Base are passively used for encroachment buffers and mission readiness; the remaining 5 percent of easement lands are used for access and utility easements. At Main Base on the Mānā Plain where the Navy holds restrictive use easements for passive buffers only, other entities hold their own leases with the State of Hawai'i for agricultural purposes. The Navy passively uses easement lands for ATFP and safety arcs. GHA safety arcs have a radius between 6,000 and 10,000 feet from the missile launch locations; the public and all nonessential personnel are excluded from being within this area prior to, during, and immediately following a launch. For the portion of the GHA on leased lands adjacent to Main Base, the Navy works with DLNR Division of State Parks to establish safety controls during missile launches and restricts entry to the southern portion of Polihale Beach Park prior to launches. Explosives storage and munitions assembly locations have ESQD arcs for explosives safety zones based on quantities and types of ammunition stored in magazines, being transported, and staged on ordnance handling pads. ESQD arcs overlay ground areas of restricted non-ammunition-related facilities and activities located on an easement subject to a MOA with DLNR.	
Kamokalā Ridge	Navy	Kamokalā Ridge includes 268 acres consisting of 89 acres of leaseholds and 179 acres of easement lands. Easement 106 (TMK: 1-2-002-001 (por.)) and ESQD Easement S-5604 (TMK: 1-2-002-001 (por.)) cover the same area (176 acres). Kamokalā Ridge leasehold land provides ordnance storage for the Navy, Hawai'i Air National Guard, Department of Energy, and other military commands with requirements for training and storage. The site consists of ordnance storage magazines that have been excavated into the cliff face of Kamokalā Ridge. The magazines provide secure storage for Class 1.1 explosives. Activities on easements at Kamokalā Ridge include roadways to access utilities. This area also serves as a tsunami evacuation site for Main Base occupants.	1-3
Mānā Water Well	Navy	The Mānā Water Well consists of 0.29 acre of leasehold land. Activities include maintenance and use of the Mānā Water Well, which provides the majority of potable water for PMRF critical to activities on fee simple lands at Main Base.	1-3
Mākaha Ridge	Navy	Mākaha Ridge consists of 245 acres (203 acres of leasehold lands and 42 acres of easement lands). The Mākaha Ridge Tracking Station serves as PMRF's secondary missile tracking and surveillance station. The station has tracking	1-4

Area[1]	*Agency*	*Description of Activities*	*Figure Number*
		and surveillance radars as well as primary telemetry systems for the range. The site is also used by other agencies to test new radar technologies. Due to the sensitivity of the technology, public access is restricted at this location. Activities on easement lands at Mākaha Ridge include roadways to and around the features, and a water line and underground communication line.	
Miloliʻi Ridge	Navy	Miloliʻi Ridge consists of 0.015 acre of leasehold land. Activities at Miloliʻi Ridge leaseholds include passive use of the frequency shift reflectors (a specific type of antenna system), which work with the radar and telemetry stations on Mākaha Ridge. The reflectors, which are passively used, do not generate emissions, and help calibrate and operate the radar systems used at Mākaha Ridge.	1-4
KPGO	Navy	KPGO consists of 16 acres of leasehold and 7 acres of easement lands. The Navy has a Use Permit with NASA for Sites A through D which support surveillance and tracking. An elevated line-of-site at the KPGO site is required for PMRF to maintain surveillance and tracking of airborne and surface units operating offshore of PMRF and that are beyond the range of the surveillance and tracking from the radars at Mākaha Ridge. Surveillance is primarily for safety reasons to ensure no surface vessels, aircraft, or personnel (private, commercial, or military) are in the hazard area, and for tracking the location of objects (i.e., missile test intercept). PMRF also has FTS telemetry at KPGO which is required by Range Safety for all missile launch events. Navy infrastructure at KPGO supports tracking radars as well as command and control systems.	1-4
	NASA	Sites A through E support KPGO activities which include collecting and coordinating geodetic data and contributing to daily measurements of the Earth's orientation in space and rotation. The diesel generator at Site B provides backup power to Sites A, C, D, and E to provide consistent power during critical Navy missions. Site C also hosts a NOAA weather radio broadcast transmitter and DLNR-managed facilities that support Kōkeʻe State Park, include a helicopter launch/landing area, maintenance building/storage building, pole barn, open storage yards/drums and vehicle storage areas, and small cinderblock shack.	1-4

Note: [1]See Figures 1-3 and 1-4.

Key: ATFP = Anti-Terrorism/Force Protection; DLNR = Department of Land and Natural Resources; ESQD = Explosive Safety Quantity Distance; FTS = Flight Termination System; GHA = Ground Hazard Area; KPGO = Kōkeʻe Park Geophysical Observatory; MOA = Memorandum of Agreement; NASA = National Aeronautics and Space Administration; PMRF = Pacific Missile Range Facility; TMK = Tax Map Key.

1.3.6 Environmental Management and Protection

The Navy manages natural and cultural resources on PMRF including leased and easement lands. Conservation management of natural and cultural resources is a priority for both mission readiness and long-term resource protection. This includes activities such as protecting the endangered Hawaiian monk seal (*Neomonachus schauinslandi*), green sea turtle (*Chelonia mydas*), wetlands, archaeological sites, iwi kūpuna (Native Hawaiian ancestral human remains), and historic buildings and structures. The Navy also protects natural and cultural resources, including Native Hawaiian sacred resources, against encroachment. PMRF's awareness of the importance of Native Hawaiian cultural values is embodied in the phrase: E Pane Mai Ka Nonoi O Nohili – Answering the Requests of Nohili.

Table 1-4 lists Navy funded and managed natural and cultural programs on State lands.

Table 1-4 Navy Programs on State Lands

Program	*Description*
REPI Projects	Addressing potential effects of sea level rise on agricultural land on the Mānā Plain by: • creating an open floodable space to reduce the quantity and improve the quality of stormwater runoff discharged from agricultural drainage ditches into the nearshore environment at PMRF; • reducing the threat erosion poses to PMRF infrastructure and water quality; and • promoting the regeneration of historic wetland habitat for endemic and endangered Hawaiian waterbirds (https://www.repi.mil/Portals/44/Documents/Buffer_Fact_Sheets/Navy/PMRF_BarkingSands.pdf).
PMRF INRMP	Natural resource management that includes erosion management, invasive plant management, native plant management, federally listed plant species management (at Mākaha Ridge), wildland fire management, nuisance and invasive animal management, special status species management, terrestrial invertebrate and pollinator management, data collection, database and records management, outdoor recreation, and natural resources awareness, education, and training. PMRF INRMPs include natural resource management at KPGO.
PMRF ICRMP	Cultural resource management, including inventories, assessments, and standard procedures for the oversight of operations and protection of all cultural resources on lands managed by the installation.
Ka Lua Kupapa'u O Nohili	Nohili Dunes, at Main Base, is a spiritual place for Native Hawaiians as indicated through historical accounts, song, and mo'olelo, including its importance with gathering of marine resources, visitation, seasonal camping, and association with traditional Native Hawaiian mortuary practices. The Navy, in collaboration with Na 'Ohana Papa O Mānā, respectfully re-inters remains exposed by erosion in the Lua Kupapa'u O Nohili crypt located on base. Unveiling of the renovated crypt expansion occurred on October 10, 2024. https://www.dvidshub.net/news/483951/our-kuleana-pmrf-hosts-aha-awa-ceremony-rededicating-lua-kupapau-o-nohili-crypt-expansion-safe-keeping-iwi-kupuna
Agricultural Preservation Initiative	Ensures agricultural land areas surrounding the installation remain in agricultural use, which is compatible with PMRF activities.
Nature-based Solutions	The Navy is assessing options for nature-based solutions to address erosion control.
Resiliency Solutions	The Navy is assessing options to implement a composting facility for waste minimization, sustainability, resiliency, environmental compliance, community and environmental protection, and operational efficiency.

Key: ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan; PMRF = Pacific Missile Range Facility; REPI = Readiness and Environmental Protection Integration.

PMRF and specific Navy long-term environmental protection activities that occur on leased and easement lands at PMRF and KPGO are presented in detail in Section 2.5, *Best Management Practices* (see Table 2-7), and include:

- Responding to requests for public access and for cultural access to individuals and organizations.
- Maintaining ungulate exclusion fencing for erosion control at Mākaha Ridge.
- Outplanting and managing native plants in areas identified as having erosion and soil compaction issues.
- Improving and protecting habitat for the federally endangered Ni'ihau panicgrass (*Panicum niihauense*) and Hawaiian picture-wing fly (*Drosophila musaphilia* and *D. sharpi*).
- Continuing predator control to protect Migratory Bird Treaty Act (MBTA)-listed species including nēnē (*Branta sandvicensis*).
- Working with the PMRF Archery Club to control ungulate populations at Kamokalā Ridge and conducting observations to identify feral cats at Kamokalā Ridge (with possibility of expanding cat trapping if necessary).
- Removing deadfall in high-risk fire areas including near the Main Base missile launch site and the Kamokalā Magazines and replanting with native, low fire risk species.
- Coordinating with U.S. Fish and Wildlife Service (USFWS), Division of Forestry and Wildlife (DOFAW), PMRF Air Operations, and PMRF Public Works to update and implement nēnē (*Branta sandvicensis*) management procedures.
- Conducting targeted invasive plant species control efforts to protect native and sensitive habitat ecosystems at KPGO.

See Chapter 2, Section 2.5 for a more detailed description of Navy and NASA best management practices (BMPs) and management strategies for natural and cultural resources.

1.4 Purpose of and Need for the Proposed Action

The Navy's purpose of the Proposed Action is to maintain DoD use of 8,172 acres of State lands (including leasehold and easement lands) on Kaua'i, Hawai'i, for a period of 25 years or longer for operational continuity and sustainment of the military readiness mission. NASA's purpose of the Proposed Action is to maintain use of 23 acres of State lands (including leasehold and easement lands) on Kaua'i for a period of 25 years or longer for continued operations of KPGO. The Proposed Action is needed because the existing real estate agreements for these State lands are set to expire between 2027 and 2030. Navy use of these State lands is required to maintain technological and safety capabilities supporting PMRF training and testing. For NASA, these State lands are critical to maintain data collection efforts of global significance. It also ensures the continued conservation management by the Navy and NASA of natural and cultural resources on these lands.

For BLNR, in addition to its role as the lessor of State lands, the proposed real estate action presents an opportunity for the agency to secure a revenue source to support its management of State lands and associated environmental and conservation programs. Fees from leases and easements would be put into a State fund as required by law. Twenty percent of ceded lands[32] revenue (fees from the leases and

[32] The term "ceded lands" is used to refer to the government lands of the Kingdom of Hawai'i and the Crown lands that were property of the Hawaiian monarch, which the Republic of Hawaii transferred or "ceded" to the United States government in the Joint Resolution of Annexation approved by President William McKinley on July 7, 1898 (30 Stat. 750). Upon statehood in 1959, the federal government returned to the State of Hawai'i all ceded lands not set aside for its own use in Section 5(f) of the Admission Act. The use of the term "ceded land" is consistent with usage by other State agencies (e.g., https://www.oha.org/about/abouthistory/).

easements) would go to the Office of Hawaiian Affairs (OHA), and the rest to the Special Land Development Fund as required by law.

By ensuring continued Navy and NASA operations on Kauaʻi, the real estate action would also preserve local jobs and income for the residents of Kauaʻi, financially contribute to the overall economic well-being of Kauaʻi, and maintain continued conservation management of natural and cultural resources on State lands at no cost to the State of Hawaiʻi.

1.5 Scope of Environmental Analysis

This EIS evaluates the potential environmental effects of the Proposed Action and alternatives from activities that affect the leasehold and easement lands in the Project Area. While the Project Area encompasses both leasehold and easement lands, mission activities by the Navy and NASA (as described in Section 1.3) occur only on leaseholds in the Project Area.

The only use by the Navy and NASA on easements is for passive buffers, utilities, and roadways. For this EIS, it is important to note that the scope of analysis for the easements is limited to only those locations with utilities and roadways. On the Mānā Plain where the Navy holds restrictive use easements for passive buffers only (S-5352, S-5804, S-5604 (TMK: 1-2-002-001 (por.)), other entities hold their own leases with the State of Hawaiʻi for agricultural purposes and these entities manage their own environmental effects subject to State requirements.

This EIS satisfies both federal and State of Hawaiʻi requirements and provides the necessary analyses to allow the Navy, NASA, and BLNR to consider the environmental effects of the Proposed Action as part of their decision-making.

Consistent with NEPA (42 U.S.C. section 4321 et seq.) and HAR section 11-200.1-24(b), the scope of the analysis for the alternatives in this EIS is proportionate to the potential for environmental effects.

Table 1-5 provides a comprehensive list of previous environmental documents reviewed in preparation of this EIS, the description of activities for the Proposed Action of each document, a list of resource topics analyzed, and information on whether the Proposed Actions for the previous environmental documents overlap with the Project Area (leasehold and easement lands) for this document. Links to all documents are on the EIS website here: https://www.pmrf-kpgo-eis.com/documents/. This list was used to identify the current and ongoing activities on leasehold and easement lands analyzed in previous environmental documents and was used to inform the analysis of the alternatives, where relevant.

Table 1-5 Previous Pacific Missile Range Facility Environmental Review Documents

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
1990 KTF Two Experiment Rocket Campaign EA (NEPA) https://www.pmrf-kpgo-eis.com/media/5akdwqin/1990-pmrf-kauai-test-facility-two-experiment-rocket-campaign-ea.pdf	Conduct a two-experiment rocket campaign.	Atmospheric Emissions; Noise; Cultural Resources; Biological Resources; Socioeconomic Impacts; Land Use; Coastal Zone Management; Occupational Safety and Health	No	No
1991 EA for U.S. Naval Observatory Very Long Baseline Interferometry Radio Telescope (NEPA) https://www.pmrf-kpgo-eis.com/media/043bl0e3/1991-us-naval-observatory-very-long-baseline-interferometry-vlbi-radio-telescope-ea.pdf	Locate a radio telescope at one of four candidate sites at NASA KPGO and at Main Base.	Traffic Impact; Flora and Fauna; Aesthetic Impact; Recreation Impact; Locational and Physical Site Conditions; EMR, RFI, and Electronic Interference; Noise Impact; Socio-Economic Impact; Historic, Cultural and Archaeological Sites; Hazardous Wastes; Aircraft Navigation; Air Quality; Infrastructure/Utilities	No	Yes (Main Base)
1992 EA for the Construction of a 154 HIANG TCS FACP at PMRF (NEPA) https://www.pmrf-kpgo-eis.com/media/fbklm1an/1992-pmrf-hawaii-air-national-guard-tactical-control-squadron-forward-air-control-post-ea.pdf	Construct a training, maintenance, and storage facility for HIANG's Forward Air Control Post unit on approximately 6 acres at PMRF. The purpose of the facilities is to support operations, vehicle maintenance, and storage elements of HIANG.	Construction Impacts; Changes in Topography; Hydrology/Drainage Impacts; Flora Impacts; Fauna Impacts	No	No

[33] Resource topics are listed as they appear in the document, and do not reflect subsequent changes in regulation and guidance.

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
1992 EA for the Construction of Military Housing Units at PMRF (NEPA) https://www.pmrf-kpgo-eis.com/media/mnyfhl4n/1992-pmrf-construction-of-military-housing-ea.pdf	Construct 13 to 34 family housing units at the PMRF Housing Area for military personnel assigned to the Range Facility on permanent duty.	Construction Impacts; Changes in Topography; Hydrology/Drainage Impacts; Flora Impacts; Fauna Impacts; Archaeological, Historic, and Cultural Resources Impacts; Aesthetic/Visual Impacts; Air Quality Impacts; Noise Impacts; Hazardous Waste Management Impacts; Man-Made Constraints; Traffic Impacts; Electrical Impacts; Water Impacts; Housing Impacts; Medical Services Impacts; Fire Protection Impacts; Police Protection Impacts; School Services Impacts	No	No
1992 Final EIS for the Strategic Target System (NEPA) https://www.pmrf-kpgo-eis.com/media/z2rbc1ea/1992-strategic-target-system-feis-volume-1.pdf	Launch Strategic Target System vehicles with experimental payloads into near space from the KTF at PMRF	Geology and Soils; Water Resources; Air Quality; Biological Resources; Cultural Resources; Land Use; Noise; Hazardous Materials and Waste; Public Health and Safety; Visual Resources	No	No
1993 EA for the Long-Range Overwater Diffusion Experiment at PMRF (NEPA) https://www.pmrf-kpgo-eis.com/media/112lzih2/1993-pmrf-long-range-overwater-diffusion-experiment-ea.pdf	Conduct a Long-Range Overwater Diffusion Experiment over the ocean portion of PMRF. The purpose is to measure alongwind diffusion rates at intermediate and long downwind distances.	Air Quality; Topography, Geology, and Soils; Vegetation; Water Resources; Wildlife; Threatened and Endangered Species; Noise; Socioeconomics; Energy, Conservation, and Irretrievable Commitments of Resources	No	No

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
1993 EA for the Mountaintop Sensor Integration and Test Program at PMRF (NEPA) https://www.pmrf-kpgo-eis.com/media/l20lupqj/1993-pmrf-mountaintop-sensor-integration-and-test-program-ea.pdf	Construct and operate a ground-based airborne surveillance and communication technology at Mākaha Ridge, Kōkeʻe, and the Kōkeʻe Air Force Station for 3 years. Components include trailers and a pedestal/antenna structure with radar equipment. All equipment would be removed after the test.	Traffic Impact; Flora; Fauna; Visual Resources; Locational and Physical Site Conditions; EMR; Noise Impact; Socio-Economic Impacts; Historic, Cultural and Archaeological Sites; Air Quality; Infrastructure/Utilities; Soils; Hazardous Waste Management	No	Yes (Main Base, Mākaha Ridge, KPGO)
1993 Final EIS for the Restrictive Easement (HEPA) https://www.pmrf-kpgo-eis.com/media/us0ldces/1993-pmrf-restrictive-easement-eis.pdf	Acquire a restrictive easement of approximately 2,110 acres on State of Hawaiʻi and Kekaha Sugar Company land adjacent to PMRF for 9 years. The purpose is to ensure safety of people and property during missile launches by restricting access to GHA prior to, during, and shortly after each launch.	Geology and Soils; Water Resources; Air Quality; Biological Resources; Cultural Resources; Visual Resources; Noise; Hazardous Materials and Waste; Health and Safety; Infrastructure; Socioeconomics; Recreation	Yes	Yes (Main Base)
1995 EA Army Mountain Top Experiment (NEPA) https://www.pmrf-kpgo-eis.com/media/ktqlzodm/1995-pmrf-army-mountain-top-experiment-ea.pdf	Conduct captive carry tests and virtual engagement simulations at PMRF using target acquisition and tracking information from Navy radars located at the PMRF Kōkeʻe site. The purpose is to surrogate airborne sensors to demonstrate engagement of a target drone simulating a cruise missile and assess associated system integration issues.	Air Quality; Airspace; Biological Resources; Cultural Resources; Geology and Soils; Hazardous Material and Waste; Health and Safety; Infrastructure; Land Use; Noise; Socioeconomics; Water	No	Yes (Main Base, KPGO)

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
1997 EA Shallow Water Training Range at PMRF (NEPA) https://www.pmrf-kpgo-eis.com/media/dajfuajz/1997-pmrf-shallow-water-training-range-ea.pdf	Install underwater instrumentation to support the SWTR west of PMRF. This would increase the 1,000-square mile underwater training area by 100 square miles shoreward. The purpose is to provide the capability to monitor ongoing Navy training exercises conducted in shallow water areas.	Location and Physical Conditions; Utilities; Fleet Training Operations; Terrestrial Flora and Fauna; Marine Environment; Cultural Resources; Aesthetic and Visual Environment; Socio-Economic Environment; Executive Order 12898, Environmental Justice; Noise; Ground and Nearshore Water Quality; Vehicle Traffic; Solid Waste/Hazardous Waste Management; Air Quality	Yes	No
1997 FONSI and EA AQM-37 Facility at PMRF https://www.pmrf-kpgo-eis.com/media/ba2lqw0x/1997-pmrf-aqm-37-facility-ea.pdf	Construct a maintenance facility for the Air Launched Drone Missile program at PMRF Barking Sands, including a target assembly building and support facilities.	Location and Physical Conditions; Existing Facilities and Utilities; Terrestrial Flora and Fauna; Cultural Resources; Aesthetic and Visual Environment; Socio-Economic; Environmental Justice; Noise; Ground/Drinking Water Supply and Quality; Vehicle Traffic; Solid Waste/Solid Waste/Hazardous Waste Management; Air Quality; Explosives Safety Quantity Distance	No	No

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
1998 PMRF Enhanced Capability Final EIS (NEPA/HEPA) https://www.pmrf-kpgo-eis.com/media/abefwgdu/004_1998-pmrf-enhanced-capability-final-eis-volume-1.pdf https://www.pmrf-kpgo-eis.com/media/5guhxnxj/005_1998-pmrf-enhanced-capability-final-eis-volume-2.pdf https://www.pmrf-kpgo-eis.com/media/mtbh53r5/006_1998-pmrf-enhanced-capability-final-eis-volume-3.pdf https://www.pmrf-kpgo-eis.com/media/1ujntth5/007_1998-pmrf-enhanced-capability-final-eis-appendices.pdf	Continuation of existing activities in surrounding air, sea, and on land at PMRF and enhancement of the capabilities of PMRF to allow theater ballistic missile defense training and testing and theater missile defense testing. This includes upgrading existing radar and communications; constructing and operating additional missile launch sites, sensors, and instrumentation facilities; constructing a missile storage magazine; and revising the GHA restrictive easement for 28 years.	Air Quality; Airspace; Biological Resources; Cultural Resources; Geology and Soils; Hazardous Materials and Hazardous Waste; Health and Safety; Land Use; Noise; Socioeconomics; Transportation; Utilities; Visual and Aesthetics; Water Resources; the Ocean Area; Environmental Justice	Yes	Yes (Main Base)

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
2008 Hawaii Range Complex FEIS/OEIS (NEPA) https://www.pmrf-kpgo-eis.com/media/dnupbd0l/2008-hawaii-range-complex-feis-foeis-volume-1.pdf https://www.pmrf-kpgo-eis.com/media/yazhezg2/2008-hawaii-range-complex-feis-foeis-volume-2.pdf https://www.pmrf-kpgo-eis.com/media/5fbhe5jn/2008-hawaii-range-complex-feis-foeis-volume-3.pdf https://www.pmrf-kpgo-eis.com/media/3szj5njj/2008-hawaii-range-complex-feis-foeis-volume-4.pdf https://www.pmrf-kpgo-eis.com/media/2tah2aks/2008-hawaii-range-complex-feis-foeis-volume-5.pdf	Support and conduct current, emerging, and future training and research, development, test, and evaluation activities in the Hawaii Range Complex to include Main Base and Mākaha Ridge sited radars, including activities in the water such as use of sonar. Proposed activities included a Field Carrier Landing Practice training event, increase in Major Exercises, increased tempo and frequency of training events, and future and enhanced RDT&E activities.	Airspace; Biological Resources; Cultural Resources; Hazardous Materials and Waste; Health and Safety; Noise; Water Resources; Geology and Soils; Land Use; Socioeconomics; Transportation; Utilities	Yes	Yes (Main Base, Mākaha Ridge, KPGO)

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
2010 PMRF Intercept Test Support EA/OEA (NEPA) https://www.pmrf-kpgo-eis.com/media/otzn5cds/2010-pmrf-intercept-test-support-ea_oea.pdf	Enhance the intercept capabilities of missile defense tests at PMRF to support and maintain future Army, Navy, MDA, and other potential customers RDT&E activities, as well as associated range capabilities. These programs would involve the placement of additional land-based systems at PMRF, including required missile launcher, radar, and support facilities.	Air Quality; Airspace (offshore and onshore); Biological Resources (offshore and onshore); Cultural Resources (offshore and onshore); Geology and Soils; Hazardous Materials and Waste; Health and Safety; Land Use; Noise; Socioeconomics (offshore and onshore); Transportation (onshore and offshore); Utilities; Water Resources	Yes	Yes (Main Base, Mākaha Ridge, KPGO)
2011 Advanced Hypersonic Weapon Program EA (NEPA) https://www.pmrf-kpgo-eis.com/media/l4cozqq1/2011-pmrf-us-army-space-and-missile-defense-command_army-forces-strategic-command-advanced-hypersonic-weapon-program-ea.pdf	Conduct a single demonstration flight test of the Advanced Hypersonic Weapon/Hypersonic Glide Body. It would be launched from Main Base, and glide at hypersonic velocities in the upper atmosphere to the vicinity of Kwajalein Atoll.	Air Quality; Airspace; Biological Resources; Cultural Resources; Hazardous Materials and Waste; Health and Safety; Noise; Water Resources	No	Yes (Main Base)
2013 Final EA for Hawai'i Joint Services Solar Power Generation (NEPA) https://www.pmrf-kpgo-eis.com/media/ifvknjln/2013-hi-joint-services-solar-power-generation-ea.pdf	Installation and operation of photovoltaic systems to reduce PMRF's reliance on non-renewable energy. The systems would generate between 7–56 megawatts of alternate current power.	Land Use Compatibility; Visual Resources; Air Quality; Water Resources; Biological Resources (Terrestrial and Marine); Cultural Resources; Geology and Soils; Hazardous Materials and Wastes; Socioeconomics; Environmental Justice; Protection of Children	Yes	Yes (Main Base)

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
2017 Final EA for Photovoltaic and Battery Energy Storage Systems at PMRF (NEPA) https://www.pmrf-kpgo-eis.com/media/5osmzhcf/2017-ea-for-photovoltaic-and-battery-energy-storage-systems-pmrf.pdf	Construct and operate combined utility-scale photovoltaic array and battery energy storage system to improve power quality and energy resiliency at Main Base. The purpose is to provide electricity backup in the event of a power outage; improve power quality in support of current and future mission operations and testing capabilities; and demonstrate leadership and successful partnerships by reaching the Navy's renewable energy goals.	Air Quality; Water Resources; Geological Resources; Cultural Resources; Biological Resources; Land Use; Visual Resources; Airspace; Noise; Infrastructure; Transportation; Public Health and Safety; Hazardous Materials and Wastes	Yes	No
2017 Final EA/OEA for Flight Experiment 1 (NEPA) https://www.pmrf-kpgo-eis.com/media/upzgr0dv/2017-pmrf-flight-experiment-1-ea_oea.pdf	Conduct a flight test designed for the Navy's Strategic Systems Programs Flight Experiment-1. The purpose is to collect data to provide a basis for ground testing, modeling, and simulation of payload performance.	Air Quality; Air Space; Biological Resources; Cultural Resources; Hazardous Materials and Wastes; Noise; Public Health and Safety; Water Resources	No	No
2018 HSTT Final EIS/OEIS (NEPA), Volumes 1–4 HSTT website: https://www.nepa.navy.mil/hstt/	Conduct military readiness training activities and research, development, testing, and evaluation activities. These military readiness activities include the use of active sonar and explosives at sea off the coasts of Southern California and Hawai'i Training activities in Hawai'i occur at the underwater ranges and nearshore waters adjacent to Main Base.	Air Quality; Sediments and Water Quality; Vegetation; Invertebrates; Habitats; Fishes; Marine Mammals; Reptiles; Birds; Cultural Resources; Socioeconomic Resources; Public Health and Safety	No[34]	No

[34] The 2025 HCTT Final EIS/OEIS supersedes the 2018 HSTT Final EIS/OEIS.

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories and 2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility (NEPA) https://www.pmrf-kpgo-eis.com/media/lmxdvuuu/2019-department-of-energy-national-nuclear-security-fonsi-continued-operation-of-the-kauai-test-facility.pdf	Continued KTF operations for National Nuclear Security Administration at PMRF. This includes increasing the number of rocket launches and replacing/modernizing facilities.	Land Use; Geology and Soils; Transportation and Traffic; Air Quality; Airspace; Noise; Water Resources; Biological Resources; Cultural Resources; Hazardous Materials and Waste Management; Infrastructure Resilience; Energy and Water Use; Socioeconomics and Environmental Justice; Human Health and Safety	Yes (This is the re-initiation of the 2018 SiteWide EA Sandia National Laboratories KTF)	Yes (Main Base)
2022 Homeland Defense Radar-Hawaii Draft EIS (NEPA) (This document contains sensitive information and not publicly available.)	Construct, test, and operate a Homeland Defense Radar, In-Flight Interceptor Communications System Data Terminal, Modernization of Enterprise Terminal, and associated support facilities, utilities, and infrastructure.	Airspace Management, Air Quality, Biological Resources, Cultural Resources, Environmental Justice, Geology and Soils, Hazardous Materials and Waste Management, Health and Safety, Infrastructure (Utilities), Land Use, Noise and Vibration, Socioeconomics, Transportation, Visual Resources, Water Resources	No	No
2025 PMRF Land-Based Training and Testing Final EA and FONSI (NEPA) https://www.nepa.navy.mil/pmrflbttea/ Pacific Missile Range Facility Land-Based Training and Testing Final Environmental Assessment	Continue land-based, multi-domain training and testing activities at launch areas and other locations within Main Base and Ka'ula Island. It includes increasing training and testing activities conducted by the Army, Air Force, Marine Corps, MDA, and foreign militaries under U.S. sponsorship and oversight. No new types of training and testing activities would occur.	Air Quality; Climate Change and Greenhouse Gases; Noise; Public Health and Safety; Terrestrial Biological Resources; Cultural Resources	Yes	Yes (Main Base, Mākaha Ridge)

Title of Previous NEPA or HEPA Document Reviewed	*Activities Analyzed in Previous Document*	*Resource Topics Analyzed in Previous Document*[33]	*Previous Project Ongoing (Y/N)*	*Overlaps with the Project Area for this EIS (Leasehold and Easement Lands)/Cited in this EIS*
2025 HCTT Final EIS/OEIS and ROD (NEPA) https://www.nepa.navy.mil/Current-Projects/At-Sea-Ranges/Hawaii-California-Training-and-Testing-EIS-OEIS/Final-EIS-OEIS/	Conduct at-sea military readiness activities and meet training and testing requirements within the HCTT study area which includes portions of O'ahu, Kaua'i, and southern California. It includes supporting current and future training and testing conducted by the Navy, Marine Corps, Coast Guard, Army, and Air Force.	Air Quality; Sediments and Water Quality; Vegetation; Invertebrates; Abiotic Habitats; Fishes; Marine Mammals; Reptiles; Birds; Cultural Resources; Socioeconomic Resources and Environmental Justice; Public Health and Safety	Yes	No
2025 Final EA for PACDERMA Infrastructure Installation https://www.pmrf-kpgo-eis.com/media/3scjq11d/final-pacderma-ea_october-2025.pdf	Construct an underwater electromagnetic measurement system to characterize the electromagnetic fields generated by oceanographic processes and naval vessels.	Benthic Habitat; Terrestrial Habitat; Water Resources; Terrestrial Invertebrates; Aquatic Invertebrates and Coral; Birds; Fish; EFH; Sea Turtles; Terrestrial Mammals; Marine Mammals	Yes	No

Key: AQM-37 = Air Launched Drone Missile; EA = Environmental Assessment; EFH = Essential Fish Habitat; EIS = Environmental Impact Statement; EMR = Electromagnetic Radiation; FACP = Forward Air Control Post; FEIS = Final Environmental Impact Statement; FONSI = Finding of No Significant Impact; GHA = Ground Hazard Area; HEPA = Accepted term for Hawai'i Revised Statutes Chapter 343; HIANG = Hawai'i Air National Guard; HCTT= Hawaii-California Training and Testing; HSTT = Hawaii-Southern California Training and Testing; KPGO = Kōke'e Park Geophysical Observatory; KTF = Kaua'i Test Facility; MDA = Missile Defense Agency; NASA = National Aeronautics and Space Administration; NEPA = National Environmental Policy Act; OEA = Overseas Environmental Assessment; OEIS = Overseas Environmental Impact Statement; PACDERMA = Pacific Deep Electromagnetic Research Measurement Array; PMRF = Pacific Missile Range Facility; RDT&E = research, development, test, and evaluation; RFI = Radio Frequency Interference; ROD = Record of Decision; SWTR = Shallow Water Training Range; TCS = Tactical Control Squadron; U.S. = United States.

1.6 Relevant Laws and Regulations

The Navy and NASA are preparing this EIS in accordance with applicable federal and State of Hawai'i laws, statutes, regulations, and policies applicable to implementation of the Proposed Action. A description of the Proposed Action's consistency with these laws, policies, and regulations, as well as the names of regulatory agencies responsible for their implementation, are found in Appendix E. This EIS has been prepared to fulfill federal and State environmental requirements for the Navy's and NASA's proposed continued use of State lands on Kaua'i. The document provides detailed assessments of potential impacts to the human and natural environment from the Proposed Action. Once the EIS process is complete, the document will support subsequent real estate negotiations.

1.7 Public and Agency Participation and Intergovernmental Coordination

Public participation is a key component of the EIS process (Figure 1-5). Formal opportunities for public input and participation in the EIS process occur during two stages:

1. During the scoping period, following the joint publication of the NOI (42 U.S.C. section 4321 et seq.), and the Environmental Impact Statement Preparation Notice (EISPN) (HAR section 11-200.1-23); and
2. During the comment period following publication of the Draft EIS (HAR section 11-200.1-25).

Figure 1-5 illustrates the stages of formal public involvement in the NEPA and HEPA environmental processes. Table 1-6 provides a summary of public engagement for these processes, and Appendix G provides a list of interested parties who were contacted as part of scoping. The public involvement processes for NEPA and HEPA for this EIS are running concurrently to meet the requirements of both State of Hawai'i and federal laws and regulations.

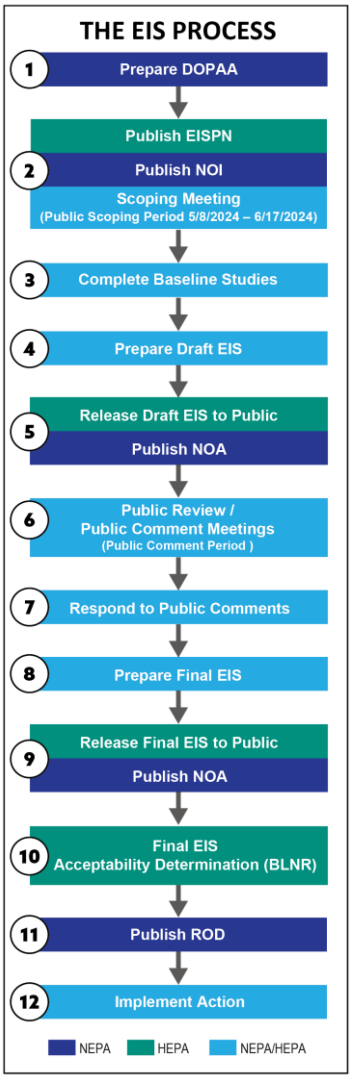


Figure 1-5 EIS Process

1.7.1 Public Engagement and Scoping

Public scoping meetings during the scoping period for this EIS were held on June 4, 5, and 6, 2024, on Kaua'i in Līhu'e, Kekaha, and Kapa'a, respectively (Table 1-6). Public scoping served as an opportunity to obtain input from the community, agencies, and other stakeholders regarding the issues and resources they would like to see addressed and analyzed throughout the EIS process, as well as identify reasonable alternatives. The public was invited to provide oral and written comments at the scoping meetings. The scoping meetings also served as an opportunity to obtain public input concerning potential effects to historic properties pursuant to Section 106 of the National Historic Preservation Act (NHPA) and HRS section 6E-8. Appendix G includes the materials used at the public scoping meetings.

Table 1-6 Public Engagement under NEPA and HEPA

Date	*Description*
May 2024	Notification postcards and letters sent to stakeholders (individuals, agencies, and organizations)
May 8 (HEPA) and May 9 (NEPA), 2024	NOI published in the *Federal Register* (NEPA), EISPN Published in *The Environmental Notice* (HEPA)
May 8, 2024	Public EIS website available: https://www.PMRF-KPGO-EIS.com
June 4, 5, 6, 2024	Public scoping meetings on Kauaʻi: Līhuʻe, Kekaha, and Kapaʻa
June 23, 2025 July 15, 16, 17, 2025 August 7, 2025	• NOA of Draft EIS for public review • Public meetings for Draft EIS: Līhuʻe, Kekaha, and Kapaʻa • Draft EIS public review period closes
August 21, 2026	Publication of NOA for Final EIS in the *Federal Register* (NEPA)
August 23, 2026	Publication of Final EIS in *The Environmental Notice* (HEPA)
August 23–September 22, 2026	30-day wait period
September 23, 2026	Publication of Record of Decision (NEPA)
October 8, 2026	Publication of BLNR Decision (HEPA)

Key: BLNR = Board of Land and Natural Resources; EIS = Environmental Impact Statement; EISPN = Environmental Impact Statement Preparation Notice; HEPA = Accepted Term for Hawaiʻi Revised Statutes Chapter 343; NEPA = National Environmental Policy Act; NOA = Notice of Availability; NOI = Notice of Intent.

Methods to solicit public input during the scoping period for this EIS included notification via mailed postcards, publication of project information on the EIS website, and mailed invitations to participate in scoping. Additionally, notices were published in *The Garden Island*, *MidWeek Kauaʻi*, *Honolulu Star-Advertiser*, and *Ka Wai Ola News* announcing the public scoping meetings (Table 1-7). An NOI was published on May 9, 2024, in the *Federal Register* (2024–10167), and an EISPN was published on May 8, 2024, in *The Environmental Notice*. Both publications announced the date and time of the scoping meetings. Appendix H includes the scoping notices, NOI, and EISPN.

Table 1-7 Newspaper Publications for Public Engagement under NEPA and HEPA During Scoping

Newspaper	*Newspaper Coverage*	*Publication Frequency*	*Publication Dates*
Honolulu Star-Advertiser	Hawaiian Islands	Daily; except Saturday	Wednesday, May 8, 2024 Thursday, May 9, 2024 Friday, May 10, 2024 Sunday, June 2, 2024 Monday, June 3, 2024 Tuesday, June 4, 2024
The Garden Island	Kauaʻi	Daily; except Sunday	Wednesday, May 8, 2024 Thursday, May 9, 2024 Friday, May 10, 2024 Saturday, June 1, 2024 Monday, June 3, 2024 Tuesday, June 4, 2024 Including online events calendar
MidWeek Kauaʻi	Kauaʻi	Wednesdays	Wednesday, May 15, 2024 Wednesday, May 22, 2024 Wednesday, May 29, 2024 Wednesday, June 5, 2024 Including online events calendar
Ka Wai Ola News	Hawaiian Islands	Monthly	Saturday, June 1, 2024

Key: HEPA = Accepted Term for Hawaiʻi Revised Statutes Chapter 343; NEPA = National Environmental Policy Act.

Letters with similar information were sent to individual, agency, and organization stakeholders (Appendix G). Stakeholders consist of agencies with a regulatory role, individuals and organizations interested in the project, and elected officials whose jurisdiction includes PMRF and KPGO. Appendix G includes the scoping postcard that was mailed to interested parties.

Comments received during the scoping period were considered in preparing the Draft EIS and are summarized in Table 1-8. Appendix I includes all scoping comments received and includes responses to comments.

Table 1-8 Summary of Scoping Comments

Resource Area/Topic	*Issue/Concern*
Proposed Action and Alternatives	• The Proposed Action does not include Navy activities on fee simple land. Impacts in the EIS should include impacts from Navy activities on fee simple lands. • Concerns about military presence and training around the Hawaiian Islands, which commenters consider sensitive environments. • Concerns about impacts from Navy activities at PMRF and from agricultural activities to the local environment and public health. • Request for military training to be conducted away from the Hawaiian Islands, which commenters consider sacred lands. • Concerns about increasing development and infrastructure and associated impacts. • Request the EIS include how ongoing missile system tests on fee simple lands impacts the environment. • Request for a figure that shows the individual leases and easements. • Request for additional details regarding military readiness at PMRF and additional details about the Proposed Action including details about KPGO surveillance and tracking. • The Project has no benefit to the community. • Concerns about the impacts training with explosives has on land and the marine environment around Hawai‘i. • Increased detail regarding the No Action Alternative including a request for robust description of restoration following the end of the lease, and concern about infrastructure that could be abandoned in place under the terms of the current leases. • The two action alternatives are similar and additional alternatives should be considered to include: ▪ a more distinctive action alternative ▪ a modified Proposed Action ▪ a shorter-term lease ▪ restoration of the Mānā Plains to wetlands and cultural practice areas ▪ removal of agriculture ▪ expansion of the Kawai‘ele Bird Sanctuary ▪ reduce Navy reliance on non-renewable energy ▪ replace big agricultural lessees with small local farmers • Concern about linking the analysis of Navy and NASA Proposed Actions. • Develop alternatives that take into account other foreseeable and needed projects on the Mānā Plains and surrounding areas; e.g., West Kaua‘i Energy Project, infrastructure for Department of Hawaiian Homelands use, water diversions to support instream flows, groundwater use restrictions and needs, siting and construction of a new landfill, repair roadways to Kōke‘e, the ongoing need for pollution control improvements to the Mānā ditch system, and Kaua‘i’s acute need for affordable housing.

Resource Area/Topic	*Issue/Concern*
	• Identify BMPs and better define the activities that occur on the leased and easement lands. • Integrate applicable nature-based project elements into the Project design. • Dune restoration could be incorporated into the Project. • Consider new technological developments associated with the Project. • As part of the new agreements, request Navy and NASA provide additional community resources including services and infrastructure. • Recommend NASA transfer its technologic infrastructure at KPGO to Space Force and phase out NASA's presence on Kaua'i. • Explain facilities on Ni'ihau and their relationship to the Proposed Action. • Support for the military's presence and activities. • Support for NASA's presence and activities. • Support for the Navy and NASA long-term resource protection. • Support of the No Action Alternative. • Support for Alternative 2.
Air Quality and Greenhouse Gases	• Provide thorough air quality data at PMRF, documentation and reporting of any incidents that have impacted air quality, and emissions data from all activities at PMRF. • Consider electric buses for use by the Navy at PMRF and other renewable energy technologies for improved base sustainability.
Biological Resources	• Request for Navy and NASA to provide natural resource data for leased and easement lands. • Concern about impacts to coastal lands and wetlands. • Concern about endangered species, including marine species. • Effects of noise, light pollution, and chemical byproducts to biological resources. • Concern of ecosystem-scale effects from military activities. • Concern about impacts from invasive species. • Concern about impacts to avian species at Kōke'e. • Consider lowland forest restoration to remediate soil and capture carbon dioxide. • Recommend early consultation with the Division of Forestry and Wildlife and U.S. Fish and Wildlife Service. • Preserve and restore natural terrestrial and marine environments.
Cultural Practices/Archaeological and Architectural Resources/NHPA Section 106 Process/HRS Chapter 6E Process	• Concern about Native Hawaiians' cultural attachment to the land and stress that their lands were wrongly taken. • Consider effects of permanent loss of State land through fee simple retention given the unique historic context of the area. • Discuss mental and emotional health impacts, sense of loss and injustice, in addition to impacts to other resources, and identify mitigation. • Establish regular communication with Native Hawaiian communities and explore other State-owned lands that could be repurposed for community use. • Request for Navy and NASA to provide information on cultural resources and cultural practices. • Request to engage in early consultation under Section 106 of the NHPA. • The Hawai'i Revised Statutes, HRS Chapter 6E process should inform the environmental review process, and incorporate any mitigation identified from the HRS Chapter 6E process. • Request for the Navy to consult with Native Hawaiian Organizations, homestead communities, and Native Hawaiian Ni'ihau beneficiaries. • Concern about impacts to culturally sensitive sites. • Concern about access for cultural practices and gathering rights at PMRF.

Resource Area/Topic	*Issue/Concern*
	• Discuss whether dune restoration would protect cultural sites. • Concern about impacts to culturally sensitive plants and animals. • Ensure a Cultural Impact Assessment is prepared for the Project and include a list of who was consulted. • EIS should incorporate a Ka Paʻakai analysis. • EIS should consider the cultural landscape. • Concern about impacts to cultural practices from water diversion to the wetland.
Cumulative Effects	• Include a description of environmental conditions prior to military operations.
EIS Process	• Concern about different interests and obligations of the federal government (Navy and NASA) and the State of Hawaiʻi (DLNR) regarding decisions about public trust lands. • Concern about the State's responsibility as the trustee of these State lands in the public trust to mālama ʻāina. • Revise Purpose and Need to reflect the State's duty to enforce the Navy and NASA's terms of the lease consistent with principles of mālama ʻāina. • Public meetings should provide an opportunity for the public to interact with each other. • Request an independent body prepare the EIS. • Not enough advertising was conducted for scoping.
Hazardous Materials and Waste	• Concern about the presence of hazardous materials and waste in the land, water, and air from activities at PMRF. • Concern about Navy cleanup after testing activities at PMRF. • Concerns about certain contaminants. • Concern about fuel storage tank conditions at PMRF. • Request removal of fuel storage tanks at PMRF. • Request for third party testing of sites for hazardous materials. • Concerns about PFAS at PMRF. • Concerns about solid waste management.
Land Use and Access	• Concern about ongoing effects from the presence of the military on Kauaʻi. • EIS should include history of land title and land use, including initial negotiation and approval of leases and easements. • EIS should analyze the land use zoning and permitting requirements. • Request for increased access to the beach for fishing, water sports (i.e., surfing and kayaking), walking, horseback riding, and camping from Kekaha Beach to Polihale.
Ocean ROW	• Request explanation for not including the Ocean ROW lease in the area of analysis. • Clarify how Ground Hazard Areas and Launch Hazard Areas are related to the Ocean ROW.
Other	• Concern about the Navy's actions impacting marine resources from underwater training and testing, and pollution from runoff at PMRF. • Request to demilitarize the Hawaiian Islands, returning the land to the people of Hawaiʻi with no trace of previous military activities. • Concerns about how the military is perceived to treat the Hawaiian Islands. • Concerns about the U.S. military and destruction caused to other countries. • Request for all acronyms to be defined and for the EIS to be consistent in use of diacriticals. • Request for EIS to define use of uncommon terms. • Concerns about impacts from RIMPAC activities.
Public Health and Safety	• Concern about impacts from agricultural activities on the easements. • Concern about impacts of explosive ordnance storage at PMRF.

Resource Area/Topic	*Issue/Concern*
	• Request for safety procedures to prevent unintentional or unauthorized detonation of ordnance be identified in the EIS. • Concern about public safety risks from Navy ordnance and hazardous material transfer on Kaua‘i. • Concern about electromagnetic radiation effects on people, wildlife, and weather. • Concerns about wildfire. • Concern about noise impacts on people.
Real Estate Agreements	• Request for a list of reports for all site inspections conducted by DLNR. • Include copies of the leases and easements.
Socioeconomics	• Concern about the low cost of the current leases and easements (only $1 for the Navy). • Support for socioeconomic benefit of the Navy and NASA to Kaua‘i. • Support for socioeconomic benefit of Alternative 2. • Concern about economic impacts of the military and associated costs. • Concern about fair market value of the new real estate agreements, and request for backpay.
Transportation	• Concern about impacts from Navy’s use of the roads.
Visual Resources	• Concern about impacts to viewsheds.
Water Resources	• Concerns about the Navy’s water use. • Discuss how current groundwater pumping at PMRF will affect the project, and if updating the practices would increase resilience. • Request for the Navy and NASA to provide information on punawai spring water sources. • Concern about impacts to water quality from Navy activities, including wells. • Concern about the Navy’s responsibility to apply for a National Pollutant Discharge Elimination System permit for outfall discharges. • Identify interconnected system of irrigation ditches. • Concerns about Red Hill and similar impacts to other water resources from Navy activities at PMRF.

Key: BMP = Best Management Practice; DLNR = Department of Land and Natural Resources; EIS = Environmental Impact Statement; HRS = Hawaii Revised Statute; KPGO = Kōke‘e Park Geophysical Observatory; NASA = National Aeronautics and Space Administration; NHPA = National Historic Preservation Act; PFAS = Per- and polyfluoroalkyl substances; PMRF = Pacific Missile Range Facility; RIMPAC = Rim of the Pacific; ROW = right-of-way; U.S. = United States.

1.7.2 Release of Public Review Draft Environmental Impact Statement

The Navy and NASA released the Draft EIS for public review and comment on June 23, 2025. The public comment period on the Draft EIS was initiated through publication in *The Environmental Notice* and publication of the NOA in the *Federal Register*. Similarly, letters notifying the public of the availability to review and comment on the Draft EIS were sent to individuals, agencies, and organization stakeholders and elected officials, including those individuals, agencies, and organizations who submitted written (or oral) comments during the scoping meetings (Appendix G). Publication of the Draft EIS initiated the 45-day public review period during which the public and interested agencies and organizations had the opportunity to review the Draft EIS and submit their written and oral comments. Additionally, public meetings were held during the Draft EIS comment period. Meetings were held in-person and were broadcast live. The public meetings also served as an opportunity to obtain public input concerning potential effects to historic properties pursuant to Section 106 of NHPA and HRS section 6E-8.

The Navy and NASA informed the public about the availability of the Draft EIS and how to provide feedback via notifications such as mailed postcards and letter invitations, stakeholder letters, newspapers, social media-related pages, the EIS website (https://www.PMRF-KPGO-EIS.com), and public meetings. Additionally, notices were published in *The Garden Island*, *MidWeek Kauaʻi*, *Honolulu Star-Advertiser*, and *Ka Wai Ola News* announcing the public meetings (Table 1-9). A NOA was published on June 20, 2025, in the *Federal Register* (2025–26287) and a Notice of Public Meetings on June 23, 2025, in the *Federal Register* (2025–26561). The publication of the Draft EIS in *The Environmental Notice* also announced the date and time of the public comment meetings. Appendix H includes the EIS notices.

Table 1-9 Newspaper Publications for Public Engagement under NEPA and HEPA During Draft EIS Comment Period

Newspaper	*Newspaper Coverage*	*Publication Frequency*	*Publication Dates*
Honolulu Star-Advertiser	Hawaiian Islands	Daily; except Saturday	Friday, June 20, 2025 Sunday, June 22, 2025 Monday, June 23, 2025 Friday, July 11, 2025 Sunday, July 13, 2025 Monday, July 14, 2025
The Garden Island	Kauaʻi	Daily; except Sunday	Friday, June 20, 2025 Saturday, June 21, 2025 Monday, June 23, 2025 Friday, July 11, 2025 Saturday, July 12, 2025 Monday, July 14, 2025
MidWeek Kauaʻi	Kauaʻi	Wednesdays	Wednesday, June 25, 2025 Wednesday, July 2, 2025 Wednesday, July 9, 2025 Wednesday, July 16, 2025
Ka Wai Ola News	Hawaiian Islands	Monthly	July 2025 edition

Key: HEPA = Accepted Term for Hawaiʻi Revised Statutes Chapter 343; NEPA = National Environmental Policy Act.

Comments received during the Draft EIS comment period were considered in preparing the Final EIS and are summarized in Table 1-10. Appendix I includes all public comments received on the Draft EIS and includes responses to comments.

Table 1-10 Summary of Draft EIS Public Comments

Resource Area/Topic	*Issue/Concern*
Proposed Action and Alternatives	• The Proposed Action should include impacts from Navy activities on fee simple lands. • The Proposed Action should include impacts identified in the 2025 Land-based Training and Testing Final EA and the 2025 Hawaii-California Training and Testing Final EIS/OEIS as they relate to activities performed on leasehold and easement lands. • The ROI should include testing and training performed offshore. • Effects from military presence and training around the Hawaiian Islands, which commenters consider sensitive environments. • Impacts from Navy activities at PMRF and from agricultural activities to the local environment and public health.

Resource Area/Topic	*Issue/Concern*
	• Request for military training to be conducted away from the Hawaiian Islands, which commenters consider sacred lands. • Increasing development and infrastructure and associated impacts. • The Proposed Action has no benefit to the Kaua‘i community. • Increased detail regarding the No Action Alternative including a request for robust description of restoration following the end of the lease, and concern about infrastructure that could be abandoned in place under the terms of the current leases. • Request easement lands transition to community-led agricultural lands. • Request for alternatives to include a shorter-term lease. • Linking the analysis of Navy and NASA Proposed Actions. • All impacts from past projects that were identified should be considered for analysis in the Final EIS if those impacts are ongoing. • Integrate applicable nature-based project elements into the Project design. • As part of the new agreements, request Navy and NASA provide additional community resources including services and infrastructure. • Explain facilities on Ni‘ihau and their relationship to the Proposed Action. • Recognition that under Alternative 2, public access would decrease and State oversight would be diminished. • Request to expand discussion on long-term lease/easement duration. • Request that nautical boundaries and additional maps be included in the Final EIS. • The No Action Alternative does not contain enough detail. • The Navy is increasing testing and training activities. • Impacts to marine life and groundwater were not analyzed. • Request to include all permits and licenses to be applied for under the Proposed Action. • Request to include impacts to State land use districts and zoning regulations under Alternative 2. • The No Action Alternative impacts are one-sided. • Opposition to all three alternatives. • Request to add additional sections to the EIS to analyze other resources. • Request for clarification on distribution of funds under the Proposed Action. • The No Action Alternative did not provide enough information on clean-up/restoration of State lands in the event of a lease expiration. • The No Action Alternative should not preclude the continuation of military funding for conservation and natural resources. • Support for the military’s presence and activities. • Support for only NASA’s maintained presence. • Support for the Proposed Action. • Support of the No Action Alternative.
Air Quality and Greenhouse Gases	• Consider electric buses, bikes, and charging stations for use by the Navy at PMRF and other renewable energy technologies for improved base sustainability. • Requirements for air pollution control permit and consideration for dust and airborne pollutants. • Military production of greenhouse gases.
Biological Resources	• Impacts on coastal lands, wetlands, and biological life that frequent wetlands. • Effects to endangered, native, and endemic species, including marine species. • Effects of noise, light pollution, and chemical byproducts to biological resources. • Ecosystem-scale effects from military activities. • Impacts from invasive species, particularly the Coconut Rhinoceros Beetle.

Resource Area/Topic	*Issue/Concern*
	• Special status species plants at KPGO, such as the kōpiko and others, were not fully analyzed in either the surveys or in the main body of the biological report. Concern that mitigation measures for the kōpiko were also not fully discussed in the EIS. • EIS should consider specific forest restoration and plant management techniques. • Request to improve hunting access for invasive ungulate removal. • Request to incorporate more robust discussion on wildland fire risk. • Request for more information on the management of native plant and animal species including terrestrial invertebrates/insects and use of insecticides. • Request data on Hawaiian picture fly surveys at KPGO including surveyor credentials. • Avian botulism in the oxidation ponds adjacent to Main Base. • Request to incorporate robust analysis of species outlined for authorized take, minimization, and mitigation actions for federally listed plant and animal, species specific recommendations, improvements to species management, and increased coordination with State regulatory agencies. • Displeased with Navy and NASA long-term resource protection. • Support for the Navy and NASA long-term resource protection. • Recommend the Navy explore alternative methods to prioritize bird conservation and monitoring at PMRF. • Request that more content from the Integrated Natural Resources Management Plan be included in the main body of the EIS. • Marine mammal "takes." • Insufficient climate change and sea level rise analysis. • Biosecurity plans for various invasive species found within the ROI. • Support for PMRF's long-term natural resource protection. • Recognition that no significant environmental concerns were identified in the analysis.
Cultural Practices/Archaeological and Historic Properties/NHPA Section 106 Process/HRS 6E Process	• Native Hawaiian's cultural attachment to the land and stress that their lands were wrongly taken. • The EIS should discuss mental and emotional health impacts, sense of loss and injustice, in addition to impacts to other resources, and identify mitigation. • Request for the Navy to consult with Native Hawaiian Organizations, homestead communities, and Native Hawaiian Niʻihau beneficiaries. • Impacts to culturally sensitive sites and activities, including impacts from noise. • More indigenous ecological knowledge and history should have been incorporated. • Access for cultural practices and gathering rights at PMRF. • Restoration of culturally sensitive plants and animals. • Sufficiency of Ka Paʻakai analysis, the Archaeological Inventory Survey, and associated mitigation measures. • Consultation with the State Aha Moku and various lineal descendent representatives was insufficient. • Request clarification on determination of significance for specific cultural sites at PMRF that are considered eligible under the NRHP. • Request to include summary of Navy's current compliance with 6E-8 and any previous SHPD determinations. • Recommendation that the EIS comply with all applicable laws and rules, including the 1997 Guidelines for Assessing Cultural Impacts. • Nohili Dune restoration should be incorporated into the No Action Alternative. • Consultation with indigenous communities was not sufficient and is purely symbolic.

Resource Area/Topic	*Issue/Concern*
	• Revise specific historical terminology used in the EIS, particularly the term "ceded." • Request for historical land titles and baseline cultural studies. • Request to analyze impacts to cultural practices on Niʻihau and Kaʻula islands. • Request for a specific Archaeological survey of Kaʻula Island. • Support for the Navy's long-term cultural resource protection of the land at PMRF, including preservation of iwi kūpuna. • Appreciation for the robust cultural resource analysis and commitments made to Native Hawaiian communities for access for cultural practices as discussed in the EIS.
Cumulative Effects	• Include a description of environmental conditions prior to military use. • Final EIS should include cumulative effects from Navy land use since commencement of current lease. • There are too many cumulative effects to the project. • Impacts from RIMPAC activities. • Inadequate cumulative effect analysis regarding contamination and development. • Support for the Navy's community engagement including blood drives, highway trash cleanups, collaboration with Kauaʻi Community College, and leadership training and sponsorship. • Support for the Navy's relationship with residents of Niʻihau. • Support for the Navy's relationship building with Kauaʻi County government, Waimea High School, and other community organizations.
EIS Process	• Different interests and obligations of the federal government (Navy and NASA) and the State of Hawaiʻi (DLNR) regarding decisions about public trust lands and fiduciary responsibilities under all three alternatives. • Question regarding posted public meeting times. • The EIS does not meet certain HEPA- or NEPA-related legal requirements. • Suggest that all concerns raised by the community be incorporated into the Final EIS. • Request for PMRF staff to participate in media engagement. • The EIS is incomplete and/or insufficient. • The EIS is too lengthy. • Request to incorporate more information into the body of the EIS instead of directing the reader to the appendices. • Request to receive receipt of comments. • Request to receive a printed copy of the EIS. • Recognition that recommendations provided in scoping comments were fully adopted in the Draft EIS. • Recognition of community participation in public meetings conducted for the Draft EIS.
Hazardous Materials and Waste	• Fuel and other hazardous material presence and conditions at PMRF in the water adjacent to Barking Sands, and on leasehold, easement, and fee simple lands. • Request for third-party verification for hazardous material testing and reporting. • PFAS at PMRF and request for investigation, sampling, and public notification and monitoring. • Contamination of lands on other DoD installations which have limited access and certain recreational activities. • Pesticide use and request for disclosure of pesticide management plans, including pesticide use in areas adjacent to Main Base. • Requirements for construction activities that could involve asbestos and lead-containing materials.

Resource Area/Topic	*Issue/Concern*
	• Request for disclosure of pollutant spill reports and management plans. • Navy clean-up after lease expiration. • Request for risk assessment and soil and groundwater testing near fuel storage tanks and missile launch areas. • Appreciation that PMRF cleans up after themselves. • Ensure that the Final EIS discusses a plan to remove all cesspools in the ROI in compliance with Hawai'i State Department of Health standards. • Request that rubbish piles from Navy and NASA activities be removed prior to lease retention.
Land Use and Access	• Ongoing effects from the presence of the military on Kaua'i. • General requests to return the land to Kanaka Maoli and concern over Kanaka Maoli sovereignty. • Request for increased access to the beach for water sports (i.e., surfing and kayaking), hiking, and camping from Kekaha Beach to Polihale. • Request for increased access for hunting, foraging, or fishing. • Request formalization of an updated, non-conditional access plan without the ability to revoke. • Request for an expanded discussion on access and an access management plan. • Request that an access agreement be incorporated into lease agreements. • Recommend land be used for affordable housing and suggest the Navy implement housing mitigation strategies. • Recognition of community events hosted by PMRF that are open to the public. • Questions regarding accuracy of permitting history for PMRF and KPGO. • Questions/concerns regarding existing use within the Conservation District, non-conforming use, and historical records of use within those areas. • Request that no hazardous materials be stored on Conservation District lands. • Request to utilize TMKs in the EIS. • Request for information on the change in acreage and TMKs from the EISPN to the Draft EIS. • Request to formalize and expand existing use agreements for helicopter operations and updates to infrastructure on State lands adjacent to Navy- and NASA-use lands. • Support for the continuation of the easements to preserve agricultural land. • PMRF helps preserve open space and agricultural land on the easement lands adjacent to Main Base.
Ocean ROW	• Proposed Action should include the 12-square mile Ocean ROW lease in the area of analysis. • The Navy's use of the Ocean ROW after lease expiration. • What materials and instrumentation are currently present and utilized in the Ocean ROW and their potential impacts to marine species.
Ongoing Effects	• The Navy's actions impacting marine resources from underwater testing and training, including the use of sonar. • Pollution from runoff at PMRF. • Impact of existing improvements to infrastructure on Mākaha and Miloli'i Ridges should be analyzed. • The right of transit along the shoreline adjacent to Barking Sands pursuant to HRS Chapter 115.
Other	• How the military is perceived to treat Native Hawaiians and the Hawaiian Islands. • Testing carried out at PMRF and its relation to global militarization and effects on other countries.

Resource Area/Topic	*Issue/Concern*
	• Recommendation for the Navy to visit various historical and art exhibits within the State. • Military activities on/at Kahoolawe, Pōhakuloa, Niʻihau, in the Kaulakahi Channel, Kawailoa-Poamoho Training Areas, Puʻunua Firing Range, Kapilina Beach Homes, Kahuku, Molokini, and the Makua Military Reservation. • Activities on military bases on Oʻahu and the scale of those activities, including amount of equipment and frequency of training activities. • Cultural and environmental impacts to Kaʻula island from military testing activities and recommendations for restoration. • Impacts associated with Red Hill. • Request to receive access to database used to create figures in the EIS. • Comments regarding other NEPA documents analyzing impacts at PMRF. • Foreign governments and the role of SpaceX in Hawaiʻi. • Ethical concerns over operations conducted by the Sandia Corporation, which owns Kauaʻi Test Facility. • Redacted portions of the EIS. • The DoD should participate in more community health-related programs on Kauaʻi and Oʻahu. • Requesting information on structures located on Ground Hazard Areas. • The EIS does not consider environmental injustices. • Request disclosure of underground, coastal, and aerial operations, including classified contracts and missile data. • Request for disclosure of any State inspections on the leasehold and easement lands. • Consider need for permanent infrastructure considering the pace of developing technologies (use of drones, cyber warfare) and recommend use of alternative non-explosive training methods.
Public Health and Safety	• Impacts from agricultural activities on the easements. • Unexploded ordnance and request for timeline and plan for removal. • Electromagnetic radiation effects on people, wildlife, and weather and request for disclosure for radiation mitigation plans and third-party oversight. • Wildfire and the risk of wildfire associated with missile launches. • Noise impacts to the public. • Questions regarding missile launch locations, weapons systems, and missile landing areas. • Questions about monitoring equipment at PMRF and KPGO. • General concern for risks to human health and health impacts from certain contaminants used in propellants. • Request that more detail on fuel storage tanks, both on leasehold and fee simple lands, be incorporated into the EIS. • Specific aircraft operations. • Request for more information on infrastructure associated with the Kamokalā Magazines. • Include discussion on safety of PMRF staff or nearby communities due to risk of increasing negative foreign relations. • Request for more information on public notification timeline during missile launches. • Request to disclose all PMRF environmental and public health plans. • Support for the Navy's activities that result in an increased feeling of safety.

Resource Area/Topic	*Issue/Concern*
	• Support for the Navy's collaboration with and augmentation of the Kaua'i County Fire Department for fire/emergency support. • Support for the Navy's invasive species management for wildfire prevention. • Support for Navy infrastructure at Mākaha Ridge supporting Hawaii Air National Guard and Federal Aviation Administration operations. • Recognition of services provided by PMRF during Hurricanes Iniki and Iwa. • Recognition of services and electricity provided by PMRF during wildfires in Kamuakani to maintain power to critical infrastructure in the area. • Recognition of firefighting services (helicopter water drops) provided by PMRF to the community. • Recognition that no significant public health and safety risks were identified in the analysis. • Recognition that PMRF contractors comply with all applicable federal and State regulations while conducting operations on both fee simple and leasehold and easement lands. • Feeling that the efforts that PMRF contractors take to be environmentally compliant is not appreciated. • Lease retention fees should be higher than what is anticipated under the Proposed Action.
Real Estate Agreements	• Request for a list of reports for all site inspections conducted by DLNR. • Lease agreements should include commitment to assist with Kekaha landfill closure and all associated cleanup. • Lease agreements should include environmental restoration as part of lease renewal. • Request that the "Unresolved Issues" section of the EIS be expanded to include more detail on land disposition under a new real estate agreement. • NASA's legal authority to provide a use permit to the Navy. • Lease renewal should include dedicated fee to support long-term natural resource protection and a market-based fee for utilities. • Request to consolidate leases under the Proposed Action. • Request for more information regarding the fair market value of the land and how the funding would be distributed. • Recommend that PMRF utilize the Kaua'i Emergency Management Agency system to inform the public about PMRF long-term natural resource protection and investment in infrastructure and community programs.
Socioeconomics	• The low cost of the current leases and easements (only $1 for the Navy). • Support for socioeconomic benefit of the Navy and NASA to Kaua'i. • Support for the employment opportunities provided by PMRF. • The legitimacy of claims regarding the positive economic impact that PMRF has on the island of Kaua'i. • Request to see a detailed breakdown of spending at PMRF. • General DoD funding and uses. • Belief that reparations are owed to Native Hawaiians. • Request that PMRF staff invest in the local economy.
Transportation	• The volume and speed of traffic in Kekaha due to PMRF activities. • Mitigation for habitat fragmentation due to road infrastructure.
Utilities	• Support for the Navy's investment in clean energy in collaboration with the Kaua'i Island Utility Cooperative. • Wastewater treatment plans should be upgraded to EPA standards. • Well and pump systems are not accurately depicted.

Resource Area/Topic	*Issue/Concern*
Water Resources	• The discussion regarding erosion at Mākaha Ridge and associated impacts to water quality is incomplete and should be expanded to include impacts from Navy-use structures and impervious surfaces. • Discuss how current groundwater pumping at PMRF and other water-related projects discussed in the EIS will affect the greater Mānā Plain, and if updating the practices would increase resilience. • Suggest allowing ADC lands to return to wetland state due to potential sea level rise, including cessation of pumping activities in the ROI and in the greater Mānā Plain. • Cumulative effects to water quality on fee simple, leasehold, and easement lands as well as water use on properties adjacent to Main Base. • Impacts to groundwater and potable water from Navy activities. • Recommend more collaboration with other agencies for water management in the Mānā Plain. • The aquifers within the ROI were not properly analyzed. • Groundwater, streams, and Mānā Plain outfalls should be tested by a third-party regularly and results should be shared publicly. • The Final EIS should include more information on the Kawaiʻele Pump Station Maintenance and Open Floodable Space projects. • Request that the USACE final determination on the proposed wetland area adjacent to Main Base be included in the Final EIS. • Request that PMRF disclose historic or current pollutant contributions to the Mānā Plain ditch and outfall system. • Research alternative methods for flood mitigation in the Mānā Plain. • Impacts to water resources in the Mānā Plain, including aquifers and muliwai systems, due to Navy activities and infrastructure at PMRF. • Impacts to nearshore waters, such as runoff and drainage, should be expanded in the EIS. • Request for more historical and pumping information on the Mānā Well. • Requirements for environmental compliance and regulatory requirements for projects which may impact State waters (i.e., permits, National Pollutant Discharge Elimination System permit, best management practices, water quality certifications). • Septic water systems on beach cottages on fee simple land and runoff. • Utilize Best Management Practices during construction activities to minimize impacts to water quality in the ROI.

Key: ADC = Agribusiness Development Corporation; DLNR = Department of Land and Natural Resources; DoD = Department of Defense; EA = Environmental Assessment; EIS = Environmental Impact Statement; EISPN = Environmental Impact Statement Preparation Notice; EPA = United States Environmental Protection Agency; HEPA = Accepted Term for Hawaiʻi Revised Statutes Chapter 343; HRS = Hawaii Revised Statute; KPGO = Kōkeʻe Park Geophysical Observatory; NASA = National Aeronautics and Space Administration; NEPA = National Environmental Policy Act; NHPA = National Historic Preservation Act; NRHP = National Register of Historic Places; OEIS = Overseas Environmental Impact Statement; PFAS = Per- and polyfluoroalkyl substances; PMRF = Pacific Missile Range Facility; RIMPAC = Rim of the Pacific; ROI = Region of Influence; ROW = right-of-way; SHPD = State Historic Preservation Division; TMK = Tax Map Key; USACE = United States Army Corps of Engineers.

1.7.3 Final EIS

Substantive[35] public comments on the Draft EIS were considered in the development of the Final EIS. A detailed summary of public comments, revisions made to the Draft EIS in response to comments, and responses to substantive comments are provided in Appendix I of the Final EIS.

1.7.4 Intergovernmental Coordination

Consultation with the USFWS and National Oceanic and Atmospheric Administration (NOAA) Fisheries, also known as National Marine Fisheries Service (NMFS), is required for actions that may affect federally listed species or critical habitat under section 7 of the Endangered Species Act (ESA). Ongoing and existing activities at PMRF and KPGO have been previously covered under formal consultations with USFWS and NMFS, which resulted in the issuance of Biological Opinions for 2014, 2018, and 2025. Since there are no new activities resulting from the Proposed Action, the Navy and NASA have determined that there would be no new effects to ESA-listed species on leasehold and easement lands and reinitiation of consultation with USFWS and NMFS is not required per ESA regulations. The Navy and NASA are coordinating with DLNR-DOFAW regarding potential effects to State-listed species. Section 3.4, *Biological Resources* includes additional information about Navy natural resource staff coordination with DOFAW for activities at PMRF. The Navy and NASA are also consulting with the Hawai‘i State Historic Preservation Officer (SHPO) as part of their NHPA requirements and coordinating with the DLNR, State Historic Preservation Division (SHPD) to satisfy HRS section 6E-8 requirements. The Navy and NASA are also in coordination with the OHA, Aha Moku Council (Kaua‘i and State of Hawai‘i), and Native Hawaiian Organizations. The Navy and NASA are coordinating with the State of Hawai‘i Office of Planning and Sustainable Development, Planning Division under the Coastal Zone Management Act (CZMA). Applicable State of Hawai‘i and federal laws, regulations, and policies are described in Appendix E.

1.7.5 Ongoing Community Coordination

The PMRF Cultural Resources department demonstrates extensive community outreach efforts by actively engaging with various stakeholders. Department personnel coordinate with lineal descendants and representatives of local cultural groups, attend community meetings, and consult with Native Hawaiian Organizations (NHOs) regarding requests to visit culturally significant areas or significant discoveries. The department also facilitates access for educational institutions and cultural practitioners, supports cleanup initiatives, and collaborates with local associations. Additionally, department personnel organize and participate in ceremonies to honor cultural heritage and work closely with NHOs on important projects, such as the construction of burial crypts and repatriation efforts. These activities highlight the department’s commitment to preserving and respecting cultural resources through comprehensive and inclusive community engagement. Table 1-11 includes a description of this engagement for the Navy and NASA.

[35] A substantive comment is one that provides new information about the project, an alternative, or the analysis; identifies a different way to meet the need; points out a specific flaw in the analysis; suggests alternate methodologies and the reasons why they should be used; makes factual corrections; or identifies a different source of credible research that, if used in the analysis, could result in different effects. In HEPA per HAR section 11-200.1-26(a), “In deciding whether a written comment is substantive, the proposing agency or applicant shall give careful consideration to the validity, significance, and relevance of the comment to the scope, analysis, or process of the EIS, bearing in mind the purpose of this chapter and chapter 343, HRS.”

Table 1-11 Ongoing Community Coordination Conducted by the Navy and NASA

Description	*Navy/NASA*
Management of Cultural Resources[36]	
Coordinate with community of the Kona Moku Ahupua‘a.	Navy
Coordinate with Aha Moku representative (Kona Moku).	Navy
Through an existing Comprehensive Agreement for NAGPRA, Navy engages in NHO consultations in the event of discovery of human skeletal remains determined to be of Native Hawaiian descent.	Navy
Coordinate access to Nohili or cultural areas for cultural access.	Navy
Coordinate with DHHL on debris cleanup.	Navy
Coordinate with Leadership Kaua‘i and recommend PMRF employees participate in the Leadership Kaua‘i program.	Navy
In coordination with PMRF Natural Resources Program, coordinate access to Mānā Plain for huli‘ia (Hawaiian observation) and ‘Āina Momona training.	Navy
Coordinate access to Nohili with various research institutions and educational groups to collect intertidal survey data and conduct monitoring to advise and direct management strategies which support intertidal fishery productivity, specifically ‘ōpihi.	Navy
Engage with Native Hawaiian Community for Native Hawaiian ceremonies related to NAGPRA and long-term cultural resource protection (Native Hawaiian places names).	Navy
Coordinate with NHOs on maintenance of Lua Kupapa‘u O Nohili (Nohili Burial Crypt) and ongoing coordination for repatriation.	Navy
Host an annual spring outreach event where local cultural organizations and work service projects provide educational presentations to community members.	Navy
Management of Natural Resources	
Support of a downed seabird aid/collection station provided and staffed by SOS, as well as wedged-tailed shearwater banding training event.	Navy
Coordinate with the Morale, Welfare, and Recreation to place natural resources-related information in and around recreational areas on PMRF, including the visitor check-in building and beach cottages.	Navy
Translocation coordination of Laysan albatross to Na ‘Āina Kai Botanical Garden and Sculpture Park.	Navy
Collaborate working relationship with KISC in regard to invasive species management.	Navy
Participate as an active member of the Kaua‘i Conservation Alliance, an informal outreach forum for natural resource managers and general public.	Navy
Provide educational information to tenants, residents, and visitors regarding lights and seabirds.	Navy
Coordinate ungulate control at Mākaha Ridge with PMRF Archery Club.	Navy
Host an annual spring outreach event where local environmental organizations and work service projects provide educational presentations to community members.	Navy
Participate in educational Science, Technology, Engineering, and Mathematics events for local elementary students and Girl Scouts.	Navy
Project partnership and collaboration with DLNR-DOFAW, National Fish and Wildlife Foundation, ADC/KAA in regard to REPI Projects.	Navy
Support site tours for any local schools or community groups that are interested.	NASA
Allow the State to use the site LZ (field) for helicopter operations in support of many State of Hawai‘i projects involving State Parks, Forestry, and DLNR. Many of these projects involve control of invasive plant species, and wildlife preservation.	NASA

[36] Includes activities conducted by PMRF Cultural Resources Management Program, CPLO, and Cultural Protocol Officer.

Description	*Navy/NASA*
Allow full access for first responders for rescue efforts where they fly rescue helicopters in and out of the site as needed for injured or lost persons in the State Park recreational areas. KPGO is one of the few places in the State Park that supports efforts like this.	NASA

Key: ADC = Agribusiness Development Corporation; DHHL = Department of Hawaiian Home Lands; DLNR = Department of Land and Natural Resources; DOFAW = Department of Forestry and Wildlife; KAA = Kekaha Agricultural Association; KISC = Kaua'i Invasive Species Committee; NAGPRA = Native American Graves Protection and Repatriation Act; NASA = National Aeronautics and Space Administration; NHO = Native Hawaiian Organization; PMRF = Pacific Missile Range Facility; REPI = Readiness and Environmental Protection Integration; SOS = Save Our Shearwaters; USDA = U.S. Department of Agriculture; WS = Wildlife Services.

This page intentionally left blank.

2 Proposed Action and Alternatives

This chapter includes a description of the Proposed Action, the screening factors used to determine reasonable alternatives, alternatives carried forward for analysis, alternatives considered but eliminated from detailed analysis, and BMPs included in the Proposed Action.

2.1 Proposed Action

The Navy proposes to retain the use of 8,172 acres of State lands on Kaua'i in support of continued and ongoing military training and testing at PMRF. NASA proposes to retain the use of 23 acres of State lands on Kaua'i in support of maintaining data collection efforts of global significance at KPGO. The Proposed Action includes current operations that occur on leasehold and easement lands.

2.2 Alternative Screening Process

NEPA requires analysis of a reasonable range of alternatives (42 U.S.C. section 4321 et seq.) and requires objective evaluation of reasonable alternatives. Similarly for HEPA (HAR section 11-200.1-24(h)), an EIS "shall describe in a separate and distinct section discussion of the alternative of No Action as well as reasonable alternatives that could attain the objectives of the action." Only those alternatives that meet the purpose of and need for the Proposed Action and are deemed reasonable following the application of alternatives screening criteria are carried forward for detailed analysis in this EIS.

The screening factors used to select reasonable alternatives that would allow the Navy and NASA missions to be fulfilled are:

- Maintain use of State lands currently used to support DoD and NASA missions on Kaua'i for a period of 25 years or longer;
- Preserve current DoD and NASA operations on Kaua'i;
- Retain existing DoD and NASA infrastructure on Kaua'i; and
- Support DLNR management of State lands and associated environmental and conservation programs on Kaua'i.

All screening factors must be met for an alternative to be considered reasonable. Table 2-1 identifies the six alternatives considered.

Table 2-1 Description of Alternatives Identified

Alternative Name	*Alternative Description*
Alternative 1: Succeeding Current Real Estate Agreements	The Navy and NASA would apply to DLNR to secure new real estate agreements with no change to the current uses in the existing agreements[37] for a minimum duration of 25 years up to a maximum duration as negotiated with DLNR.
Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds	The Navy and NASA would pursue fee simple acquisition of up to 700 acres (684–Navy, 16–NASA) of leaseholds, and otherwise obtain use of the remaining acreage as described in Alternative 1.

[37] The Navy would not pursue new real estate agreements for easements B-1 and B-2 under the action alternatives as these were temporary construction permits granted in 1977 and are no longer needed.

Alternative Name	*Alternative Description*
Alternative 3: No Action Alternative	The State of Hawai'i would not issue the Navy and NASA any real estate agreements for the State lands on Kaua'i after expiration of the leases and easements between 2027 to 2030. The current real estate agreements for 8,172 acres with the Navy and 23 acres with NASA would expire. Existing infrastructure on Navy and NASA leasehold and easement lands could be removed or remain in place as determined by negotiations between the parties pursuant to the existing real estate agreements.
Alternatives Considered but Not Carried Forward for Detailed Analysis	
Succeeding Leases and Easements Except for Current Leases at Mākaha Ridge and KPGO	The Navy and NASA would obtain succeeding leases and easements on leased land not currently located in the State of Hawai'i's Conservation District. These would include leaseholds at Main Base, Kamokalā Ridge, Mānā Water Well, and Miloli'i Ridge, but would not include succeeding leaseholds or easements at Mākaha Ridge or KPGO.
Succeeding Leases Only with No Easements	The Navy and NASA would only obtain succeeding lease agreements and not succeeding easements. These would include succeeding leaseholds at Main Base, Kamokalā Ridge, Mānā Water Well, Miloli'i Ridge, Mākaha Ridge, and KPGO, but not easements at Main Base, Kamokalā Ridge, Mākaha Ridge, or KPGO.
Shorter Duration	The Navy and NASA would obtain succeeding real estate agreements for a short duration (less than 25 years).

Key: BLNR = Board of Land and Natural Resources; KPGO = Kōke'e Park Geophysical Observatory; NASA = National Aeronautics and Space Administration; PMRF = Pacific Missile Range Facility.

Table 2-2 summarizes the application of the screening factors to these alternatives and the results. Two alternatives meet all the screening factors: (1) succeeding current real estate agreements at fair market value; and (2) fee simple acquisition of current leaseholds and obtain use of same easements[38]. Section 2.3 includes a description of alternatives carried forward for detailed analysis and Section 2.4 includes a description of alternatives considered but eliminated from detailed analysis.

2.3 Alternatives Carried Forward for Detailed Analysis

The screening analysis resulted in two action alternatives (Alternatives 1 and 2), depicted in Figures 2-1 and 2-2. Alternative 3 is the No Action Alternative, which was carried forward for analysis in this EIS (Section 2.3.3, *No Action Alternative*) as required by NEPA and HEPA. This alternative is depicted in Figure 2-3.

A comparison of these alternatives is provided in Table 2-3, which lists the acres of leasehold and easement lands.

[38] The Navy would not pursue new real estate agreements for easements B-1 and B-2 under the action alternatives as these were temporary construction permits granted in 1977 and are no longer needed.

Table 2-2 Alternatives Screening Evaluation

Screening Factors	*Alternatives Carried Forward for Detailed Analysis*			*Alternatives Considered but Not Carried Forward for Detailed Analysis*		
	Alternative 1: Succeeding Current Real Estate Agreements[1]	*Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds*[2]	*Alternative 3: No Action Alternative*[3]	*Succeeding Leases and Easements (Except at Mākaha Ridge and KPGO)*[4]	*Succeeding Leases Only (No Succeeding Easements)*[5]	*Shorter Duration (less than 25 years)*
Maintains use of State lands currently used to support DoD and NASA missions on Kaua‘i for a period of 25 years or longer	Yes	Yes	No	No	No	No
Preserves current DoD and NASA operations on Kaua‘i	Yes	Yes	No	No	No	Yes
Retains existing DoD and NASA infrastructure on Kaua‘i	Yes	Yes	No	No	No	Yes
Supports DLNR management of State lands and associated environmental and conservation programs	Yes	Yes	Yes–with limitations	Yes	Yes–with limitations	Yes
Alternative Carried Forward	Yes	Yes	Yes[6]	No	No	No

Notes: See Section 2.3 for alternatives carried forward for detailed analysis and Section 2.4 for alternatives considered but eliminated from detailed analysis.
[1]See Section 2.3.1, Alternative 1: Succeeding Current Real Estate Agreements.
[2]See Section 2.3.2, Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds.
[3]See Section 2.3.3, Alternative 3: No Action Alternative.
[4]See Section 2.4.1, Succeeding Leases and Easements (Except at Mākaha Ridge and KPGO).
[5]See Section 2.4.2, Succeeding Leases Only (No Succeeding Easements).
[6]Carried forward per NEPA and HEPA requirements.
Key: DLNR = Department of Land and Natural Resources; DoD = Department of Defense; KPGO = Kōke‘e Park Geophysical Observatory; NASA = National Aeronautics and Space Administration.

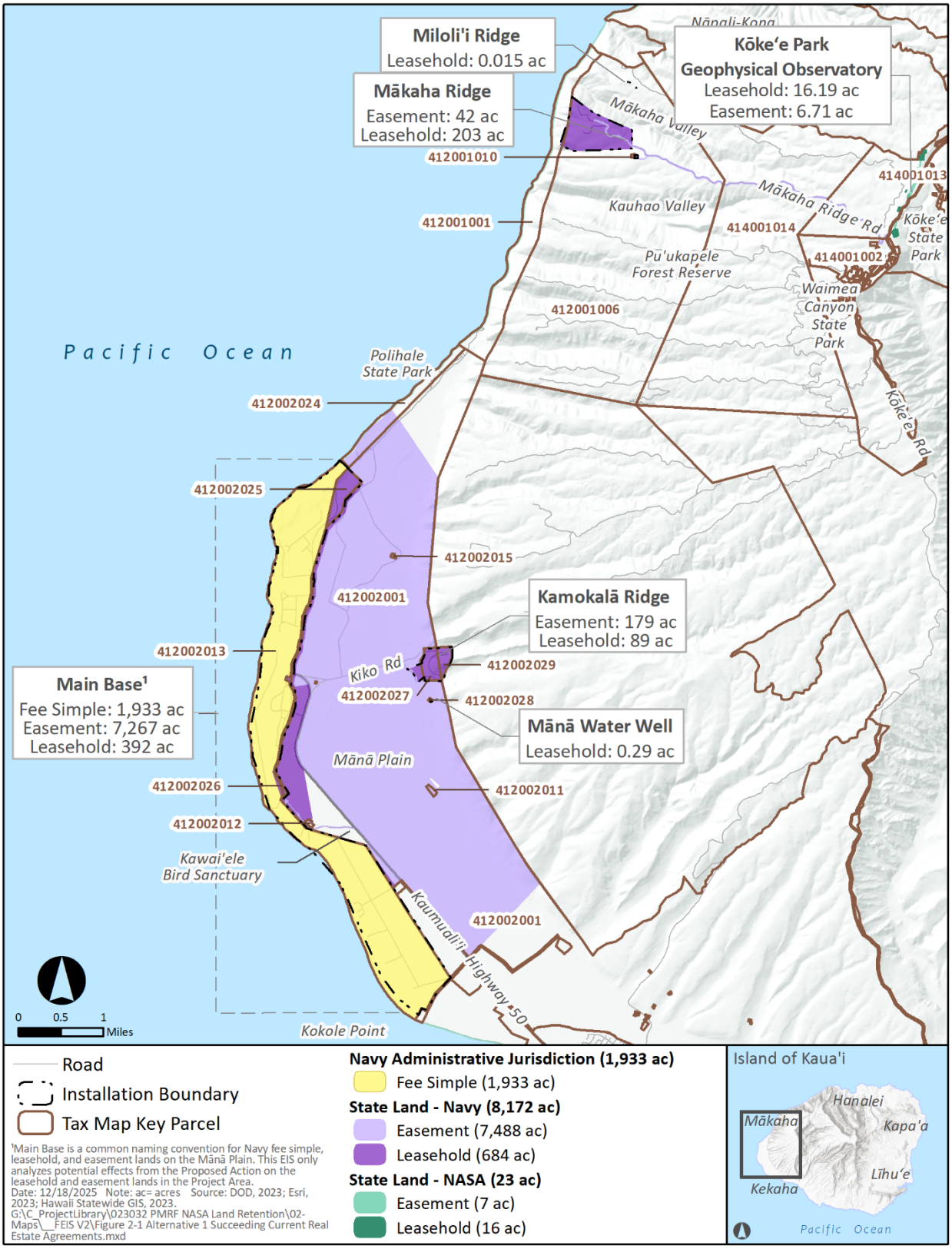


Figure 2-1 Alternative 1: Succeeding Current Real Estate Agreements

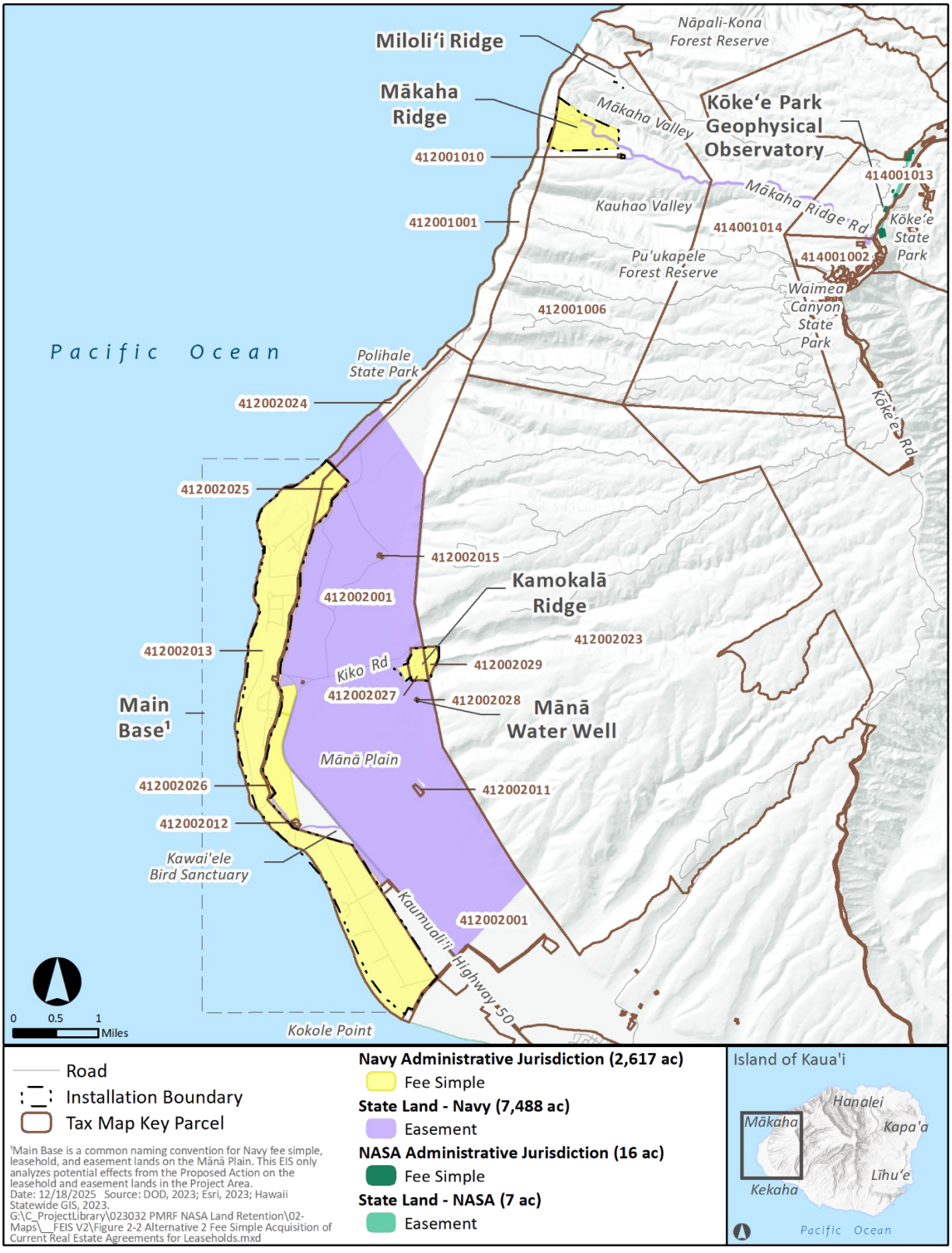


Figure 2-2 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds



Figure 2-3 Alternative 3: No Action Alternative

Table 2-3 Comparison of Alternatives: Navy and NASA Land Status and Acreages by Location

Location	*Existing Conditions/Alternative 1 (acres)*				*Alternative 2 (acres)*				*Alternative 3 (acres)*			
	Lease-hold	*Ease-ment*	*Fee Simple*	*Total*	*Lease-hold*	*Ease-ment*	*Fee Simple*	*Total*	*Lease-hold*	*Ease-ment*	*Fee Simple*	*Total*
Navy												
Main Base	392	7,267	1,933[2]	9,592	N/A	7,267	2,325	9,592	N/A	N/A	1,933[2]	1,933
Kamokalā Ridge	89	179	N/A	268	N/A	179	89	268	N/A	N/A	N/A	N/A
Mānā Water Well	0.29	N/A	N/A	0.29	N/A	N/A	0.29	0.29	N/A	N/A	N/A	N/A
Miloli‘i Ridge	0.015	N/A	N/A	0.015	N/A	N/A	0.015	0.015	N/A	N/A	N/A	N/A
Mākaha Ridge	203	42	N/A	245	N/A	42	203	245	N/A	N/A	N/A	N/A
Total	684	7,488[1]	1,933[2]	10,105	N/A	7,488	2,617	10,105	N/A	N/A	1,933[2]	1,933
NASA												
KPGO	16	7	N/A	23	N/A	7	16	23	N/A	N/A	N/A	N/A
Total	16	7	N/A	23	N/A	N/A	23	23	N/A	N/A	N/A	N/A

Notes: [1]7,488 acres includes 7,315 acres of Restrictive Use Easements and 173 acres of Utility and Roadway Easements.
[2]The amount of Navy fee simple land does not change under these alternatives. The 1,933 acres represent land the Navy already holds in fee simple.

Key: KPGO = Kōke‘e Park Geophysical Observatory; N/A = Not Applicable; NASA = National Aeronautics and Space Administration.

2.3.1 Alternative 1: Succeeding Current Real Estate Agreements

Under this alternative, the Navy and NASA would apply to DLNR to secure new real estate agreements, for a minimum duration of 25 years up to a maximum duration as negotiated with DLNR, and for the same uses as the current leases and easements (see Table 1-1 and Appendix C)[39]. The Navy's agreements would include 684 acres of land leased exclusively by the Navy and 7,488 acres of easement lands (for a total of 8,172 acres[40]). Approximately 95 percent of the easement lands are passively used for encroachment buffers and mission readiness; the remaining 5 percent are used for access and utility easements. NASA's agreements would include 16 acres of land leased exclusively by NASA and 7 acres of easements (for a total of 23 acres). NASA would enter into a new real estate agreement with the Navy for continued use of Sites A–D at KPGO.

Securing the new real estate agreements at fair market value from BLNR must occur prior to expiration of the current real estate agreements to ensure uninterrupted operation of all federal agency missions. Under this alternative, there would be no changes to the type or frequency of current activities occurring on State leasehold and easement lands. This alternative would not change any use or maintenance of existing infrastructure and would not involve construction, renovation, or demolition of facilities. This alternative would also preserve the Navy- and NASA-funded natural and cultural resource management activities on the leased and easement lands.

The leasehold and easement areas are currently used for safety buffers and Anti-Terrorism/Force Protection (ATFP) security requirements (Main Base); leasehold areas are currently used for ordnance storage-related facilities (Kamokalā Ridge), potable water (Mānā Water Well), radar and telemetry related facilities (Miloli'i and Mākaha Ridges), and data collection and tracking (KPGO). The easement areas are currently used for utilities, roadways, and as encroachment buffers for government activities on fee simple lands. Many of these easements also preserve existing land use and prevent incompatible development that would negatively affect the ability of PMRF and NASA to meet their mission requirements.

Under this alternative, the Navy and NASA would maintain succeeding agreements for the current real estate agreements, and this alternative meets all screening factors (see Section 2.2, *Alternative Screening Process*). This alternative (1) maintains use of State lands currently used to support DoD and NASA missions on Kaua'i for a period of 25 years or longer; (2) preserves current DoD and NASA operations on Kaua'i; (3) retains existing DoD and NASA infrastructure on Kaua'i; and (4) supports DLNR management of State lands and associated environmental and conservation programs on Kaua'i.

Under Alternative 1, in addition to the existing governmental purposes of the leasehold and easement lands, Navy and NASA natural and cultural resource activities and responsibilities would continue (see Section 1.3, *Background*). This includes continued Navy funding for resource management actions and public use programs (see Section 1.3.6, *Environmental Management and Protection*); pursuing Readiness and Environmental Protection Integration (REPI) projects; continuing general natural resource management as identified in the PMRF Integrated Natural Resources Management Plan (INRMP); and

[39] The Navy would not pursue new real estate agreements for easements B-1 and B-2 under the action alternatives as these were temporary construction permits granted in 1977 and are no longer needed.

[40] The acreage presented during scoping and in the Environmental Impact Statement Preparation Notice (EISPN) double-counted one easement area (Easement 106 (Tax Map Key [TMK]: 1-2-002-001 (por.)) and ESQD Easement S-5604 (TMK: 1-2-002-001 (por.)), which cover the same area). Therefore, upon correction, the total acreage has been reduced from 8,348 acres to 8,172 acres (176-acre reduction in the easement area).

continuing cultural resource management as identified in the PMRF ICRMP (see Table 1-4 in Section 1.3.6). Under this alternative, any new terms and conditions would be identified during real estate negotiations with the State.

The six locations are shown in Figure 2-4 (Main Base[41]), Figure 2-5 (Kamokalā Ridge and Mānā Water Well), Figure 2-6 (Miloliʻi Ridge), Figure 2-7 (Mākaha Ridge), and Figure 2-8 (KPGO).

2.3.2 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

Under this alternative, the Navy and NASA would pursue fee simple acquisition at fair market value of up to 700 acres (684 acres for Navy use and 16 acres for NASA use) of leaseholds and otherwise obtain use of the same easement lands as described in Alternative 1[42]. The new Navy fee simple land of 684 acres would include 392 acres of land at Main Base, 89 acres at Kamokalā Ridge, 0.29 acre at the Mānā Water Well, 0.015 acre at Miloliʻi Ridge, 203 acres at Mākaha Ridge; and the NASA fee simple land would include 16 acres at KPGO. This acreage would be transferred from ownership by the State of Hawaiʻi to the U.S. Government.

This alternative would not change any use or maintenance of existing infrastructure and would not involve construction, renovation, or demolition of facilities. The activities described under Alternative 1 at these sites would continue (see Section 1.3, *Background* and Section 2.3.1, *Alternative 1: Succeeding Current Real Estate Agreements*). The land would be managed in perpetuity by the Navy and NASA according to federal requirements. Under this alternative, Navy and NASA activities and responsibilities on these lands would continue (see Section 1.3, *Background* and the description above for Section 2.3.1, *Alternative 1: Succeeding Current Real Estate Agreements*). Under this alternative, the Navy could continue to operate at KPGO under a new real estate agreement with NASA.

By acquiring the leased parcels, this alternative meets the purpose and need of the Proposed Action, secures Navy and NASA use of State lands near Navy lands on Kauaʻi, and preserves the use of State lands for military readiness and continuation of Navy activities, as well as NASA's current geodetic activities. This alternative also meets all of the screening factors (see Section 2.2, *Alternative Screening Process*). This alternative (1) maintains use of lands currently used to support DoD and NASA missions on Kauaʻi for a period of 25 years or longer; (2) preserves current DoD and NASA operations on Kauaʻi; (3) retains existing DoD and NASA infrastructure on Kauaʻi; and (4) supports DLNR management of State lands and associated environmental and conservation programs on Kauaʻi. It would result in federal ownership of land that is currently leased from the State of Hawaiʻi, which would allow the Navy to maintain use of DoD land on Kauaʻi for a period of 25 years or longer, preserve current DoD and NASA operations, and retain existing DoD infrastructure. Under this alternative, the Navy and NASA would continue current management of natural and cultural resources on these lands, which are consistent with DLNR's environmental and conservation programs. Under this alternative, any new terms and conditions would be identified during real estate negotiations with the State.

[41] Leasehold and easement lands located at Main Base. Approximately 95 percent of the easement lands at Main Base are passively used for encroachment buffers and mission readiness.

[42] The Navy would not pursue new real estate agreements for easements B-1 and B-2 under the action alternatives as these were temporary construction permits granted in 1977 and are no longer needed.

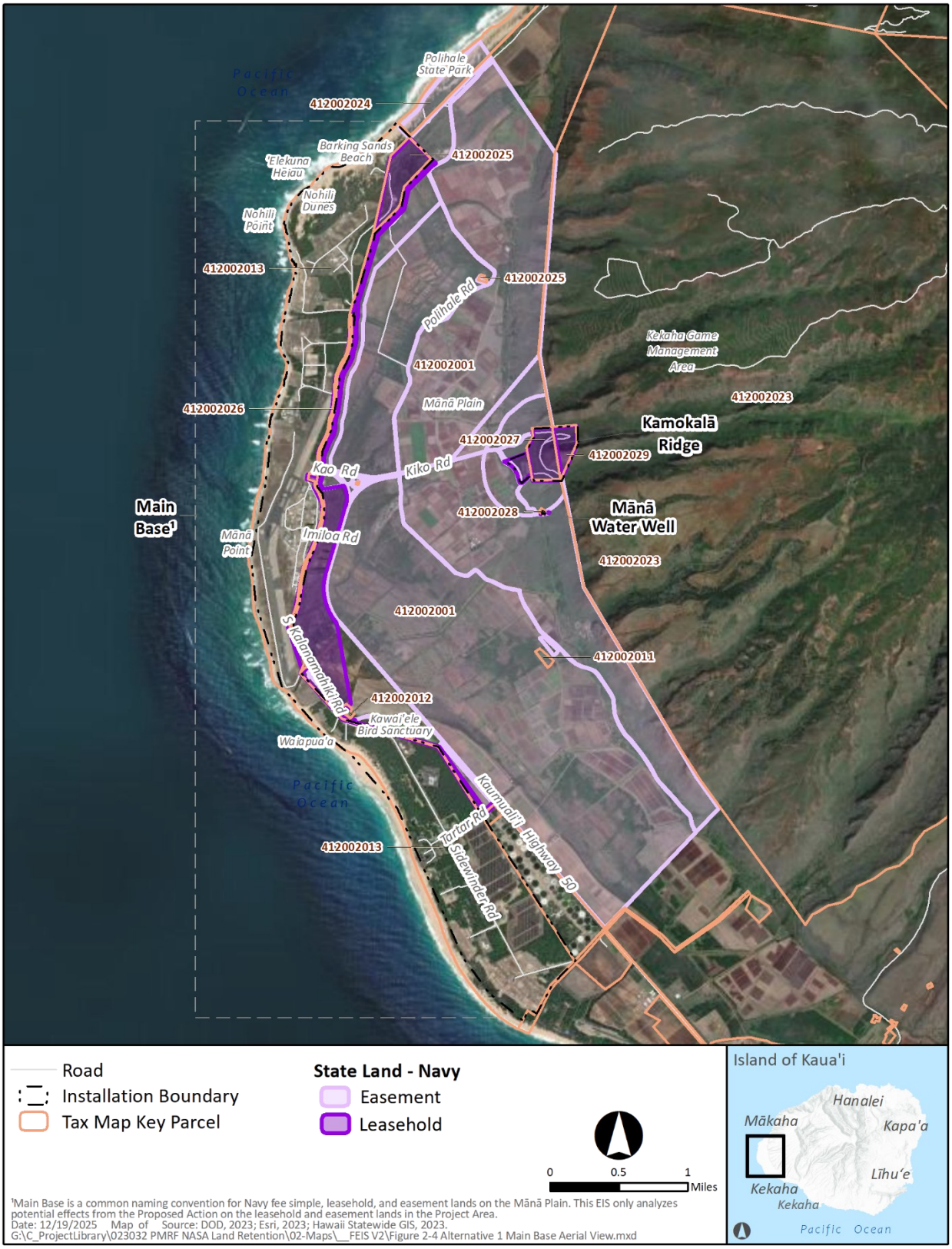


Figure 2-4 Alternative 1: Main Base: Aerial View

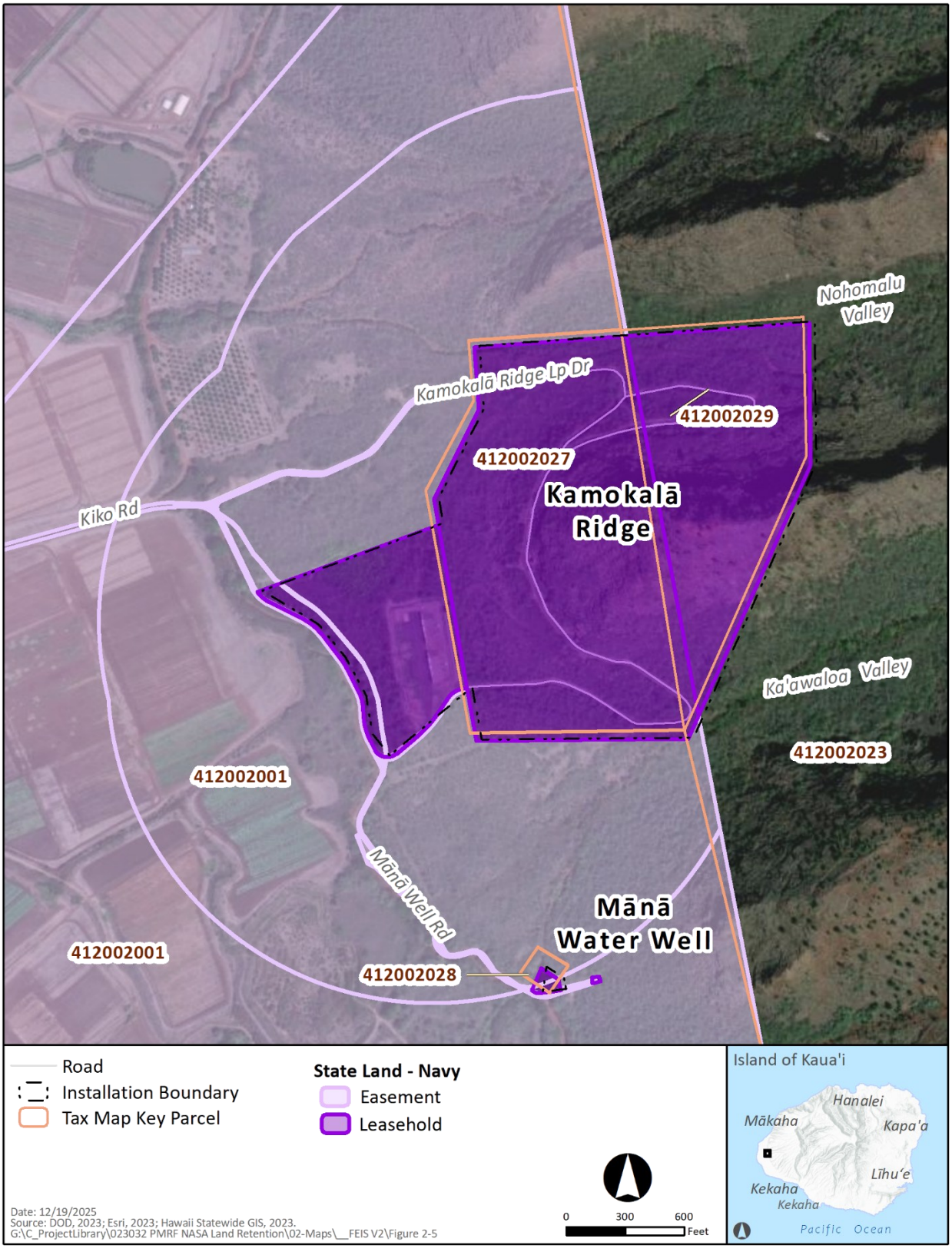


Figure 2-5 Alternative 1: Kamokalā Ridge and Mānā Water Well



Figure 2-6 Alternative 1: Miloli'i Ridge

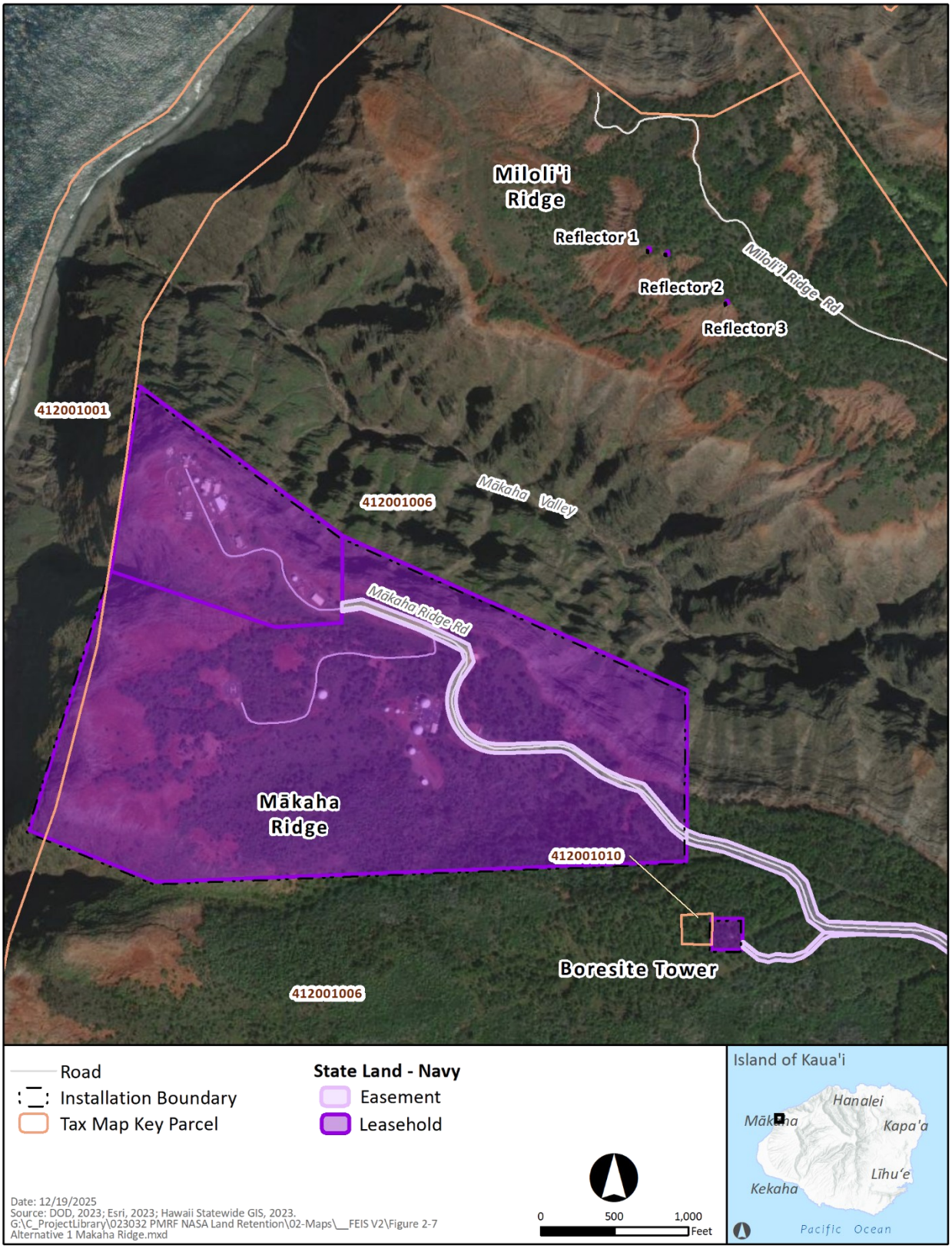


Figure 2-7 Alternative 1: Mākaha Ridge

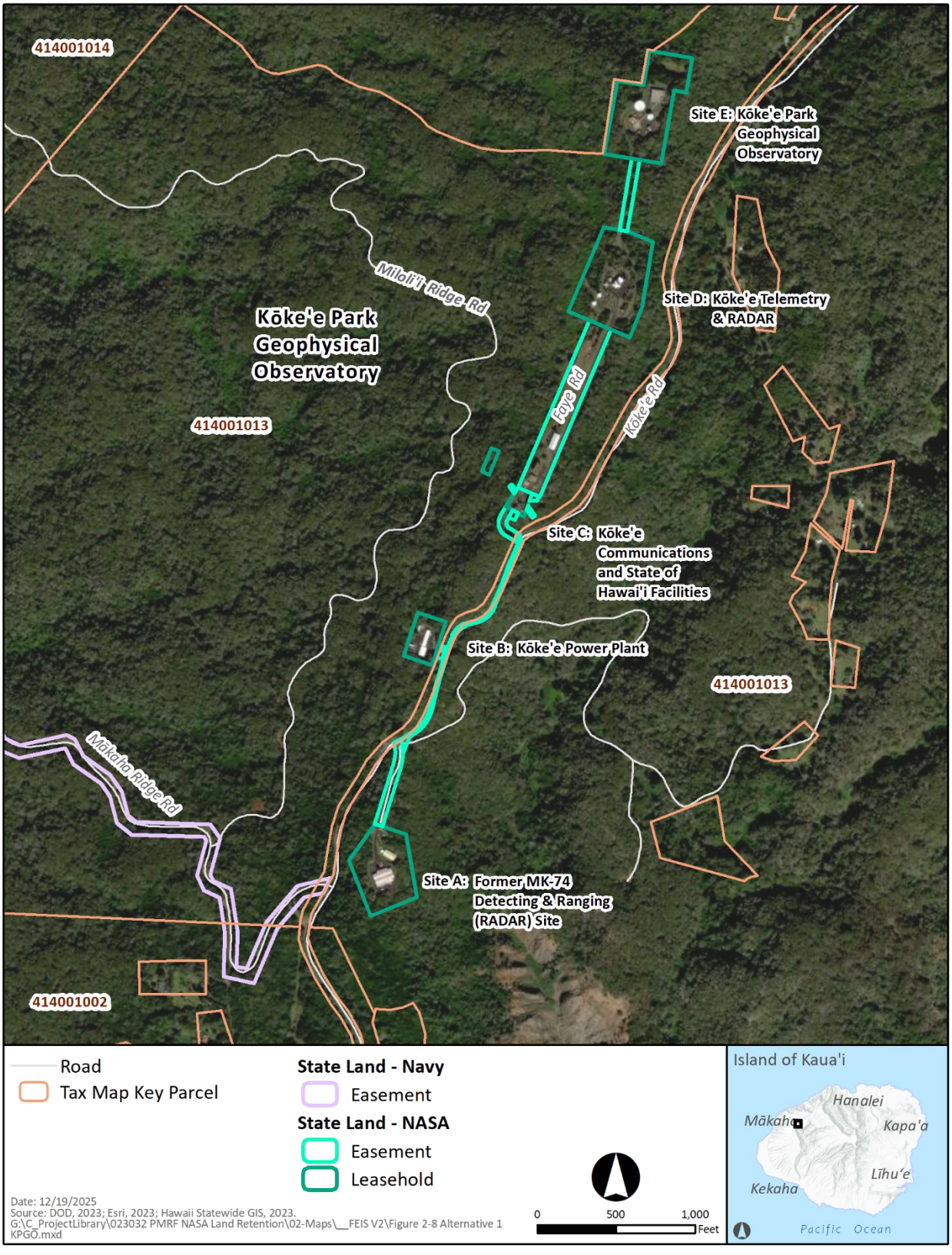


Figure 2-8 Alternative 1: KPGO

2.3.3 Alternative 3: No Action Alternative

NEPA and HEPA require inclusion of a No Action Alternative and analysis of reasonable alternatives to provide a clear basis for choice among options by the decision-maker (42 U.S.C. section 4321 et seq., HAR Title 11 Chapter 200.1 Section 24). Under the No Action Alternative, the State would not grant Navy and NASA any new real estate agreements for the State lands on Kauaʻi (8,172 acres Navy, 23 acres NASA) after expiration of the leases and easements between 2027 and 2030.

In this EIS, the No Action Alternative consists of the potential steps that would take place if the new real estate agreements for leases and easements are not granted to the Navy and NASA after their expiration. The analysis of the environmental resources will also examine the loss of Navy and NASA programs and potential effects to each resource; however, the full effect of such an alternative cannot yet be determined due to the State's future management of its returned lands, and what both parties may negotiate, as described below.

Potential Steps Carried Forth Under the No Action Alternative

Under this alternative, the Navy and NASA would carry forth the following process:

1. The State of Hawaiʻi would not grant Navy and NASA any new real estate agreements for the State lands on Kauaʻi (8,172 acres Navy, 23 acres NASA) after expiration of the leases and easements between 2027 and 2030.
2. Pursuant to the terms of the current real estate agreements[43], at the expiration of the leases and easements, any return of State property would involve complex negotiations and collaboration with the State to determine the condition of the returned lands. Negotiations may include:
    a. Whether existing infrastructure on the State of Hawaiʻi lands would be removed or remain in place;
    b. Any remediation required before the State of Hawaiʻi reacquired control of the property;
    c. The transfer of various environmental and cultural responsibilities presently conducted by Navy and NASA to the State of Hawaiʻi; and
    d. Any additional time the Navy and NASA may need to accomplish these actions following lease and easement expiration.
3. The timeline for this process is unknown. Initially, the Navy and NASA would need to prepare an environmental condition of property (ECP) to report the current condition of all State lands under federal control to include the infrastructure and any cultural resources. The ECP would determine whether the property meets the federal and applicable State laws concerning hazardous or toxic substances and whether environmental remediation would be required.

[43] State of Hawaiʻi lease S-3852 (Appendix C): "The Government shall surrender possession of the premises upon the expiration or sooner termination of this lease and, if required by the Lessors, shall within sixty (60) days thereafter, or within such additional time as may be mutually agreed upon, remove its signs and other structures; provided that in lieu of removal of structures the Government abandon them in place. The Government shall also remove weapons and shells used in connection with its training activities to the extent that a technical and economic capability existing and provided that expenditures for removal of shells will not exceed the fair market value of the land."

4. Finally, once that process is complete and all future actions agreed upon, the federal and State government would need to establish a timeline and follow-on real estate instruments to allow these future actions and activities to be accomplished prior to the State resuming control over the property.
5. Consistent with the terms of the leases, negotiations could result in decisions to remove all infrastructure on the leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO ("extreme case scenario").

As the details are presently unknown and subject to negotiations, the effects from the No Action Alternative may be subject to additional future analysis, consultations, documentation, and environmental reviews once the full scope of the actions necessary is known. Any future actions under this alternative would comply with all applicable federal and State laws.

Loss of Navy and NASA Mission Under the No Action Alternative

Under the No Action Alternative, the Navy would not be able to conduct a substantial portion of training and testing events at PMRF supported by leasehold and easement lands.

As explained in Chapter 1 (*Purpose of and Need for the Proposed Action*), the activities conducted at PMRF are essential to the national security interests of the U.S. Government. The Navy would potentially need to relocate and continue these activities at some other location, given the reduction in capabilities at PMRF as a result of the loss of the State lands. At present, identifying where and how PMRF training and testing needs could be accommodated—and the consequences and effects analysis of such a scenario—would involve a complex planning, budgeting, and acquisition program that is speculative and beyond the scope of this EIS. A summary of mission effects to the PMRF training and testing mission from this alternative is provided in Table 2-4.

Table 2-4 Effects to PMRF Training and Testing Mission from the No Action Alternative

Activities	*Effects to Mission from the No Action Alternative*
Missile/Target Launches	The loss of required setback distances and easement areas would substantially reduce essential safety buffer zones required for some training and testing missions as well as for preventing incompatible development. Without these setbacks and safety buffer zones, operations on fee simple lands at Main Base could not continue as currently conducted. Only a limited set of aerial targets could potentially be launched without the land needed for safety buffer zones.
Encroachment Planning	The loss of required setback distances and easement areas would eliminate the ability of the Navy to maintain encroachment buffers that help prevent real estate development around the installation incompatible with the PMRF training and testing mission.
Facility Use and Management	The Navy would have no access to critical infrastructure facilities that support operations at Mākaha Ridge (including a guard shack, a Frequency Interference Control Building, Maintenance Facility, Telemetry Building, a boresight tower, telemetry antennas, water tanks, a laboratory, radar sites, communications, a power plant, antennas, and a helicopter pad), ordnance storage at Kamokalā Ridge, 22 buildings with utility infrastructure and roads at Main Base, secondary and operation access roads to Main Base, access roads to Mākaha Ridge, and frequency shift reflectors at Miloliʻi Ridge, as well as utility and drainage easements. This alternative would also result in the loss of the Navy's environmental management and protection programs described in Section 1.3.6, *Environmental Management and Protection*.

Activities	*Effects to Mission from the No Action Alternative*
Flood Protection	Loss of drainage easements could affect range and daily operations until drainage management is established to prevent flooding of adjacent agricultural lands.
Support Facilities and Utilities Transmission	Buildings at Main Base located on leasehold lands are strategically located and cannot be moved; therefore, the loss of these buildings and the utility easements that support them would result in losing the ability to conduct missions at PMRF associated with this infrastructure. Loss of utility easements would affect all range and daily operations unless new utility connections could be established.
Potable Water	Loss of access to the Mānā Water Well would result in severe effects to daily operations as it is the primary source of all potable water for PMRF. Without access to a steady, reliable source of potable water, there would be effects on overall living conditions and PMRF would not have water for a diversity of operations, such as for supply chillers and fire suppression.
Instrumentation	With the loss of Mākaha Ridge, most of the training and testing operations would cease due to loss of critical tracking radars and data telemetry systems required to conduct exercises in a multi-dimensional environment. This includes critical feedback for range safety concerns. This would result in a loss of support to surface, subsurface, air, and space operations. Loss of frequency shift reflectors at Miloli'i Ridge would result in the inability to calibrate instrumentation and antennas, which would affect data collection and could result in safety issues related to tracking on the range. Loss of radar and telemetry systems at KPGO would also affect data collection and could result in safety issues related to maintaining and tracking airborne and surface units operating offshore at PMRF and those beyond the range of the surveillance and tracking radars located at Mākaha Ridge.
Ordnance Storage/ Management	With the loss of ordnance storage at Kamokalā Ridge, the base would not be able to meet explosive safety storage requirements and could not support certain missions at PMRF. Without storage, the missile assembly building could not be used since there would be no safe place to store the assembled munitions.
Access	Loss of access roads at Main Base, located on State lands, would result in effects to military readiness activities and DoD operations, since the secondary access gate is utilized by personnel during peak commute times and is used as a primary access point when the primary access gate is closed. The loss of the ordnance gate would result in shifting of ordnance transport through the primary gate, which could result in effects to safety and would limit access to and from the base during times when ordnance is being transported.
Power	Loss of KPGO Site B, which includes the backup plant diesel generator for Sites A, C, D, and E, would affect the source of reliable power when systems at KPGO are supporting range operations.

Key: DoD = Department of Defense; KPGO = Kōke'e Park Geophysical Observatory; PMRF = Pacific Missile Range Facility.

Table 2-5 lists the operational impacts to the Navy by lease and easement if succeeding agreements are not secured. Figures 2-9 through 2-14 depict the locations of the leases and easements. The specific training and testing activities impacted if agreements are not renewed are considered sensitive information not publicly available due to operational security requirements.

Table 2-5 No Action Alternative: Activities and Operational Impacts to the Navy

Name of Parcel	*TMK*	*Grant Type (Lease[L]/ Easement[E])*	*Activity*	*Operational Impact if Agreement Not Renewed*
Main Base				
Tract E-1	1-2-002-025	L	Contains ordnance related facilities, and lands required to comply with federal ATFP guidelines regarding setback distances around military bases.	Leased area contains ordnance-related facilities critical to the support of the PMRF mission. Inability to perform launch operations would result in lack of ability to support various Navy missions. Also, reduction in security posture and increased costs to meet ATFP requirements. There are no suitable locations on Navy fee simple land to which the buildings could be relocated.
Tract E-2 Tract E-2-A	1-2-002-026 (por.)	L	Operations. Includes lands required to comply with federal ATFP guidelines regarding setback distances around military bases.	Reduction in security posture and increased costs to meet ATFP requirements.
Lot B	1-2-002-001 (por.)	L	Encroachment.	Reduction in security posture and increased costs to meet ATFP requirements.
Lot 1	1-2-002-001 (por.)	L	Drainage.	If existing agricultural lands were to flood, PMRF would experience increased vulnerability to encroachment and BASH hazards. Without PMRF management of that land, State of Hawai‘i would take over management of the drainage.
Lot 9	1-2-002-001 (por.)	L	Drainage.	If existing agricultural lands were to flood, PMRF would experience increased vulnerability to encroachment and BASH hazards. Without PMRF management of that land, State of Hawai‘i would take over management of the drainage.
Lot 3	1-2-002-001 (por.)	L	Access.	Used as secondary entrance to the base and is the ordnance gate (for transport of ordnance from main base to Kamokalā Ridge). There

Name of Parcel	*TMK*	*Grant Type (Lease[L]/ Easement[E])*	*Activity*	*Operational Impact if Agreement Not Renewed*
				would be impacts to public safety if ordnance transport went through the main gate.
Lot 10	1-2-002-001 (por.)	L	Drainage. Includes lands required to facilitate the operation and maintenance of drainage ditches and pumps to protect adjacent lands from flooding.	If existing agricultural lands were to flood, PMRF would experience increased vulnerability to encroachment and BASH hazards. Without PMRF management of that land, State of Hawai‘i would take over management of the drainage.
Lot 13	1-2-002-001 (por.)	L	Access. Includes lands required to facilitate access in support of the operation and maintenance of drainage ditches and pumps to protect adjacent lands from flooding.	If existing agricultural lands were to flood, PMRF would experience increased vulnerability to encroachment and BASH hazards. Without PMRF management of that land, State of Hawai‘i would take over management of the drainage.
Lot 7	1-2-002-001 (por.)	L	Access. Includes Exclusive Roadway Access Easement.	Operations gate, which is open in the morning and afternoon, and provides secondary entrance to the base. Without this access, there would be no other entrance if the primary entrance were to be temporarily shut down, and this would impact access to critical PMRF facilities.
Lot A-1	1-2-002-001 (por.)	L	Encroachment/Drainage. Includes Non-Exclusive Drainage Easement and Roadway Access Easement.	If existing agricultural lands were to flood, PMRF would experience increased vulnerability to encroachment and BASH hazards. Without PMRF management of that land, State of Hawai‘i would take over management of the drainage. Also, this would impact access to critical PMRF facilities.
Easement 100 Easement 101 Easement 102	1-2-002-001 (por.)	E	Includes use of the lands for agricultural purposes to preclude encroachment on	If existing agricultural lands were to flood, PMRF would experience increased

Name of Parcel	*TMK*	*Grant Type (Lease[L]/ Easement[E])*	*Activity*	*Operational Impact if Agreement Not Renewed*
Easement 103 Easement 104 Easement 105			operations by other development.	vulnerability to encroachment and BASH events. 100–103 within GHA and ESQD arcs, 104–105 to prevent encroachment.
Easement 107 Easement B Easement B-3 Easement B-4	1-2-002-001 (por.)	E	Includes Non-Exclusive Roadway Access Easement.	This would impact access to critical PMRF facilities, and impact access to the base's main source of potable water.
Easement D	1-2-002-001 (por.)	E	Electrical.	Lack of access to critical PMRF facilities.
Easement E	1-2-002-001 (por.)	E	Roadway.	Lack of access to critical PMRF facilities.
Easement F	1-2-002-001 (por.)	E	Cable.	Lack of electrical service to critical PMRF facilities.
Easement G Part 1	1-2-002-001 (por.)	E	Communication.	Lack of communication service to critical PMRF facilities.
Easement G Part 2	1-2-002-001 (por.)	E	Water.	Lack of water service to critical PMRF facilities.
Easement H	1-2-002-001 (por.)	E	Roadway.	Lack of access to critical PMRF facilities.
Easement A Part 1	1-2-002-001 (por.)	E	Access.	Lack of access to critical PMRF facilities.
GHA Easement 1 GHA Easement 2	1-2-002-001 (por.), 1-2-002-024 (por.)	E	The GHA for many of the ballistic and hypersonic missiles launched from PMRF extends into the Mānā Plain.	Restriction of the GHA to only federal property would mean no ballistic or hypersonic missiles can be safely launched from PMRF.
Kamokalā Ridge				
Tract E-3 Parcel 1 Tract E-3 Parcel 2	1-2-002-029, 1-2-002-027	L	Magazines 1–12 are utilized for proper storage of explosives with effective flexibility to separate incompatible explosives.	Inability to meet ordnance safety storage requirements would result in lack of ability to support aerial target and ballistic and hypersonic missile missions.
Kamokalā Ridge Add	1-2-002-001 (por.)	L	Magazines 12–13 are required for proper storage of explosives with effective flexibility to separate incompatible explosives.	Inability to meet explosive safety storage requirements resulting in lack of ability to support various missions at PMRF.
Easement 106	1-2-002-001 (por.)	E	Restrictive Use. Includes use of the lands for agricultural purposes to preclude encroachment on operations by development.	Potential for encroachment due to development and incompatible uses to current Navy operations to include RF spectrum interference,

Name of Parcel	*TMK*	*Grant Type (Lease[L]/ Easement[E])*	*Activity*	*Operational Impact if Agreement Not Renewed*
			Easement 106 and ESQD Easement S-5604 cover the same area (176 acres).	lighting that may impact NVG training, AICUZ concerns, etc.
Easement A Part 2 Por. A Easement A Part 2 Por. B Easement A Part 2 Por. C Easement A Part 2 Por. D Easement A Part 3	1-2-002-001 (por.)	E	Includes Non-Exclusive Roadway Access Easement.	Lack of access to critical PMRF facilities.
Easement G Part 3 Easement G Part 4 Easement G Part 5 Easement G Part 6	1-2-002-001 (por.)	E	Water pipeline.	Lack of water to critical PMRF facilities.
ESQD Easement S-5604	1-2-002-001 (por.)	E	Restrictive Use. Easement 106 and ESQD Easement S-5604 cover the same area (176 acres).	Lack of access to critical PMRF facilities.
Mānā Water Well				
Tract E-4	1-2-002-028	L	Infrastructure associated with well.	Reduced reliability of potable water source and increased cost of water. Impacts to range operations from loss of water source.
Lot 12	1-2-002-001 (por.)	L	Location of water well.	Reduced reliability of potable water source and increased cost of water.
Miloli‘i Ridge				
Miloli‘i Ridge No. 1 Miloli‘i Ridge No. 2 Miloli‘i Ridge No. 3	1-2-001-006 (por.)	L	Location of frequency shift reflector used with radar and telemetry stations.	Inability to calibrate instrumentation and antennas which would limit effectiveness during data collection and could result in safety issues related to tracking of vehicles on the range.
Mākaha Ridge				
Parcel A – Mākaha Parcel B – Mākaha	1-2-001-006 (por.)	L	Facility housing radar antenna. Unique location due to geography allowing coverage of both the base and ocean range.	Without the instrumentation located at Mākaha Ridge, much of PMRF’s training and testing missions would be unsupportable since loss of

Name of Parcel	*TMK*	*Grant Type (Lease[L]/ Easement[E])*	*Activity*	*Operational Impact if Agreement Not Renewed*
			The vast majority of PMRF instrumentation exists at Mākaha Ridge to include radar systems, telemetry, communications, electronic warfare assets, etc.	the data provided by that instrumentation would make it impossible to provide range safety oversight, management and coordination of air and sea space under the control of PMRF, execution of exercises/tests and collection of customer required data.
Bore Site	1-2-001-010	L	Used to locate bore site targets for use with radar and telemetry stations.	Loss of this facility would limit PMRF support of Pacific Fleet training operations and national test initiatives. Inability to calibrate instrumentation and antennas which would limit effectiveness during data collection and could result in safety issues related to tracking of vehicles on the range.
Parcel E Road	1-2-001-006 (por.)	E	Includes Non-exclusive Roadway Access Easement.	Lack of access to critical PMRF facilities.
Parcel D Road Parcel C Road	1-2-001-006 (por.), 1-4-001-014 (por.), 1-4-001-002 (por.), 1-4-001-013 (por.)	E	Includes Non-exclusive Roadway Access Easement.	Lack of access to critical PMRF facilities.
Bore Site Access Road	1-2-001-006 (por.)	E	Includes Non-exclusive Roadway Access Easement.	Lack of access to critical PMRF facilities.
Kōkeʻe Park Geophysical Observatory				
S-3917 6 parcels	1-4-001:013 (por.)	L, E	Includes facilities (buildings, RADAR, antenna, transmitters) that support Navy operations.	Loss of Navy radar and telemetry systems at KPGO would limit effectiveness during data collection and could result in safety issues related to surveillance and tracking of airborne and surface units operating offshore of PMRF and that are beyond the range of the surveillance and tracking from the radars located at Mākaha Ridge on the range.

Name of Parcel	*TMK*	*Grant Type (Lease[L]/ Easement[E])*	*Activity*	*Operational Impact if Agreement Not Renewed*
				Loss of Site B, which includes the back-up plant diesel generator for Sites A, C, D, and E would impact the source of reliable power when systems at KPGO are supporting Navy range operations and NASA SGP activities.

Key: AICUZ = Air Installation Compatible Use Zone; ATFP = Anti-Terrorism/Force Protection; BASH = Bird/Wildlife Aircraft Strike Hazard; ESQD = Explosive Safety Quantity Distance; GHA = Ground Hazard Area; KPGO = Kōkeʻe Park Geophysical Observatory; NASA = National Aeronautics and Space Administration; NVG = Night Vision Goggles; PMRF = Pacific Missile Range Facility; RADAR=Radio Detecting and Ranging; RF=Radio Frequency; SGP = Space Geodesy Project.

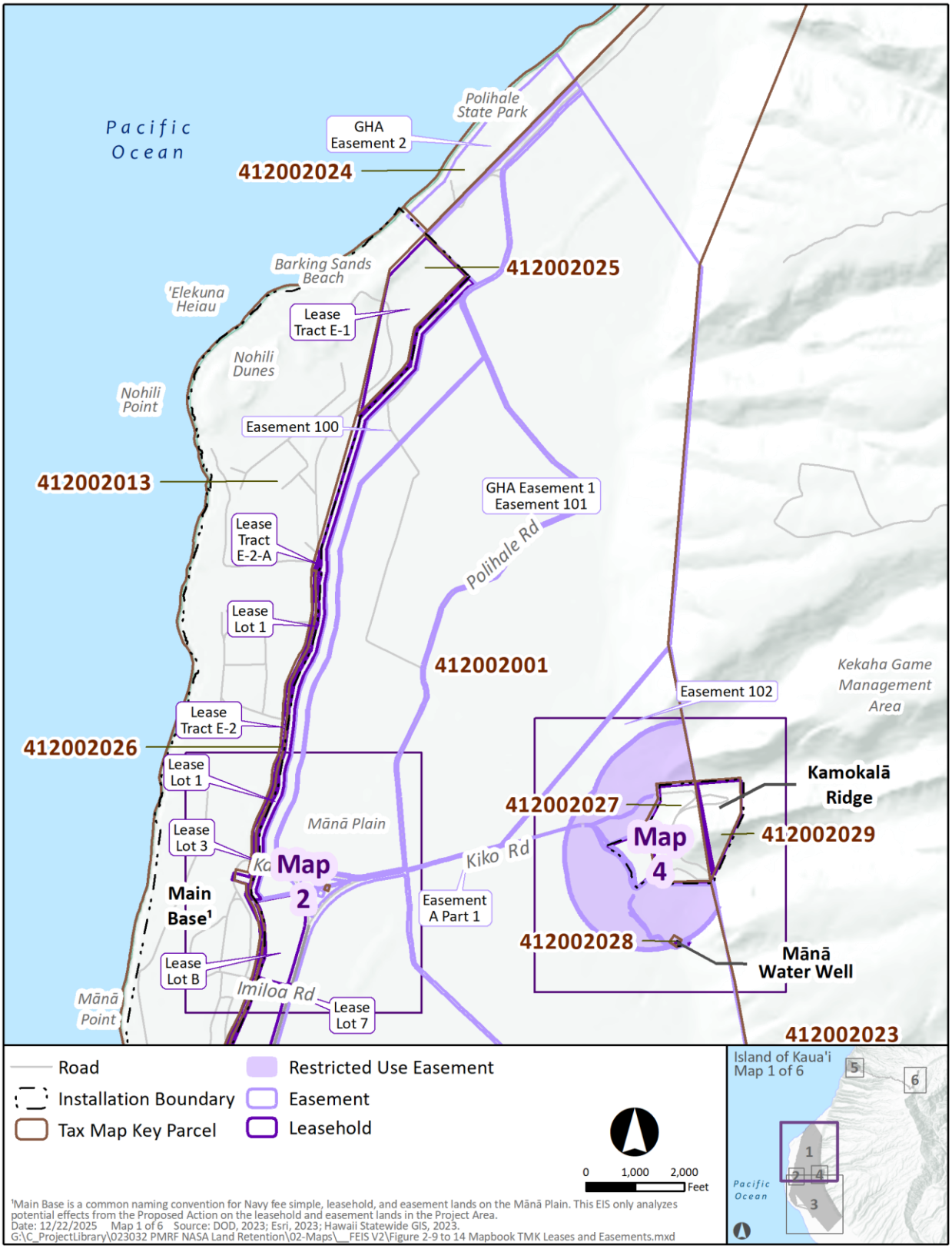


Figure 2-9 Leases and Easements at Main Base (Northern Part)

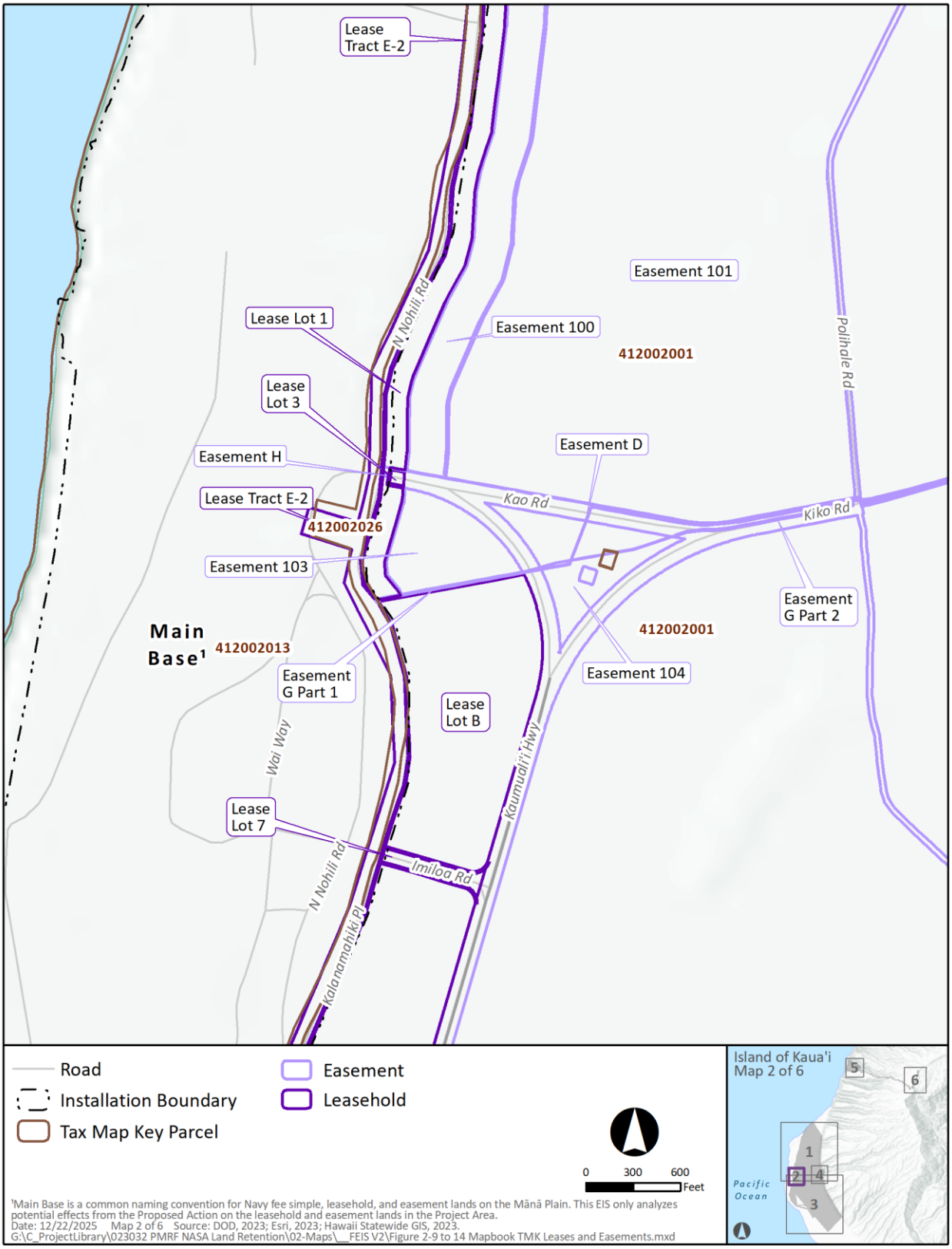


Figure 2-10 Leases and Easements at Main Base (Center)

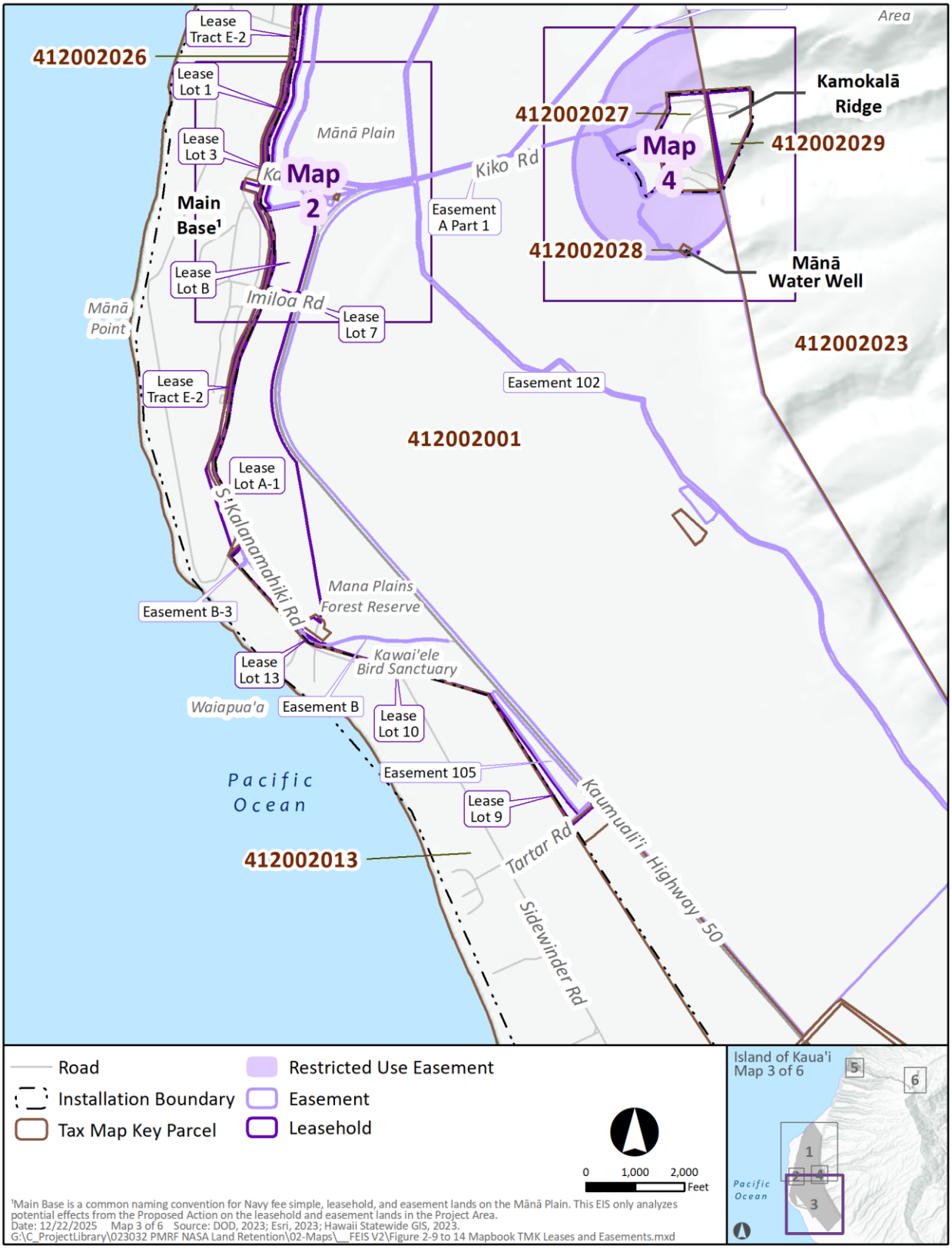


Figure 2-11 Leases and Easements at Main Base (Southern Part)

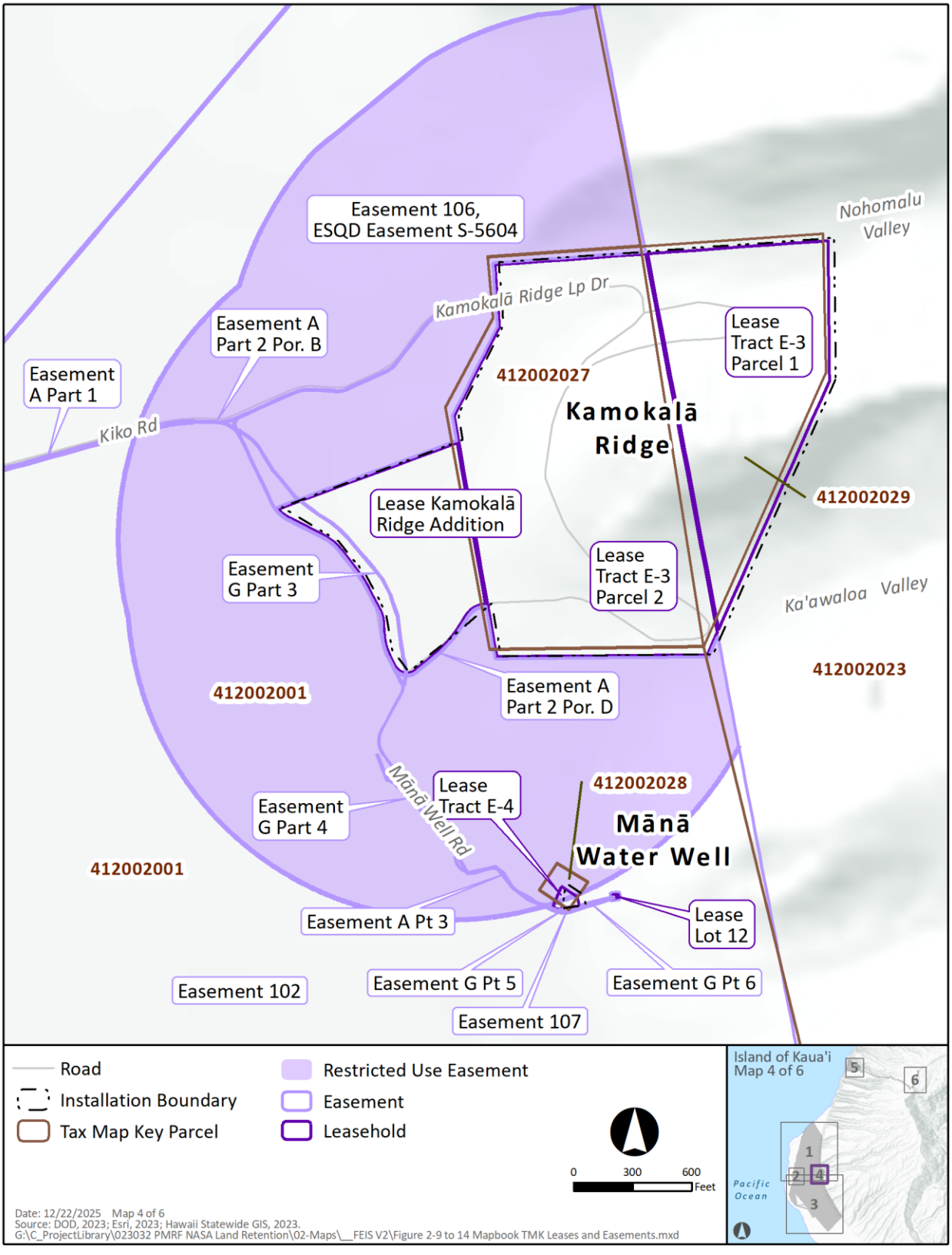


Figure 2-12 Leases and Easements at Kamokalā Ridge and Mānā Water Well

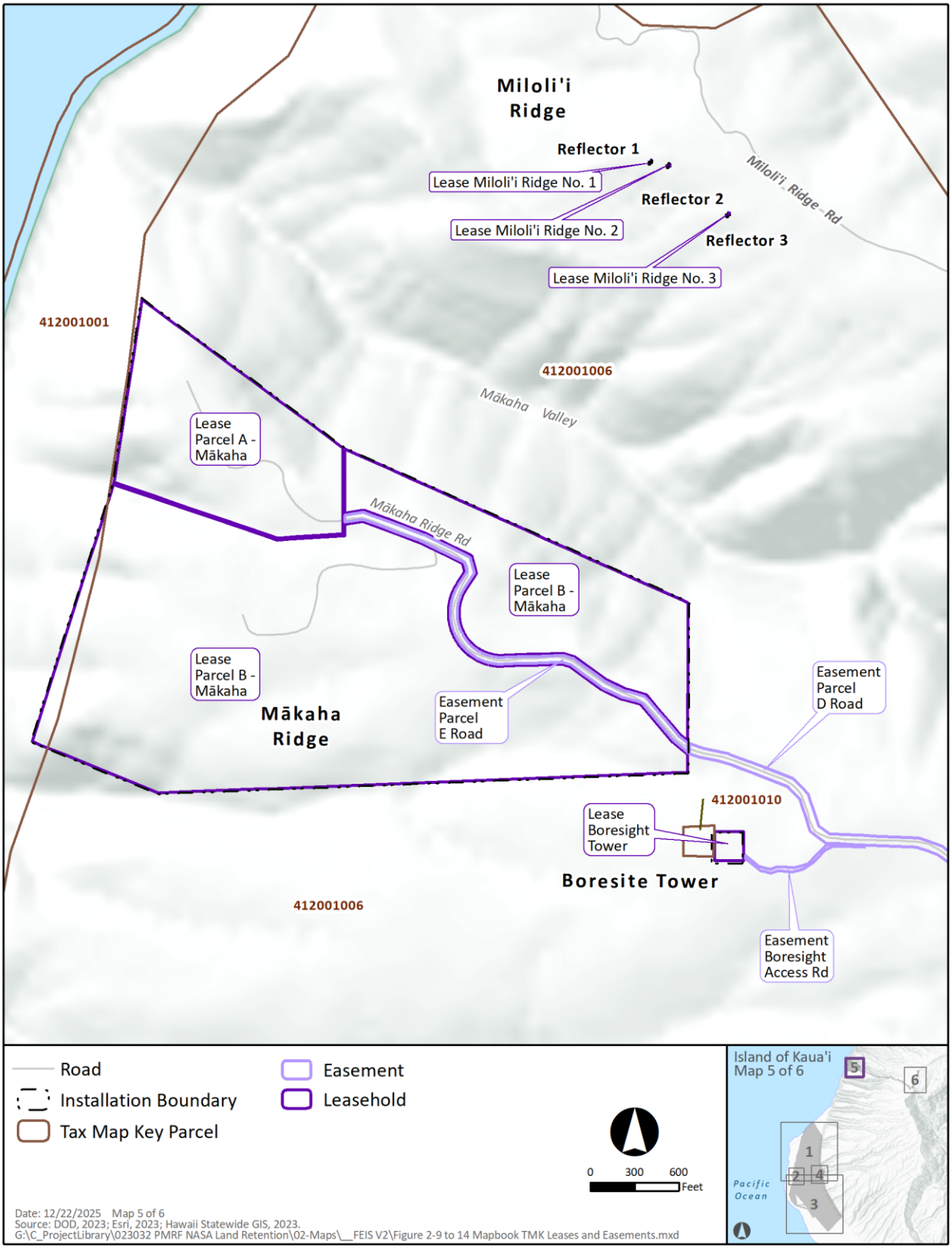


Figure 2-13 Leases and Easements at Mākaha Ridge and Miloli'i Ridge

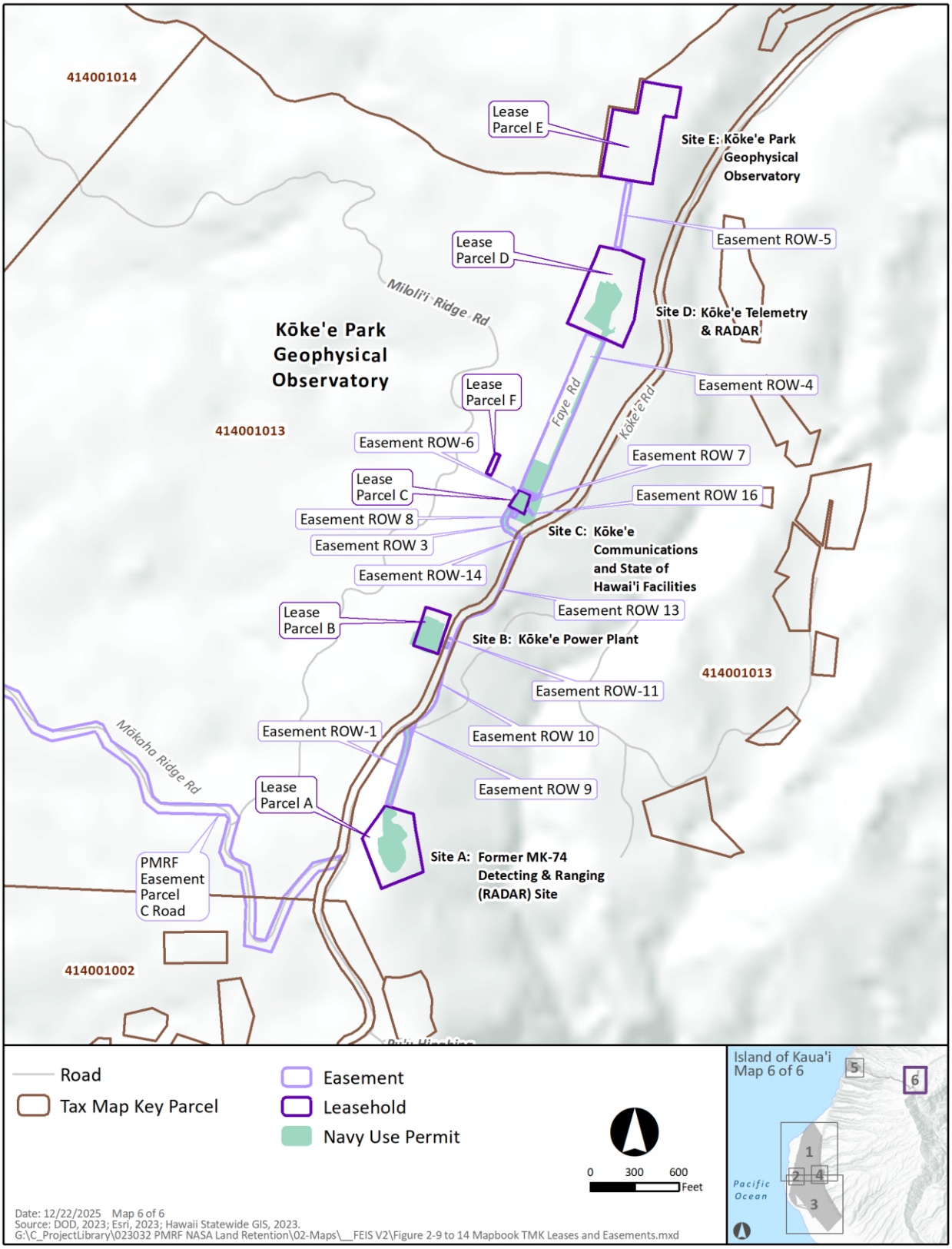


Figure 2-14 Leases and Easements at Kōkeʻe Park Geophysical Observatory

The loss at KPGO would affect NASA's ability to maintain a global network of space geodetic observatories that work together to maintain a stable terrestrial reference system contributing to NASA missions, military and civilian navigation, and the scientific community. Under the No Action Alternative, NASA would lose access to Sites A through E at KPGO. Without succeeding real estate agreements, all of NASA's current activities at KPGO would cease. This would result in a loss of capabilities to the larger Space Geodesy Project (SGP) mission and would affect NASA's ability to maintain a global network of space geodetic observatories. It is fundamental for spacecraft tracking, as well as terrestrial, airborne, and maritime navigation. The scientific disciplines that rely on these data include sea level assessments, earthquake early warning systems, volcano deformation, flooding patterns, glacier dynamics, and tsunami early warning systems including those for Hawai'i. This loss would affect NASA missions, military and civilian navigation, the scientific community, and society overall; essentially, anyone that relies on GPS. Similar to the Navy, replacement of this capability elsewhere would be a complex planning, budgeting, and acquisition program that is speculative and beyond the scope of this EIS. A summary of effects to the NASA mission from this alternative is provided in Table 2-6.

Table 2-6 Effects to NASA Activities from the No Action Alternative

NASA Activities	*Grant Type (Lease[L]/ Easement[E])*	*Activity*	*Effects to NASA Activities from the No Action Alternative*
Space Geodesy Project	L, E	Includes facilities (buildings, RADAR, antenna, transmitters) that support NASA operations.	Without use of KPGO Sites A through E, NASA would lose its northern Pacific VLBI and DORIS stations, and two GNSS stations, substantially reducing the capability of NASA's global SGP to support modern positioning, navigation, and timing, including the GPS, as well as satellite observations, natural hazard early warning systems, and societal/scientific applications that rely on the data produced at KPGO.

Key: DORIS = Doppler Orbitography by Radiopositioning Integrated on Satellite; GNSS = Global Navigation Satellite System; GPS = Global Positioning System; KPGO = Kōke'e Park Geophysical Observatory; NASA = National Aeronautics and Space Administration; RADAR=Radio Detecting and Ranging; SGP = Space Geodesy Project; VLBI = Very Long Baseline Interferometry.

Additionally, under the No Action Alternative, the environmental management and long-term resource protection currently conducted by Navy and NASA on State lands would no longer occur under Navy and NASA management (see Section 1.3.6, *Environmental Management and Protection*). Negotiations and coordination with the State for the transfer of the various environmental management now performed by the Navy and NASA would ensue.

2.4 Alternatives Considered but Not Carried Forward for Detailed Analysis

As part of the alternative identification process, agencies are required to describe the alternatives considered but eliminated from detailed analysis and to provide a brief discussion of the rationale for not studying the alternative in detail. The following alternatives were considered but not carried forward for detailed analysis because they do not meet the purpose and need for the Proposed Action.

2.4.1 Succeeding Leases and Easements (Except at Mākaha Ridge and KPGO)

Under this alternative, the Navy would obtain succeeding leases and easements on leased land at Main Base, Kamokalā Ridge, Mānā Water Well, and Miloliʻi Ridge, but would not include succeeding leases or easements at Mākaha Ridge or KPGO. Under this alternative, the Navy would not have access to the secondary missile tracking and surveillance station. Without this secondary area, the Navy could not conduct radar tracking, telemetry receiving/recording, frequency monitoring, or target control and would lose access to the land with the buildings and facilities located there. Without the leasehold at KPGO, the NASA operations and geodetic measurements from the site would cease, causing a loss of data products used by navigation systems, spacecraft operations, GPS, natural hazard monitoring early warning systems, and the scientific community. This alternative does not meet screening factors (1) maintain use of land currently used to support DoD and NASA missions on Kauaʻi for a period of 25 years or longer since many of the missions could not occur; (2) preserve current DoD and NASA operations on Kauaʻi since without the facilities at Mākaha Ridge or KPGO current operations could not continue; or (3) retain existing DoD and NASA infrastructure on Kauaʻi since access to the infrastructure located at Mākaha Ridge or KPGO would not continue.

2.4.2 Succeeding Leases Only (No Succeeding Easements)

Under this alternative, the Navy and NASA would only obtain succeeding lease agreements and not succeeding easements. These would include succeeding leases at Main Base, Kamokalā Ridge, Mānā Water Well, Miloliʻi Ridge, Mākaha Ridge, and KPGO, but not easements at Main Base, Kamokalā Ridge, Mākaha Ridge, or KPGO. For the restrictive use easements, as described in Table 1-1, the safety distances in the restrictive use easements include: (1) Ground Hazard Area (GHA) safety arcs around both PMRF Launch Sites located both on fee simple land at the northern part of the installation and also at Kokole Point Launch Site at the southern part of the installation; and (2) Explosive Safety Quantity Distance (ESQD) arcs for explosive safety zones around explosives storage (at Kamokalā) and munitions assembly locations (on leasehold lands at Main Base). Without succeeding easements, the Navy would lose required setback distances that provide essential safety buffer zones required for training and test missions, access roads, and utility easements.

Without access to or use of the roads included in the easements, the Navy would not be able to access the leaseholds located at Kamokalā Ridge, Mānā Water Well, or Mākaha Ridge. Additionally, the Navy would not be able to continue environmental management or long-term resource protection programs. Under this alternative, NASA would lose the easements that connect the leasehold lands and could not continue its missions. This alternative does not meet screening factors (1) maintain use of land currently used to support DoD and NASA missions on Kauaʻi for a period of 25 years or longer; (2) preserve current DoD and NASA operations; (3) retain existing DoD and NASA infrastructure; and (4) support DLNR management of State lands and associated environmental and conservation programs. See Tables 2-5 and 2-6 for details regarding how Navy and NASA activities would be impacted by the loss of easements.

2.4.3 Shorter Duration Alternative

Under this alternative, the Navy and NASA would obtain succeeding agreements for a short duration (less than 25 years). This alternative would require more frequent processing of real estate agreements.

Additionally federal and State funding would be required to revisit the environmental review documentation and real estate negotiations at more frequent intervals. This alternative would not meet the Proposed Action purpose of securing DoD and NASA use (for a minimum duration of 25 years up to a maximum duration as negotiated with DLNR) of the State-owned land on Kaua‘i for the Navy’s operational continuity and sustainment of the military readiness mission and NASA’s continued operations of KPGO. Therefore, this alternative does not meet the first screening factor, (1) maintain use of land currently used to support DoD and NASA missions on Kaua‘i for a period of 25 years or longer. It does, however, meet screening factors (2) preserve current DoD and NASA operations on Kaua‘i; (3) retain existing DoD and NASA infrastructure on Kaua‘i; and (4) support DLNR management of State lands and associated environmental and conservation programs on Kaua‘i.

2.5 Best Management Practices

BMPs are policies, practices, and measures the Navy and NASA use to reduce the environmental effects of designated activities, functions, or processes. Although these actions minimize potential effects by avoiding, minimizing, or reducing/eliminating effects, they are distinguished from potential mitigation measures because these actions are (1) existing requirements for the Proposed Action; (2) ongoing, regularly occurring practices; or (3) not unique to this Proposed Action. More specifically, these conservation measures are inherently part of the Proposed Action and are not potential mitigation measures proposed as a function of the environmental review or approval process for the Proposed Action.

Table 2-7 lists PMRF and KPGO BMPs currently implemented, which include Standard Operating Procedures (SOPs) from the ICRMP and resource management strategies from the 2023 PMRF INRMP, as well as those established by the applicable regulations, policies, statutes, and other installation SOPs for the Navy and NASA. The PMRF ICRMP and PMRF INRMP ensure the protection of cultural and natural resources, respectively. NASA’s contractor operates KPGO (Site E) in accordance with the Environmental Management Plan under the Space Exploration Network Services and Evolution (SENSE) contract. Implementation of the Environmental Management Plan includes the following steps: evaluation, checking, and corrective action; environmental planning and impact process; water management; air quality management; and waste management.

Table 2-8 includes a list of Plans, Instruction Memoranda, and Operating and Maintenance Procedures (OMPs) applicable to the Navy’s operations on the leasehold and easement lands. Specific applicable BMPs that fall under these plans are included under applicable resource sections in Chapter 3.

Proposed mitigation measures to minimize the effects of the Proposed Action are discussed separately in this EIS (Chapter 5: Existing and Continuing Mitigation Measures and Proposed Enhanced Engagement).

Table 2-7 PMRF and KPGO Best Management Practices and Resource Management Strategies

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Navy PMRF – Cultural Resources Management (CRM)[1]				
CRM-1	Effects to historic properties	ICRMP SOP #1: NHPA Section 110 Compliance. The Navy has an ongoing responsibility to maintain a professional cultural resources program to identify and manage properties eligible for listing in the NRHP, consistent with the NHPA.	Navy management of leasehold lands.	Integrated with ongoing activities and Cultural Resources Management program.
CRM-2	Effects to historic properties	ICRMP SOP #2: Coordination with Natural Resources Management. DoD Instructions 4715.03 and 4715.16 and OPNAVINST 5090.1E require that cultural resources management programs be integrated with natural resources programs. This coordination is meant to make certain, to the maximum extent feasible, that the Navy complies with all applicable Executive Orders and federal natural and cultural resources statutory and regulatory requirements. The PMRF CRM is responsible for the coordination of cultural and natural resources at PMRF and conducting NHPA Section 106 reviews in conjunction with NEPA reviews and section 7 of the ESA.	Navy management of leasehold lands.	When planning a cultural resources action that could adversely affect the vegetation, wildlife, threatened or endangered species, or sensitive habitat within the APE.
CRM-3	Effects to historic properties	ICRMP SOP #3: Cultural Resources Data Management. The Navy maintains an effective data management system to facilitate compliance with Sections 106 and 110 of the NHPA as well as NEPA and requirements for curating federally owned and administered archaeological collections (36 CFR part 79).	Data obtained by Navy from the Project Area.	Navy updates this system with information on identification and management of cultural resources during planning and implementation of projects and activities.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
CRM-4	Effects to historic properties	ICRMP SOP #4: NHPA Section 106 Compliance. Section 106 of the NHPA is a process designed to ensure that historic properties are taken into account during the planning and execution of federal undertakings. SOP #4 describes the integration of the Section 106 process of the NHPA, implemented by regulations of the ACHP (36 CFR part 800), as well as ARPA and the provisions of the CNRH PA for Navy undertakings in Hawai'i that is followed at PMRF and KPGO.	Proposed Navy undertakings potentially affecting properties in the Project Area.	Any Proposed Action, undertaking, or activity of the type that historic properties, both above and below ground, could be affected, assuming such properties were present.
CRM-5	Effects to archaeological resources	ICRMP SOP #5: ARPA Compliance. Per ARPA it is a federal offense to excavate, remove, damage, alter, or otherwise deface archaeological resources on lands under federal jurisdiction without authorization. The sale, purchase, exchange, transport, or receipt of archaeological resources obtained in violation of this law also is a federal offense.	Navy implements ARPA on leasehold lands.	Prior to construction and/or ground-disturbing activities conducted within installation areas, the project shall go through a Navy installation Dig Permitting process that includes ARPA compliance, or when there is evidence of unauthorized activity on lands controlled by the Navy.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
CRM-6	Effects to historic properties and traditional Hawaiian cultural resources	ICRMP SOP #6: Native Hawaiian Consultation. Consultation is mandated by federal laws and regulations, including the NHPA and 36 CFR part 800, NAGPRA and 43 CFR part 10, and ARPA. Consultation is also mandated by the MOA among the U.S. Navy, PMRF, Hawai'i SHPO, and ACHP regarding activities proposed within the 1998 PMRF Enhanced Capacity Final EIS, the 2011 NAGPRA Comprehensive Agreement, DoD Instruction 4710.03, and CNRH PA. SECNAVINST 4000.35B also specifies that appropriate consultation will be initiated with Native Hawaiians "whenever the [Navy] conducts or supports undertakings that may affect any National Register resource, whether [Navy]-managed or not."	Navy activities in the Project Area.	Whenever a federal project involves an activity that (1) may involve issues of concern expressed by a NHO or (2) requires the removal or excavation of human remains or funerary objects that are affiliated with Native Hawaiians or a present-day federally recognized Native American group.
CRM-7	Cultural resource protection	ICRMP SOP #7: Management of Historic Properties. In cases in which Navy undertakings will have adverse effects on historic properties, the PMRF CRM will activate the Section 106 consultation process with the Hawai'i SHPO and the ACHP. The PMRF CRM must consult with CNRH, the Hawai'i SHPO, ACHP, and NHOs regarding any effects to historic properties as a result of base activities, and shall also refer to, and comply with, existing MOAs, PAs, and The Secretary of the Interior's Standards for the Treatment of Historic Properties.	Proposed Navy undertakings potentially affecting properties in the Project Area.	Whenever projects may adversely affect or may adversely affect a historic property, including archaeological sites and historic buildings and structures.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
CRM-8	Cultural resource protection	ICRMP SOP #8: Monitoring During Construction and/or Ground-Disturbing Activities. The PMRF CRM oversees archaeological investigations and monitoring as applicable, in consultation with the Hawai'i SHPO, ACHP, and NHOs. This SOP is provided to all on-site managers and supervisors who are carrying out work in archaeologically sensitive areas to ensure their awareness.	Proposed Navy undertakings potentially affecting properties in the Project Area.	Whenever construction and/or ground-disturbing activities are conducted in areas of potential effect identified as archaeologically sensitive areas.
CRM-9	Cultural resource protection	ICRMP SOP #9: Inadvertent Discovery of Archaeological Remains. When previously unidentified archaeological resources are encountered during the operations at PMRF, the PMRF CRM is responsible for assessing the situation consistent with 36 CFR part 800, section 13 or the Navy Region Hawaii PA. Operations shall stop in the immediate vicinity to support efforts to avoid, minimize, or mitigate adverse effects. A copy of this SOP is provided to all on-site managers and supervisors who are carrying out work that could result in inadvertent discovery of archaeological resources.	Navy activities in the Project Area.	When archaeological resources are discovered during any activity, action, or undertaking at PMRF, regardless of whether a project has met compliance with Section 106 review or Section 110 of the NHPA.
CRM-10	Cultural resource protection	ICRMP SOP #10: Inadvertent Discovery of Human Remains. In 2011, the Navy and Na 'Ohana Papa O Mānā executed a NAGPRA CA to address intentional excavation or discovery of NAGPRA items. The CA is the Plan of Action that documents the process for carrying out the requirements of 43 CFR part 10, Subpart B for standard consultation procedures, determination of custody, treatment, and disposition of NAGPRA items. A copy of the SOP is provided to all on-site managers and supervisors of projects involving ground disturbance to ensure awareness of these requirements.	Navy activities in the Project Area.	When NAGPRA items are discovered during an action, undertaking, or activity at PMRF, regardless of whether a project has met compliance with Section 106 review or Section 110 of the NHPA.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
CRM-11	Cultural resource protection	ICRMP SOP #11: Curation. The Navy's cultural resources responsibilities include providing for the curation of artifact collections and historical documents recovered from agency-owned or -leased property as required under 36 CFR part 79, 36 CFR part 1220, and 36 CFR part 1228, as well as SECNAVINST 4000.35B and OPNAVINST 5090.1E.	Artifact collections, records, reports, and historical documents recovered by Navy from leased lands.	Navy maintains collections and new material is accessioned at the completion of projects.
CRM-12	Cultural resource protection	ICRMP SOP #12: Use of Historic Properties. In accordance with Section 110 of the NHPA and SECNAVINST 4000.35B, the Navy should use available historic buildings to the maximum extent feasible (while preserving their historic character and function) prior to new construction, lease, or the acquisition of buildings used to carry out its responsibilities as long as reuse does not conflict with the mission of the Navy. SOP #12 of the ICRMP provides uniform guidelines for PMRF staff and tenants/users when planning projects that involve demolition, removal, or replacement of a historic building or structure that is listed, or is eligible for listing, in the NRHP, or has not been evaluated for eligibility.	Ongoing and future activities on leaseholds.	Whenever the use of existing facilities or potential construction of new facilities is under review.
CRM-13	Cultural resource protection	ICRMP SOP #14[44]: Emergency Situations. Describes procedures for emergencies involving imminent threat to national security, to life or property, or a declaration of a natural disaster; and imminent damage to sites from natural actions such as erosion, consistent with 36 CFR section 800.12 and the Region PA.	Ongoing and future activities on leaseholds.	When there is a declaration of a natural disaster or a state of emergency or immediate threat to life or property, or reports by observers of damage to historic properties from natural actions such as erosion.

[44] ICRMP SOP #13 refers to the Historic Asset Management Process which is a tool no longer used at PMRF; therefore, there is no corresponding BMP for that SOP.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
CRM-14	Cultural resource protection	ICRMP SOP #15: Public Involvement and Outreach. PMRF coordinates with installation departments included but not limited to Public Affairs Office, Natural Resource Program, NHOs, and researchers or nonprofits, to support public outreach and outreach requests on a case-by-case scenario. Outreach visitors and participants have included, and will continue to include, local residents and Hawaiian descendants, plantation, and military community members; NHOs; congressional delegations; officials from DoD and the Missile Defense Agency, as well as State and County officials; and local school groups and a myriad of nongovernmental organizations.	Ongoing and future activities on leaseholds.	Integrated with ongoing activities.
CRM-15	Cultural resource protection	ICRMP SOP #16: Public and Cultural Access. Provides guidelines and procedures for responding to requests for public access on a case-by-case basis and for cultural access to individuals and organizations, including any NHO that attaches cultural significance to historic properties on PMRF and KPGO.	Ongoing and future activities on leaseholds.	When requested by individual or organization to access PMRF.
CRM-16	Cultural resource protection	ICRMP SOP #17: Permits, Leases, and Contracts. Provides standardized ARPA statements for inclusion in permits, leases, contracts, or other legal agreements between CNRH and other military branches, government agencies, individuals, businesses, or organizations. It is based on ARPA and OPNAVINST 5090.1E. The PMRF CRM coordinates with real estate, contracting, and legal staff preparing permits, leases, contracts, or other legal agreements to ensure adequate protections are in place.	Ongoing and future activities on leaseholds.	When preparing permits, leases, contracts, or other legal agreements.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Navy PMRF – Natural Resources[2]				
Soil management	Effects to soils	• Conduct general surveys for erosion and soil compaction issues annually to prioritize restoration sites. • Mitigate and prevent soil erosion of coastal dune habitat by outplanting, establishing, and monitoring native dune building plants in areas identified as having erosion issues. • Implement additional security measures such as increased signage and roping off specific areas to alleviate undue pressures from off-road vehicle presence, especially in Nohili Dune areas. • Maintain Mākaha Ridge ungulate exclusion fencing for erosion control. • Monitor ungulate exclusion fence for areas vulnerable to ingress monthly and regularly monitor site for ungulate presence. Remove ungulates when identified within fence area. • Outplant 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.	Ongoing and future activities on leaseholds.	Monitoring conducted annually. Implementation of soil protection measures conducted year-round.
Designated critical habitat	Effects to designated critical habitat for panicgrass	• Work to improve protection, habitat, and/or consider outplanting Niʻihau panicgrass. • Protections will be aimed at preventing unauthorized off-road vehicle use, and invasive plant removal and to demonstrate benefit to the species. • Outplant 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.	Ongoing and future activities on leaseholds.	Protections implemented year-round.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Hawaiian picture-wing fly management	Effects to Hawaiian picture-wing flies	• Conduct surveys every 5 years to assess presence/absence of endangered Hawaiian picture-wing fly species at and directly adjacent to KPGO. • 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.	Ongoing and future activities on leaseholds.	Surveys conducted periodically.
Marine nearshore management	Effects to nearshore environments	• Establish a monitoring program for the nearshore environment of PMRF to inform future management decisions and monitor changes over time. • Partner with DLNR DAR to incorporate regular monitoring site(s) in PMRF's nearshore waters into the State's regular monitoring schedule, as feasible.	Ongoing and future activities on leaseholds.	Monitoring conducted year-round.
Hawaiian monk seal management	Effects to Hawaiian monk seals	• 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. • 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, identification, and aid in population abundance monitoring. • Conduct regular surveys approximately 5 times per week on beaches near the Nohili Ditch outfall and Kuaki'i for monk seal presence, and all other beaches approximately twice per week.	Ongoing and future activities on leaseholds.	Surveys conducted year-round. Kuaki'i, Turtle Cove surveys conducted daily (if accessible).

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Sea turtle management	Effects to sea turtles	• 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. • Conduct surveys by biologists approximately 5 times per week on beaches near the Nohili Ditch outfall and Kuaki'i for sea turtle presence and ensure that marine surveys in nearshore areas quantify sea turtles and potential foraging or resting habitat. • 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. • Continue to encourage good communication between Security and natural resources staff regarding sea turtle activity on PMRF beaches to reduce negative effects to the species from Security beach patrol vehicles. • 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. • Continue to implement surveys to ensure no sea turtles are in affected areas during training exercises or in-water work. • An interagency agreement was listed in FY23 to allow the Navy to partner with the NMFS PIFSC to deploy SPLASH tags (GPS and Argos) on sea turtles and will be pursued at PMRF. • Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.	Ongoing and future activities on leaseholds.	Surveys conducted year-round. Kuaki'i, Turtle Cove surveys conducted daily (if accessible). Nest surveys conducted seasonally (May–July).

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Marine mammal management	Effects to marine mammals	• Continue to report all observations of marine mammal strandings or deaths to NOAA Fisheries and assist in response efforts.	Ongoing and future activities on leaseholds.	Surveys conducted year-round. All reportable observations made year-round.
Ungulate management	Effects to natural resources habitats ESA terrestrial species	• Maintain efficacy of ungulate-proof fence at Mākaha Ridge. • Conduct regular monitoring for ungulates inside the fence, as well as vulnerable areas along the fence. • Maintain Mākaha Ridge fence for erosion control.	Ongoing and future activities on leaseholds.	Surveys conducted monthly.
Predator management	Effects to MBTA species and Laysan albatross	• 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.	Ongoing and future activities on leaseholds.	Tracking and trapping conducted year-round.
Predator management	Effects to Hawaiian monk seals	• Continue base-wide predator control to remove 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.	Ongoing and future activities on leaseholds.	Tracking and trapping conducted year-round.
Predator management	Effects to natural resources	• Work with the PMRF Archery Club to control ungulate populations at Kamokalā Ridge by implementing trapping and baiting stations if the animals become a nuisance to Navy operations or pose a risk to protected species. • Conduct observations to identify feral cats at Kamokalā Ridge and consider expanding cat trapping if use is consistent or becomes a nuisance.	Ongoing and future activities on leaseholds.	Tracking and trapping conducted year-round.
Wildland fire management	Effects to natural and cultural resources	• Coordinate with the PMRF Fire Department on developing updates to the existing Fire Management Plan. • Remove deadfall (woody debris) 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.	Ongoing and future activities on leaseholds.	Tracking and recording conducted year-round. Removal efforts conducted as needed.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Nēnē management	Effects to nēnē	• Coordinate with USFWS, DOFAW, PMRF Air Ops, and PMRF Public Works to annually review and update the PMRF Nēnē Management Plan. • Work with PMRF Air Ops and USDA-WS to ensure 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. • 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. • Continue to conduct regular, standardized surveys for nēnē at PMRF Barking Sands, Mākaha Ridge, and KPGO sites to effectively detect nēnē nests and inform management and determine habitat types that attract the species. • Continue to communicate with facilities maintenance personnel about nēnē nest locations and collaborate to develop effective protective measures for the species and ensure that no vegetation removal or other persistent disturbances occur within 100 feet of nest sites and goslings to reduce risk of take. • Support regular outreach to PMRF visitors and personnel on the importance of not providing food and water to nēnē and develop outreach material aimed at increasing awareness of the species.	Ongoing and future activities on leaseholds.	Survey conducted weekly year-round.
Nēnē management	Effects to nēnē	• 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 that does not act as a nēnē attractant, rather than lawn, will be installed in open areas surrounding buildings and parking areas to decrease attraction of nēnē.	Construction on leaseholds.	Survey conducted weekly year-round.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Waterbird risk management	Effects to waterbirds, public health and safety	• Continue to coordinate closely with Facilities Maintenance regarding restrictions on vegetation removal practices within a 100-foot radius of waterbirds or their nests. • 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. • 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. • Coordinate with Public Works to develop oxidation pond flushing protocols in response to avian botulism outbreaks or high-risk conditions. • Coordinate with Facilities Maintenance on all oxidation pond complex construction and restoration plans. • Supplement ongoing water quality testing to detect particulates and soluble chemicals in waters at PMRF. Testing should be conducted at least quarterly.	Ongoing and future activities on leaseholds.	Adaptations implemented year-round.
Waterbird risk management	Effects to waterbirds	• Replace and improve waterbird crossing signage at PMRF as needed to reduce risk of vehicle strikes, evaluate efficacy of signs, and explore new tools to reduce vehicle strikes.	Ongoing and future activities on leaseholds.	Replacement completed year-round.
Waterbird Risk management	Effects to waterbirds	• Continue to conduct regular monitoring for Hawaiian waterbird species at Barking Sands to effectively detect and reduce effects to nests.	Ongoing and future activities on leaseholds.	Surveys conducted Year-round. Surveys conducted at all locations twice weekly. Surveys conducted at Oxidation Pond 5 times a week.

Best Management Practice	***Effects Reduced/ Avoided***	***Description of Best Management Practices and Management Strategies***	***Applicability in the Project Area***	***Frequency of Implementation***
MBTA management	Effects to MBTA species	• Continue to incorporate monitoring of shorebirds, cattle egrets (*Bubulcus ibis*), and black-crowned night herons (*Nycticorax nycticorax*) at wetland sites. Record opportunistic observations of barn owls (*Tyto alba*) and pueo (*Asio flammeus*) at all other areas of base to inform control measures for non-native species and protective measures for native species. • Keep track of non-native songbird species at PMRF and their numbers by participating in the annual Audubon Christmas Bird Count. • Continue to advise development projects at PMRF that have potential to negatively affect native MBTA species and their habitat on how to avoid effects. • 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.	Ongoing and future activities on leaseholds.	Surveying and monitoring conducted year-round.
Laysan albatross management	Effects to Laysan albatross	• Coordinate with DOFAW on potential new albatross release sites. • Work with partners to ensure that as many albatross eggs as possible stay on Kauaʻi and find new suitable egg relocation locations. • Closely monitor re-sights of translocated albatross by working with partners on the north shore of Kauaʻi to enter data into the Airtable application database.	Ongoing and future activities on leaseholds.	Monitoring conducted year-round.
Laysan albatross management	Effects to Laysan albatross	• Continue the PMRF Laysan Albatross Egg Swap program. • Continue to translocate albatross to the north shore of Kauaʻi from January–April. • Support research on PMRF albatross populations that increases the understanding of their behavior as it relates to the PMRF airfield.	Ongoing and future activities on leaseholds.	Support for research, translocation, and egg swap conducted year-round.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Shearwater management	Effects to shearwater nesting	• Enhance wedge-tailed shearwater (*Ardenna pacifica*) 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. • Research and work with facilities and Morale, Welfare, and Recreation to implement methods for discouraging wedge-tailed shearwater burrowing in the immediate vicinity of the PMRF Beach Cottages. • 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).	Ongoing and future activities on leaseholds.	Research and protective measures conducted year-round.
Shearwater management	Effects to shearwater populations	• Conduct annual wedge-tailed shearwater population surveys in the Kinikini Ditch, beach cottages, and Nohili Dune areas. • Work with partners to collect additional data that supports adaptive management on PMRF and regional conservation objectives for shearwater species.	Ongoing and future activities on leaseholds.	Surveys conducted year-round.
Bat management	Effects to Hawaiian hoary bat (pupping season)	• Tree trimming/removal activities shall be conducted outside of the bat pupping season (June 1 to September 15) to the maximum extent practicable to avoid and minimize effects of base infrastructure, operations, and maintenance. • Conduct follow-up acoustic surveys for Hawaiian hoary bats every 5 years. • In situations where trimming or removal of a tree with a known bat roost is determined necessary, the Navy and/or NASA shall work with the USFWS to develop and implement an SOP for bat roosting surveys.	Ongoing and future activities on leaseholds. Construction on leaseholds.	Surveys conducted every 5 years.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Invasive plant species management	Effects to natural resources	• Native vegetation shall be used as practicable, and recommended by agencies, for revegetation efforts. • Ensure 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.	Ongoing and future activities on leaseholds.	Removals conducted annually.
Invasive plant species management	Effects to natural resources	• Ensure early detection and a rapid response to invasive plant species through a minimum of annual surveys at all high-risk and sensitive areas. • Conduct removal of invasive plant species in sensitive areas, monitor for re-growth, and restore with outplantings, if necessary, with a target of 80% reduction in invasive species within the areas of concern.	Ongoing and future activities on leaseholds.	Surveys and removals conducted annually.
Invasive species management	Effects to habitat	• 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.	Ongoing and future activities on leaseholds.	Protections conducted year-round.
Invasive animal species management	Effects to natural resources	• Include biosecurity 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.	Ongoing and future activities on leaseholds. Construction on leaseholds.	Not yet implemented.
Invasive animal species management	Effects to natural resources	• 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 agencies. • Increase outreach with all personnel on PMRF about the hazards of feeding feral/invasive species and assist in the enforcement of such policies by practicing good communication with Security.	Ongoing and future activities on leaseholds.	Outreach conducted annually.

Best Management Practice	***Effects Reduced/ Avoided***	***Description of Best Management Practices and Management Strategies***	***Applicability in the Project Area***	***Frequency of Implementation***
Invasive animal species management	Effects to natural resources	• Conduct surveys to improve baseline knowledge of populations of invasive animals at PMRF and KPGO. • Conduct ant surveys to assess presence of invasive ants including the little fire ants (*Wasmannia auropunctata*) 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. • Continue to partner with the Hawai'i Department of Agriculture and Biosecurity to ensure Coconut Rhinoceros Beetle (*Oryctes rhinoceros*) traps are checked and maintained at PMRF.	Ongoing and future activities on leaseholds.	Surveys conducted year-round. Coconut Rhinoceros Beetle traps checked weekly (frequency may vary).
Endangered seabird management	Effects from night lighting (disorientation/ fallout)	• Whenever feasible, exterior night lighting shall include bat- and bird-friendly design features such as shielded lights (to reduce ambient light), use of motion detectors and/or other automatic controls, and lighting design that uses shields to prevent light from shining upward into the sky.	Ongoing and future activities on leaseholds.	Adaptations deployed year-round.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Endangered seabird management	Effects from exterior facility lighting	• Exterior lighting shall be architecturally integrated with the character of all structures, energy efficient, and shielded or recessed so that direct glare and reflections shall be confined, to the maximum extent feasible, within the boundaries of the site. Shielded lighting directs rays toward the ground, and the light source, whether bulb or tube, shall not be visible from adjacent properties. • Exterior lighting shall be directed downward and away from adjacent properties. • Parking and security lighting shall consist of full cutoff fixtures, which permit no upward light, unless a different cutoff classification is specifically authorized through the architectural review process. • Obtrusive light shall be minimized by limiting outdoor lighting that is misdirected, excessive, or unnecessary, and light required for the development shall be directed downward to minimize spill over onto adjacent properties and reduce vertical glare or up-lighting.	Ongoing and future activities on leaseholds.	Adaptations deployed year-round.
Endangered seabird management	Effects to seabirds	• Continue to host a SOS aid station at PMRF and monitor station during business days with SOS monitoring on weekends and holidays. • Advise various tenants on PMRF 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). • Provide a 10-year calendar to mission planners with high-risk dates for endangered seabird fall out. • Develop a Wildlife Friendly Lighting Guide for installation personnel and tenants to assist in planning for lighting needs.	Ongoing and future activities on leaseholds.	SOS aid/monitoring station supported during Dark Skies Program (September 15–December 15). Lighting adaptations completed year-round.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Endangered seabird management	Effects to seabirds	• Continue to fund and implement surveys to assess seabird strikes at KPGO Site C. • Minimize the potential for death or injury of seabirds due to collisions with PMRF communication towers located at KPGO Site C.	Ongoing and future activities on leaseholds.	Surveys completed year-round when birds are present on land (March–December).
Endangered seabird management	Effects to seabirds from night lighting (disorientation/ fallout)	• Continue to promote base-wide and KPGO awareness and implementation of the PMRF Dark Skies Program through annual trainings. • Continue Dark Skies implementation in areas adjacent to colonial nesting grounds at high elevation nesting sites during critical fledging timeframes. • Conduct systematic ground searches for fallen out seabirds after high-risk night operations.	Ongoing and future activities on leaseholds.	Adaptations completed year-round.
Native plant habitat management	Effects to native plant communities	• Continue to update baseline floral surveys to improve understanding of plant communities at PMRF and KPGO. • Ensure post-planting care, including irrigation, invasive plant removal, and long-term monitoring and maintenance is implemented for all native plant restoration projects.	Ongoing and future activities on leaseholds.	Surveys conducted year-round.
Native plant habitat management	Effects to pollinators	• Identify suitable locations for planting native Hawaiian plants, particularly those that benefit native pollinators in support of national pollinator objectives. • Ensure that plant communities found to support native terrestrial invertebrate species are protected, enhanced, and that construction or removal projects have minimal minor effects on these populations.	Ongoing and future activities on leaseholds. Construction on leaseholds.	Monitoring conducted year-round.
Terrestrial invertebrate management	Effects to pollinators	• Conduct species inventory at additional PMRF and KPGO sites and conduct monitoring for native invertebrate species.	Ongoing and future activities on leaseholds.	Monitoring conducted year-round.
Terrestrial invertebrate management	Effects to pollinators	• Coordinate all use of pesticides by natural resources staff with the NAVFAC Pacific PMC and ensure that all applicators have received appropriate certifications. • Ensure that treatments will not have negative effects on protected species. Prohibit the use of neonicotinoids at PMRF and KPGO sites.	Ongoing and future activities on leaseholds.	Adaptations conducted year-round.

Best Management Practice	*Effects Reduced/ Avoided*	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Frequency of Implementation*
Public health and safety management	Effects to public health and safety	• Continue to restrict access during missile testing and launches at the restricted easement adjacent to Barking Sands. • Adhere to applicable regulations and policy to limit interaction with vessel traffic when range activities occur.	Ongoing and future activities on leaseholds.	Regularly.
Public health and safety management	Effects to public health and safety	• Coordinate with the ADC to ensure compliance with the CWA and other environmental regulatory requirements where there is a nexus with federal monies or property.	Ongoing and future activities on leaseholds.	Regularly.
NASA KPGO – Environmental Management Plan[3]				
Endangered Species	Effects to endangered and threatened species	• SENSE has surveyed the endangered and threatened species around the area. Any changes to SENSE operations or construction activities are planned with the consideration of endangered and threatened species effects to minimize or eliminate the effects on wildlife. SENSE leverages local agencies for guidance on current regulatory requirements and reduction of effects.	Ongoing and future activities on leaseholds.	Surveys completed year-round.

Note: Natural Resource Management BMPs and SOPs guide conservation efforts on fee simple and leasehold lands and road easements and KPGO leasehold lands and easements. Since biological species, such as wildlife, can move across landscapes, these management actions could affect biological species across the ROI, extending beyond the fee simple lands of PMRF.

Key: ACHP = Advisory Council on Historic Preservation; ADC = Agribusiness Development Corporation; APE = Area of Potential Effects; ARPA = Archaeological Resources Protection Act; BMP = Best Management Practice; BOS = Base Operating Support; CA = Comprehensive Agreement; CFR = Code of Federal Regulations; CNRH = Commander, Navy Region Hawaii; CRM = Cultural Resources Management; CWA = Clean Water Act; DAR = Division of Aquatic Resources; DLNR = Department of Land and Natural Resources; DoD = Department of Defense; DOFAW = Division of Forestry and Wildlife; ESA = Endangered Species Act; FY = Fiscal Year; GPS = Global Positioning System; HAMP = Historic Asset Management Process; ICRMP = Integrated Cultural Resources Management Plan; KISC = Kaua'i Invasive Species Committee; KPGO = Kōke'e Park Geophysical Observatory; MBTA = Migratory Bird Treaty Act; MILCON = Military Construction; MOA = Memorandum of Agreement; NAGPRA = Native American Graves Protection and Repatriation Act; NAVFAC = Naval Facilities Engineering Systems Command; NEPA = National Environmental Policy Act; NHO = Native Hawaiian Organizations; NHPA = National Historic Preservation Act; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; NRHP = National Register of Historic Places; OPNAVINST = Office of the Chief of Naval Operations Instruction; PA = Programmatic Agreement; PIFSC = Pacific Islands Fisheries Science Center; PMC = Pest Management Consultant; PMRF = Pacific Missile Range Facility; ROI = Region of Influence; SECNAVINST = Secretary of the Navy Instruction; SENSE = Space Exploration Network Services and Evolution; SHPO = State Historic Preservation Office; SOP = Standard Operating Procedure; SOS = Save our Shearwaters; U.S. = United States; USDA-WS = United States Department of Agriculture-Wildlife Services; USFWS = United States Fish and Wildlife Service.

Sources: [1]U.S. Navy PMRF, 2012.
[2]NAVFAC Pacific, 2023a.
[3]SENSE, 2023.

Table 2-8 PMRF Applicable Plans, Instruction Memoranda, and Operating and Maintenance Procedures

Plan/IMs/OMPs	*Affected Resource*	*Description of SOP/Best Management Practices*	*Applicability in the Project Area*	*Responsible Entity*	*Status*	*Frequency of Implementation*	*Link*
PMRF SPCC Plan	Hazardous Materials and Waste	Includes bulk storage container data, secondary containment, fail safe engineering, transfer operations, security, and maintenance requirements.	Hazardous materials are utilized and/or stored on leasehold lands on Main Base, Mākaha Ridge, and KPGO.	Navy Region Hawaii SPCC Program Manager	January 2023	Whenever POLs are present, stored, or being transported in amounts greater than 55 gallons.	Contains sensitive information and not publicly available.
Handling and Transportation of Ammunition, Explosives, and Hazardous Materials, PMRFINST 8023.2K	Hazardous Materials and Waste	Establishes procedures in accordance with DOT regulations for transportation of hazardous materials, provides standard for blocking and bracing of explosives for truckloads, and sets forth regulations for drivers of vehicles engaged in transporting explosives. Also provides guidance on explosive management during incoming shipments, outgoing shipments, and movement within PMRF boundaries.	Explosives, ammunition, and hazardous materials are transported and used within the leasehold and easement areas.	Operation and Maintenance Contractor, Ordnance supervisor, PMRF Explosives Safety Officer, and PMRF Commanding Officer	September 2010	During the transportation or handling of any hazardous materials or explosives.	Contains sensitive information and not publicly available.

Plan/IMs/OMPs	*Affected Resource*	*Description of SOP/Best Management Practices*	*Applicability in the Project Area*	*Responsible Entity*	*Status*	*Frequency of Implementation*	*Link*
PMRF Oil and Hazardous Substance Spill Contingency Plan	Hazardous Materials and Waste, Public Health and Safety	Establishes procedures to ensure that PMRF is adequately prepared to respond to a release of any hazardous substance that requires an emergency response.	Hazardous substances (fuel and oil) are stored on leasehold lands on Main Base, Mākaha Ridge, and KPGO.	Facility Incident Commander	June 2022	In response to an unintentional release of oil and/or other hazardous materials.	Contains sensitive information and not publicly available. However, a spill response flow chart from the plan is available here: https://pmrf-kpgo-eis.com/media/n5vnq23e/spill-flowchart-from-pmrf-oil-and-hazardous-substance-spill-contingency-plan.pdf
Spill Response Standard Operating Procedure, ES-253	Hazardous Materials and Waste, Public Health and Safety	Provide guidance, establish protocols, and support spill response actions to minimize impact to the environment.	Hazardous substances (fuel and oil) are stored on leasehold lands on Main Base, Mākaha Ridge, and KPGO.	Facility Incident Commander	July 2021	In response to an unintentional release of oil and/or other hazardous materials.	Contains sensitive information and not publicly available.

Plan/IMs/OMPs	*Affected Resource*	*Description of SOP/Best Management Practices*	*Applicability in the Project Area*	*Responsible Entity*	*Status*	*Frequency of Implementation*	*Link*
Range Safety Policy, PMRFINST 8020.16A	Public Health and Safety	Establishes risk management policy governing range operations, including training exercises conducted at or under the jurisdiction of the PMRF.	Hazards from range operations are present on leasehold and easement areas on and adjacent to fee simple lands at Main Base.	Range Safety Officer and all personnel involved in conducting missile flight operations at PMRF	May 2015	During missile launch activities.	Contains sensitive information and not publicly available.
Ground Hazard Plan, PMRFINST 8020.15A	Public Health and Safety	Sets forth detailed ground safety procedures to be followed in the conduct of Launch Operations from the PMRF.	Ground hazard areas, and pre-launch hazard areas are present on leasehold and easement lands on Main Base.	Ground Safety Officer	June 2018	During missile launch activities.	Contains sensitive information and not publicly available.
HERO, Personnel, and Fuel Survey of PMRF	Public Health and Safety	The NSWCDD, Electromagnetic Measurements & Engineering Branch (B55) conducted a HERO, HERP, and HERF survey of PMRF in 2019.	HERO and HERP risks occur on leasehold and easement lands on Main Base, Mākaha Ridge, and KPGO.	Naval Ordnance Safety and Security Activity Commanding Officer	The Radiation Hazards Survey periodicity for this installation has been aligned so that the HERO, HERP, and HERF surveys are conducted concurrently. Survey completed in 2019, report dated September 2020.	Periodically.	Contains sensitive information and not publicly available.

Plan/IMs/OMPs	*Affected Resource*	*Description of SOP/Best Management Practices*	*Applicability in the Project Area*	*Responsible Entity*	*Status*	*Frequency of Implementation*	*Link*
Brush and Wildfire Firefighting, FES DIPB .09	Public Health and Safety	To establish procedures for department members during brush and wildland fire emergencies.	Wildfire hazards are present, in areas adjacent to missile launch areas, on leasehold and easement lands on Main Base.	Fire Chief, Assistant Fire Chief, Assistant Chief of Training	March 2024	During brush and wildland fire emergencies on leased or easement lands on PMRF.	https://www.pmrf-kpgo-eis.com/media/du2lfsqr/pmrf-brush-and-wildfire-firefighting-department-internal-procedure.pdf
Ammunition and Ordnance Management, PMRFINST 8023.1K	Public Health and Safety	Includes ammunition asset accountability, ammunition transaction reports, use of only qualified personnel for specific tasks, and certification maintenance. A Fire Hazard Location Report of all ordnance facilities is provided to the fire chief as changes occur/once a month.	Ordnance is stored and utilized on leasehold areas on Main Base and Kamokalā Ridge.	PMRF Launch/ Ordnance Officer, and all personnel who handle ordnance at PMRF	November 2005	As applicable.	Contains sensitive information and not publicly available.
Sanitary Survey	Water Resources	DOH conducted a sanitary survey of the PMRF water system.	Water pumped out of the Mānā Water Well is distributed as potable water to leasehold areas on Main Base.	DOH, Safe Drinking Water Branch	Conducted August 28, 2022, Navy responded with plan of action February 14, 2023	As applicable.	Pending response from DOH for project closeout.

Plan/IMs/OMPs	*Affected Resource*	*Description of SOP/Best Management Practices*	*Applicability in the Project Area*	*Responsible Entity*	*Status*	*Frequency of Implementation*	*Link*
Potable Water Sampling, 3.2.7 OMP-001	Water Resources	Establishes specific and detailed procedures to be used by the operations and maintenance personnel of the Facilities Maintenance Plumbing shop. The execution of this instruction is required to ensure the quality of water being distributed at PMRF and comply with the PWS and DOH Safe Drinking Water Act. Also describes testing protocol for chlorine and total coliform in potable water.	Water pumped out of the Mānā Water Well is distributed as potable water to leasehold areas on Main Base.	PMRF Public Works Director, Facilities Maintenance Supervisor, Plumbing shop personnel	2022	Chlorine sampling: daily. Coliform sampling: monthly.	https://www.pmrf-kpgo-eis.com/media/cx3ggh2k/pmrf-potable-water-sampling-operating-and-maintenance-procedure.pdf
PMRF Potable Water Supply Distribution System, 3.2.7 OMP-005	Water Resources	Establishes specific and detailed actions to be taken by the operations and maintenance personnel during normal equipment use and periodic checks; and in the event of a major disaster, breakdown, or gross contamination of the water supply.	Water pumped out of the Mānā Water Well is distributed as potable water to leasehold areas on Main Base.	PMRF Public Works Director, Facilities Maintenance Supervisor, Facilities Maintenance personnel	October 2022	Water quality monitoring (parameter dependent): daily, monthly, or as required. Maintenance (equipment dependent): daily, monthly, quarterly, annually, or as required.	Contains sensitive information and not publicly available.

Plan/IMs/OMPs	*Affected Resource*	*Description of SOP/Best Management Practices*	*Applicability in the Project Area*	*Responsible Entity*	*Status*	*Frequency of Implementation*	*Link*
Consumer Confidence Water Quality Report/Sanitary Survey/Annual Water Quality Monitoring Report, PMRF Kaua'i Water System, Mānā Water Well	Water Resources	Provides information about the PMRF water distribution system and provides results of contaminant levels found in water samples.	Water pumped out of the Mānā Water Well is distributed as potable water to leasehold areas on Main Base.	Navy Region Hawaii	July 2026	Annual.	https://www.pmrf-kpgo-eis.com/media/thrfvml3/2026-consumer-confidence-water-report.pdf
KTF Site Sustainability Plan	Hazardous Materials and Waste	Outlines BMPs that are implemented at KTF to decrease environmental effects from the use of hazardous materials on site. Establishes policies for pesticide use, waste management, and fuel and oil usage.	Oil and fuel are stored on leasehold lands on Main Base that make up a small portion of KTF.	Department of Energy	2024	Whenever hazardous materials are present, stored, or being transported.	Contains sensitive information and not publicly available.
PMRF RCRA Contingency Plan	Public Health and Safety; Hazardous Materials and Waste; Water Resources	Provides preparedness, prevention, and emergency procedures in order to minimize the possibility of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste into the air, soil, or surface water. Outlines operations and maintenance procedures,	Ordnance is stored and utilized on leasehold areas on Main Base and Kamokalā Ridge. Wildfire hazards are present, in areas adjacent to missile launch areas, on leasehold and	PMRF Launch/ Ordnance Officer; Fire Chief	May 2023	Whenever hazardous materials are present, stored, or being transported.	Contains sensitive information and not publicly available.

Plan/IMs/OMPs	*Affected Resource*	*Description of SOP/Best Management Practices*	*Applicability in the Project Area*	*Responsible Entity*	*Status*	*Frequency of Implementation*	*Link*
		fire prevention and communication equipment, testing and maintenance, local fire department information (Crash/Fire), vicinity applicability, and emergency response requirements including a quick reference guide.	easement lands on Main Base.				
NASA SENSE Environmental Management Plan	Public Health and Safety; Water Resources; Hazardous Materials and Waste	Describes procedures and practices to ensure environmental protection. Describes environmental policy, compliance, prevention and pollution, authority and accountability, risk assessments, and emergency procedures. Outlines waste management, hazardous waste shipment, water management, pesticides, and record keeping.	Hazardous substances (fuel, oil, pesticides) are stored on leased lands at KPGO. Universal waste is produced at leased lands at KPGO.	NASA Deputy Program Manager, NASA Safety and Health Manager	January 2023	As needed.	https://www.pmrf-kpgo-eis.com/media/q44bucom/4052023-nasa-space-exploration-network-services-and-evolution-environmental-management-plan.pdf

Key: BMP = Best Management Practice; DIPB= Department Internal Procedure Barking Sands; DOH = Hawai'i Department of Health; DOT = Department of Transportation; FES= Fire and Emergency; HERF = Hazards of Electromagnetic Radiation to Fuel; HERO = Hazards of Electromagnetic Radiation to Ordnance; HERP = Hazards of Electromagnetic Radiation to Personnel; IM = Instruction Memoranda; KPGO = Kōke'e Park Geophysical Observatory; KTF= Kaua'i Test Facility; NASA= National Aeronautics and Space Administration; NAVFAC = Naval Facilities Engineering Systems Command; NSWCDD = Naval Surface Warfare Center, Dahlgren Division; OMP = Operating and Maintenance Procedure; PMRF = Pacific Missile Range Facility; PMRFINST = Pacific Missile Range Facility Instruction; POL = petroleum, oil, and lubricant; PWS = Public Water Supply; RCRA = Resource Conservation and Recovery Act; SENSE = Space Exploration Network Services and Evolution; SOP = Standard Operating Procedure; SPCC = Spill Prevention, Control, and Countermeasure.

3 Affected Environment and Environmental Consequences

This section summarizes the approach to defining the affected environment and effects analysis[45] for resources evaluated in this EIS. Detailed analysis by resource is provided in Section 3.2 through Section 3.13.

3.1 Introduction to the Affected Environment and Environmental Consequences

3.1.1 Affected Environment

The affected environment includes areas where effects from the Proposed Action or alternatives evaluated in this EIS could occur, as depicted geographically by the region of influence (ROI) which varies by resource (see Table 3.1-1 for ROI by resource). The affected environment is considered the baseline environment without the Proposed Action. Historical actions and predictable environmental trends contribute to the current environment. The description of the affected environment uses existing information, input from subject matter experts, and project-specific resource surveys conducted in 2024 for the leaseholds and portions of the easement lands. These surveys included: architectural survey, archaeological inventory survey (Appendix F), cultural impact assessment (Appendix F), terrestrial wildlife surveys (special status wildlife species, birds, and invasive and/or pest species) (Appendix K, PMRF Fauna Survey Report, KPGO Fauna Survey Report), Hawaiian hoary bat surveys (Appendix K), vegetation surveys (special status plant species, plant communities, land cover types, and invasive plant species) (Appendix K, PMRF Flora Survey Report, KPGO Flora Survey Report), and a wetland delineation (Appendix L). Description of the affected environment on the easement lands in the Project Area is focused on those locations with utilities that support Navy and NASA missions (see Section 1.5, *Scope of Environmental Analysis*).

The regulatory environment for each of the resources is included in Appendix E and summarized in each resource section.

3.1.2 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA, including for BLNR to evaluate whether the Proposed Action may "have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a floodplain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters" (see, e.g., HAR section 11-200.1-13(b)(11)). The following leasehold and easement lands are located within the 3.2-foot sea level rise exposure area scenario for purposes of BLNR's analysis under HEPA:

- Leaseholds: Tract E-1 (TMK: 1-2-002-025), Tract E-2 (TMK: 1-2-002-026 (por.)), Tract E-2-A (TMK: 1-2-002-026 (por.)), Lot 1 (TMK: 1-2-002-001 (por.)), Lot 3 (TMK: 1-2-002-001 (por.)), Lot 7 (TMK: 1-2-002-001 (por.)), Lot 10 (TMK: 1-2-002-001 (por.)), Lot 13 (TMK: 1-2-002-001 (por.)), Lot A-1 (TMK: 1-2-002-001 (por.), Lot B (TMK: 1-2-002-001 (por.)); and

[45] The terms "effects" and "impacts" are used interchangeably in this document.

- Easement Lands: GHA Easement 1 (TMK: 1-2-002-001 (por.)), GHA Easement 2 (TMK: 1-2-002-024 (por.)), Easements 100 – 104 (TMK: 1-2-002-001 (por.)), Easement B (TMK: 1-2-002-001 (por.)), Easements B-1 – B-4 (TMK: 1-2-002-001 (por.)), Easement D (TMK: 1-2-002-001 (por.)), Easement F (TMK: 1-2-002-001 (por.)), Easement G Pt 1 (TMK: 1-2-002-001 (por.)), Easement G Pt 2 (TMK: 1-2-002-001 (por.)), Easement H (TMK: 1-2-002-001 (por.)).

Figure 3.1-1 shows the location of the 3.2-foot sea level rise exposure scenario area in relation to the Project Area.

The existing conditions in the State of Hawai‘i are representative of the existing conditions of the study area, as summarized in Table 3.1-1.

Table 3.1-1 Existing Conditions of Hawai‘i

Condition	***Description***
Regional temperature	Average temperatures on Kaua‘i range from 69 to 85°F (21 to 29°C) but are cooler at higher elevations ranging from 45 to 68°F (7 to 20°C) at KPGO. Sea surface temperatures range from a low of approximately 73°F (23°C) between late February and March to a high of approximately 79°F (26°C) in late September or early October.
Precipitation pattern	Rainfall averages between 25 and 30 inches (64 and 76 centimeters) a year over the Pacific Ocean near Hawai‘i, with PMRF averaging nearly 20 inches (52 centimeters) per year and 70 inches (178 centimeters) per year at higher elevations including KPGO.
Frequency and intensity of extreme weather events	Storm tracks and Pacific anticyclone in the region are sometimes referred to as “nearly stationary,” with weather in the region usually maintaining stability.
Elevation	The elevation of the study area ranges from near sea level (at PMRF) to approximately 3,600 feet above sea level (KPGO).

Key: °C = degrees Celsius; °F = degrees Fahrenheit; KPGO = Kōke‘e Park Geophysical Observatory; PMRF = Pacific Missile Range Facility.
Source: National Weather Service, 2020.

Predictable environmental trends for this EIS are described in Table 3.1-2. The trends listed in the table represent the consequences of assuming nearly the highest possible global greenhouse gas (GHG) emissions. The likelihood of effects resulting from this high-end emissions scenario is debated among scientists because future global emissions are dependent on unknowns such as policies and technology developments (Hausfather and Peters, 2020; Riahi et al., 2007, 2011; Schwalm et al., 2020a, 2020b).

Table 3.1-2 serves as a base for the other resources to assess how predictable trends affect the resource.



Figure 3.1-1 Sea Level Rise Exposure Area

Table 3.1-2 Predictable Environmental Trends

Predictable Trend	*Description*
Rising global temperatures (air/ocean)	• Over the past 100 years, there has been an upward trend in air temperature in Hawai'i of 0.042°C (0.023°F) per decade, with 2015 being recorded as 0.794°C (0.441°F) above the 100-year average (McKenzie, 2016). The fifth warmest year on record was 2022, which is notable since 2022 was a La Niña cool-phase year (State of Hawai'i, 2024). • Air temperatures are projected to increase by 2.2 to 3.3°C (4.0 to 5.9°F) from current baseline by late century (HCCMAC, 2017; McKenzie, 2016). • Global temperatures have already risen approximately 1°C since the pre-industrial era (NOAA National Centers for Environmental Information, 2024). • Sea surface temperatures could increase 2.8°C (5.0°F) from current baseline by late century (HCCMAC, 2017). • Changes to average local air and sea temperatures have implications across the region including for water supplies and coastal resources.
Change in precipitation patterns	• Generally speaking, in Hawai'i, wet areas are on windward slopes, and dry areas are leeward. Precipitation is projected to increase as much as 30 percent in wet areas (windward) and decrease as much as 60 percent in dry areas (leeward) by the calendar year 2100 (Timm et al., 2014; Zhang et al., 2016). PMRF is located on the leeward side of Kaua'i. Therefore, a decrease by as much as 60 percent in the study area could occur by calendar year 2100. • Other projections model that extreme rainfall events will increase in both the wet and dry seasons, with a 20% increase in extreme rates in the dry season and 10% increase during the wet season (Xue et al., 2020). • Precipitation changes have wide implications. For example, an increase in evaporation due to temperature increases, combined with a decrease in precipitation, could lead to more extreme drought. Increase in extreme rain events can lead to higher rates of erosion, mudslides, flooding, and damage to infrastructure.
Increased frequency and/or intensity of extreme weather events	• Hurricanes are increasing in intensity (Cangialosi et al., 2020). • During the extremely active calendar year 2014 Hawaiian hurricane season, hurricanes were more likely to occur; however, other extreme weather events such as specific droughts and heavy rain events continue to be challenging to anticipate (Murakami et al., 2015). • Increased frequency and intensity of hurricanes will occur in Hawai'i, though the details of those projections are continually being refined (Zhang and Wang, 2017; Emanuel, 2015; Tuleya et al., 2016).
Rising sea levels and associated storm surge	• Sea levels near PMRF are projected to rise approximately 3.2 feet (1.0 meter) by the calendar year 2100 (PacIOOS, 2020). • With projections including impacts of storm surges, flooding, and erosion, PMRF is considered a highly impacted area at risk of large economic losses. • In 2020, the Honolulu Harbor Tide gauge recorded its highest daily mean water levels observed over the 112 years of records (HCCMAC, 2022).

Predictable Trend	*Description*
Ocean acidification	• Ocean uptake of carbon dioxide results in changes to the chemistry of sea water known as ocean acidification. From pre-industrial times, the pH of the ocean has changed from 8.1 pH to 8.0 pH, a numerically small change that represents significant change in ocean chemistry (Jiang et al., 2019). • The NOAA Pacific Marine Environmental Laboratory monitors this change in ocean chemistry, including pH. pH could decrease 0.33 from current baseline by the calendar year 2100 (Bopp et al., 2013). • Ocean acidification impacts affect coral by making them more susceptible to predation, physical mechanical damages, and disease, which in turn impacts fisheries and ecosystems.

Key: % = percent; °C = degrees Celsius; °F = degrees Fahrenheit; HCCMAC = Hawai'i Climate Change Mitigation and Adaptation Commission; NOAA = National Oceanic and Atmospheric Administration; PMRF = Pacific Missile Range Facility.

Sources: Bopp et al., 2013; Cangialosi et al., 2020; Emanuel, 2015; HCCMAC, 2017, 2022; Jiang et al., 2019; Knutson et al., 2015; McKenzie, 2016; Murakami et al., 2015; NOAA, 2020; NOAA National Centers for Environmental Information, 2024; Pacific Islander Council on Climate Change, 2020; PacIOOS, 2020; State of Hawai'i, 2024; Timm et al., 2014; Tuleya et al., 2016; United States Global Change Research Program (USGCRP), 2018; Xue et al., 2020; Zhang et al., 2016; Zhang and Wang, 2017.

3.1.3 Region of Influence

For each resource, a ROI is identified. The ROI is the geographic area that could be affected by the Proposed Action and alternatives. The geographic extent is determined by the degree of effect (i.e., the physical reach of any effect on the resource). The ROI for the Proposed Action is generally the Navy and NASA leasehold and easement lands; with the exception of certain resources such as cultural practices, air quality and greenhouse gases, public health and safety, transportation, and socioeconomics, where the geographic extent of the affected environment is larger. Table 3.1-3 includes a list of the ROIs for each resource, and Figure 3.1-2 illustrates the ROIs.

Table 3.1-3 Regions of Influence

Resource	*Region of Influence*[1]	*Section/Figure Reference*
Archaeological and Architectural Resources	Navy and NASA held leasehold and easement lands at PMRF and KPGO	See Section 3.2.1, Figures 3.1-2 and 3.2-1
Cultural Practices	Western portion of the ahupua'a of Waimea in the district of Kona on Kaua'i, extending from Kalalau Valley in the north to Kekaha Town in the south, and roughly from Waimea Canyon in the east and across Mānā Plain to the nearshore waters in the west	See Section 3.3.1 Figures 3.1-2 and 3.3-1
Biological Resources	Navy and NASA held leasehold and easement lands at PMRF and KPGO	See Section 3.4.1, Figure 3.1-2
Land Use and Access	Navy and NASA held leasehold and easement lands at PMRF and KPGO	See Section 3.5.1, Figure 3.1-2
Socioeconomics	Kaua'i County, Hawai'i	See Section 3.6.1, Figures 3.1-2 and 3.6-1
Water Resources	Navy and NASA held leasehold and easement lands at PMRF and KPGO	See Section 3.7.1, Figure 3.1-2
Utilities	Navy and NASA held leasehold and easement lands at PMRF and KPGO	See Section 3.8.1, Figure 3.1-2

Resource	*Region of Influence*[1]	*Section/Figure Reference*
Public Health and Safety	Navy and NASA held leasehold and easement lands at PMRF and KPGO. The ROI also includes ordnance transportation routes and emergency transportation routes.	See Section 3.9.1, Figure 3.1-2
Air Quality and Greenhouse Gases	Kaua'i County, Hawai'i	See Section 3.10.1, Figure 3.1-2
Transportation	The ROI includes ordnance transportation routes and emergency transportation routes.	See Section 3.11.1, Figures 3.1-2 and 3.9-1
Hazardous Materials and Waste	Kamokalā Ridge, Mākaha Ridge, Miloli'i Ridge, Mānā Water Well, KPGO, and leasehold and easement lands at Main Base (including KTF)	See Section 3.12.1, Figure 3.1-2
Visual Resources	Navy and NASA held leasehold and easement lands at KPGO and PMRF	See Section 3.13.1, Figure 3.1-2

Note: [1]The scope of analysis on the easements is limited to those locations with utilities or access that support Navy and NASA missions.

Key: KPGO = Kōke'e Park Geophysical Observatory; KTF = Kaua'i Test Facility; NASA = National Aeronautics and Space Administration; PMRF = Pacific Missile Range Facility; ROI = Region of Influence.

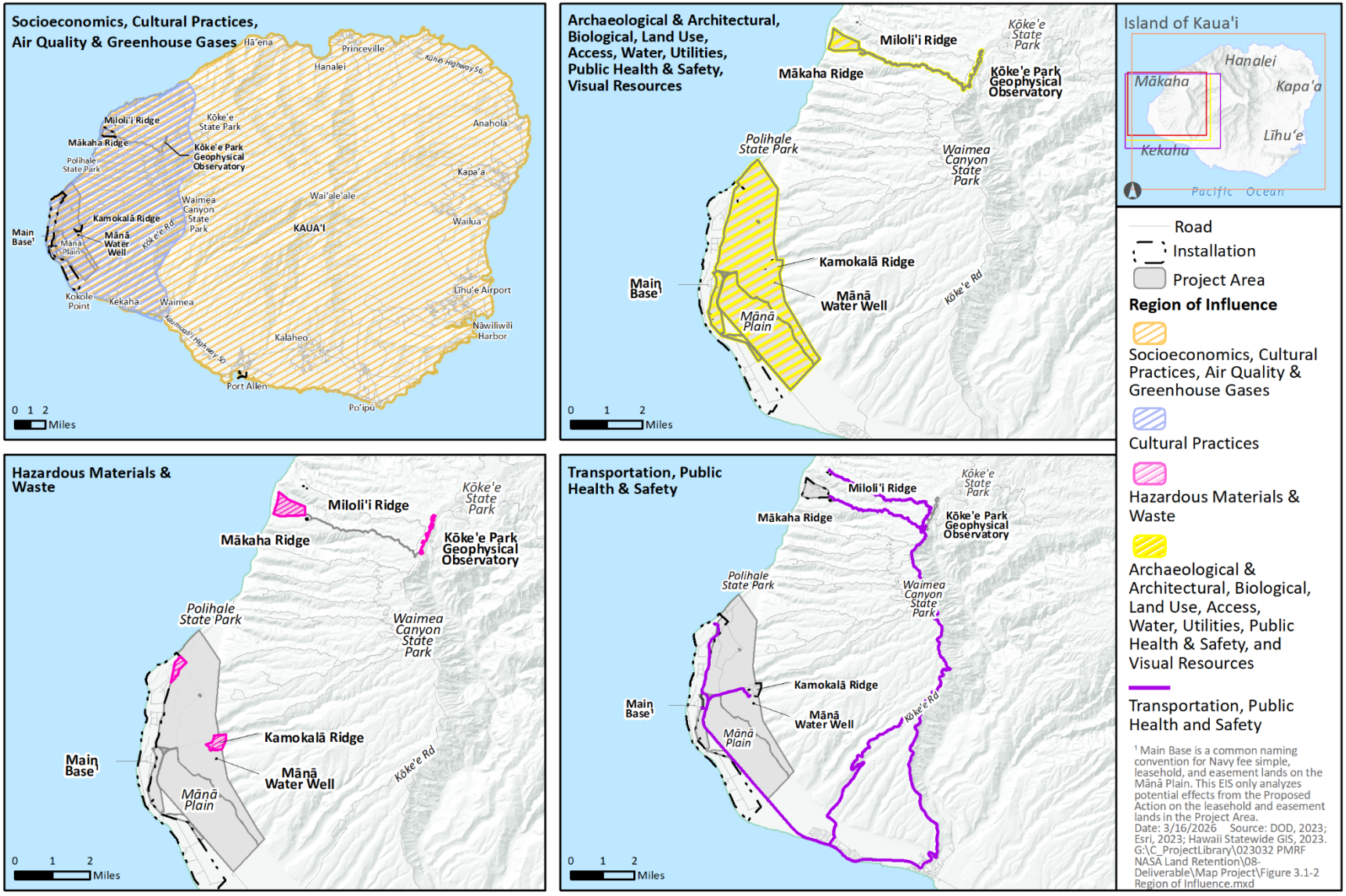


Figure 3.1-2 Regions of Influence

3.1.4 Effects Analysis

This section describes the method for determining the environmental effects associated with each alternative.

3.1.4.1 Approach to Analysis

Effects can occur at the same time and place as the Proposed Action or alternatives or can occur later in time or farther removed in distance from the Proposed Action and alternatives. Effects removed in time, geographically remote, or the product of a lengthy causal chain are not considered.

Effects and their significance are described in terms of affected area, degree (extent to which the effect would result in an appreciable change to the resource), duration (short- or long-term), and whether beneficial or adverse, considering the setting as specified by the ROI for each resource. The short-term duration effects are generally construction-related and the long-term duration effects are generally activities-related. The effects analysis for each resource describes effects in these terms to assist the decision-maker in understanding the potential significance of each effect analyzed and compares the effects of each of the three alternatives.

Significant effects are adverse effects that meet a set of significance criteria determined prior to the analysis. Significance criteria used in this EIS include the context of the action and the intensity of the effect. Context is associated with the location of the Proposed Action or the ROI, which varies among resource areas. Intensity refers to the severity of the effect.

HRS Chapter 343 and HAR section 11-200.1-2 define “significant effect” or “significant impact” as meaning “the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State’s environmental policies or long-term environmental goals and guidelines as established by law, or adversely affect the economic welfare, social welfare, or cultural practices of the community and State.”

The EIS identifies the effects of ongoing activities including existing protection and mitigation measures in place (from previous NEPA and HEPA documents) to minimize those effects and the administrative nature of securing new real estate agreements. Where applicable, the EIS identifies Enhanced Engagement the Navy and NASA would implement to improve management of the environment and further the State of Hawai‘i’s kuleana to mālama ‘āina (responsibility to care for the land and to properly manage the resources and gifts it provides).

The analysis for each resource describes effects in these terms to assist the decision-maker in understanding potential significance of each effect analyzed and properly compare the effects of each action alternative. The effects analysis for each resource includes a description of assessment methodology and evaluates potential effects by identifying (1) the project action(s) that could result in notable effects to the resource, (2) the nature and type of effects expected to result from those project actions, (3) metrics used to quantify those effects, and (4) concludes with a statement identifying whether the alternative results in adverse effects, and whether any adverse effects were identified to be potentially significant.

3.1.4.2 Alternative Analysis

Under the action alternatives, there would be no proposed changes to the type or frequency of current activities occurring on State lands, there would be no change in any use or maintenance of existing infrastructure, nor any construction, renovation, or demolition of facilities. Essentially, the action alternatives represent a continuation of the existing effects from ongoing use of State lands. Where applicable, resource analysis includes the effects from ongoing activities required by the BMPs, permits, plans, and SOPs, as requirements carried over from previous environmental reviews, including any associated mitigation measures and protection measures that remain ongoing. The No Action Alternative represents no issuance of new real estate agreements.

3.1.4.2.1 Alternative 1: Succeeding Current Real Estate Agreements

Under Alternative 1, the State of Hawai‘i would issue the Navy and NASA new real estate agreements with no change to existing uses in the existing agreements (Section 2.3.1). Alternative 1 represents the continuation of existing conditions and effects. The analysis assumes that succeeding real estate agreements would be for a minimum duration of 25 years up to a maximum duration as negotiated with DLNR.

3.1.4.2.2 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

Under Alternative 2, the Navy and NASA would acquire in fee simple the land currently held in leaseholds (no change to the existing footprint) and otherwise obtain use of the same easements[46] (Section 2.3.2).

For Alternative 2, the analysis considers how the loss of State lands through the fee simple acquisition of the 684 acres of previous leased land differs from retention through term-limited mechanisms such as leaseholds and easements as analyzed under Alternative 1. The effects are related to land retention mechanisms, which for some resources could result in minor effects; however, for some resources, the effects may not be minor. Consideration for how these land tenure mechanisms could be perceived by the public, in the unique historic context of the affected environment, is also examined.

3.1.4.2.3 Alternative 3: No Action Alternative

Under Alternative 3: No Action Alternative, the State of Hawai‘i would not grant the Navy and NASA any new real estate agreements after expiration of the leases and easements between 2027 to 2030 (see Section 2.3.3, *Alternative 3: No Action Alternative*). Under this alternative, the Navy and NASA would carry forth the following process (also described in Section 2.3.3):

1. The State of Hawai‘i would not grant Navy and NASA any new real estate agreements for the State lands on Kaua‘i (8,172 acres Navy, 23 acres NASA) after expiration of the leases and easements between 2027 and 2030.
2. Pursuant to the terms of the current real estate agreements, at the expiration of the leases and easements, any return of State property would involve complex negotiations and collaboration

[46] The Navy would not pursue new real estate agreements for easements B-1 and B-2 under the action alternatives as these were temporary construction permits granted in 1977 and are no longer needed.

with the State of Hawai'i to determine the condition of the returned lands. Negotiations may include:

a. Whether existing infrastructure on the State lands would be removed or remain in place;

b. Any remediation required before the State of Hawai'i reacquired control of the property;

c. The transfer of various environmental and cultural responsibilities presently conducted by Navy and NASA to the State; and

d. Any additional time the Navy and NASA may need to accomplish these actions following lease and easement expiration.

3. The timeline for this process is unknown. Initially, the Navy and NASA would need to prepare an ECP to assess the current condition of all State lands under federal control to include the infrastructure and any cultural resources. The ECP would determine whether the property meets the federal and applicable State laws concerning hazardous or toxic substances and whether environmental remediation would be required.

4. Finally, once that process is complete and all future actions agreed upon, the federal and State government would need to establish a timeline and follow-on real estate instruments to allow these future actions and activities to be accomplished prior to the State resuming control over the property.

5. Consistent with the terms of the leases, and under the extreme case scenario, negotiations could result in decisions to remove all infrastructure on leaseholds and easements at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO.

As described in Section 2.3.3, the Navy would not be able to conduct a substantial portion of training and testing events because of the loss of safety and buffer areas for missile and target launches and access to critical infrastructure necessary to support ongoing operations and the loss at KPGO would affect NASA's ability to maintain a global network of space geodetic observatories that work together to maintain a stable terrestrial reference system contributing to NASA missions, military and civilian navigation, and the scientific community. In the absence of knowing how the State lands would be used by the State of Hawai'i, the analysis for each resource presents a qualified assessment of likely effects. The analysis will qualitatively identify potential effects. As explained in Section 2.3.3, under the No Action Alternative, the lack of new real estate agreements would require the Navy and NASA to undertake entirely new actions, which would require additional analysis, consultations, and documentation once the full scope of the actions was known.

For example, under one of the current leases, Lease S-3852 (Appendix C): "The Government shall surrender possession of the premises upon the expiration or sooner termination of this lease and, *if required by the Lessor*, shall within sixty (60) days thereafter, or within such additional time as may be mutually agreed upon, remove its signs and other structures; provided that in lieu of removal of structures the Government structures would remain in place. The Government shall also remove weapons and shells used in connection with its training activities to the extent that a technical and economic capability exists and provided that expenditures for removal of shells will not exceed the fair market value of the land."

Due to this language, the No Action Alternative in this EIS is evaluated through an extreme case scenario involving removal and disposal of all infrastructure (Navy, NASA, and DLNR infrastructure at KPGO Site C) and by assessing the effects that could occur from ground-disturbing activities associated with demolition and removal of existing infrastructure. Comments received on the Draft EIS noted that the outcome of the No Action Alternative is unknown and, therefore, the level of significance should not be presumed for this alternative. In response to these comments, the Final EIS has been revised to remove statements regarding the presumptive level of significance of effects for the No Action Alternative; in their place, statements in the effect summaries have been added to clarify the unknown nature of the No Action Alternative.

3.1.5 Resources Analyzed

This EIS includes a detailed analysis of the following resources: archaeological and architectural resources, cultural practices, biological resources, land use and access, socioeconomics, water resources, utilities, public health and safety, air quality and greenhouse gases, transportation, hazardous materials and waste, and visual resources. As described below, there are no potential effects to airspace, marine navigation, and marine biological resources; therefore, these resources were not analyzed in this EIS. As discussed in Section 1.1, *Project Introduction and Overview*, the Ocean ROW is not part of the area analyzed in this EIS.

Airspace. The leasehold and easement lands located in the Project Area are entirely land-based. The Proposed Action does not pertain to activities occurring in airspace or affecting the designation, management, or use of airspace over Kauaʻi or surrounding waters. All aircraft, military and civilian, are subject to Federal Aviation Administration (FAA) regulations, which define permissible uses of designated airspace and are implemented to control those uses. Special use airspace is designed for the types of Navy activities that occur at PMRF. Restricted Areas (such as R-3101 north and west of Kauaʻi) are designated to contain hazards to non-participating aircraft, and Warning Areas (such as W-188 north and west of Kauaʻi, and W-186 southwest of Kauaʻi) accommodate activities that present a hazard to other aircraft. PMRF controls this special use airspace and the Proposed Action and alternatives, including the No Action Alternative, would not change the control of this airspace.

In addition, the Navy implements SOPs for clearing areas of all nonparticipants before initiating potentially hazardous activities, such as Notices to Airmen issued by the FAA. For example, Notices to Airmen inform civilian pilots of upcoming temporary closures to special use airspace and to avoid radar areas and electronic warfare assets at Kōkeʻe and Mākaha Ridge during program activities. The leasehold and easement lands associated with the Proposed Action do not change these procedures nor do they affect access to the PMRF airfield, Kekaha airstrip, or heliports at Kōkeʻe and Mākaha Ridge. All arriving and departing aircraft would continue to operate under the control of PMRF Radar Control Facility on Navy fee simple land to ensure there are no airfield or airport conflicts. Furthermore, the Proposed Action includes no change to Navy activities that involve use of existing special use airspace. Consequently, leasehold and easement lands associated with the Proposed Action would not conflict with ongoing airspace plans, policies, and controls. As such, there would be no effects on airspace from the action alternatives or the No Action Alternative. A discussion on the use of airspace as it relates to public health and safety can be found in Section 3.9.1.4.1, *Main Base*. Effects to airspace associated with existing Navy activities are addressed in the 2018 Hawaii-Southern California Training and Testing (HSTT)

Final EIS/OEIS[47,48], the 2025 Hawaii-California Training and Testing (HCTT) Final EIS/OEIS[49], the 1998 PMRF Enhanced Capability Final EIS[50], and the 2019 Finding of No Significant Impact (FONSI) Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility [KTF])[51].

Marine Navigation. The leasehold and easement lands associated with the Proposed Action do not extend into nearshore waters, and they do not affect marine navigation. In alignment with existing federal regulations, the Navy implements SOPs for clearing areas (including sea space) of all nonparticipants before initiating potentially hazardous activities in order to limit or avoid disruptions to marine navigation. The exclusion of marine vessels from the waters surrounding PMRF is carefully planned, with advance notice to allow use of alternative waters. Commercial and recreational vessels entering areas offshore from PMRF, including established restricted areas and danger zones, operate under maritime regulations such as ballast water management and safety regulations. The U.S. Coast Guard issues Local Notices to Mariners prior to military operations, providing advance notice to commercial ship operators, commercial fishers, recreational boaters, and other users of the area so they can plan their activities accordingly. These temporary clearance procedures are implemented for the safety of the public and to minimize disruptions to marine navigation. Any displacement of marine vessels is usually of short duration (typically less than 24 hours) and limited only to areas where there is a risk of injury or property damage. The Navy also has procedures to manage situations when civilian marine vessels are within a testing or training area at the time of a scheduled operation.

Leasehold and easement lands associated with the Proposed Action would not affect marine navigation or the associated management activities. The types of offshore designations, marine navigation procedures, and public notifications (e.g., Local Notices to Mariners) would remain unchanged for PMRF. As such, there would be no effects to marine navigation from the action alternatives or the No Action Alternative. Effects to marine navigation associated with existing Navy activities are addressed in the 2018 HSTT Final EIS/OEIS[48] and the 2025 HCTT Final EIS/OEIS.

Marine Biological Resources. The leasehold and easement lands do not extend into nearshore waters, and no associated activities directly affect the marine environment. Activities in the leaseholds and easement areas do not involve stressors that could affect marine resources, such as airborne and underwater noise, underwater energy activities (e.g., explosives or electromagnetic devices), placement of materials or structures in the ocean environment, expended materials in the ocean environment (involving the potential for contamination or for ingestion by marine fauna), or physical disturbance in the ocean environment (such as entanglement and physical strikes). Therefore, the Proposed Action would not directly affect marine sediments, marine water quality, marine vegetation, invertebrates (including coral), marine habitats, marine fish, or marine mammals. Secondary effects to marine vegetation from suspended sediments and turbidity can occur anywhere around Kaua'i due to runoff from the island into nearshore ocean waters. However, activities on the leasehold and easement lands

[47] https://www.pmrf-kpgo-eis.com/media/x04k34eq/061_2018-hawaii-southern-california-training-and-testing-feis-oeis-volume-1.pdf

[48] The 2025 HCTT Final EIS/OEIS supersedes the 2018 HSTT Final EIS/OEIS.

[49] https://www.nepa.navy.mil/Current-Projects/At-Sea-Ranges/Hawaii-California-Training-and-Testing-EIS-OEIS/Final-EIS-OEIS/

[50] https://www.pmrf-kpgo-eis.com/media/abefwgdu/004_1998-pmrf-enhanced-capability-final-eis-volume-1.pdf

[51] https://www.pmrf-kpgo-eis.com/media/lmxdvuuu/2019-department-of-energy-national-nuclear-security-fonsi-continued-operation-of-the-kauai-test-facility.pdf

at PMRF would not change as part of the Proposed Action, so there would be no change to the volume or type of runoff on the west side of Kaua'i that would cause new or different secondary effects to marine vegetation. As such, there would be no effects to marine resources from the action alternatives or the No Action Alternative. Marine resource BMPs would remain as described in Table 2-7. Species such as green and hawksbill sea turtles and Hawaiian monk seals that may be found onshore on easement land for basking, nesting, or other reasons within the ROI are discussed in Section 3.4, *Biological Resources*. Effects to these sea turtles from activities occurring on the Main Base fee simple lands are considered in the 2025 Land-Based Training and Testing Final EA. Effects to sea turtles and other marine biological resources associated with existing Navy activities at sea are addressed in the 2018 HSTT Final EIS/OEIS[52] and the 2025 HCTT Final EIS/OEIS.

3.1.6 Relevant NEPA and HEPA Documents Considered in the Analysis

In addition to new data collected in support of this EIS (see Appendices F, K, L), the descriptions of the affected environment and analysis of potential effects consider previous NEPA and HEPA documentation prepared for prior and ongoing actions at PMRF and KPGO. Table 3.1-4 presents a comprehensive list of all relevant past NEPA and HEPA documents at PMRF and KPGO within the Project Area (leasehold and easement lands) and summarizes key issues (including effects and mitigation measures analyzed in previous documents) associated with each NEPA and HEPA document for reference purposes. These documents were used to identify the relevant ongoing effects on leasehold and easement lands in the Project Area analyzed in previous environmental documents, including ongoing mitigations, and were used to inform the analysis of the alternatives, where applicable. For the following resources, the ROI for this EIS exceeds the Project Area (see Section 3.1.3): Cultural Practices, Socioeconomics, Public Health and Safety, and Air Quality and Greenhouse Gases. This combination of new data and previous findings supports a more comprehensive review of ongoing effects and mitigations in the Project Area (leasehold and easement lands).

For current BMPs and SOPs applicable to the protection of cultural and natural resources at PMRF and KPGO see Table 2-7. See Table 2-8 for current Plans, Instruction Memoranda, and OMPs applicable to the Navy's operations on the leasehold and easement lands. Collectively, these tables in Chapter 2 represent the current and ongoing environmental protection measures and operational and maintenance procedures for resource protection and to ensure the health and safety of the public.

[52] The 2025 HCTT Final EIS/OEIS supersedes the 2018 HSTT Final EIS/OEIS.

Table 3.1-4 List of Relevant Potential Effects and Mitigation Measures from Previous Environmental Review Documents for Activities in the Project Area

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
1993 Final EIS for the Restrictive Easement	HEPA	Main Base[53]	Biological Resources	Potential wildlife effects from helicopter and launch noise. Helicopter and launch noise could cause a startle effect on wildlife in the area, but no significant effects are expected.	N/A	Section 3.4, Biological Resources
1993 Final EIS for the Restrictive Easement	HEPA	Main Base	Hazardous Materials and Waste	Hazardous materials and waste may be introduced from missiles that have landed in the GHA as a result of early flight termination[54].	Hazardous waste resulting from early flight termination is cleared from the area in accordance with the cleanup procedures described in the 1992 Final EIS for the Strategic Target System[55].	Section 3.12, Hazardous Materials and Waste
1993 Final EIS for the Restrictive Easement	HEPA	Main Base	Land Use and Access	Use of the southern end of Polihale State Park would be interrupted 20 minutes prior to launch. The interruptions would occur up to 30 times per year and would include access to and from the State Park. No significant effects to recreational resources would occur because the total closure time for the southern end of the State Park would be	People within the easement are notified 3 hours prior to launch.	Section 3.5, Land Use and Access

[53] Note that "Main Base" is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.
[54] Early flight termination is defined as the purposeful, controlled termination of a missile launch. The missile flight safety officer controls early flight termination. The missile flight safety officer maintains positive control over the missile at all times and continuously monitors the flight trajectory in relation to the predicted impact area for debris. If the missile approaches an unsafe trajectory, the flight will be terminated.
[55] https://pmrf-kpgo-eis.com/media/z2rbc1ea/1992-strategic-target-system-feis-volume-1.pdf

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
				approximately 15 hours per year. No persons within the developed camping or picnicking areas would be affected and people entering and exiting the park would only be delayed during the short closure period.		
1993 Final EIS for the Restrictive Easement	HEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from missile launch activities, such as exposure to hazardous wastes or fire if safety procedures are not followed.	Road closure and surveillance flights occur prior to launch to ensure GHAs are clear. Fire crews will be on stand-by in case of fire.	Section 3.9, Public Health and Safety
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Archaeological and Architectural Resources	Potential effects, such as accidental damage, to archaeological resources from ground disturbance if work occurs in a culturally sensitive area.	Personnel are briefed that they are working in a culturally sensitive area and on the federal laws protecting the resources within that area.	Section 3.2, Archaeological and Architectural Resources
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Archaeological and Architectural Resources	Fire damage to archaeological or cultural resources could occur from missile launch if fire management mitigations are not followed.	Water is sprayed on vegetation within the immediate vicinity surrounding the launch vehicle prior to launch. In the event ignition of vegetation does occur, fire suppression personnel are instructed to use an open spray nozzle, whenever possible, rather than a directed stream to quell the fire. This minimizes erosion damage to areas (such as the sand dunes) and prevents possible destruction of potential cultural resources.	Section 3.2, Archaeological and Architectural Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Kamokalā Ridge	Archaeological and Architectural Resources	Risk of incidental removal of cultural materials or destruction of sites by personnel during construction or operation.	Adherence to ICRMP procedures, NAGPRA, and briefings to construction and operational personnel.	Section 3.2, Archaeological and Architectural Resources
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Biological Resources[1]	Noise from launches may startle nearby wildlife but no significant effects would occur due to the infrequency and short duration of launch events. Project floodlights could disorient the threatened Newell's shearwater.	The use of shielded lighting mitigates impacts to the Newell's shearwater.	Section 3.4, Biological Resources
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Biological Resources	Vegetation fires near launch pad may occur during launches.	The installation of a portable blast deflector on the launch pad could protect the vegetation of the adjacent sand dunes. The potential for starting a fire would be further reduced by clearing dry vegetation from around the launch pad. Spraying the vegetation adjacent to the launch pad with water just before launch would reduce the risk of ignition. Emergency fire crews are available during all Strategic Target system launches to quickly extinguish any fire and minimize its effects. An open (spray) nozzle is used, when possible, rather than a directed stream when extinguishing fires, to avoid erosion damage to the sand dunes and to prevent possible destruction of cultural resources.	Section 3.4, Biological Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Biological Resources[1]	PMRF activities could disturb Hawaiian stilts. Hawaiian stilts use water bodies adjacent to the Main Base leaseholds and easement lands but have not been disturbed by helicopter activity nearby in the past and would not be expected to be affected by helicopters or other low flying aircraft in the future.	N/A	Section 3.4, Biological Resources
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base, Mākaha Ridge	Biological Resources[1]	The potential for main-beam (airborne) exposure to thermal effects to birds exists. Relatively few microwave studies have been conducted on birds. Likewise, while there is specific information on calculating whole-body-averaged specific absorption rates at different frequencies for various polarizations for many mammalian species over a wide range of sizes, there is little or no specific information for birds. Mitigating these concerns is the fact that radar beams are relatively narrow. To remain in the beam for any period requires that the bird flies directly along the beam axis, or that a hovering bird such as a raptor does so for a significant time. There is presently insufficient information to make a quantitative estimate of	N/A	Section 3.4, Biological Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
				the joint probability of such an occurrence (beam stationary/bird flying directly on-axis or hovering for several minutes), but it is probably low. Thus, although the potential for adverse effects on birds exists, the probability that it would occur with any frequency is judged to be low.		
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Accidental spill or misuse of oil or fuels could occur if existing plans were not followed.	PMRF outlines procedures in SPCC Plan and the Installation Spill Contingency Plan. The Installation Spill Contingency Plan contains immediate procedures (in flow chart form) to be carried out by personnel once a discharge is detected, notification and reporting requirements, response equipment, hazard analysis, recommended spill actions and cleanup, training, environmental protection, and SDS.	Section 3.12, Hazardous Materials and Waste
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Hazardous waste at PMRF can include batteries, contaminated soil, asbestos, gasoline, paint related material, oil, methanol, ammonia solution, sand blast material, otto fuel, isopropyl alcohol, and sea water/otto fuel. Exposure to hazardous waste can be harmful to humans.	Hazardous waste is not stored beyond a 90-day collection period on Main Base.	Section 3.12, Hazardous Materials and Waste

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and disposed of properly.	Navy's CHRIMP, a DoD program which reduces the hazardous materials that are procured, stored, distributed, and disposed of as waste by using a centralized control and inventory point. This program also provides tracking and environmental reporting.	Section 3.12, Hazardous Materials and Waste
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Hazardous Materials and Waste	Unintended release of PCBs poses potential effects to water quality, human health, and the environment. PCBs found at PMRF/Main Base were contained in fluorescent lamp ballasts and capacitors in certain electronic equipment.	Components are labeled according to TSCA, 40 CFR part 761, requirements for shipping, and disposed of through the DRMO or a contractor within 1 year of the waste's initial storage.	Section 3.12, Hazardous Materials and Waste
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Mākaha Ridge	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and reduced in usage properly. Hazardous materials used at Mākaha Ridge include lubricating oils and solvents.	PMRFINST 5100.2J, Hazardous Material Control and Management Program[56] and CHRIMP.	Section 3.12, Hazardous Materials and Waste
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if public is not cleared from appropriate areas.	Implementation of defined explosive safety quantity distance arcs.	Section 3.9, Public Health and Safety

[56] https://pmrf-kpgo-eis.com/media/v1thhdtv/pmrfinst-51002j.pdf

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, from premature, unintentional or unauthorized detonation of ordnance.	Implementation of Explosive Safety Approval. Ordnance transported by trained ordnance personnel and within special vehicles for transit and in accordance with U.S. DOT regulations 49 CFR parts 100–109.	Section 3.9, Public Health and Safety
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from accidental release of liquid fuels during transportation of liquid fuels to Main Base that could result in exposure to liquid fuels.	Transportation of these materials is conducted in compliance with U.S. DOT regulation 49 CFR parts 100–109 and 49 CFR sections 171.1–172.558.	Section 3.9, Public Health and Safety
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from electromagnetic radiation to people within the radiation area. Exposure risk would be negligible outside of the radar beam.	All operations conducted in accordance with COMPMTCINST 5100.15, Radiological Safety Manual, and establishment of safety zones and conducting sector blanking (a feature that prevents radar from transmitting to unwanted angles/reflections and improves accuracy) in occupied areas. Warning lights are also illuminated when radar is operational.	Section 3.9, Public Health and Safety
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury, during missile launch activities if public is not cleared from missile launch area.	SOPs implemented for all ground hazard areas. Public and personnel excluded from the ground hazard area during launch. These SOPs include establishing road control points and clearing the area using vehicles and helicopters (if necessary). The road control points are established 3 hours prior to launch to allow security forces to monitor traffic as it passes through the	Section 3.9, Public Health and Safety

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
					GHA. At 20 minutes prior to launch, the area is determined to be clear of the public to ensure that, in the unlikely event of early flight termination, no injuries or damage to persons or property would occur. After the Range Safety Officer declares the area safe, the security force gives the all-clear signal, and the public is allowed to reenter the area.	
1998 PMRF Enhanced Capability Final EIS	HEPA/NEPA	Mākaha Ridge	Public Health and Safety	Potential effects to public health and safety from electromagnetic radiation to people within the radar area. Exposure risk is negligible outside of the radar beam.	The site is regularly surveyed for radiation hazards, and all systems have warning lights to inform personnel when radar units are operating.	Section 3.9, Public Health and Safety
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Potential accidental release of oil or fuels if prevention procedures are not followed.	The PMRF SPCC Plan outlines procedures that prevent and control discharge of oil or oil products and outlines the immediate response plan should an unintentional discharge occur. The Installation Spill Contingency Plan contains immediate procedures (in flow chart form) to be carried out by personnel once a discharge is detected, notification and reporting requirements, response equipment, hazard analysis, recommended spill actions and cleanup, training, environmental protection, and SDS.	Section 3.12, Hazardous Materials and Waste

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Exposure to hazardous waste can be harmful to humans.	Hazardous waste is not stored beyond a 90-day collection period on Main Base.	Section 3.12, Hazardous Materials and Waste
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials, including oil and fuels, can pose risks to humans if not controlled, tracked, and disposed of properly.	PMRF outlines procedures in the Hazardous Waste Management Plan and holds a Used Oil transporter/ processor permit through DOH.	Section 3.12, Hazardous Materials and Waste
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and disposed of properly.	Navy's CHRIMP, a DoD program which reduces the hazardous materials that are procured, stored, distributed, and disposed of as waste by using a centralized control and inventory point. This program also provides tracking and environmental reporting.	Section 3.12, Hazardous Materials and Waste
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Mākaha Ridge	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if not controlled, tracked, and reduced in usage properly. Hazardous materials used at Mākaha Ridge include lubricating oils, low sulfur diesel fuel, and solvents.	PMRFINST 5100.2C, Hazardous Material Control and Management Program.	Section 3.12, Hazardous Materials and Waste
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Mākaha Ridge	Hazardous Materials and Waste	Potential effects from accidental release of oil or fuels, including risk to the environment.	All tanks are above ground with appropriate containment devices.	Section 3.12, Hazardous Materials and Waste

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Hazardous Materials and Waste	Potential effects from unintentional release of hazardous materials, such as fire or environmental pollution.	No solid propellant missile launches occur during rainy conditions, and the launch system will not use a water deluge system for cooling and noise suppression. Activation of the PMRF Fire Department and Spill Response Team.	Section 3.12, Hazardous Materials and Waste
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if safety procedures are not followed.	Employment of system safety concepts and risk assessment methodology.	Section 3.9, Public Health and Safety
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if SOPs were not in place.	SOPs implemented for all Ground Hazard Areas and use of PMRF Missile Accident Emergency Team. These SOPs include establishing road control points and clearing the area using vehicles and helicopters (if necessary). Road control points are established 3 hours prior to launches. This allows security forces to monitor traffic that passes through the GHAs. At 20 minutes before a launch, the GHA is cleared of the public to ensure that, in the unlikely event of early flight termination, no injuries or damage to persons or property would occur. After the Range Safety Officer declares the area safe, the security force gives the all-clear signal, and the public is allowed to reenter the area. Public and personnel excluded from	Section 3.9, Public Health and Safety

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
					the GHA during launch. Implementation of defined explosive safety-quantity distance arcs.	
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, from premature, unintentional or unauthorized detonation of ordnance.	Implementation of Explosive Safety Approval, PMRFINST 8020.5C, Explosive Safety Criteria for Range Users Ordnance Operations[57]. Defined explosive safety quantity distance arcs are implemented.	Section 3.9, Public Health and Safety
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Kamokalā Ridge	Public Health and Safety	Potential effects to public health and safety, such as injury to people, from premature, unintentional or unauthorized detonation of ordnance during transportation.	PMRFINST 8023.G, implementation of defined explosive safety-quantity distance arcs, ordnance is transported in accordance with U.S. DOT regulations.	Section 3.9, Public Health and Safety
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from transportation of liquid fuels to Main Base that could result in exposure to liquid fuels.	Transportation of these materials is conducted in compliance with U.S. DOT regulations 49 CFR parts 100–109.	Section 3.9, Public Health and Safety
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities if public is not cleared from appropriate areas.	Flight termination and clearance of specified regions. Before a launch is allowed to proceed, the range is determined cleared using input from ship sensors, visual surveillance from aircraft and range safety boats, radar data, and acoustic information.	Section 3.9, Public Health and Safety

[57] https://pmrf-kpgo-eis.com/media/vhkhufz2/pmrfinst-80205c.pdf

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Archaeological and Architectural Resources	Inadvertent ignition of vegetation during launch activities and subsequent fire suppression activities could damage archaeological resources.	Water is sprayed on vegetation within the immediate vicinity surrounding the launch vehicle prior to launch. In the event ignition of vegetation does occur, fire suppression personnel are instructed to use an open spray nozzle, whenever possible, rather than a directed stream to quell the fire, to avoid erosion damage to the sand dunes and to prevent possible destruction of cultural resources.	Section 3.2, Archaeological and Architectural Resources
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Archaeological and Architectural Resources	Potential effects to archaeologically sensitive areas, such as damage, from increased human presence as a result of training or maintenance activities.	Briefing personnel working in culturally sensitive areas, including providing information on federal laws protecting cultural resources.	Section 3.2, Archaeological and Architectural Resources
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Mākaha Ridge	Archaeological and Architectural Resources	Unexpected discovery of archaeological or Native Hawaiian resources.	Hawaii SHPO and Native Hawaiian stakeholders are notified in accordance with the Programmatic Agreement.	Section 3.2, Archaeological and Architectural Resources
2008 Hawaii Range Complex Final EIS/OEIS	NEPA	Main Base	Biological Resources	Unintentional introduction of invasive species.	Military Customs Inspectors are responsible for implementing federal customs statutes and agricultural regulations for transfers of military goods and personnel from overseas into U.S. jurisdiction. Military inspectors do not inspect goods and personnel transferred to Hawai‘i from the U.S. mainland, because inspections apply only to shipments entering Hawai‘i from foreign	Section 3.4, Biological Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
					sources or those bound to the mainland from Hawai'i. Military inspectors are trained to look for prohibited animals, soil, seeds, and other pests. Inbound flights carrying cargo from the mainland and landing at PMRF are advised to inspect and secure their cargo prior to shipment to ensure it is free of invasives. To prevent transport of invasive seeds from Main Base to Kōke'e, ground crews are tasked to blow/wash down vehicles and equipment prior to movement.	
2008 Hawaii Range Complex Final EIS/OEIS (VOL 2) Ch. 4–11	NEPA	Main Base	Cultural Practices	Restricted access to traditional religious and cultural properties (Nohili Dune).	Access to identified cultural resources within PMRF Barking Sands is managed through written requests processed and approved by the PMRF Cultural Resources Manager and the Installation Commanding Officer.	Section 3.3, Cultural Practices
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base and Mākaha Ridge	Archaeological and Architectural Resources	Unanticipated encounter of cultural resources (particularly human remains) may occur during any activity.	All activities cease in the immediate vicinity of the find; subsequent actions and notifications follow the guidance provided in the PMRF ICRMP.	Section 3.2, Archaeological and Architectural Resources
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Archaeological and Architectural Resources	Post flight anomalies, such as fire, may occur during launches and this may damage archaeological resources.	Water is sprayed on vegetation within the immediate vicinity surrounding the launch vehicle prior to launch. In the event ignition of vegetation does occur, fire suppression personnel are instructed to use an open spray nozzle, whenever possible, rather	Section 3.2, Archaeological and Architectural Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
					than a directed stream to quell the fire, to avoid erosion damage to the sand dunes and to prevent possible destruction of cultural resources.	
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Unintentional introduction of invasive species.	The Navy prepares a Hazard Analysis and Critical Control Point Plan or a similar invasive species risk assessment plan that addresses viable concerns that are or may be applicable to this project.	Section 3.4, Biological Resources
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Newell's shearwater and other night-flying migratory birds may be impacted from lighting at PMRF. Light at night can disrupt flight and migratory paths of these species.	Full cutoff, shielded exterior lighting is installed following USFWS guidelines to minimize reflection and effects on light-sensitive wildlife to protect the Newell's shearwater and other night-flying migratory birds. PMRF works directly with Save our Shearwaters to minimize effects on the birds from its activities. If avoidance of activities during bird fallout season is not practicable, monitoring for downed birds near the new towers would be conducted as appropriate, per PMRF Dark Skies Program.	Section 3.4, Biological Resources
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Wedge-tailed shearwaters and albatross may be disrupted by construction activities or could be involved in bird-aircraft strikes.	PMRF manages the PMRF wedge-tailed shearwater colony through the clearing of invasive vegetation and monitoring by qualified, professional field biologists to produce detailed reports that document shearwater nesting success and health and growth of the colony. PMRF will continue	Section 3.4, Biological Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
					its permitted relocation of albatross and albatross eggs from the KTF area to inhibit nesting there as part of its BASH program.	
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	Wedge-tailed shearwaters may be disrupted by construction activities.	To the extent practicable, construction activities are scheduled so that as much as possible will occur outside of the nesting season (Nesting: March–May; Egg Laying, Hatching, Chick Rearing: June–October; Fledging: November).	Section 3.4, Biological Resources
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Biological Resources	The U.S. EPA has determined that non-fibrous aluminum oxide found in solid rocket motor exhaust is nontoxic. Because aluminum oxide and hydrogen chloride do not bioaccumulate, no indirect effects on the food chain are anticipated from these exhaust emissions.	N/A	Section 3.4, Biological Resources
2010 PMRF Intercept Test Support EA/OEA	NEPA	Kamokalā Ridge	Hazardous Materials and Waste	Potential effects to public health and safety, such as injury to people, from premature, unintentional or unauthorized detonation of ordnance during transportation.	Materials are contained in required devices with proper ventilation, marking and placarding.	Section 3.12, Hazardous Materials and Waste
2010 PMRF Intercept Test Support EA/OEA	NEPA	Kamokalā Ridge	Public Health and Safety	Potential effects to health and safety, such as injury to people, due to transfer and storage of ordnance.	Safety arcs and storage standards are implemented in accordance with DoD and Navy standards as well as PMRFINST 8023.G.	Section 3.9, Public Health and Safety
2010 PMRF Intercept	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety from transportation of	The following transportation procedures are implemented to minimize the potential for liquid fuel mishap: Trained spill	Section 3.9, Public Health and Safety

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
Test Support EA/OEA				liquid fuels to Main Base, such as exposure to fuel.	response teams are on standby for the transportation of all missile liquid propellants. Truck shipments on Kaua'i have trained escorts. All shipments are scheduled to avoid peak traffic periods for roads and to avoid high-use times for harbors. Local fire and police, and local area State transportation officials are notified in advance of shipments, and informed by experienced personnel (and trained, if necessary) of existing safety procedures to be used during transportation on Kaua'i. Notice of shipment to State and local officials Propellant vapor leak check and liquid propellant container inspection prior to offloading propellant from ship and after loading propellant into trucks.	
2010 PMRF Intercept Test Support EA/OEA	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities.	Flight termination and clearance of specified regions.	Section 3.9, Public Health and Safety
2013 Final EA for Hawai'i Joint Services Solar Power Generation	NEPA	Main Base	Water Resources	Photovoltaic ground mount systems could result in minor increase in rainwater runoff due to increase in impervious surface area.	As appropriate, the project will implement BMPs to capture and retain stormwater on site and allow it to infiltrate into the soil or to be discharged at a rate that would not exceed the predevelopment hydrology to adjacent surface waters. A NPDES permit	Section 3.7, Water Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
					will be obtained for sites with construction exceeding 1 acre (0.4 hectare).	
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Archaeological and Architectural Resources	Archaeological or architectural resources could be damaged or disturbed from construction.	A cultural resources professional monitors construction activities and would contact SHPO and Native Hawaiian stakeholders to address any potential effects.	Section 3.2, Archaeological and Architectural Resources
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National	NEPA	Main Base	Archaeological and Architectural Resources	Archaeological resources could be damaged from minimal ground disturbance from construction and maintenance.	N/A	Section 3.2, Archaeological and Architectural Resources

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
Laboratories Kaua'i Test Facility)						
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Archaeological and Architectural Resources	Potential effects on soil from contamination from fuel, lubricant, paint, and solvent spills.	Implementing policies such as handling all products in accordance with manufacturer's recommendations; refueling on impermeable surfaces; inspecting equipment regularly for safety, cleanliness, and leaks; removing leaking equipment from service; and performing rapid cleanup if such releases were to occur.	Section 3.2, Archaeological and Architectural Resources
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia	NEPA	Main Base	Hazardous Materials and Waste	Hazardous materials can pose risks to humans if exposure occurs.	Controlled access for authorized personnel through gates, badging, and designated public access points.	Section 3.12, Hazardous Materials and Waste

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
National Laboratories Kaua'i Test Facility)						
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Public Health and Safety	Potential for unintentional discharge of oil, and risks to human health if exposure occurs.	PMRF SPCC Plan.	Section 3.9, Public Health and Safety

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Biological Resources	Potential for seabird fallout as a result of nighttime lighting and night operations during fledging season.	2018 Biological Opinion of the USFWS for the Proposed Base-wide Infrastructure, Operations, and Maintenance Activities at the Pacific Missile Range Facility, Island of Kaua'i, Hawai'i.	Section 3.4, Biological Resources
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Hazardous Materials and Waste	Potential for unintentional discharge of oil.	PMRF SPCC Plan.	Section 3.12, Hazardous Materials and Waste

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Hazardous Materials and Waste	Unintentional release of hazardous materials could occur if safety measures are not followed.	EPCRA, Toxic Release Inventory, Federal Insecticide, Fungicide, and Rodenticide Act, Toxic Substances Control Act, and CWA.	Section 3.12, Hazardous Materials and Waste
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Hazardous Materials and Waste	Waste can be generated during routine maintenance or modification to a facility. Hazardous waste can pose risks to humans if exposure occurs.	Implementation of Site Sustainability plan, Federal Facility Compliance Act, RCRA, Pollution Prevention and Waste Minimization, and Pollution Prevention Act.	Section 3.12, Hazardous Materials and Waste

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, including injury to people, if proper handling processes for explosives are not followed.	All processes involving high-energy source use and storage are performed in accordance with DOE Explosives Order and 10 CFR part 851.	Section 3.9, Public Health and Safety

Document	*Type of Environmental Review Document (HEPA/NEPA)*	*Location on Leasehold and Easement Lands in Project Area*	*Resource*	*Effects Analyzed in Previous Document*	*Mitigation Measure(s) in Previous Document*	*Ongoing Effects and Mitigation Discussed in this EIS*
2019 FONSI Continued Operation of the Kaua'i Test Facility Sandia National Laboratories (2018 Site-Wide EA Sandia National Laboratories Kaua'i Test Facility)	NEPA	Main Base	Public Health and Safety	Potential effects to public health and safety, such as injury to people, during missile launch activities.	During launch activities, all authorized personnel not at an assigned duty station are evacuated to a point outside the explosive safety distance and Ground Hazard Areas.	Section 3.9, Public Health and Safety

Note: [1]The USFWS concurred with the findings of the Navy's Biological Assessment in October 1998 and stated in the Record of Decision that the Proposed Action (from the 1998 PMRF Enhanced Capability Final EIS) is "not likely to adversely affect (NLAA) endangered or threatened species."

Key: BASH = Bird/Wildlife Aircraft Strike Hazard; BMP = Best Management Practice; CFR = Code of Federal Regulations; CHRIMP = Consolidated Hazardous Materials Reutilization and Inventory Management Program; COMPMTCINST = Commander, Pacific Missile Test Center Instruction; CWA = Clean Water Act; dB = decibel; DoD = Department of Defense; DOE = Department of Energy; DOH = Hawai'i Department of Health; DOT = Department of Transportation; DRMO = Defense Reutilization and Marketing Office; EA = Environmental Assessment; EIS = Environmental Impact Statement; EPA = United States Environmental Protection Agency; EPCRA = Emergency Planning and Community Right-to-Know Act; FEIS = Final Environmental Impact Statement; FONSI = Finding of No Significant Impact; GHA = Ground Hazard Area; HEPA = Accepted Term for Hawai'i Revised Statutes Chapter 343; ICRMP = Integrated Cultural Resources Management Plan; kg = kilogram; KTF = Kaua'i Test Facility; lbs = pounds; N/A = Not Applicable; NAGPRA = Native American Graves Protection and Repatriation Act; NEPA = National Environmental Policy Act; NPDES = National Pollutant Discharge Elimination System; OEA = Overseas Environmental Assessment; OEIS = Overseas Environmental Impact Statement; PCB = polychlorinated biphenyl; PMRF = Pacific Missile Range Facility; PMRFINST = Pacific Missile Range Facility Instruction; RCRA = Resource Conservation and Recovery Act; SDS = Safety Data Sheets; SHPO = State Historic Preservation Office; SOP = Standard Operating Procedure; SPCC = Spill Prevention, Control, and Countermeasure; TSCA = Toxic Substances Control Act; U.S. = United States; USFWS = United States Fish and Wildlife Service.

3.2 Archaeological and Architectural Resources

Archaeological and architectural resources refer to a variety of resources that include archaeological, architectural, and other resources of cultural importance. Most often, the analysis focuses on "historic properties," as defined under the National Register of Historic Places (NRHP) as districts, sites, buildings, structures, and objects meeting the Criteria of Eligibility for NRHP-listing (36 Code of Federal Regulations [CFR] section 60.4). Under NEPA, archaeological and architectural resources that may not necessarily qualify for NRHP-listing are considered; these may include resources such as archaeological sites determined not NRHP-eligible, commemorative properties, sacred sites, and cemeteries (Council on Environmental Quality [CEQ] and Advisory Council on Historic Preservation [ACHP], 2013). Other types of resources, such as culturally sensitive natural resources, are addressed in Section 3.3, Cultural Practices.

For purposes of this EIS, archaeological and architectural resources are divided into three categories: archaeological resources, architectural resources, and traditional cultural places (TCPs). *Archaeological resources*, both pre-contact and historic, are any material remains of past human life or activity (e.g., tools, fish hooks, hearths, middens, or bottles) and are present in sites and/or districts. Archaeological resources may contain Native American Graves Protection and Repatriation Act (NAGPRA) cultural items, including iwi kūpuna (Hawaiian ancestral remains), funerary objects, sacred objects, and objects of cultural patrimony. *Architectural resources* include buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources under 50 years old, such as Cold War-era military buildings, must meet additional criteria for exceptional importance in order to qualify as historically significant. *TCPs* are places that are eligible for inclusion in the NRHP for their significance to a living community for their association with cultural beliefs, customs, or practices that are rooted in the community's history and that are important in maintaining the community's cultural identity.

For HRS Chapter 343 analysis, archaeological and architectural resources similarly include natural or human-made resources of historic, cultural, archaeological, or aesthetic significance. Typically, these include "significant historic properties," defined as any building, structure, object, district, area, or site, including heiau and underwater sites, which are over 50 years old and meet the Criteria of the Hawai'i Register of Historic Places as enumerated in HAR section 13-198-8 or the Criteria enumerated in HAR section 13-284-6(b). Archaeological and architectural resources that would be considered during NEPA analysis are also evaluated in HEPA analysis.

3.2.1 Affected Environment

3.2.1.1 Region of Influence

The ROI for archaeological and architectural resources includes leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli'i Ridge, and KPGO. Additionally, it includes any overlapping resources, whether individually or as a district, which may also experience direct or indirect effects (Figure 3.2-1).

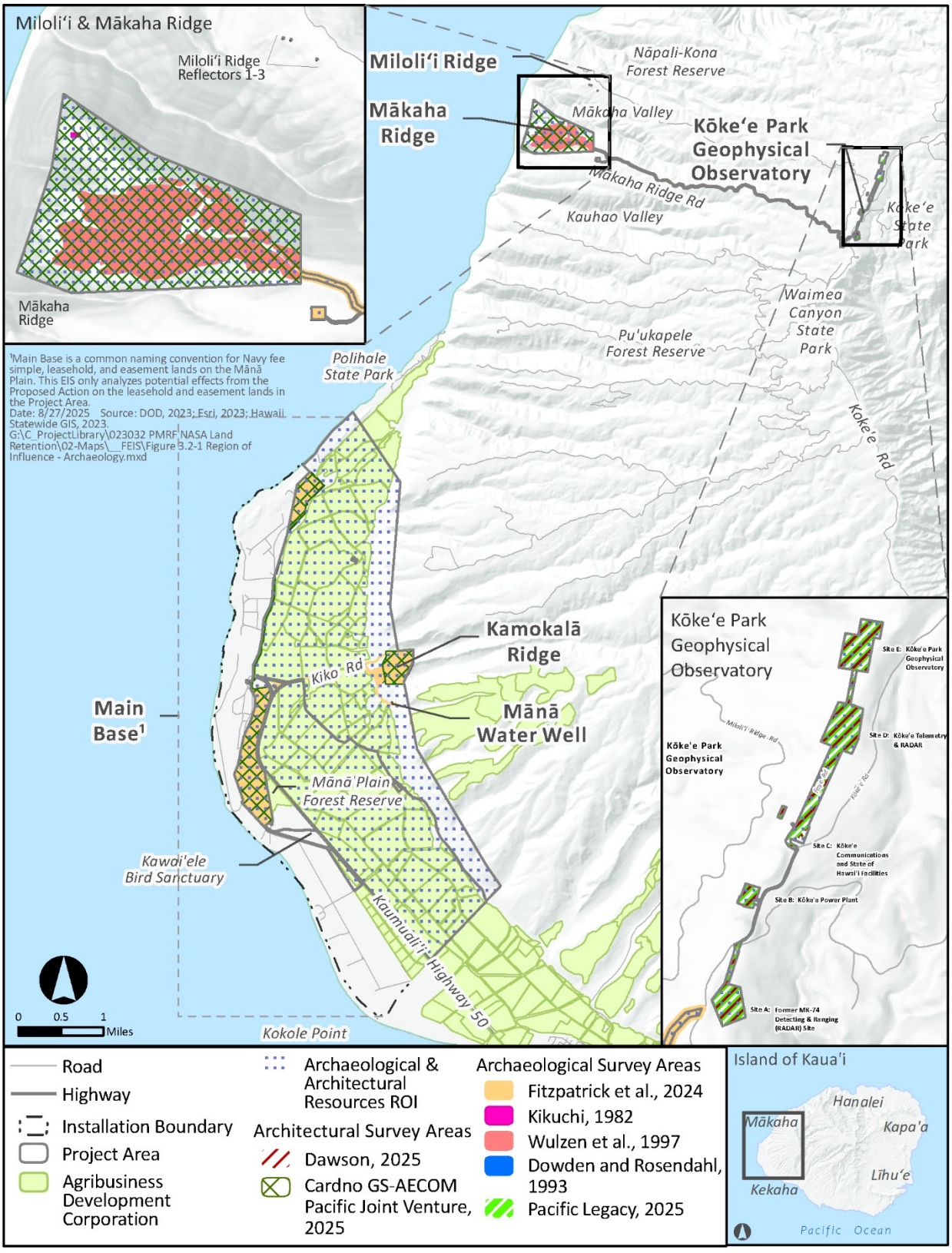


Figure 3.2-1 Archaeological and Architectural Resources Region of Influence

3.2.1.2 Regulatory Setting

Several federal laws and regulations address archaeological and architectural resources. These are more fully described in Appendix E. In addition to NEPA, this EIS also considers the effects on cultural resources pursuant to the NHPA of 1966 as amended. A federal agency's responsibility for protecting historic properties is defined by NHPA Sections 106 and 110. Section 106, in part, requires federal agencies to take into account the effects of their undertakings on historic properties. Historic properties are defined as resources eligible for NRHP listing by meeting four significance Criteria:

- Criterion A: that are associated with events that have made a significant contribution to the broad pattern of our history; or
- Criterion B: that are associated with the lives of persons significant in the past; or
- Criterion C: that embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value or represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D: that have yielded, or may be likely to yield, information important in prehistory or history.

Properties constructed within the past 50 years are also required to demonstrate exceptional importance under Criteria Consideration G.

At PMRF, compliance with the NHPA is primarily accomplished through the 2012 *Programmatic Agreement Among the Commander Navy Region Hawaii, the Advisory Council on Historic Preservation and the Hawai'i State Historic Preservation Officer Regarding Navy Undertakings in Hawai'i*, as amended in September 2024—also known as the Commander, Navy Region Hawai'i (CNRH) Programmatic Agreement (PA). Following on a 1999 Memorandum of Agreement (MOA) for the enhancement of facilities at PMRF that included Kōke'e, or KPGO, the CNRH PA also includes the Navy's actions at the KPGO facility, as does the 2012 PMRF ICRMP (U.S. Navy PMRF, 2012). Additionally, the installation follows established NAGPRA procedures as agreed to in the *Comprehensive Agreement Between U.S. Department of the Navy at Pacific Missile Range Facility, Kaua'i, Hawai'i, and Na 'Ohana Papa o Mānā*.

The State of Hawai'i has similar cultural resources regulations that require State agency and SHPD review of projects involving permitting, licensing, land use change, subdivision, or other uses under HRS section 6E-8. HAR Chapter 13-275 establishes procedures to identify "significant historic properties" in project areas, assess any effects, and then develop and execute plans to avoid, minimize, or mitigate adverse effects to these significant historic properties. The term "significant historic properties" refers to those that are either eligible for the Hawai'i Register of Historic Places as identified in HAR section 13-198-8, or that meet the Criteria enumerated in HAR section 13-275-6(b):

- Criterion "a." Be associated with events that have made an important contribution to the broad patterns of our history;
- Criterion "b." Be associated with the lives of persons important in our past;
- Criterion "c." Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
- Criterion "d." Have yielded, or is likely to yield, information important for research on prehistory or history; or
- Criterion "e." Have an important value to the Native Hawaiian people or to another ethnic group of the State due to associations with cultural practices once carried out, or still carried out, at

the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

3.2.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.2-1 summarizes the predictable environmental trends for archaeological and architectural resources.

Table 3.2-1 Predictable Environmental Trends for Archaeological and Architectural Resources

Predictable Trend	Influence on Resource
Rising global temperatures (air/ocean)	• Not applicable. No reasonably close causal relationship to archaeological or architectural resources identified.
Change in precipitation patterns	• Potential increases in flooding or drought conditions impacting culturally valued plants and animals. Potential for increased erosion that could damage cultural or natural resources.
Increased frequency and/or intensity of extreme weather events	• Potential for increased erosion of hillsides that could damage cultural resources or natural resources such as plants and animals.
Rising sea levels and associated storm surge	• Increased gradual and catastrophic erosion of buried cultural sites, including iwi kūpuna, on beaches.
Ocean acidification	• Not applicable. No reasonably close causal relationship to archaeological or architectural resources identified.

3.2.1.4 Background

For Pre-Contact background and context, please see Section 3.3, *Cultural Practices*. The following historical context is summarized from the 2012 PMRF ICRMP (U.S. Navy PMRF, 2012).

The Mānā Plain is a clearly delineated geographical zone of human occupation during the prehistoric period. The coastal dune and back beach areas were the setting for temporary fishing camps that were linked to permanent communities at the foothills of the central mountain. From the inland edge of the plain, the Mānā community could access the forest resources of the upland mountains and was in easy reach of the wetlands where taro and fish were cultivated and wild resources such as ducks and birds were hunted (Flores and Kaohi, 1992).

Early accounts discuss Mānā Plain as a teeming wetland and associated in oral history as the area with spiritual significance, where mirages occur, and an area attributed to smokeless food (Pukui 1983: 271). It is likely that permanent settlements or communities concentrated at the inland edge of the Mānā Plain, where houses and temples were built at the base of the cliffs, on high ground overlooking the wetlands. Kalo farming was limited and noted to take place at Kolo pond (Flores and Kaohi, 1992).

Small fishing communities, possibly limited to temporary camps, were scattered along the coast, concentrating near optimum localities such as breaks in the reef where canoes could be launched or where reefs provided rich habitat for nearshore marine resources. Some camps were located on the protected, lee sides of the high dunes from Nohili Point to Polihale (Flores and Kaohi, 1992).

Set aside for use as a territorial airport by the Territory of Hawai'i in 1921, Barking Sands Landing Field, as it was originally named, was one of numerous landing fields in the Hawaiian Islands. The Army also began establishing an air presence in Hawai'i in the first half of the twentieth century, starting with

Schofield Barracks (Oʻahu) in 1913. By the late 1920s, early military planners had come to view Kauaʻi as a crucial location for advanced warning and early interception of enemy aircraft – a U.S. Army Signal Corps and the U.S. Army Air Corps used the Port Allen Military Reservation on Kauaʻi as a landing field starting in the late 1920s. In 1928, the Territorial Aeronautical Commission surveyed and then gained control of the landing field through an executive order for its value as a stopover for transpacific flights. Australian aviator Charles Kingsford-Smith drew attention to Barking Sands in June 1928 when he used the landing field as an important stopover point on his transpacific flight.

World War II brought a significant increase in the development of landing fields and airports in Hawaiʻi, including Barking Sands Landing Field. The expansion of the U.S. Army Air Corps required new installations as much as it did new personnel and aircraft. Rather than build new facilities, the Air Corps in many instances made arrangements to take over or share commercial and municipal airport facilities. In the first half of 1940, the Army requested that the Territory of Hawaiʻi set aside the 550-acre Mānā Airport (present-day Barking Sands) for military operations. The U.S. Army Air Corps activated Barking Sands in June 1940 and by November, the War Department authorized the construction of housing for 750 men of the 299th Infantry Regiment (Hawaiian National Guard) at the base to be overseen by the Works Progress Administration.

The World War II and Cold War eras brought considerable changes to Barking Sands and the surrounding ridges. At the time of the Japanese attack on Pearl Harbor, Barking Sands was an unpaved landing strip with a small number of support structures. The wartime expansion was primarily focused around the north and south runways, which were paved in 1942. After the attack on Pearl Harbor, the U.S. Army Corps of Engineers (USACE) ramped up the pace of defense-related construction projects in the Hawaiian Islands and airfields were of high priority. In May 1942, Barking Sands/Mānā was designated Barking Sands Army Air Base. The base expanded as the war progressed. At nearby Kamokalā Ridge, 10 tunnel magazines, some with monorail transport, were built into the cliff side in 1943 and used for bomb storage.

After World War II, the Air Force's use of the installation was minimal into the early 1950s. Nevertheless, it added 200 acres to the existing 2,000 in 1948 and served as an off-site base linked to Hickam Air Force Base in Honolulu. In 1953, the installation's first major Cold War mission arrived when the Navy brought its Regulus guided (cruise) missile training mission to the installation. The Regulus training mission stimulated the Navy's formal naming of its activity as the PMRF. The Navy sustained Regulus training at PMRF into the 1960s. Regulus operations led to the negotiation for a full transfer of the airfield from the Air Force to the Navy in 1964. By the late 1950s, enhanced ballistic missile capabilities enabled the launching of satellites and manned spacecraft into the Earth's orbit. In 1958, the U.S. established NASA and began developing a U.S. space program. A crucial early problem confronting NASA engineers involved tracking satellites as they orbited earth. (Tsiao, 2008:xxxvii). Hawaiʻi, situated in the middle of the Pacific Ocean, presented "an ideal setting for a network ground station" to pick up radio signals from satellites and manned spacecraft high above the ocean (Tsiao, 2008:85). In 1960–1961, NASA and the Navy built the Kōkeʻe Tracking Station within Kōkeʻe State Park near the western rim of Waimea Canyon, approximately 10 miles north of the town of Kekaha.

The Kōkeʻe Tracking Station became operational in September 1961 in time to support NASA's first unmanned Mercury mission (MA-4). Five months later, it played a key role in tracking John Glenn's first manned orbital mission (Friendship 7). It continued supporting Mercury missions through 1963 and

went on to track 10 Project Gemini spaceflights and 14 flights of the Apollo program (Honolulu Star-Bulletin, 1968). In July 1969, the Kōkeʻe Tracking Station received and transmitted to Houston voice relay and telemetry data communications (including television coverage) transmitted from the Apollo 11 Lunar Module Eagle, helping to facilitate NASA's historic first moon landing. Built as a joint venture between NASA and the Navy, the Kōkeʻe Tracking Station also supported Air Force intercontinental ballistic missile launches, naval fleet missile evaluation and training exercises, and nuclear test programs. On September 30, 1989, after the Kōkeʻe Tracking Station was replaced by the Tracking and Data Relay Satellite 4 system, NASA transferred most of the equipment at the station to the Navy and changed its focus to a new Earth observation role, renaming the facility Kōkeʻe Park Geophysical Observatory (Tsiao, 2008:240, 303–304).

3.2.1.5 Archaeological and Architectural Resources Studies

Archaeological and architectural surveys were conducted for all portions of the ROI where activities associated with the Proposed Action are the type that could affect these resources, assuming they were present. The surveys covered all leaseholds and all easements for utilities and roadways in the ROI. Continued use and routine maintenance activities within these areas have the potential to affect archaeological and architectural resources. Per discussions with DLNR, the proposed restrictive use easement lands were not surveyed because those lands are under the jurisdiction of the Agribusiness Development Corporation (ADC), and the proposed easement terms and Navy uses of those lands would not have the potential to affect archaeological and architectural resources. Figure 3.2-1 shows the locations of the archaeological and architectural surveys along with the lands under ADC jurisdiction. Archaeological surveys have been conducted at leaseholds on Main Base, Kamokalā, Mānā Water Well, and the access road to the Mākaha Ridge facility (Fitzpatrick et al., 2024), at Mākaha Ridge (Kikuchi, 1982; Dowden and Rosendahl, 1993; Wulzen et al., 1997), Miloliʻi Ridge (Cardno GS-AECOM Pacific Joint Venture, 2025a), and at KPGO (Pacific Legacy, 2025). Architectural surveys have been conducted at Main Base, Kamokalā, and Mākaha Ridge (Cardno GS-AECOM Pacific Joint Venture, 2025b), Mānā Well and Miloliʻi Ridge (Cardno GS-AECOM Pacific Joint Venture, 2025c), and at KPGO (DAWSON, 2025). The locations of these collective surveys are shown in Figure 3.2-1. A desktop analysis of previous archaeological studies was conducted to identify archaeological and architectural resources located within these restrictive use easements.

TCPs in the ROI were identified in several studies: a 1992 study by Flores and Kaohi, a 2004 study by Tuggle and Tomonari-Tuggle, and in the 2012 ICRMP (U.S. Navy PMRF, 2012). Additionally, the Navy is currently preparing an updated TCP study, which is anticipated to be completed in 2026.

3.2.1.6 Existing Conditions

A summary of archaeological sites, architectural resources, and TCPs is shown in Tables 3.2-2, 3.2-3, and 3.2-4, respectively.

The current leaseholds contain a total of 19 archaeological sites within the ROI. Seven were previously recorded and 12 are newly identified sites, as described in the PMRF Archaeological Inventory Survey (Appendix F). Of the previously recorded sites, six have been determined not NRHP-eligible and one is considered an eligible historic property under NRHP Criteria A and D. Six of the previously recorded sites are evaluated as not significant under HRS Chapter 6E and one site is evaluated to be significant under

Criteria "a," "d," and "e." Per HAR section 13-276-8, no further historic preservation work is recommended for sites 01-2042, 01-2049, 05-0652, 05-0653, 05-0658, 05-2000, IA-005, IA-009, IA-011, IA-012, TS-001, and TS-002. For sites 01-1860, IA-001, IA-002, IA-003, IA-004, IA-006, IA-007, IA-008, IA-008, and IA-010, no formal preservation planning or data recovery is recommended at this time; however, the Navy will continue to manage these properties in accordance with applicable federal and State laws as described in Section 3.2.1.2.

Table 3.2-2 Summary of Archaeological Resources within the Region of Influence

Site No.	*Location*	*Period*	*Site Description*	*NRHP Status (Significance Criterion)*	*HRS Chapter 6E Significance Status (Criterion)*
01-1860	Main Base	Traditional Hawaiian	Nohili Dune Site	A/D	a/d/e
01-2042	Main Base	World War II-era	Historic Midden	Not Eligible	Not Significant
01-2049	Main Base	World War II-era	Historic Midden	Not Eligible	Not Significant
05-0652	Kamokalā Ridge	Traditional Hawaiian	Rock Mound	Not Eligible	Not Significant
05-0653	Kamokalā Ridge	Traditional Hawaiian	Rock Mounds	Not Eligible	Not Significant
05-0658	Kamokalā Ridge	Traditional Hawaiian	Rock Mound	Not Eligible	Not Significant
05-2000	Main Base	World War II-era	Bathhouse Complex	Not Eligible	Not Significant
IA-001	Kamokalā Ridge	Hawaiian	Rock Wall	D	d/e
IA-002	Kamokalā Ridge	Hawaiian and/or post-Contact	Rock Wall and Enclosure Complex	D	d/e
IA-003	Kamokalā Ridge	Hawaiian and/or post-Contact	Rock Shelter	D	d/e
IA-004	Kamokalā Ridge	Hawaiian	Stone Platform and Modified Outcrop	D	d/e
IA-005	Kamokalā Ridge	Hawaiian and post-Contact	Rock Wall	Not Eligible	Not Significant
IA-006	Kamokalā Ridge	Hawaiian	Terrace Complex	D	d/e
IA-007	Kamokalā Ridge	Hawaiian and/or post-contact	Basalt Quarry	D	d/e
IA-008	Kamokalā Ridge	Hawaiian	Agriculture/Habitation	D	d/e
IA-008	Kamokalā Ridge	Hawaiian	Terrace Complex	D	d/e
IA-009	Kamokalā Ridge	World War II or after	Refuse Area	Not Eligible	Not Significant
IA-010	Kamokalā Ridge	Hawaiian and/or post-contact	Rock Mound	D	d/e

Site No.	*Location*	*Period*	*Site Description*	*NRHP Status (Significance Criterion)*	*HRS Chapter 6E Significance Status (Criterion)*
IA-011	Main Base	World War II or after	Former Shooting Range	Not Eligible	Not Significant
IA-012	Main Base	Post-Contact	Refuse Area	Not Eligible	Not Significant
TS-003	KPGO	Post-contact	Terrace	Not Eligible	Not Significant

Note: Site numbers containing "IA" are temporary numbers for newly recorded sites. Site numbers containing "01-" or "05-" are SIHP inventory numbers prefaced by "50-30-"

Key: NRHP = National Register of Historic Places; SIHP = State Inventory of Historic Places.

The current leasehold lands contain a total of 89 built properties within the ROI, all of which were evaluated for NRHP and HRS Chapter 6E eligibility. Of these, 40 properties have been recommended NRHP and HRS Chapter 6E eligible, 1 individually and 39 as contributors to 2 recommended historic districts at Mākaha Ridge and KPGO, respectively. The remaining 49 properties and related infrastructure have been recommended not NRHP-eligible or significant under HRS Chapter 6E under any Criteria, either individually or as a contributor to a district.

Table 3.2-3 Summary of Architectural Resources within the Region of Influence

Location	*Build Date*	*Property Name*	*NRHP Status (Significance Criterion)*	*HRS Chapter 6E Significance Status (Criterion)*
Main Base	1969	Missile Assembly and Blockhouse	A	a
Mākaha Ridge	1974	An/Mps-25 Radar	A/C	a/c
Mākaha Ridge	1968	Communication Building	A	a
Mākaha Ridge	1966	Microwave Tower	A	a
Mākaha Ridge	1966	Fpq-10 Radar Tower (S)	A	a
Mākaha Ridge	1966	Fpq-10 Radar Building	A	a
Mākaha Ridge	1966	Fpq-10 Radar Tower (N)	A	a
Mākaha Ridge	1966	Radar Air Traffic Cont Building	A	a
Mākaha Ridge	1966	Tws Radar Tower	A	a
Mākaha Ridge	1982	Wide Band Radar #2	A/C	a/c
Mākaha Ridge	1969	Telemetry Facility	A	a
Mākaha Ridge	1970	Gkr-8a Med Gain Antenna	A/C	a/c
Mākaha Ridge	1970	Gkr-8a Antenna	A/C	a/c
Mākaha Ridge	1970	Gkr-8a Antenna	A/C	a/c
Mākaha Ridge	1970	Gkr-9a Antenna Tower	A	a
Mākaha Ridge	1970	Gkr-9a Antenna Tower	A	a
Mākaha Ridge	1974	C-Band Satcom Antenna	A	a
Mākaha Ridge	1989	Elec Warfare and Comm Building	A	a
KPGO Site A	1960	T&C Building	A	a
KPGO Site A	1966	Utility/Support Building	A	a
KPGO Site A	1971	Administration Building	A	a
KPGO Site A	1971	Sentry House (Security Building)	A	a
KPGO Site A	c. 1970	Communications Tower	A	a
KPGO Site B	1960	Power House	A	a
KPGO Site C	1966	Collimation Tower Equipment Building	A	a
KPGO Site C	1972	Utility Building 2	A	a
KPGO Site C	c. 1970	Communications	A	a

Location	*Build Date*	*Property Name*	*NRHP Status (Significance Criterion)*	*HRS Chapter 6E Significance Status (Criterion)*
KPGO Site C	c. 1970	Boresight Tower	A	a
KPGO Site C	c. 1970	Microwave Tower	A	a
KPGO Site D	1960	ANFPS-16 Radar Building	A	a
KPGO Site D	1963	Supply Storage Building	A	a
KPGO Site D	1968	Cable Termination Building	A	a
KPGO Site D	1974	Transmitter Building	A	a
KPGO Site D	1960	Scamp Tower	A	a
KPGO Site E	1966	Unified S-Band Operations Building	A	a
KPGO Site E	1966	Hydro-Mechanical Building	A	a
KPGO Site E	1968	Cable Hut	A	a
KPGO Site E	1960	Verlort Tower	A	a
KPGO Site E	1960	Storage	A	a
KPGO Site E	c. 1970	Boresight Type II	A	a

Legend: * = NRHP-eligible as a contributor to an NRHP-eligible Historic District.

The current leasehold lands contain one TCP within the ROI.

Table 3.2-4 Summary of Traditional Cultural Places within the Region of Influence

SIHP Site No. 50-30-05-	*Location*	*Site Description*	*NRHP Status (Significance Criterion)*	*HRS Chapter 6E Significance Status (Criterion)*
50-30-05-1860	Tract E-1 (TMK: 1-2-002-025)	Nohili Dune	A/D	a/d/e

Key: NRHP = National Register of Historic Places; SIHP = State Inventory of Historic Places; TMK = Tax Map Key.

3.2.1.6.1 Main Base

Archaeological Resources

A total of six archaeological resources have been recorded at Main Base leasehold areas. All but one of these resources have been determined or recommended as not NRHP-eligible or HRS Chapter 6E significant. Two of these resources were recorded in the recent pedestrian survey and given temporary site numbers and evaluated using 1- by 1-meter excavation units to assess their NRHP eligibility and HRS Chapter 6E significance. These two newly identified sites on Main Base leaseholds were determined to not be NRHP-eligible or HRS Chapter 6E significant under any Criteria (U.S. Navy PMRF, 2012; Fitzpatrick et al., 2024).

Architectural Resources

The 2025 *Architectural Survey Report: Pacific Missile Range Facility and Kōkeʻe Park Geophysical Observatory* surveyed 12 architectural resources at Main Base that were constructed between 1969 and 1988 within the Project Area. One property, the Missile Assembly and Blockhouse, was recommended as NRHP-eligible under Criterion A and significant under HRS Chapter 6E Criterion “a,” for its direct and important role in the installation’s Cold War missions. The other 11 resources were recommended not NRHP-eligible or HRS Chapter 6E significant under any Criteria (Cardno GS-AECOM Pacific Joint Venture, 2025b).

Traditional Cultural Places

A number of Native Hawaiian place names exist on the landscape within the Kona Moku. While Hawaiian place names impart traditional knowledge, not all named places meet the NRHP eligibility criteria to be considered TCPs. Section 3.3.1 discusses such places as they relate to cultural resources and practices. The following text describes TCPs that have been assessed as eligible under the NRHP criteria. Among the previous studies to identify TCPs at PMRF, there is one identified in association with the leasehold parcels at Main Base. The Nohili Dune (State Inventory of Historic Places [SIHP] Site 50-30-05-1860) is an archaeological site that spans Navy fee simple and leasehold parcels. This property has been evaluated as NRHP-eligible under Criterion A for its association with traditional Native Hawaiian beliefs and practices and Criterion D for its potential to contain information from the past (U.S. Navy PMRF, 2012). It has been evaluated as HRS Chapter 6E significant under Criteria "a" and "e" for its associations with traditional Native Hawaiian beliefs and practices and Criterion "d" for its potential to contain information about the past.

3.2.1.6.2 Kamokalā Ridge

Archaeological Resources

A total of 14 archaeological resources have been identified at Kamokalā Ridge. Five of these resources have been determined or recommended as not NRHP or HRS Chapter 6E eligible. Nine have been recommended as NRHP-eligible under Criterion D and HRS Chapter 6E significant under Criterion "d" for their potential to provide important information about the prehistory and history of Kauaʻi and Hawaiʻi, and also under HRS Chapter 6E Criterion "e" for their important value to the Native Hawaiian people due to associations with cultural practices once carried out, or still carried out, at the property. These latter resources were recorded in the recent pedestrian survey and given temporary site numbers and evaluated using 1- by 1-meter excavation units to assess their NRHP eligibility and HRS Chapter 6E significance (U.S. Navy PMRF, 2012; Fitzpatrick et al., 2024).

Architectural Resources

Ten ammunition magazines at Kamokalā Ridge were evaluated as NRHP-eligible prior to 2005. Since then, the ACHP's *DoD Ammunition Magazine Program Comment* has mitigated adverse effects to these property types and, therefore, these structures are no longer managed or treated as NRHP-eligible under NHPA. These structures are HRS Chapter 6E significant under Criterion "a" for their association with the development of Barking Sands Army Air Base and under Criterion "c" as a distinctive type of ammunition magazine. The *Architectural Survey Report: Pacific Missile Range Facility and Kōkeʻe Park Geophysical Observatory* surveyed an additional building at Kamokalā Ridge. This property, an Equipment Shed constructed in 1967, was recommended not NRHP-eligible or HRS Chapter 6E significant under any Criteria (Cardno GS-AECOM Pacific Joint Venture, 2025b).

Traditional Cultural Places

To date, no TCPs have been identified in the Kamokalā Ridge area. Navy is continuing reviews and engagement with Native Hawaiian stakeholders to ensure the identification of TCPs remains current and to respond accordingly.

3.2.1.6.3 Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge

Archaeological Resources

Neither the PMRF ICRMP, nor the archaeological surveys in Appendix F have identified archaeological resources within the Mānā Water Well, Mākaha Ridge (or associated road corridor), or Miloliʻi Ridge areas.

Architectural Resources

All of the architectural resources at Mānā Water Well are younger than 50 years and do not meet Criteria Consideration G for exceptional importance; therefore, no architectural resources are NRHP-eligible or HRS Chapter 6E significant.

The *Architectural Survey Report: Pacific Missile Range Facility and Kōkeʻe Park Geophysical Observatory* surveyed 23 Cold-War properties at Mākaha Ridge. These properties were all constructed between 1966 and 1989. Of the 23 properties, 17 are recommended NRHP-eligible as a historic district that is NRHP-eligible under Criteria A and C and HRS Chapter 6E significant under Criteria "a" and "c." The district is significant for its role in the Barking Sands Tactical Underwater Range and Barking Sands Underwater Range Expansion mission during the Cold War, as well as its importance in defining technological or scientific capabilities in communications, radar and telemetry technologies, intelligence, and weapons systems testing during the Cold War. Architecturally, the district is also significant for its distinct method or type of construction conveyed through a large concentration of domed telemetry towers as highly specialized and which feature design innovations in engineering, communications, and radar and telemetry technologies. Five of the 17 contributors reflect this architectural significance under NRHP Criterion C and HRS Chapter 6E Criterion "c." Two of the properties built after 1975 also met the threshold for exceptional importance under Criteria Consideration G. The other six properties at Mākaha Ridge were recommended as not NRHP-eligible or HRS Chapter 6E significant under any Criteria because they lacked a direct and important association to the installation's Cold War programs (Cardno GS-AECOM Pacific Joint Venture, 2025b).

Several structures are present at Miloliʻi Ridge, but these have been determined not NRHP-eligible or HRS Chapter 6E significant under any Criteria (Cardno GS-AECOM Pacific Joint Venture, 2025c).

Traditional Cultural Places

Neither the PMRF ICRMP nor previous studies have identified TCPs within the Mānā Water Well, Mākaha Ridge (or associated road corridor), or Miloliʻi Ridge areas.

3.2.1.6.4 KPGO

Archaeological Resources

An archaeological survey of KPGO sites A, B, C, D, and E (Pacific Legacy, 2025) identified one archaeological resource, a post-Contact stone terrace at Site E assigned a temporary field number TS-003. The terrace is recommended as not NRHP-eligible or HRS Chapter 6E significant as it has not yielded, nor is it likely to yield, information important in prehistory or history.

Architectural Resources

An architectural survey of 43 properties and associated infrastructure across KPGO sites A, B, C, D, and E recommended 22 buildings and structures as NRHP-eligible as part of a Kōkeʻe Tracking Station Historic District, a twentieth-century NASA facility. These contributors to the district were built prior to 1975 while 21 non-contributing properties were either ancillary to the district's significance or were moved to their current location within the past 50 years. The Kōkeʻe Tracking Station district was recommended as NRHP-eligible under Criterion A and HRS Chapter 6E significant under Criteria "a" for its association with NASA's 1961–1989 manned space missions. This period of significance corresponds with its use as a NASA tracking station (DAWSON, 2025).

Traditional Cultural Places

A recent survey of KPGO sites A, B, C, D, and E (Pacific Legacy, 2025) did not identify TCPs within the KPGO area.

3.2.2 Environmental Consequences

3.2.2.1 Approach to Analysis

The Navy and NASA used information from past and current studies to analyze potential effects on known archaeological and architectural resources for each Proposed Action alternative. Under NEPA, potential effects to archaeological and architectural resources may result from physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the importance of the resource; introducing visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features; neglecting the resource to the extent that it deteriorates or is destroyed; or by constraining access. These effects evaluated under NEPA and HEPA are similar to the criteria used to determine adverse effects on historic properties under the NHPA per 36 CFR section 800.5(a)(2)(i)-(vii), criteria for adverse effects on historic properties. Additionally, analysis of potential effects on archaeological and architectural resources considers both direct and indirect effects related to causality. Direct effects have been defined as occurring at the same time and place with no intervening cause while indirect effects are caused by the undertaking at a later time or further removed in distance, but which are still reasonably foreseeable.

During the NEPA and HEPA public scoping process and development of the Draft EIS, the Navy and NASA provided information and solicited input from the public, interested organizations, local governments, and NHOs on potential effects and measures to avoid, minimize, or mitigate adverse effects to historic properties.

3.2.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.2.2.2.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 1, the Navy and NASA would retain control of the Project Area through new leases and easements and operations would continue. The potential for continued federal operations and activities on leasehold lands to affect historic properties are covered and would continue to be covered under existing NHPA consultations, prior NEPA documents, under the CNRH PA, and additional Section 106 consultation, as necessary. Additionally, the Navy would continue to update the ICRMP to

proactively manage archaeological and architectural resources. Continued implementation of these requirements ensures that the continuation of current actions would present no change to or introduce any new effects to archaeological and architectural resources.

Additional consultation under the CNRH PA is required only for Proposed Actions and undertakings that would cause adverse effects to historic properties. Such undertakings may include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of an historic property.
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

Administrative actions, such as the enactment of real estate agreements, without physical changes, would not warrant further review under the CNRH PA.

Under State law, the existing federal processes and procedures similarly minimize or mitigate potential effects to the HRS Chapter 6E significance of historic properties. Under HRS section 6E-7, the leasing of State lands containing historic properties could be subject to reservations, restrictions, covenants, or conditions which relate to the preservation of the historic properties, such as rights of access, public visitation, operation, maintenance, restoration, and repair. These covenants or restrictions may be subject to negotiations with the State to, at a minimum, maintain the current level of protections for historic properties.

There would be no change to effects to historic properties from the implementation of Alternative 1; therefore, Alternative 1 would not result in effects to archaeological and architectural resources.

3.2.2.2.2 Effect Summary

Alternative 1 would not result in effects to archaeological and architectural resources because any potential adverse effects from activities would be resolved through review under Section 106 of the NHPA prior to approval, as well as all existing consultations, agreements, and conservation measures. Regulatory protections remain unchanged under Alternative 1. **Therefore, effects are not significant as Alternative 1 includes neither new activities that would affect archaeological and architectural resources, nor would it alter existing regulatory protections for any future actions with the potential to affect these resources.**

3.2.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.2.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 2, the Navy and NASA would pursue fee simple acquisition of the current leaseholds and obtain use of the same easements. The acquisition of the current leaseholds would result in the transfer of historic properties currently under the jurisdiction of the State into federal ownership. Under federal law, a federal agency's act of entering into a real estate agreement is not an undertaking that has the "potential to cause effects on historic properties, assuming such historic properties were present," as stipulated by 36 CFR section 800.3(a)(1). Under Hawaiʻi State law, HRS section 6E-7 would require the concurrence of the DLNR, including SHPD review, before the management transfer of non-burial historic properties, and consultation with the Kauaʻi Island Burial Council before the transfer of burial sites.

The potential for continued federal operations and activities on acquired former leasehold lands to affect historic properties are, and would continue to be, covered under existing NHPA consultations and NEPA documents, or would be covered under the CNRH PA and additional Section 106 consultation, as necessary. Additionally, the Navy would continue to update the ICRMP to proactively manage archaeological and architectural resources. These processes and procedures, when considered under State law, would similarly minimize or address potential effects to the HRS Chapter 6E significance of historic properties. There would be no change to effects to historic properties, and any potential effects would be addressed by the existing consultation and conservation measures, and so as a result, the implementation of Alternative 2 would not result in effects to archaeological or architectural resources.

3.2.2.3.2 Effect Summary

Alternative 2 would not result in effects to archaeological and architectural resources because all activities with the potential to affect them are subject to review under Section 106 of the NHPA prior to approval, as well as all existing consultations, agreements, and conservation measures. Regulatory protections remain unchanged under Alternative 2. **Therefore, effects are not significant as Alternative 2 includes neither new activities that would affect archaeological and architectural resources, nor would it alter existing regulatory protections for any future actions with the potential to affect these resources.**

3.2.2.4 No Action Alternative

3.2.2.4.1 Main Base, Kamokalā Ridge, and KPGO

Under the No Action Alternative, the State of Hawai‘i would not issue succeeding leases and easements, resulting in Navy and NASA leasehold and easement lands reverting back to State of Hawai‘i control and management. In this case, NRHP-eligible and HRS Chapter 6E significant historic properties such as archaeological sites and historic buildings would cease to be managed by the Navy and NASA under their respective cultural resource management programs. Responsibility for their management would revert to the State, pursuant to the existing real estate agreements and any negotiations with the State to determine the transfer of various environmental and cultural responsibilities now performed by Navy and NASA back to the State. Adverse actions related to these transfers could include the removal of existing buildings, structures, and infrastructure, resulting in the demolition of historic properties and potential for the inadvertent discovery of archaeological resources. Such actions would fall under the purview of the State under HRS section 6E-8 and would require review under that law separate from the Proposed Action.

The transfer of historic properties out of federal control without adequate or legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance is an adverse effect under the NHPA. Day-to-day implementation of federal protections listed in Section 3.2 would cease in the ROI. This could potentially lead to a loss of continuity in the protection of archaeological and architectural resources on those lands if institutional knowledge about the resources, lines of communication with NHOs and stakeholders, and protection programs become disrupted. In this case, the transfer of historic properties out of federal control and into a State review environment guided by HRS section 6E-8 may be sufficient as adequate or legally enforceable restrictions. The

implementation of the No Action Alternative would need to be reviewed consistent with 36 CFR part 800 and the CNRH PA to assess the potential adverse effects of the loss of federal protections.

HRS section 6E-8 review only applies to State projects. If the State of Hawai‘i does not issue succeeding leases and easements, then the State would not undertake a project requiring review under HRS section 6E-8. As described above, actions related to the transfer of the leased lands back to the State pursuant to the existing real estate agreements and any negotiations with the State would be reviewed separately under HRS section 6E-8. Because the resources would revert wholly to State of Hawai‘i control, the State’s protections listed in Section 3.2 would likely continue.

As a result of the No Action Alternative, effects to archaeological and architectural resources may occur through the change from federal protections under the Navy’s and NASA’s historic preservation programs to any applicable State protections.

3.2.2.4.2 Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge

There are no identified archaeological or architectural resources at Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge. Therefore, the No Action Alternative will not affect such resources.

3.2.2.4.3 Effect Summary

The No Action Alternative may result in effects to archaeological and architectural resources on leaseholds and easements at Main Base, Kamokalā Ridge, and KPGO due to the change from federal protections under the Navy’s and NASA’s historic preservation programs to State protections**. Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.3 Cultural Practices

For the purpose of this EIS, cultural practices are traditions or living expressions of a community that are inherited from ancestors and passed on to descendants—things that people do within the environment that are guided by their culturally-specific understanding of the world. With respect to Native Hawaiian cultural practices, the term refers to the exercise of rights customarily and traditionally held for subsistence, cultural, and religious purposes and possessed by ahupua‘a tenants who are descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778. Some examples of cultural practices include subsistence farming, commercial operations, residences, agricultural, access related, recreational, and religious and spiritual customs. These practices can include ‘ōlelo Hawai‘i (Hawaiian language), ‘ōlelo no‘eau (wise sayings), haipule (worship), mahi‘ai kalo (taro farming), lawai‘a (fishing), lā‘au lapa‘au (Hawaiian medicine), kāhea (spiritual invocation), ‘oli (chanting), mele (singing), lua (Hawaiian martial arts), hoe wa‘a (canoe paddling), he‘e nalu (surfing), kapa (tapa making from wauke or māmaki bark), lauhala (pandanus leaf) weaving, gathering materials for lei, and hula.

Native Hawaiian cultural practices are inextricably intertwined with the environment through Native Hawaiians’ culturally recognized genealogical relationship with the ‘āina and its resources. While aspects of cultural practices can be intangible, cultural practitioners use valued cultural, natural, and historic resources when they conduct their practices. Such resources may be archaeological and architectural

resources as described in Section 3.2 above, especially TCPs eligible for NRHP-inclusion (National Park Service, 2024). Valued cultural and natural resources do not need to be eligible historic properties and may include, but are not limited to, beliefs, plants and animals, vistas, winds, rains, natural features of the landscape, and wahi pana (cultural sites, legendary places, and sacred sites).

3.3.1 Affected Environment

3.3.1.1 Region of Influence

For purposes of this EIS, and consistent with the 1997 Cultural Impact Assessment (CIA) Guidelines, the ROI for cultural practices (Figure 3.3-1) is the western portion of the ahupuaʻa of Waimea in the district of Kona on Kauaʻi, extending from Kalalau Valley in the north to Kekaha Town in the south, and roughly from Waimea Canyon in the east and across Mānā Plain to the nearshore waters in the west.

3.3.1.2 Regulatory Setting

Federal laws and regulations addressing cultural practices and associated resources include NEPA (Appendix E). In addition, this action in particular is guided by both Secretary of the Navy Instruction (SECNAVINST) 4000.35B and Environmental Readiness Program Manual (Office of the Chief of Naval Operations Manual [OPNAV M] 5090.1), DoD Instruction 4710.03, *Consultation With Native Hawaiian Organizations* and DoD Directive 4715.03, *Natural Resources Management*, and NASA Procedural Requirement (NPR) 5810.1, *NASA Cultural Resource Management*. State law and regulations addressing cultural practices and associated resources include Article IX Section 9 and Article XII Section 7 of the Hawaiʻi Constitution and HRS Chapters 1-1 and 7-1. HRS Chapter 343 (as amended by Act 50 in 2000) and HAR Chapter 11-200.1 require the disclosure of the Proposed Action on the cultural practices of the community and State, and the 1997 Environmental Review Program (ERP) (formerly Office of Environmental Quality Control) CIA Guidelines provides methodology and content protocol for CIAs that inform the EIS process. Appendix E contains a list of applicable regulations.

Case law upholds the State's obligations under Article XII Section 7 of the Hawaiʻi Constitution. In particular, *Ka Paʻakai O Ka ʻĀina v. Land Use Commission*, 94 Hawaiʻi 31 (2000), establishes a framework for analyzing effects to valued cultural, historical, or natural resources in the ROI, including the extent to which traditional and customary Native Hawaiian rights are exercised in a project area. The analysis, known as a "*Ka Paʻakai* analysis" must be conducted by the State. This section, along with the CIA (see Appendix F), can be used by the State to conduct its "*Ka Paʻakai* analysis" of the Proposed Action.

3.3.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.3-1 summarizes the predictable environmental trends for cultural practices.

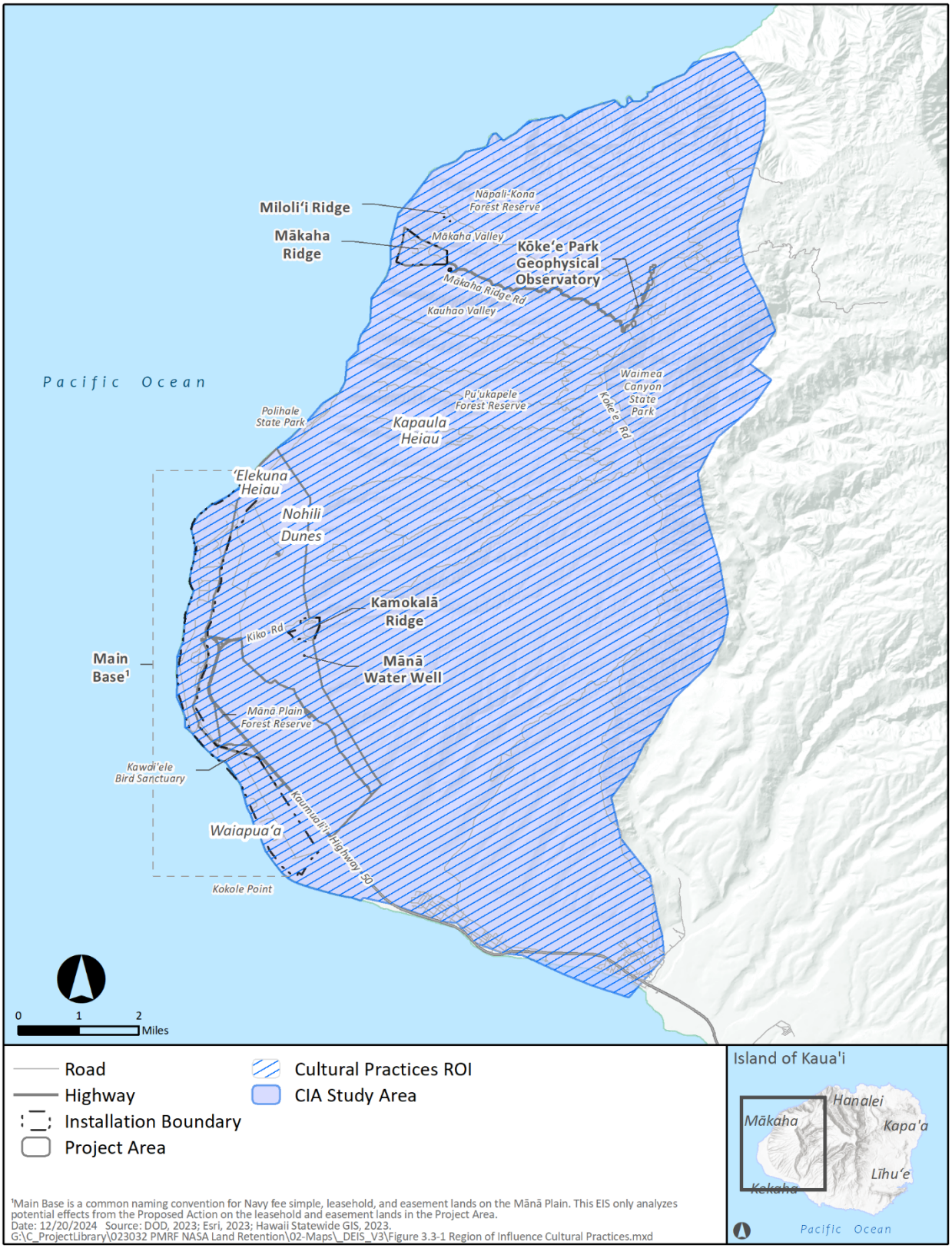


Figure 3.3-1 Cultural Practices Region of Influence

Table 3.3-1 Predictable Environmental Trends for Cultural Practices

Predictable Trend	Influence on Resource
Rising global temperatures (air/ocean)	• Increased stress on culturally valued plants and animals; altered habitat suitability and potential shifts in species distributions move culturally valued flora and fauna from established locations of cultural practices.
Change in precipitation patterns	• Potential increases in flooding or drought conditions impacting culturally valued plants and animals. Potential for increased erosion that could damage cultural or natural resources.
Increased frequency and/or intensity of extreme weather events	• Potential for increased erosion of slopes and coastal dunes that could damage cultural resources or natural resources such as plants and animals.
Rising sea levels and associated storm surge	• Increased erosion of archaeological and architectural resources, especially coastal-facing resources. Loss of coastal habitats (e.g., wetlands, beaches) critical for culturally valued plants and animals; salinity intrusion affecting freshwater species and ecosystems.
Ocean acidification	• Potential disruptions to food webs and marine biodiversity supporting cultural practices.

3.3.1.4 Background

Some versions of the Kumulipo—the creation story of the Hawaiian Islands and people—relate that the mokupuni (island) of Kauaʻi (also called Kamawaelualanimoku in at least one version) was conceived by Wākea (Sky Father) and Papa (Earth Mother), and like the other islands is genealogically related to the Hawaiian people. Thus, the ʻāina (the land, "that which feeds") is a living ancestor, and wahi pana are culturally important in part because of that relationship to nā kānaka maoli (Native Hawaiian people). A discussion of wahi pana within the ROI for cultural practices, their meanings, and their locations is presented in the CIA (Appendix F).

Surviving genealogies passed down by oral tradition and recorded by historians illustrate the interconnected relationships among the ruling families of Kauaʻi across generations and the other islands. Prominent aliʻi of Kauaʻi included Moʻikeha who came from Tahiti, Kūkona a 15th century Mōʻī who defended the island against invasion and his son Manōkalanipō whose reign is said to be a Golden Age on Kauaʻi, and Kaumualiʻi the last independent Mōʻī of Kauaʻi.

The ethnographic works from the late 19th and early 20th centuries offer valuable insights into traditional Hawaiian literature, including moʻolelo (stories), oli (chants), and mele (songs). These works help bring the ancestors and people of old to life by revealing their personalities, struggles, and cultural connections to legendary places. Two moʻolelo translated by Keao NeSmith, "The Story of Pāpiohuli" and "A Romantic Tale of the Hero Kapūnohuʻula," are detailed in the CIA (Appendix F). These stories highlight the cultural significance of locations near Mānā, as well as its shoreline and marine resources.

The western portion of the moku of Kona lies between the coast and the Waimea River where there are scores of valleys which modern geology attributes to the carving and winding of waters flowing for several million years. Below these valleys are plains stretching out from the mountains to the oceans.

Traditional land uses in this part of Kona include settlement, resource collection and subsistence, burial, and transportation. The coastal dune and back beach areas were the setting for temporary fishing camps that were linked to permanent communities at the foothills of the central mountain. The area was characterized by abundant marine resources and a readily accessible sandy shoreline. Before they were drained in the second half of the 19th century, fish were raised in the swamp areas of Limaloa, Kawaiʻele, Nohili, and Kolo within brackish water loko puʻuone (fishponds separated from the sea by a sandbar). Wet taro was also cultivated at Kolo, and wild resources such as ducks and birds were hunted in the swamps. The coastal plain was a source of plant resources that included ʻaʻaliʻi (*Dodonaea viscosea*) shrubs for firewood, hiʻaloa or ʻuhaloa (*Waltheria indica*) and other plants for medicine, makaloa (*Cyperus laevigatus*) and neki (also called ʻakaʻakai*; Schoenoplectus tabernaemontani*) for weaving.

Taro, sweet potato, bananas, and other food crops were grown in and at the mouths of the narrow gulches that fed onto the plain; however, the aridity of the plain limited the amount of farming. Most Mānā people exchanged fish and dryland products such as gourds with taro producers from other parts of the island. Thus, because taro cooking and *poi*-making was done elsewhere, it was said that "Ola i ka ʻai uwahi ʻole o ke kini o Mānā" or "The inhabitants of Mānā live on food cooked without smoking" (Pukui, 1983:271).

Primary traditional land routes crossed the Mānā Plain along the shoreline and along the base of the cliffs and ridges. Other trails connected the coastal plain to the mountains. For fishing or travel by sea, canoes were launched from beaches with unobstructed reefs and passageways such as at Palaiholani, Keanapuka, Poʻoahonu, Keawanaiʻa, and Polihale. After heavy flooding caused by Kona storms, the Mānā swamps and marshes were able to be crossed by canoe.

The coastal dunes, extending from Polihale near the north end of the ROI, through Nohili to Waiapuaʻa and Kokole in the south, were the burial grounds of ancient Hawaiians. The mountain ridges above Polihale are a leina-a-ka-ʻuhane or place where spirits leap to travel to the place of the dead. Several heiau, paths, and roads on the cliffs of Mānā, and an ocean outlet at Kawaiʻele for the loko puʻuone are attributed to the menehune, who tradition holds were the first inhabitants of Kauaʻi and the other islands and master stone masons. The heiau include ʻElekuna near Nohili Dune (the location is imprecisely known), Kapaula north of the ROI, and Polihale north of the ROI. The contemporary practice of maile and mokihana gathering in Kōkeʻe State Park was reported to normally occur outside of the ROI in the area above the Puʻu ka Pele cabins (R.M. Towill Corporation, 2014). Other materials gathered include ferns, dead wood, and other plant material, including weeds such as banana poka. The park hosts the Eo e Emalani i Alakaʻi festival held by Hui o Laka in commemoration of the achievements of and aloha for Hawaiʻi's Queen Emma, celebrating her journey to the Kōkeʻe uplands and Kilohana vista back in 1871.

3.3.1.4.1 Cultural Studies

A CIA (Appendix F) was conducted to identify effects from the Proposed Action on cultural practices. The study included archival research, a review of prior cultural studies within the ROI, and ethnographic interviews with 23 individuals who have past or current pilina (connection) to the ROI, are known Hawaiian cultural or natural resources specialists, are known Hawaiian traditional practitioners, or were referred by another reputable person.

3.3.1.4.2 Public and Native Hawaiian Participation

During the preparation of the CIA, 23 individuals participated in interviews. These participants are named in Table 3.3-2 and their input referenced in the CIA (Appendix F). The Navy also regularly consults with individuals and NHOs through each installation cultural resources program, see Section 1.7.5, *Ongoing Community Coordination*. During the NEPA public scoping process and preparation of the Draft EIS, the Navy provided information and solicited input from the public, interested organizations, local governments, and NHOs on potential effects and measures to minimize or mitigate such effects.

Table 3.3-2 Participants in Cultural Impact Assessment Interviews

Name	*Participation*
Richard Keaoʻopuaokalani "Keao" NeSmith	CIA interview; CIA preparation
Brad "Kipi" Akana	CIA interview
Sylvia Johnette "Leinaʻala" (Akana) Compoc	CIA interview
Paul Compoc	CIA interview
Kaina Makua	CIA interview
Enoka Chee Fook Karratti	CIA interview
Treston "Hena" Caberto-Raco	CIA interview
James Kanohoanu Nakaahiki	CIA interview
Sean Mokuonahiala Andrade	CIA interview
Edwin Ray "Aʻalona" Dela Cruz	CIA interview
Eben Kawaikea Manini	CIA interview
Bill Dan "Billy" DeCosta	CIA interview
Michael "Mike" Andreas Faye	CIA interview
Christine Faye	CIA interview
Clisson Kunane	CIA interview
Daynette Dee Sumie Puanani Morikawa (Ah Puck)	CIA interview
Keith Pomeroy Robinson	CIA interview
Elaine Kuʻulei Momi O Kai Kawaiola Gampong Keamoai	CIA interview
Ronald Dan Kouchi	CIA interview
Val Kane Turalde	CIA interview
C. Pualokelani Harada	CIA interview
Chandlyn Kielepuaalaokalani Harada	CIA interview
Dennis Eguchi	CIA interview

Key: CIA = Cultural Impact Assessment.

3.3.1.5 Existing Conditions

Cultural practices; valued cultural, historical, and natural resources; and access routes to locations where practices and resources occur within the ROI were identified at Main Base, Kamokalā Ridge, and KPGO in the CIA, public scoping comments, and prior studies. General locations of cultural practices and cultural resources are listed in Table 3.3-3. The locations of leaseholds and easement parcels named in the table are shown on the maps in Appendix D. In addition to specific practices and resources discussed below, the kuleana (responsibility) to mālama ʻāina (care for the land), which stems from the Hawaiian genealogical relationship to the land, is a commonly held cultural belief expressed by participants in the CIA (Appendix F) and found in oral history and documentary sources. Public comments received during scoping meetings for the current EIS refer to Native Hawaiians' cultural attachment to the land and stress the feelings that their native lands were wrongly taken in the 1893 overthrow of the Kingdom of Hawaiʻi. Some Native Hawaiian participants in the CIA interviews and public scoping meetings report

feelings of loss and injustice when ceded lands are acquired by non-Hawaiian entities, especially to the U.S. Government whom they accuse of illegally occupying the Hawaiian Islands. Other participants in the CIA interviews and public scoping meetings did not express these feelings.

At PMRF, coordination of access for cultural practices is guided by the PMRF ICRMP SOP #16 for approving and providing support for Native Hawaiian cultural practitioners who request cultural and public access to the installation. The program is designed to meet the needs of cultural practitioners while maintaining safety and military security. The current access program begins with a request for cultural and public access submitted in writing to the Navy. Upon receiving the request, PMRF Cultural Resources Management (CRM) personnel conduct any necessary consultation and coordination with other facility divisions and personnel, including the Public Affairs, Safety, and Range offices, to ensure there are no security issues or other circumstances that conflict with granting access. CRM personnel also consult with Na ʻOhana Papa o Mānā and other NHOs on all requests for cultural access. The PMRF CRM personnel notify requestors in writing of the approval or disapproval of their access request. If access is approved, a list of all attendees is submitted by the requestor 5 working days prior to the requested date of access to allow for any necessary security clearances and to arrange for support staff. All attendees must present government-issued picture identification upon entry and sign a waiver of liability.

Table 3.3-3 Cultural Practices and Resources Located Within or Accessed via the Project Area (Leasehold and Easement Lands)

Cultural Practices	***Main Base***	***Kamokalā Ridge***	***KPGO***
Veneration of iwi kūpuna and ancestors	Tract E-1 (TMK: 1-2-002-025) Easement 2	n/a	n/a
Shoreline practices and resources at Polihale	Easement 2	n/a	n/a
Spiritual qualities of Kaunalewa	Easement 102 (TMK: 1-2-002-001 (por.))	n/a	n/a
Hula, songwriting, observation of native flora, educational visits, and assessing marine resources	Tract E-1 (TMK: 1-2-002-025)	n/a	n/a
Resources and Wahi Pana in the Current Leaseholds and Easements			
Archaeological sites	Tract E-1 (TMK: 1-2-002-025)	Tract E-3 Parcels 1 & 2 (TMK: 1-2-002-029, 1-2-002-027)	n/a
Kahelu Heiau	n/a	Easement 106 (TMK: 1-2-002-001 (por.)) Easement S-5604 (TMK: 1-2-002-001 (por.))	n/a
Nohili Dune	Tract E-1 (TMK: 1-2-002-025)	n/a	n/a

Cultural Practices	*Main Base*	*Kamokalā Ridge*	*KPGO*
Resources and Practices Accessed via Current Leaseholds and Easements			
Nohili Dune ʻElekuna Heiau	Tract E-1 (TMK: 1-2-002-025) Tract E-2 (TMK: 1-2-002-026 (por.)) Tact E-2A (TMK: 1-2-002-026 (por.)) Lot A-1 (TMK: 1-2-002-001 (por.)) Lot 9 (TMK: 1-2-002-001 (por.)) Easement B (TMK: 1-2-002-001 (por.)) Easement E (TMK: 1-2-002-001 (por.))	n/a	n/a
Polihale cultural sites	Easement 1 (TMK: 1-2-002-001 (por.))	n/a	n/a
Shoreline practices and resources at Polihale	Easement 1 (TMK: 1-2-002-001 (por.))	n/a	n/a
Shoreline practices and resources on Fee Simple PMRF at Waiapuaʻa	Lot 9 (TMK: 1-2-002-001 (por.)) Easement E (TMK: 1-2-002-001 (por.))	n/a	n/a

Key: ESQD = Explosive Safety Quantity Distance; KPGO = Kōkeʻe Park Geophysical Observatory; n/a = not applicable; PMRF = Pacific Missile Range Facility; TMK = Tax Map Key.

In addition to the access program described above, all of PMRF's shoreline access areas are open with the exception of locations indicated by restricted area signage. The Navy is currently preparing a TCP study that is anticipated to be completed in 2026, and the results of that study will be used to assist the Navy in providing access to TCPs that may exist within the Project Area. Since 2005, the Navy has provided the Morale, Welfare, and Recreation Guest Card Program, which allows civilians to access PMRF using the main gate and provides access to Waiapuaʻa Bay and beach areas. In August 2012, beach access along PMRF's north and south boundaries was adjusted to allow walk-on beach use for civilians without authorized access to PMRF. Walk-on access to PMRF's shorelines typically occurs from either the north or south and community members can fish, shell-collect, and surf. Civilians are not allowed to drive motorized vehicles on the State beach at any time. The authorization of PMRF beach access is based on circumstances related to the PMRF Force Protection Condition, public safety during range operations, and the protection of threatened and endangered animal and plant species and habitats.

At KPGO, requests for access are made via phone or email to the KPGO Site Manager.

3.3.1.5.1 Main Base

The veneration of iwi kūpuna and ancestors occurs on Tract E-1 (TMK: 1-2-002-025) where a portion of Nohili Dune is located, and within Easement 2 at various locations including Poʻoahonu and Polihale. Traditional shoreline cultural practices occur on Easement 2 and include the following: fishing and gathering marine resources, such as shells, mollusks, seaweed, and salt; lāʻau lapaʻau (traditional Hawaiian medicine) uses of the one (sand); camping; and surfing. Participants who were interviewed

identified Kaunalewa, located within Easement 102 (TMK: 1-2-002-001 (por.)), as a place where fleeting apparitions of a traditional Hawaiian grass hale (house) and modern houses within the agricultural fields have been seen by at least three different people. NHOs and community members visit Nohili Dune in Tract E-1 (TMK: 1-2-002-025) to perform hula, conduct songwriting workshops, observe native flora, make educational visits, and assess marine resources.

Resources and Wahi Pana that occur within Main Base include iwi kūpuna that are known or likely to be located in the sand dunes on Tract E-1 (TMK: 1-2-002-025) and Easement 2; a portion of the Nohili Dune located on Tract E-1 (TMK: 1-2-002-025); and traditional Hawaiian archaeological sites (SIHP 50-30-01-0006, -0007, -1860, -0869) located on Easement 2.

Leaseholds and easements at Main Base contain access routes to locations where cultural practices occur. Nohili Dune and the approximate location of ʻElekuna Heiau are accessed by road through the PMRF installation, which crosses through Tract E-1 (TMK: 1-2-002-025), Tract E-2 (TMK: 1-2-002-026 (por.)), Tact E-2A (TMK: 1-2-002-026 (por.)), Lot A-1 (TMK: 1-2-002-001 (por.)), Lot 9 (TMK: 1-2-002-001 (por.)), Easement B (TMK: 1-2-002-001 (por.)), and Easement E (TMK: 1-2-002-001 (por.)). Shoreline practices and resources and culturally important sites at Polihale are accessed by Saki Mānā Road, which crosses through Easement 1 (TMK: 1-2-002-001 (por.)). These include Polihale heiau (SIHP 505-30-01-0001) and several archaeological sites (SIHP 50-30-01-0003, 1817, 1818, 1819, 1820, 1821), springs (SIHP 50-30-01-1863 and 1864), and the leina-a-ka-ʻuhane or place where spirits leap. Shoreline practices and resources on Navy fee simple lands at Waiapuaʻa are accessed via Tartar Drive through the PMRF main gate on Lot 9 (TMK: 1-2-002-001 (por.)) and Easement E (TMK: 1-2-002-001 (por.)).

3.3.1.5.2 Kamokalā Ridge

No specific cultural practices were identified as occurring at Kamokalā Ridge. Valued cultural resources and wahi pana include traditional Hawaiian archaeological sites related to agriculture and temporary habitation (Sites IA001, IA002, IA003, IA004, IA005, IA006, IA007, IA008, and IA010), all of which are located within lease Tract E-3 Parcels 1 and 2 (TMK: 1-2-002-029, 1-2-002-027). The location of Kahelu Heiau (50-30-05-00010) is within Easement 106 (TMK: 1-2-002-001 (por.)) and Easement S-5604 (TMK: 1-2-002-001 (por.)).

3.3.1.5.3 Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

No cultural practices or resources were identified at Mānā Water Well, Mākaha Ridge, or Miloliʻi Ridge.

3.3.1.5.4 KPGO

The CIA did not identify specific cultural practices or resources used for cultural practices at KPGO.

3.3.2 Environmental Consequences

3.3.2.1 Approach to Analysis

Adverse effects to cultural practices could result if access to locations where traditional cultural practices occur is restricted, ceremonial use of those locations is restricted, or natural and cultural resources that are used in cultural practices are adversely affected. Under HRS Chapter 343, potential

effects to cultural practices may result from direct or indirect disruption of practices or from the disturbance of or restriction of access to resources necessary for the exercise of cultural practices.

The criterion considered to assess whether the Proposed Action would result in potential significant effects to cultural practices is the extent or degree to which:

- The proposed project creates new restrictions on access to locations where cultural practices occur, and the practice cannot be accomplished in another location.

3.3.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.3.2.2.1 Main Base and Kamokalā Ridge

Under Alternative 1, the Navy and NASA would retain control of the Project Area through new leases and easements. Based on testimony received during the CIA interviews and public scoping meetings, the Navy and NASA acknowledge that Alternative 1 would result in feelings of loss and injustice for some Native Hawaiians if the Project Area, consisting of ceded lands, are leased by non-Hawaiian entities, especially the U.S. Government. These feelings of loss and injustice could be perceived as a long-term moderate adverse effect. Other participants in the CIA interviews and public scoping meetings did not express these feelings.

Restrictions on access to leasehold and easement lands where cultural practices and associated resources occur would be similar to current conditions. No new restrictions would result from the Proposed Action. On leasehold lands, access to areas around Main Base and at Kamokalā Ridge where cultural practices, resources, and wahi pana occur would continue to be coordinated by PMRF as described in Section 3.3.1.4.3. Some participants in the CIA interviews and scoping commentors felt that access should not be restricted; others participate in PMRF's public Command-sponsored events and conduct cultural practices. Within restrictive access easements located on Main Base, access to locations where cultural practices, resources, and wahi pana occur would be temporarily restricted when the easements are closed during launch operations. These closures would also temporarily restrict access to locations within the ROI where cultural practices, resources, and wahi pana occur by closing roads that cross the easements. Temporary closures of easements would be expected to last no more than a few hours at a time.

3.3.2.2.2 Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

No cultural practices, resources, or wahi pana were identified at Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. No access routes to locations within the ROI where cultural practices, resources, or wahi pana occur cross Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. There would be no effects to cultural practices, resources, and wahi pana at Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO.

3.3.2.2.3 Effect Summary

As described above, Alternative 1 would not result in adverse effects to cultural practices or wahi pana on leaseholds and easements at Main Base[58] and Kamokalā Ridge and would have no effects at Mānā

[58] Note that "Main Base" is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.

Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. The Navy and NASA acknowledge that for some Native Hawaiians, the continued possession of ceded lands by the U.S. Government could be perceived as a long-term, moderate, adverse effect. Moderate restrictions on access to leasehold and easement lands where cultural practices and associated resources occur would continue to be managed by the Navy and NASA to accommodate requests for access to locations under their jurisdiction for cultural practices and wahi pana. There would be no change to ongoing implementation of current management practices (see Table 3.1-4) or BMPs (Section 2.5). In addition, Enhanced Engagement-2 (Chapter 5, Table 5.2-1) would improve access for Cultural Practices in the Project Area. **Therefore, the potential effects of Alternative 1 to cultural practices could be adverse but not significant.**

3.3.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.3.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Based on testimony received during the CIA interviews and public scoping meetings, the Navy and NASA acknowledge that Alternative 2 would result in feelings of loss and injustice for some Native Hawaiians if the current leaseholds consisting of ceded lands are acquired by non-Hawaiian entities, especially the U.S. Government. These feelings of loss and injustice could be perceived as a long-term moderate adverse effect and may be greater under Alternative 2 considering up to 700 acres of State lands would be sold to the U.S. Government. Other participants in the CIA interviews and public scoping meetings did not express these feelings.

Although ownership of the leasehold lands would change from the State of Hawaiʻi to the Navy and NASA, restrictions on access to locations where cultural practices, resources, and wahi pana occur would be similar to current conditions, and no new restrictions would result from the Proposed Action. Potential effects to cultural practices, resources, and wahi pana would be the same as under Alternative 1.

3.3.2.3.2 Effect Summary

As described above, Alternative 2 would not result in adverse effects to cultural practices or wahi pana on former leaseholds and easements at Main Base and Kamokalā Ridge and would have no effects at Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. The Navy and NASA acknowledge that for some Native Hawaiians, the acquisition of ceded lands by the U.S. Government could be perceived as a long-term, moderate, adverse effect. Moderate restrictions on access to former leasehold and easement lands where cultural practices and associated resources occur would continue to be managed by the Navy and NASA to accommodate requests for access to locations under their jurisdiction for cultural practices and wahi pana. There would be no change to ongoing implementation of current management practices (see Table 3.1-4) or BMPs (Section 2.5). In addition, Enhanced Engagement-2 (Chapter 5, Table 5.2-1) would improve access for Cultural Practices in the Project Area. **Therefore, the potential effects of Alternative 2 to cultural practices could be adverse but not significant. If actions are determined to have potential adverse effects, they would be subject to regulatory oversight to avoid, minimize, or mitigate the effects consistent with federal regulations.**

3.3.2.4 No Action Alternative

3.3.2.4.1 Main Base and Kamokalā Ridge

Under the No Action Alternative, federal control of locations within the ROI where cultural practices and resources occur would cease, and control would revert to the State of Hawai‘i. PMRF’s coordination with cultural practitioners would continue for Navy fee simple lands only.

Should all existing infrastructure be removed, short-term, minor to moderate, potential adverse effects on cultural practices could result from access restrictions due to public safety concerns during demolition and removal activities.

Access to cultural practices and resources at Waiapua‘a on fee simple land at Main Base would not be affected under the No Action Alternative. Access to these areas is currently controlled at the main gate on Tartar Drive, which is located on Lot 9 (TMK: 1-2-002-001 (por.)) and Easement E (TMK: 1-2-002-001 (por.)). Under the No Action Alternative, the Navy would continue to provide access through its public outreach and the Morale, Welfare, and Recreation pass programs, and it would continue to control access to Tartar Drive at the boundary of the Navy’s fee simple land. This would result in no substantial change to access to Waiapua‘a for cultural practices. Through coordination with Native Hawaiian cultural practitioners, the Navy would ensure that cultural practices are not disrupted, within the limits of military security and public safety.

Effects to cultural practices and resources located within easements or accessed by road through easements at Main Base would be minor under the No Action Alternative because the occasional closure of those parcels by the Navy during launch operations would cease.

The State of Hawai‘i would be responsible for managing access to all other locations shown in Table 3.3-3.

Day-to-day implementation of federal protections listed in Section 3.3.1.4.3 would cease. State protections listed in Section 3.3.1.4.3 would continue. Ongoing consultations with NHOs and other stakeholders by the Navy would cease for the expired leasehold and easement lands. This could potentially lead to a loss of continuity in the protection of cultural practices on those lands if communication between cultural practitioners, other stakeholders, and the State of Hawai‘i does not adequately replace PMRF’s consultation program. The degree to which cultural practices and resources on the former leasehold lands and easements would be affected by the No Action Alternative would depend on State policies and programs that are beyond the scope of this analysis.

Some Native Hawaiian participants in the CIA interviews and public scoping meetings report feelings of loss and injustice when ceded lands are possessed by non-Hawaiian entities, especially to the U.S. Government whom they accuse of illegally occupying the Hawaiian Islands. For those who feel this way, the No Action Alternative could result in long-term beneficial effects because the ceded lands would be back in possession of the State of Hawai‘i and potentially available for use by Native Hawaiians. Other participants in the CIA interviews and public scoping meetings did not express these feelings.

3.3.2.4.2 Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, and KPGO

No cultural practices, resources, and wahi pana were identified at Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, and KPGO. No access routes to locations outside of the ROI where cultural practices,

resources, and wahi pana occur cross Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. There would be no effects to cultural practices, resources, and wahi pana at Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO.

3.3.2.4.3 Effect Summary

As described above, the No Action Alternative could result in short-term, minor to moderate adverse effects to access for cultural practices during periods of potential demolition and/or removal activities in areas of former leaseholds and easements at Main Base and Kamokalā Ridge. No effects would be expected at Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. Additionally, the Navy and NASA acknowledge that for some Native Hawaiians, designating ceded lands into the State's possession could be perceived as a long-term beneficial effect. The potential benefit of the areas reverting to the State of Hawaiʻi's possession would be determined by future land use designations and activities determined by the State of Hawaiʻi, not as a part of this EIS as they are not Navy actions. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.3.2.5 Ka Paʻakai Analysis

The DLNR Land Division, representing BLNR who approves the EIS and oversees the implementation of any real estate actions, is obligated under Article XII, section 7 of the Hawaiʻi Constitution to make an independent assessment of impacts on customary and traditional practices of Native Hawaiians from the Proposed Action. The Hawaiʻi Supreme Court's decision in *Ka Paʻakai O Ka ʻĀina* v. *Land Use Commission*, 94 Hawaiʻi 31, 7 P.3d 1068 (2000), provides an analytical framework to put into effect the State's obligation to protect Native Hawaiian customary and traditional practices while reasonably accommodating competing public and private interests. Within the "*Ka Paʻakai* framework," an agency must make specific findings and conclusions about: (1) the identity and scope of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the project area; (2) the extent to which those resources—including traditional and customary Native Hawaiian rights—will be affected or impaired by the proposed action; and (3) the feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if they are found to exist. Although HAR Chapter 11-200.1 does not require the inclusion of a *Ka Paʻakai* analysis in a HEPA EIS, the Navy and NASA are providing this summary of the information in this EIS available to be used in the three-part test by DLNR Land Division:

1) The cultural practices; valued cultural, historical, and natural resources; and access routes to locations where practices and resources occur within the ROI that were identified in the ROI are described in Section 3.3.1.5. Table 3.3-3 lists where the identified resources and practices occur. These include resources and practices that physically occur in the Project Area as well as those resources and practices that are accessed via the Project Area.
2) Effects to the identified cultural resources and practices associated with Alternative 1 are described in Section 3.3.2.2. Those associated with Alternative 2 are in Section 3.3.2.3. Those associated with the No Action Alternative are described in Section 3.3.2.4.
3) Mitigation for effects to cultural practices caused by Navy and NASA access restrictions that would result from all the alternatives would include the continued implementation of current

management practices (see Table 3.1-4) and BMPs (Section 2.5). Additionally, as part of the Proposed Action, the Navy is proposing to create a process to streamline access to these resources and places through the development of a PMRF Access Management Plan (see Enhanced Engagement-2 in Table 5.2-1).

3.4 Biological Resources

Terrestrial biological resources include native and introduced plant and animal species and their habitats. Habitat includes the resources and conditions present in an area that support a plant or animal. This analysis focuses on species that are important to the function of ecosystems or are protected under federal or State law. Terrestrial biological resources comprise vegetation, wildlife, and critical habitat categories. Special status species are identified within the vegetation and wildlife categories.

Special status species are defined as species that are listed, have been proposed for listing, or are candidates for listing as threatened or endangered under the ESA and other species of concern as recognized by State or federal agencies. Detailed descriptions of these species, their habitat and distribution, life cycle, threats to their survival, and conservation measures can be found in the USFWS's Environmental Conservation Online System, the 2014, 2018, and 2025 USFWS Biological Opinions (Appendix K), which included an assessment of infrastructure and activities conducted at PMRF (Department of Energy [DOE], 2019), and the 2023 PMRF INRMP (Appendix K) (Naval Facilities Engineering Systems Command [NAVFAC] Pacific, 2023a).

Critical habitat consists of specific areas within a geographical area occupied by a species at the time of listing that contain physical or biological features essential to conservation of the species. These areas may require special management considerations or protection determined by USFWS.

This section does not include marine biological resources due to the terrestrial-based nature of the scope of this EIS, with the exception of special status marine species that utilize terrestrial regions of the ROI for basking, nesting, and resting, such as sea turtles and monk seals.

3.4.1 Affected Environment

3.4.1.1 Region of Influence

The ROI for biological resources includes leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge, and KPGO, and additionally, includes any areas that may experience noise, runoff, or other direct or indirect effects to plants, wildlife, or their habitat (Figure 3.4-1).

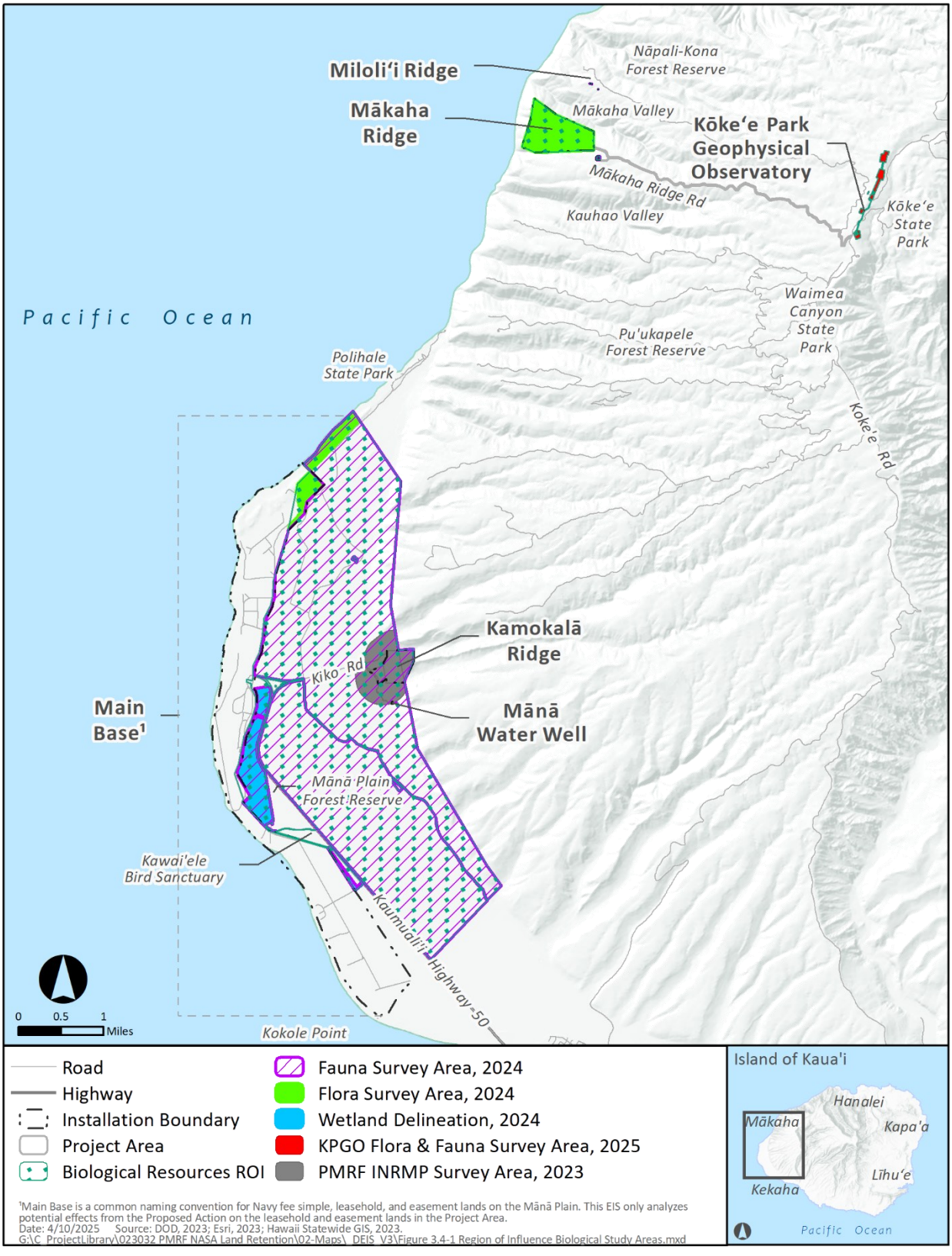


Figure 3.4-1 Biological Resources Region of Influence

3.4.1.2 Regulatory Setting

Terrestrial biological resources are regulated by DoD (Navy), Office of the President, USFWS, and DLNR DOFAW. Biological resources are managed in accordance with the ESA, MBTA, State of Hawai‘i Endangered Species Laws, and the Sikes Act. The Sikes Act is the primary authority governing DoD’s management of natural resources and requires that INRMPs be reviewed for operation and effect regularly by the installation, the USFWS, and DOFAW, not less often than every 5 years. Although the Navy prepared the PMRF INRMP, all KPGO natural resources (Sites A–E) are also included in the PMRF INRMP. Annual reviews of the PMRF INRMP with stakeholders help facilitate adaptive management, which allows necessary updates regarding natural resource management policies. A web-based tool named Metrics, used to conduct annual installation reviews, has been developed to assess the effectiveness of programs such as INRMPs and natural resource management (NAVFAC Pacific, 2023a). The decision whether to update or revise the INRMP is based on the outcomes of these reviews. The next update or revision of the PMRF INRMP will incorporate outcomes of the 2025 Biological Opinion. A list of all applicable federal, State, and local policies used for the management of biological resources within the ROI can be found in Appendix E.

Section 7(a)(2) of the ESA, as amended (16 U.S.C. section 1531 et seq.), requires federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. Consultation with the USFWS and NMFS is required for actions that may affect listed species or critical habitat. Ongoing and existing activities on fee simple and leasehold lands at PMRF have been previously covered under formal and informal consultations with USFWS, which resulted in the issuance of Biological Opinions for 2014, 2018, and 2025. Since there are no new activities resulting from the Proposed Action, the Navy and NASA have determined that there would be no new effects to terrestrial ESA-listed species on leasehold and easement lands and reinitiation of consultation with USFWS is not required. In light of recent surveys, ‘i‘iwi (*Drepanis coccinea*) and Hawaiian picture-wing fly (*Drosophila musaphilia* and *D. sharpi*) will be considered in consultation with USFWS if there is potential to affect these species. Additionally, since the Navy has determined that there would be no new effects to marine ESA-listed species on leasehold and easement lands (landlocked), a reinitiation of consultation with NMFS is not required.

Existing activities on PMRF Main Base lands (fee simple, leaseholds, and easements) and areas outside of the ROI, such as Port Allen, are subject to the 2014, 2018, and 2025 Biological Opinions and Incidental Take Statements (ITSs) resulting from those opinions. The Biological Opinions contain conservation measures designed to avoid and/or minimize impacts to federally listed species (see Table 2-7). These existing conservation measures are not tied to this Proposed Action and have positive effects both within and outside the ROI. In general, as part of a Biological Opinion, the USFWS can issue ITSs when an agency’s actions may unintentionally, but not unexpectedly, take federally listed species. Section 9 of the ESA prohibits the take of endangered and threatened species, without special exemption. Take is defined as: to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. An ITS includes terms and conditions to implement reasonable and prudent measures the agency must undertake to minimize the impact of incidental take. Additionally, the USFWS and NMFS provide conservation recommendations to the agency for the benefit of these listed species. The 2014, 2018, and 2025 Biological Opinions for PMRF each contain an ITS which authorizes a specific

amount of take, to include nests, eggs, chicks (avian species) or pups (bat species), and adults that may occur during activities on fee simple or leasehold lands (Appendix K of the Final EIS). If the level of take is exceeded due to an action, reinitiation of consultation with USFWS and NMFS is required. For specific details regarding take limits of species and associated conservation measures, refer to the Biological Opinions provided in Appendix K of the Final EIS.

3.4.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA. Table 3.4-1 summarizes the predictable environmental trends for biological resources.

Table 3.4-1 Predictable Environmental Trends for Biological Resources

Predictable Trend	Influence on Resource
Rising global temperatures (air/ocean)	• Increased stress on terrestrial and marine species; altered habitat suitability and potential shifts in species distributions; impacts to seasonal ecosystem variances; potential decrease in food availability.
Change in precipitation patterns	• Altered freshwater availability affecting wetland ecosystems; potential increases in flooding or drought conditions impacting plant and animal life; increased rates of erosion and sedimentation impacting ecosystem habitats.
Increased frequency and/or intensity of extreme weather events	• Higher mortality rates among vulnerable species; destruction of habitats; increased erosion and sedimentation in coastal and riverine areas.
Rising sea levels and associated storm surge	• Loss of coastal habitats (e.g., wetlands, beaches) critical for nesting and feeding; salinity intrusion affecting freshwater species and ecosystems.
Ocean acidification	• Decreased calcification rates in marine organisms (e.g., corals, shellfish); potential disruptions to food webs and marine biodiversity.

The 2023 PMRF INRMP, prepared by the Navy, establishes a framework for resource management at PMRF and KPGO and is intended to guide implementation of natural resource conservation in the affected environment for the ROI (NAVFAC Pacific, 2023a). The PMRF INRMP serves as a repository for natural resource information, provides guidance on how the Navy is to meet compliance requirements, and sets management goals, required actions, and resources necessary to protect and manage the installation's natural resources. In 2023 and 2024, vegetation and wildlife surveys were conducted at PMRF and KPGO in support of this EIS (Appendix K, PMRF Flora Survey Report, PMRF Fauna Survey Report, PMRF Hoary Bat Survey Report, KPGO Flora Survey Report, KPGO Fauna Survey Report) (NAVFAC Pacific, 2023b, 2024, 2025; Hamer Environmental, 2025a, 2025b). Additionally, prior vegetation and wildlife inventories were conducted at PMRF and KPGO to support the 2023, and previous, PMRF INRMPs.

NASA operates the SENSE Environmental Management Plan which describes the Environmental Management program, practices, and procedures for all SENSE contract locations (NASA, 2023). Adherence to this plan helps ensure environmental protection. To achieve this, SENSE utilizes an

integrated systematic approach to establish, implement, manage, and maintain an effective Environmental Management Program.

3.4.1.4 Existing Conditions

Hawai'i's unique environment and native species have evolved together in isolation over the last 70 million years. Due to this isolation, Hawai'i also has high numbers of endemic species with approximately 10,000 of its native species being found nowhere else (Hawai'i Invasive Species Council, 2015).

Conservation Management

Table 2-7 lists current PMRF BMPs which include SOPs from the 2023 PMRF INRMP, as well as those established by the applicable regulations, policies, and other SOPs. In addition, the 2023 PMRF INRMP includes KPGO natural resource management under the sublease to the Navy. Additional programs that benefit conservation management efforts are provided below.

As discussed in the 2023 PMRF INRMP, Mākaha Ridge contains an ungulate exclusion fence to protect native plant species in the region. A hunting program, initiated by the Navy, is comprised of local community members who reduce impacts on vegetation created by dogs and ungulate populations such as goats, deer, and pigs (Appendix K, NAVFAC Pacific, 2023a). As part of ongoing activities, this effort along with outplanting restoration efforts, would continue to help reduce erosion on the ridge.

DoD's REPI Program facilitates long-term, collaborative partnerships that preserve important habitats and natural resources, support sustainable and productive land uses, and promote resilient natural and working lands and waters for installations and their surrounding communities. The REPI Program supports partnerships per 10 U.S.C. section 2684a, which authorizes partnerships among the Military Services, private conservation groups, and State and local governments to acquire real property interests. REPI projects have been recently awarded: Kekaha Agricultural Association (KAA) on behalf of ADC in 2022, and DLNR-DOFAW in 2023. The purposes of the projects are to mitigate impacts of sea level rise, protect and restore native forests within the watershed, and improve water quality in the nearshore environment of West Kaua'i.

Coordination with DOFAW

The Navy regularly coordinates with DOFAW personnel on invasive and protected species response efforts, and emerging landscape-scale issues. DOFAW is a partner agency, under the Sikes Act, which participates in the PMRF INRMP review process and implementation. During semi-annual meetings, the PMRF and KPGO Natural Resource Manager provides relevant information to State officials regarding natural resources on lands managed by the Navy and NASA, such as project status and observational data of wildlife; all ESA-listed species actions are communicated to DOFAW within the required timelines.

As part of the effort to keep DOFAW informed and updated on the studies that were prepared for this EIS, the PMRF Natural Resource Manager contacted the DOFAW Kaua'i Branch Manager on August 22, 2023, expressing the Navy's and NASA's interest to share cultural and natural resource work plans in support of this Final EIS. The PMRF Natural Resources Manager sent DOFAW the work plans for the PMRF Wetland Delineation Survey, the KPGO Hoary Bat Survey, the PMRF Fauna Survey, and the PMRF Flora Survey on August 22, 2023, and September 11, 2023. The PMRF Natural Resource Manager sent DOFAW final reports for the PMRF Flora Survey and the PMRF Wetland Delineation Survey on February 14, 2024, and the PMRF Fauna Survey on June 28, 2024. PMRF sent the Final PMRF Hoary Bat Survey to

DOFAW on January 24, 2025. NASA sent the final reports for the KPGO Hoary Bat Survey, the KPGO Fauna Survey, and the KPGO Vegetation Survey to DOFAW on August 5, 2025.

The State provides advice and subject matter experts on conservation objectives and strategies, participates in conservation project development, supports invasive species removal efforts, and at times, partners in project implementation. Collaboration also includes partnering on REPI projects and sharing resource information for statewide conservation efforts.

The Navy and NASA will continue to involve DOFAW in regular PMRF INRMP review and revision processes, per the Sikes Act. Additionally, Section 7 (a)(1) directs federal agencies to carry out conservation programs for listed species. The PMRF INRMP guides implementation of natural resources conservation on lands managed by the Navy, to include KPGO. The Navy and NASA understand and value the importance of such communications regarding the conservation and recovery of ESA- and State-listed species.

3.4.1.4.1 Vegetation

General Vegetation Communities

Vegetation communities and land cover types vary across the ROI due to topography and water availability, depicted in Figures 3.4-2, 3.4-3, and 3.4-4. Geospatial data shown in Figure 3.4-2 reflect vegetative cover types described in the 2023 PMRF INRMP and include vegetative communities found on Navy fee simple lands. The vegetative communities on Navy fee simple lands, although outside the ROI, are presented because these data reflect general vegetative communities in the Mānā Plain. Vegetative inventories were conducted on leasehold lands (NAVFAC Pacific, 2023b). Detailed vegetative inventory surveys were not conducted on easement lands in support of this EIS. Per discussions with DLNR, the proposed restrictive use easement lands were not surveyed because those lands are under the jurisdiction of ADC, and the proposed easement terms and Navy uses of those lands would not have the potential to affect biological resources.

Main Base

Vegetative communities at Main Base in the ROI include: kiawe-koa haole scrub (*Neltuma pallida-Leucaena leucocephala*), kiawe scrub, pōhinahina-naupaka dune (*Vitex rotundifolia-Scaevola sericea*), shoreline (dunes), wetlands, ruderal, and agricultural lands (NAVFAC Pacific, 2023a). The kiawe-koa haole and kiawe scrub communities are the dominant vegetation in the undeveloped portions. Dune vegetation, located on the seaward facing slopes of the Nohili sand dunes, consist mostly of native vegetation community, including pōhinahina, naupaka, pōhuehue or beach morning glory (*Ipomoea pes-caprae*), and ʻakiʻaki grass (*Sporobolus virginicus*). Other native plants found close to the beach include ʻilima (*Sida fallax*), kanuaʻoa pehu or love-vine (*Cassytha filiformis*), ʻākulikuli or sea purselane (*Sesuvium portulacastrum*), aʻaliʻi (*Dodonaea viscosa*), milo (*Thespesia populnea*), and hau (*Hibiscus tiliaceus*) (NAVFAC Pacific, 2023b). The inland side of the dunes contains mostly windswept patches of kiawe and koa haole scrub. Portions of leasehold lands at Main Base are landscaped on a regular basis. Vegetation at the low elevation on leaseholds and easements of Main Base is in the "kiawe and lowland scrub" zone of Hawaiʻi, a classification used to describe areas below 1,000 feet elevation, where the annual rainfall is less than 20 inches (DOE, 2019). Main Base has a nominal elevation of 15 feet above mean sea level (NAVFAC Pacific, 2023b). Wetland vegetation occurs throughout the easements in the ROI, including permanent or ephemeral wetlands on the Mānā Plain. Ruderal (disturbed, weedy) vegetation is present along roadsides (Appendix L).

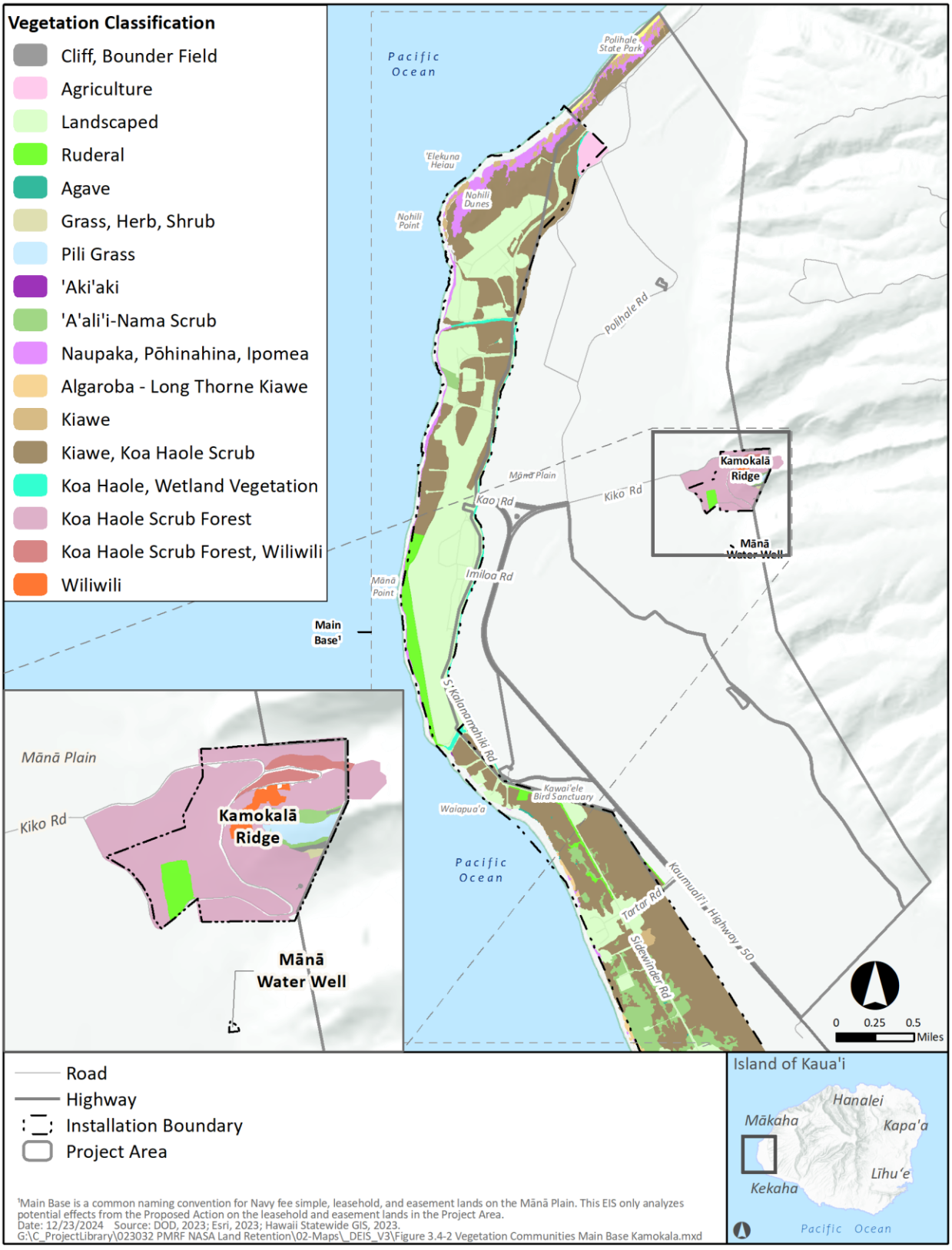


Figure 3.4-2 Vegetation Communities: Main Base, Kamokalā Ridge, and Mānā Water Well

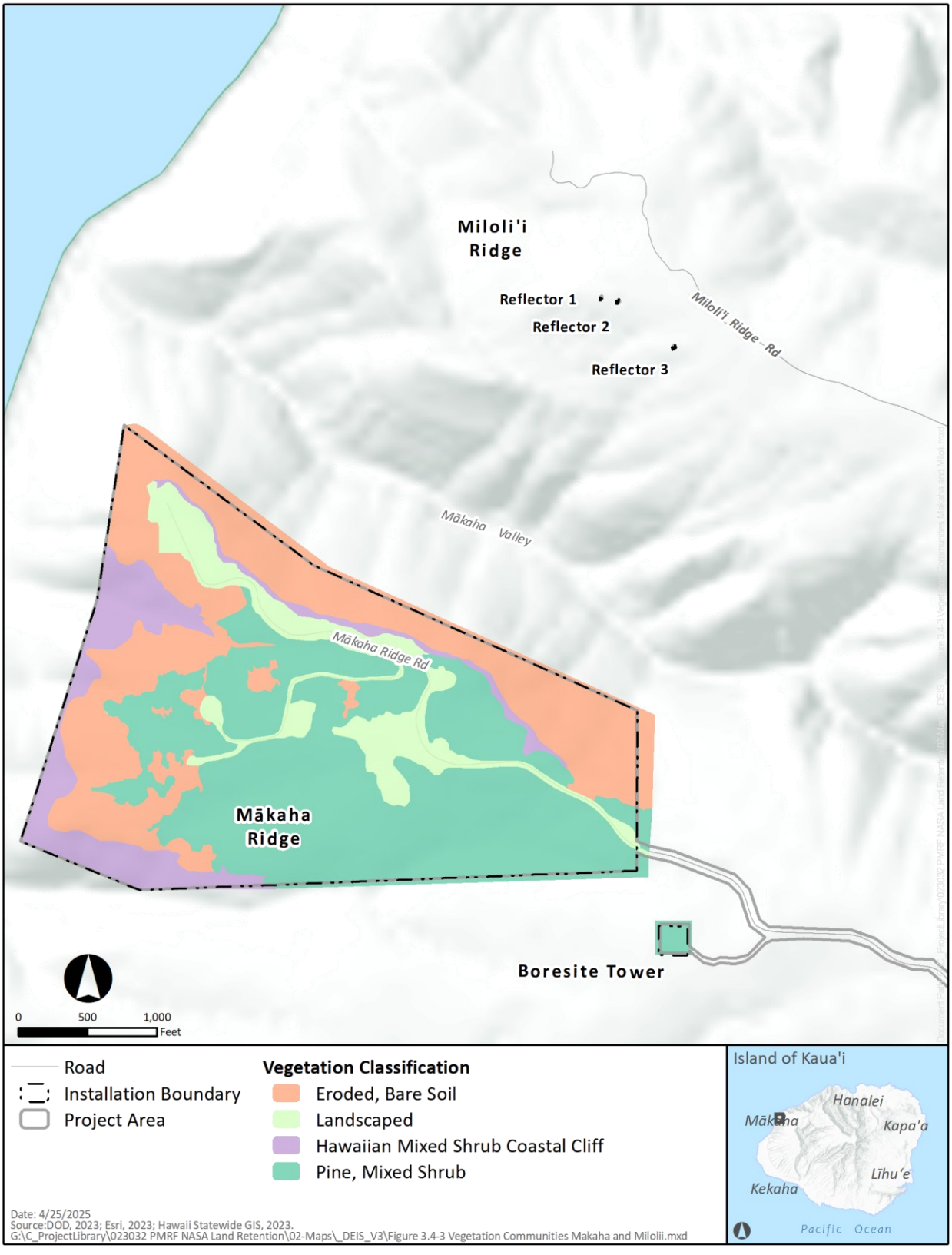


Figure 3.4-3 Vegetation Communities: Mākaha Ridge and Miloli'i Ridge

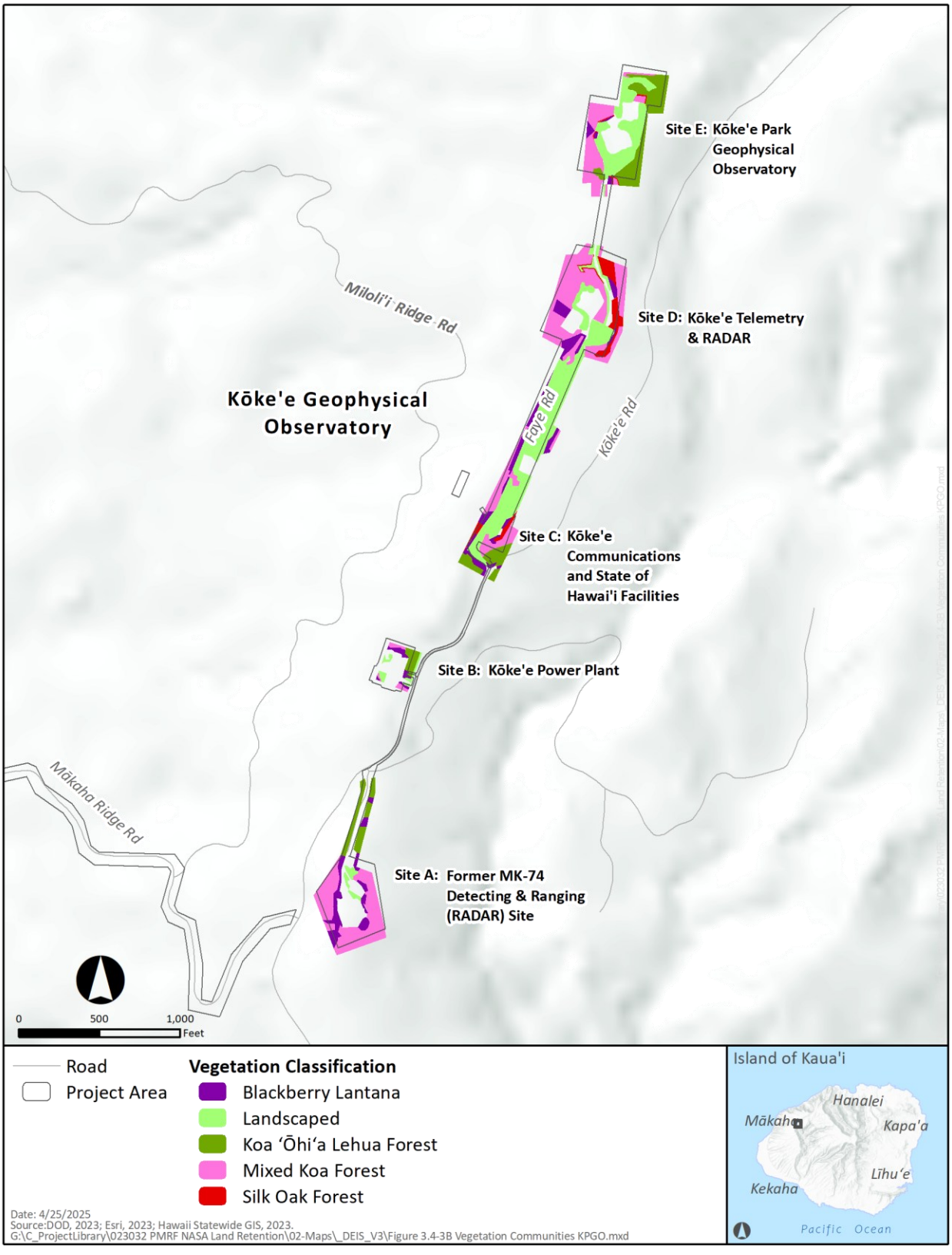


Figure 3.4-4 Vegetation Communities: KPGO

Kamokalā Ridge and Mānā Water Well

The higher elevations at Kamokalā Ridge and the Mānā Water Well contain kiawe-koa haole and kiawe scrub communities, with interspersed native wiliwili (*Erythrina sandwicensis*) trees (NAVFAC Pacific, 2023b). Along the cliff faces and the top of the ridge are silk oak (*Grevillea robusta*) trees and scrub-shrub with non-native grasses (NAVFAC Pacific, 2023a).

Mākaha Ridge and Miloli'i Ridge

The vegetative communities on Mākaha and Miloli'i ridges include plants accustomed to dry, drought tolerant, and disturbed regions. Non-native canopy consists of pine (*Pinus elliottii*), eucalyptus (*Eucalyptus* spp.), and silk oak trees, while understory consists of non-native and invasive grasses and non-native scrub, such as lantana (NAVFAC Pacific, 2023a, 2023b). Forested vegetative communities include native species such as koa (*Acacia koa*), alahe'e (*Psydrax odorata*), a'ali'i, and pūkiawe (*Leptecophylla tameiameiae*). Grass lawns are regularly mowed at Mākaha Ridge and vegetation is routinely cleared from around infrastructure at Miloli'i Ridge. The coastal cliff community below the ridges is primarily composed of mixed shrub species, sparse vegetation, and barren unvegetated areas. Plant restoration efforts occur on a few cliffside and bare areas to reduce erosion (NAVFAC Pacific, 2023a, 2023b).

KPGO

Vegetation and land cover mapping was conducted by desktop and refined in the field during surveys to document common plant species. KPGO is 79 percent (15.1 acres) evergreen forest, 6 percent (1.2 acres) scrub-shrub land covers, and 15 percent (2.9 acres) developed open space (managed grasses like lawn or low-lying vegetation). Native tree species include koa (*Acacia koa*), 'ōhi'a (*Metrosideros polymorpha*), hame (*Antidesma platyphyllum*), and sandalwood or 'iliahi (*Santalum freycinetianum*). Non-native tree species include paperbark tree (*Melaleuca quinquenervia*), avocado (*Persea americana*), and banana (*Musa x paradisiaca*) (Appendix K, KPGO Flora Survey Report) (Hamer Environmental, 2025a).

Invasive Plant Species

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli'i Ridge

Hawai'i's native vegetation is threatened by a variety of non-native invasive species. Invasive species are defined as plants, animals, or pathogens that are non-native to the ecosystem under consideration and whose introduction causes or is likely to cause harm (U.S. Department of Agriculture [USDA], 2018). The State of Hawai'i currently has a list of plant species designated as "Noxious Weeds for Eradication or Control Purposes," which was developed in 1992 (Hawai'i Invasive Species Council, 2024). In addition, the Kaua'i Invasive Species Committee (KISC) maintains lists of species identified for early detection and rapid response (EDRR) as well as a list of species that are targeted for control with the intent of eventual eradication from Kaua'i (KISC, 2017). EDRR listed species are newly discovered non-native species with limited distribution in Kaua'i that can potentially be eradicated from the island, whereas species on the KISC target list have been identified as invasive threats and are prioritized for control or eradication (KISC, 2017).

Invasive plants are prevalent in the ROI and are managed and controlled by PMRF and Natural Resource staff on fee simple lands, leaseholds, and utility easements. Some introduced species on this list include long-thorn kiawe (*Neltuma juliflora*), banana poka (*Passiflora mollissima*), comb hyptis (*Hyptis pecinata*), and Asian melastome (*Melastoma candidum*). Other damaging species include koa haole and golden

crown-beard (*Verbesina encelioides*) which can alter ecosystems by outcompeting native plant species and hinder wildlife as well as reduce diversity among plant communities. Invasive plants exist in all vegetation communities of leaseholds and easements at Main Base, Kamokalā Ridge, and Mānā Water Well, such as drought tolerant koa haole, and on the ridges of Mākaha, Miloliʻi, and KPGO such as lantana (*Lantana camara*) (NAVFAC Pacific, 2023b). A comprehensive list of introduced plant species on the PMRF installation is located in the first section of Appendix C of the 2023 PMRF INRMP (pages 69–95). The 2023 PMRF INRMP with appendices is available on the EIS website (https://pmrf-kpgo-eis.com/media/wc3aqq12/final_2023-pmrf-inrmp-appendices.pdf).

KPGO

Seven State-listed noxious weeds were documented at KPGO: blackberry (*Rubus argutus*) and Chinese privet (*Ligustrum sinense*) were the most abundant noxious weeds found in every site; black wattle (*Acacia mearnsii*), spreading mist flower (*Ageratina riparia*), bull thistle (*Cirsium vulgare*), and ivy gourd (*Coccinia grandis*) were all found in limited numbers, each in only one site of KPGO. Noted as highly invasive by the Kōkeʻe Resource Conservation Program, strawberry guava (*Psidium cattleianum*) infestations were documented in every site of KPGO. Sites A, D, and E contained dense patches of vegetation. All five of the invasive plant species targeted by the Kōkeʻe Resource Conservation Program occur at KPGO: kahili ginger (*Hedychium gardnerium*), fire tree (*Myrica faya*), firethorn (*Pyracantha angustifolia*), Chinese privet, and strawberry guava. Twelve KISC invasives were found including widespread lantana, blackberry, and daisy fleabane (*Erigeron karvinskianus*). Those KISC species with more limited presence and potential for eradication included kahili ginger, smoke bush (*Buddleia madagascariensis*), Bolivian fuschia (*Fuschia boliviana*), and Australian tree fern (*Sphaeropteris cooperi*) (Appendix K, KPGO Flora Survey Report) (Hamer Environmental, 2025a).

3.4.1.4.2 Special Status Plants

A list of all special status plant species known to occur or with potential to occur in the ROI is included in Table 3.4-2.

Table 3.4-2 Special Status Plant Species Known to or with Potential to Occur within the Region of Influence

Species Information				*Location of Species*[1]		
Scientific Name	***Common Name***	***Hawaiian Name***	***Regulatory Status***	***Main Base***	***Mākaha Ridge***	***KPGO***
Alphitonia ponderosa		Kauila	SC			X
Lobelia niihauensis	Niʻihau Lobelia		FE, SE		X	
Ochrosia kauaiensis		Holei	SC			X[2]
Panicum niihauense	Niʻihau Panicgrass	Lauʻehu	FE, SE	X		
Peucedanum sandwicense		Makou	FT, ST		X	
Pritchardia minor	Alakaʻi Swamp Pritchardia	Loulu	SC			X[2]
Psychotria grandiflora		Kōpiko	FE, SE			X
Schiedea apokremnos	Kauaʻi Schiedea	Maʻoliʻoli	FE, SE		X	
Sesbania tomentosa	Oʻahu Riverhemp	ʻŌhai	FE, SE	X		
Spermolepis hawaiiensis	Hawaii Scaleseed		FE, SE		X	
Wilkesia hobdyi		Dwarf iliʻau	FE, SE		X	

Species Information				*Location of Species*[1]		
Scientific Name	***Common Name***	***Hawaiian Name***	***Regulatory Status***	***Main Base***	***Mākaha Ridge***	***KPGO***
Zanthoxylum kauaense	Kaua‘i Pricklyash	A‘e	SC			X

Note: [1]No special status plants have been documented at Kamokalā Ridge, Mānā Water Well, or Miloli‘i Ridge.
[2]Native restoration outplant area, December 2022.
Key: FE= federally endangered; FT = federally threatened; KPGO = Kōke‘e Park Geophysical Observatory; SE = State endangered; SC = Species of Concern (as described in DLNR, 2011, 2025); ST = State threatened.
Source: NAVFAC Pacific, 2023a, 2023b.

Main Base

Lau‘ehu or Ni‘ihau panicgrass (*Panicum niihauense*) is an ESA-listed endangered plant that previously inhabited the coastal vegetation community within the ROI. This perennial bunchgrass is currently only known to occur on Kaua‘i but was also known historically from Ni‘ihau. Four lau‘ehu individuals were observed at Polihale State Park on the easements of Main Base during a recent vegetation survey (Appendix K, PMRF Flora Survey Report). ‘Ōhai (*Sesbania tomentosa*) is an ESA-listed endangered plant that is found at Polihale State Park on easement lands in the ROI. This shrub to small tree is known to occur on O‘ahu, Moloka‘i, Maui, Kaua‘i, Kaho‘olawe, and Hawai‘i. While these plant species have not been found on PMRF in recent surveys, there is the potential that they could occur within the ROI.

Mākaha Ridge

Four ESA-listed endangered species are known to occur on PMRF at Mākaha Ridge: dwarf ili‘au (*Wilkesia hobdyi*), Hawai‘i scaleseed (*Spermolepis hawaiiensis*), Ni‘ihau lobelia (*Lobelia niihauensis*), and Kaua‘i schiedea or mā‘oli‘oli (*Schiedea apokremnos*). Additionally, one ESA-listed threatened species, makou (*Peucedanum sandwicense*), is known to occur.

Kamokalā Ridge, Mānā Water Well, and Miloli‘i Ridge

No ESA-listed plants have been documented at Kamokalā Ridge, Mānā Water Well, or Miloli‘i Ridge.

KPGO

Four special status plant species have been identified during vegetation surveys of KPGO, the federal and State endangered kōpiko (*Psychotria grandiflora*), and three species of concern, kauila (*Alphitonia ponderosa*), Kaua‘i pricklyash or a‘e (*Zanthoxylum kauaense*), and Alaka‘i Swamp pritchardia or loulu (*Pritchardia minor*). A small population of five kōpiko plants was observed within the KPGO study area. Primary threats include habitat degradation from ungulates and herbivory by insects. The small populations of kauila, a‘e, and loulu were generally noted as healthy. Although federally endangered ‘akoko (*Euphorbia halemanui*) was previously documented outside Site D of KPGO, the plant species was not identified during the 2024 vegetation surveys (Hamer Environmental, 2025a). ‘Ohe‘ohe (*Polyscias kavaiensis*), a State species of concern, was noted previously in the KPGO study area. While ‘ohe‘ohe was not observed during this survey, two others, ‘ohe (*Polyscias hawaiensis*) and ‘ohe kiko ‘olā (*Polyscias waimeae*), both endemic and a closely related species of the same genus, were documented (Appendix K, KPGO Flora Survey Report) (Hamer Environmental, 2025a).

3.4.1.4.3 Critical Habitat–Plants

Main Base

Critical habitat for ʻōhai has been designated just north of Polihale State Park (Figure 3.4-5). Much of PMRF's coastal strand vegetation within the ROI supports unoccupied (meaning that there is no historical record of presence there) USFWS designated critical habitat for lauʻehu. The USFWS has determined that these areas contain the primary constituent elements necessary for the recovery of the species and are essential to the recovery of the species because not enough areas outside of PMRF exist to support recovery. During vegetation surveys conducted in the fall of 2023, four lauʻehu individuals were observed in the sand dune region on easement lands of Polihale State Park (NAVFAC Pacific, 2023b).

Kamokalā Ridge and Mānā Water Well

No critical habitat for plants occurs in Kamokalā Ridge and Mānā Water Well.

Mākaha Ridge and Miloliʻi Ridge

Upper portions of Mākaha Ridge Road overlap with critical habitat for the following plants: *Poa manni*, *Poa siphonoglossa,* broadleaf dubautia or koholāpehu (*Dubautia latifolia*)*,* ʻakoko*,* ʻaiea (*Nothocestrum peltatum*)*, Cyperus pennatiformis,* pōpolo or pōpolo ʻaiakeakua (*Solanum sandwicense*)*,* and *Xylosma crenatum.*

Critical habitat for plants exists outside of the ROI, north of Mākaha and Miloliʻi Ridge such as *Cyperus trachysanthos*, *Scheidea apokremnos*, *Brighamia insignis*, *Hedyotis stjohnii*, *Centaurium sebaeoides*, *Pteralyxia kauaiensis*, *Scheidea membranacea*, *Melicope knudsenii*, *Lipochaeta fauriei*, *Schiedea kauaiensis*, and *Wilkesia hobdyi* (Figure 3.4-5).

KPGO

Initially, critical habitats for three plant species were identified at KPGO, including koholāpehu, ʻaiea or hālena (*Nothocestrum* sp.), and pōpolo or pōpolo ʻaiakeakua. Upon further review, USFWS determined that an incidental overlap resulted from the geographic information system polygon drawing process and no critical habitat exists within KPGO.

3.4.1.4.4 Wildlife

The Hawaiian Islands support a unique selection of wildlife because of their isolation. Species native to Hawaiʻi include a wide array of native and endemic birds, as well as sea turtles and marine mammals that inhabit the islands' near and offshore waters.



Figure 3.4-5 Critical Habitat for Special Status Plants

As with vegetation, numerous wildlife species have been introduced to the islands and are considered invasive and/or are designated as Injurious Wildlife Species by the State of Hawai'i (HAR Chapter 13-124, Exhibit 5). Species designated as injurious include numerous birds, reptiles, invertebrates, and mammals. KISC has also identified a number of invasive EDRR wildlife species targeted for control on Kaua'i. EDRR species include the coqui frog (*Eleutherodactylus coqui*), mongoose (*Herpestes javanicus*), coconut rhinoceros beetle (CRB) (*Oryctes rhinoceros*), brown tree snake (*Boiga irregularis*), and little fire ant (*Wasmannia auropunctata*), among others. All known outbreaks of these species have been controlled or are undergoing control efforts by KISC, the Hawai'i Department of Agriculture Biosecurity (DAB), and other partner agencies (KISC, 2017, 2024). The following KISC EDRR species are known to occur, or have been found on fee simple or leasehold lands: CRB, naio thrips, also known as Myoporum thrips (*Klambothrips myopori*), and coqui frog. The first discovery of CRB on fee simple lands occurred on July 24, 2025. As of February 2026, a total of 13 CRBs have been detected on fee simple land; no detections have been made on easement lands. CRB management on PMRF consists of extensive control and monitoring measures, such as weekly pheromone trap checking, monthly advanced tree monitoring and inspections, covering of green waste with netting, and treatment of every potentially affected tree with a foliar spray (B. McFarland, PMRF, personal communication, February 19, 2026). The Navy and NASA will continue to collaborate on management actions with KISC, the CRB Hawaii Response Team, DOFAW, Hawai'i DAB, and NAVFAC (Capt. R. Prince, PMRF, personal communication, October 28, 2025). The first discovery of naio thrips on leasehold lands (Mākaha Ridge) occurred in August 2025. Naio thrips infestations on Kaua'i are believed to have existed before the initial discovery on the island in 2025. Currently there is no rapid response protocol to eradicate this species (B. McFarland, PMRF, personal communication, February 19, 2026). The first detection and discovery of coqui frog occurred on March 23, 2026, on leasehold lands (B. McFarland, PMRF, personal communication, March 14, 2026). Rapid response measures conducted by KISC, in coordination with the Navy, led to the control of one individual on April 20, 2026. Remote acoustic monitors were deployed across the installation on fee simple lands after the initial detection; no further detections have been made. One individual was controlled on April 20, 2026, and there have been no further detections.

A comprehensive list of introduced wildlife species is located in the second section of Appendix C of the 2023 PMRF INRMP (pages 98–110). The 2023 PMRF INRMP with appendices is available on the EIS website (https://pmrf-kpgo-eis.com/media/wc3aqq12/final_2023-pmrf-inrmp-appendices.pdf).

3.4.1.4.5 General Avian Wildlife

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli'i Ridge

Bird surveys conducted at PMRF 2023 and 2024 in support of this EIS indicate that introduced, non-native bird species are the most abundant bird species at PMRF (Appendix K, PMRF Fauna Survey Report) (NAVFAC Pacific, 2024). Non-native bird species observed throughout PMRF are typical of lowlands in the Hawaiian Islands, where most of the natural habitats have been altered by development and agriculture. Examples of species observed include zebra dove (*Geopelia striata*), warbling white-eye (*Zosterops japonicus*), rock dove (*Columba livia*), red-crested cardinal (*Paroaria coronata*), common waxbill (*Estrilda astrild*), and common myna (*Acridotheres tristis*) (NAVFAC Pacific, 2024).

Invasive birds can be observed in all areas of PMRF and include barn owl (*Tyto alba*) and cattle egret (*Bubulcus ibis*). Barn owl have been observed on leaseholds and easements at Main Base, while cattle

egrets have been observed throughout the PMRF, regardless of elevation (NAVFAC Pacific, 2024). In 2017, USFWS issued a depredation control order in Hawai‘i for the non-native cattle egret and barn owl as they are known to predate other species native to Hawai‘i (50 CFR section 21.55). While both species are MBTA-listed, PMRF is permitted for take of these two species under this control order with regards to Bird/Wildlife Aircraft Strike Hazard (BASH) concerns and active control to reduce predation on native species.

KPGO

Bird surveys conducted at KPGO in 2024 in support of this EIS indicate that introduced, non-native bird species are the most abundant bird species at KPGO. Non-native bird species observed throughout KPGO are typical of lowlands in the Hawaiian Islands, where most of the natural habitats have been altered by development and agriculture. Examples of species observed during the survey include warbling white-eye (*Zosterops japonicus*), red junglefowl (*Gallus gallus*), and white-rumped shama (*Copsychus malabaricus*). The Kaua‘i ‘elepaio (*Chasiempis sclateri*) was the only non-listed, native forest bird observed during the survey (Appendix K, KPGO Flora Survey Report) (Hamer Environmental, 2025b).

3.4.1.4.6 Special Status Avian Wildlife

ESA-Listed Avian Wildlife

Table 3.4-3 provides the ESA- and State of Hawai‘i-listed wildlife species known to or with potential to occur within the ROI. Observations from surveys conducted in 2023 and 2024 are depicted in Figure 3.4-6 (NAVFAC Pacific, 2024).

Seabirds

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, and KPGO

Four ESA-listed seabirds have the potential to occur in the ROI, including Newell’s shearwater or ‘a‘o (*Puffinus newelli*), band-rumped storm petrel or ‘akē‘akē (*Hydrobates castro*), Hawaiian petrel or ‘ua‘u (*Pterodroma sandwichensis*), and short-tailed albatross or makalena (*Phoebastria albatrus*). Kaua‘i provides the majority of Hawai‘i’s habitat for the threatened Newell’s shearwater. The Newell’s shearwater nests from April to November in the interior mountains of Kaua‘i. Fledglings leave the nesting grounds at night in October and November and head for the open ocean. The band-rumped storm petrel is an endangered breeding visitor that typically arrives in February and has been detected in the cliffs below the Mākaha facility, from its nesting grounds to the sea.

Table 3.4-3 ESA-Listed and State of Hawai‘i-Listed Wildlife Known to or with Potential to Occur within the Region of Influence

Species Information				*Location*					
Scientific Name	***Common Name***	***Hawaiian Name***	***Regulatory Status***	***Main Base***	***Kamokalā Ridge***	***Mānā Water Well***	***Mākaha Ridge***	***Miloli‘i Ridge***	***KPGO***
Waterbirds									
Anas wyvilliana	Hawaiian Duck	Koloa maoli	FE, SE	X					
Branta sandvicensis	Hawaiian Goose	Nēnē	FT, SE	X	X	X	X	X	X
Fulica alai	Hawaiian Coot	‘Alae ke‘oke‘o	FE, SE	X					
Gallinula galeata sandvicensis	Hawaiian Gallinule	Alae ‘ula	FE, SE	X					
Himantopus mexicanus knudseni	Hawaiian Black-necked Stilt	Ae‘o	FE, SE	X					
Forest Birds									
Drepanis coccinea	Scarlet Honeycreeper	‘I‘iwi	FT, SE						X
Seabirds									
Hydrobates castro	Band-Rumped Storm Petrel	‘Ak ē‘ak ē	FE, SE	X	X	X	X	X	X
Phoebastria albatrus	Short-tailed Albatross	Makalena	FE, SE	X					
Pterodroma sandwichensis	Hawaiian Petrel	‘Ua‘u	FE, SE	X	X	X	X	X	X
Puffinus newelli	Newell’s Shearwater	‘A‘o	FT, ST	X	X	X	X	X	X
Mammals									
Aeorestes semotus	Hawaiian Hoary Bat	‘Ōpe‘ape‘a	FE, SE	X	X	X	X	X	X
Neomonachus schauinslandi	Hawaiian Monk Seal	‘Īlio holo i ka uaua	FE, SE	X					
Reptiles									
Chelonia mydas	Green Sea Turtle	Honu	FT, ST	X					
Eretmochelys imbricata	Hawksbill Sea Turtle	Honu‘ea	FE, SE	X					
Invertebrates									
Drosophila musaphilia	Hawaiian Picture-wing Fly	-	FE, SE						X
Drosophila sharpi	Hawaiian Picture-wing Fly	-	FE, SE						X

Key: FE= federally endangered; FT = federally threatened; KPGO = Kōke‘e Park Geophysical Observatory; PMRF = Pacific Missile Range Facility; SE = State endangered; ST = State threatened

Sources: NAVFAC Pacific 2023a, 2024.

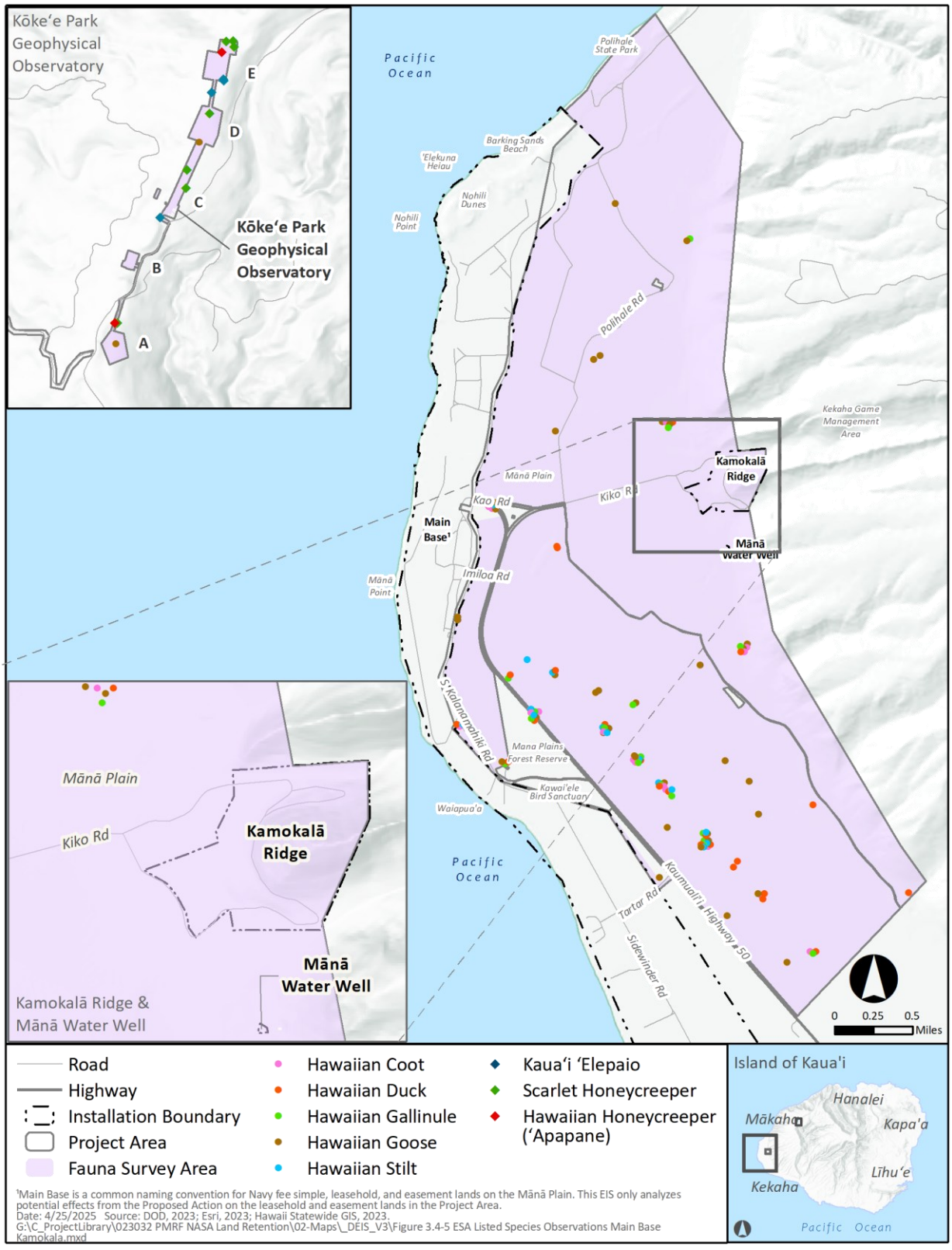


Figure 3.4-6 Endangered Species Act-Listed Wildlife Species Observations in 2022–2024: Main Base, Kamokalā Ridge, Mānā Water Well, and KPGO

On Kauaʻi, several grounded fledglings of band-rumped storm petrel, Newell's shearwater, and Hawaiian petrels have been found in recent years as part of the seabird recovery programs. Most birds have been found near the mouth of Waimea Canyon, indicating that some birds still breed in the vicinity. Band-rumped storm petrels are nocturnal over land and are active around dusk to dawn. Nesting occurs from April through May. Chicks begin hatching in late June and fledge in late October to November. Hawaiian petrels are endangered breeding visitors, whose breeding season begins in February and continues through May, with fledgling season occurring in November or December. Hawaiian petrels and fledglings have been observed flying between nesting sites in the cliffs and at-sea for foraging purposes. Although Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel are not known to nest or roost at Main Base, they are known to fly over or near the ROI. There has been only one sighting of the endangered short-tailed albatross on fee simple lands at Main Base in March 2000, resting on the grass on the inland side of the PMRF runway (NAVFAC Pacific, 2023a).

Waterbirds

Main Base

Five ESA-listed waterbirds have the potential to occur in the ROI at Main Base, including the Hawaiian coot or ʻalae keʻokeʻo (*Fulica alai*), Hawaiian goose or nēnē (*Branta sandvicensis*), Hawaiian duck or koloa maoli (*Anas wyvilliana*), Hawaiian gallinule or ʻalae ʻula (*Gallinula galeata sandvicensis*), and Hawaiian stilt or aeʻo (*Himantopus mexicanus knudseni*). ESA-listed waterbird habitat within the ROI is associated with (1) Kawaiʻele wildlife sanctuaries that include a State Waterbird Refuge for Hawaiʻi's endangered waterbird species, adjacent to the ROI; and (2) agricultural drainages from the Nohili and Kawaiʻele ditches. Agricultural drains within the ROI are located on fee simple, leaseholds, and easement lands of Main Base and provide habitat for ESA-listed waterbirds.

The Hawaiian goose is a year-round resident that has been observed and has nested at the Main Base, on fee simple lands, near the runway and beach cottages. From 2000 to 2014, the numbers of Hawaiian geese at Main Base increased, as has been generally experienced across Kauaʻi (NAVFAC Pacific, 2023a). Hawaiian geese have been observed flying down into lower elevation habitats on Mānā Plain. Hawaiian geese are also attracted to the adjacent Kinikini Ditch and State-managed Kawaiʻele Waterbird Sanctuary located just east of the base. In July 2012, a record high of 91 Hawaiian geese were observed near Kawaiʻele Wetlands, within sight of the PMRF runway (DOE, 2019). Despite efforts to discourage their use of PMRF through hazing, nesting continues to occur (DOE, 2019). During 2023 and 2024 surveys, Hawaiian geese were prevalent throughout PMRF and in the ROI (NAVFAC Pacific, 2024).

Hawaiian duck, Hawaiian coot, Hawaiian gallinule, and Hawaiian black-necked stilt have been observed utilizing the ditches, including Nohili Ditch and the ditch systems along the eastern edge of KTF as well as and ponds and reservoirs in the ROI. During 2023 and 2024 surveys, these Hawaiian waterbirds were prevalent throughout leasehold and easement lands on the Mānā Plain (NAVFAC Pacific, 2024) (see Figure 3.4-6). These Hawaiian waterbirds regularly utilize wetland areas adjacent to the ROI including Kawaiʻele Waterbird Sanctuary and Mānā Plains Forest Reserve as well as degraded aquatic habitat.

Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

With the exception of the Hawaiian goose, waterbirds have not been recorded at Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, or KPGO (Appendix K, PMRF Fauna Survey Report, KPGO Fauna Survey Report) (Hamer Environmental, 2025b; NAVFAC Pacific, 2023a, 2024).

MBTA Avian Wildlife

Main Base

MBTA bird species on leasehold and easement lands at Main Base include waterfowl, seabirds, shorebirds, and one raptor. The pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) is the only endemic non-migratory bird species that occurs in the region and is not federally listed as threatened or endangered. The pueo is State-listed as endangered on the island of Oʻahu and can be observed on the leasehold and easement lands at Main Base. Laysan albatross or mōlī (*Phoebastria immutabilis*) and black-footed albatross or kaʻupu (*Phoebastria nigripes*) are MBTA-listed species known to occur within the ROI at Main Base. A few individual black-footed albatross have been observed loafing on base during the breeding season, but this species has not attempted to nest at PMRF. In contrast, Laysan albatross nest in the vegetated area to the west of the PMRF central runway and use the lawn-like ruderal vegetation areas on KTF (ROI at Main Base) for courtship and nesting (NAVFAC Pacific, 2023a).

A nesting colony of wedge-tailed shearwaters or ʻuaʻu kani (*Ardenna pacifica*) is also located near the beach cottages on fee simple lands on Main Base. Nesting colony restoration efforts begun in 2006 included removing non-native trees and planting naupaka seedlings and native beach vegetation such as pōhinahina, ʻilima, and ʻakiʻaki seeds. There were an estimated 276 breeding pairs in the compound in 2006 (DOE, 2019). The Navy also installed polyvinyl chloride (PVC) pipe segments into the compound to provide some artificial burrows that would not collapse (PMRF, 2010).

Many other MBTA-listed species have been documented on leasehold and easement lands at Main Base, such as brown booby (*Sula leucogaster*), sanderling (*Calidris alba*), black-crowned night heron (*Nycticorax nycticorax*), wandering tattler (*Tringa incana*), ruddy turnstone (*Arenaria interpres*), and Pacific golden plover or kōlea (*Pluvialis fulva*) (NAVFAC Pacific, 2023a).

Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

In the higher elevation regions among the cliff regions of Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge, white-tailed tropicbirds (*Phaethon lepturus*) have been observed. Other MBTA species listed above also have the potential to occur at these higher elevations, such as the Pacific golden plover and cattle egret (NAVFAC Pacific, 2023a).

KPGO

MBTA protected species observed at KPGO included the Pacific golden plover, white-tailed tropicbird, and native Hawaiian honeycreepers, such as Kauaʻi ʻamakihi (*Chlorodrepanis stejnegeri*), and ʻapapane (*Himatione sanguinea*). Non-native MBTA birds observed included invasive cattle egret, house finch (*Haemorhous mexicanus*), northern mockingbird (*Mimus polyglottos*), and the most abundant migratory species, northern cardinal (*Cardinalis cardinalis*) (Appendix K, KPGO Fauna Survey Report) (Hamer Environmental, 2025b).

3.4.1.4.7 General Mammalian Wildlife

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

All non-ESA-listed terrestrial mammalian species in the ROI are non-native as well as invasive. Feral cats (*Felis catus*) and rats (*Rattus* sp.) are the most common species recorded (PMRF, 2010). Signs of feral pigs (*Sus scrofa*) and black-tailed deer (*Odocoileus columbianus*) were also recorded during the 2023 and

2024 PMRF fauna surveys (NAVFAC Pacific, 2024). At least four species of rodent are likely present in the ROI: house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), roof rat (*Rattus rattus*), and Pacific rat (*Rattus exulans*). Feral dogs (*Canis lupus familiaris*) have been observed on Main Base and feral goats (*Capra hircus*) have been observed in the upper elevation cliff regions of Mānā Water Well and Kamokalā, Mākaha, and Miloliʻi ridges (NAVFAC Pacific, 2023a). Cats, rats, dogs, deer, goats, and pigs are nuisance species of environmental concern to native bird species as they prey on eggs and juveniles and/or destroy essential nesting and vegetative ecosystems.

KPGO

General mammalian wildlife at KPGO is similar to the wildlife found on leaseholds and easements at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge. Evidence of non-native, invasive wildlife, such as feral pigs, feral goats, cattle egret, and black-tailed deer were observed during the recent 2024–2025 surveys. In addition, feral cats, mice, and rat species, found on leaseholds and easements at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge, are likely present at KPGO (Hamer Environmental, 2025b).

3.4.1.4.8 Special Status Mammalian Wildlife

Table 3.4-3 lists the ESA-listed mammalian species that have the potential to be located on PMRF and are protected by the ESA and/or State of Hawaiʻi.

Main Base

Hawaiian monk seals or ʻīlio holo i ka uaua (*Neomonachus schauinslandi*) are frequently sighted both in nearshore waters and hauled out on beaches on fee simple lands at Main Base. Since May 2006, the majority of these observations of Hawaiian monk seals are north of Kinikini Ditch on fee simple lands. Hawaiian monk seals are most often observed in areas where sandy beach, smooth bench or sandy pockets are found (PMRF, 2010). Sightings of Hawaiian monk seal haul outs are regularly documented by the PMRF Natural Resource Staff. Potential habitat for Hawaiian monk seals extends north of fee simple lands and extends into the ROI on Main Base easements at Polihale State Park (NAVFAC Pacific, 2023a).

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

The endangered Hawaiian hoary bat or ʻōpeʻapeʻa (*Aeorestes semotus*) is the only native terrestrial mammal in Hawaiʻi. In 2010 and 2011, the Navy contracted U.S. Geological Survey biologists to survey for bat occurrence at PMRF on fee simple lands (Bonaccorso and Pinzari, 2011). While detectability and bat call activity remained relatively consistent year-round, monitoring results showed bat occurrence was highest between September and December and dropped between February and May. Detection data indicated that Main Base may be used during the fall months by adult bats for "fall swarming" in preparation for mating (DOE, 2019). A bat survey conducted from 2020–2021 confirmed general bat activity levels were consistent with activity recorded during 2010–2011, but bat occupancy rates were higher in 2020–2021 (Welch et al., 2021). In 2023 and 2024, surveys were conducted to detect and document presence/absence of Hawaiian hoary bats at six locations across the ROI in PMRF (Figure 3.4-7). While recent detections continue to indicate year-round activity, detectability has remained consistent and high at northern leaseholds and easements at Main Base and Mākaha and Miloliʻi Ridges from October to June (NAVFAC Pacific, 2025). A decrease in detectability occurred between April and June in 2024 (NAVFAC Pacific, 2025).

KPGO

The Hawaiian hoary bat has been observed or detected at Sites A, C, and D, and occurrence is year-round at KPGO (Hamer Environmental, 2025c; NAVFAC Pacific, 2023a). During 2024–2025 surveys, individuals were detected on 240 nights out of 300 detector-nights sampled across all pooled monitoring sites and months, resulting in a detection rate of 0.80. Overall detection rates were generally high, with bats exhibiting "high detectability" levels (above 0.50 for the proportion of nights with bat detections) at all three survey locations, and detection rates peaked in August 2024. Survey location 1, located within Site D, consistently had the highest detection rates. Nightly bat activity was high across all sites. Survey location 1 had detections on 93.8 percent of nights surveyed, survey location 2 (located within Site C) had detections on 80 percent of nights surveyed, and the third survey location (located within Site A) had detections on 63.4 percent of nights surveyed. Foraging buzzes were detected at all three sites throughout the survey period. While foraging buzzes made up a small percentage of overall detections, they occurred throughout the monitoring period at all three sites. The percentage of detections flagged as foraging buzzes was highest at Site 1 (Hamer Environmental, 2025c).

3.4.1.4.9 General Amphibious and Reptilian Wildlife

Main Base and Mākaha Ridge

Terrestrial reptiles were documented during wildlife surveys conducted in 1999 (in support of the 2001 PMRF INRMP) and in 2006 (NAVFAC Pacific, 2023a). Terrestrial reptiles, such as mourning gecko (*Lepidodactylus lugubrus*), house gecko (*Hemidactylus frenatus*), snake-eyed skink (*Cryptoblepharus poecilopleurus*), and moth skink (*Lipinia noctua*) were observed at Main Base in the ROI and Mākaha Ridge. The house gecko was the most common reptile found during the surveys. Green anole (*Anolis carolinensis*) was observed at Mākaha Ridge. The only terrestrial amphibian recorded on Main Base in the ROI was the cane toad (*Rhinella marina*) during the same wildlife surveys in 1999, with the addition of the bull frog (*Lithobates catesbeianus*) during surveys conducted in 2023 and 2024 (NAVFAC Pacific, 2024).

Kamokalā Ridge, Mānā Water Well, Miloli'i Ridge, and KPGO

The terrestrial amphibian and terrestrial reptiles observed at Main Base and Mākaha Ridge also have the potential to occur at Kamokalā Ridge, Mānā Water Well, Miloli'i Ridge, and KPGO.

3.4.1.4.10 Special Status Reptilian Wildlife

Main Base

Table 3.4-3 lists the ESA-listed reptile species that have the potential to be located in the ROI (there are no ESA-listed amphibian species) (NAVFAC Pacific, 2023a).



Figure 3.4-7 Hawaiian Hoary Bat Survey Locations and Detections in 2024 in the Region of Influence

Green sea turtles or honu (*Chelonia mydas*) are a threatened species and are the only marine reptiles in the ROI. As adults, green sea turtles forage and rest in the shallow waters around the main Hawaiian Islands in late summer and early fall. Reproduction in the Hawaiian population occurs primarily in the northwest Hawaiian Islands in the summer, but green sea turtles have used fee simple Main Base sand beaches for nesting. Turtle nesting has been documented as far back as 1988 at PMRF (1988, 1989, 1999, and 2010). Between 2015 and 2021, a total of 10 green sea turtle nests were documented on fee simple lands (DOE, 2019; NAVFAC Pacific, 2023a). Green sea turtles are regularly observed basking onshore in the vicinity of the ditch and further north below the dunes at Nohili; haul outs of green sea turtles elsewhere on fee simple lands on Main Base are rare (DOE, 2019). Potential habitat for green sea turtles extends north of fee simple lands and extends into the ROI on easements at Polihale State Park.

The Hawksbill turtle or honu‘ea (*Eretmochelys imbricata*) has been reported in the open waters offshore of Kaua‘i. There is one record of a hawksbill turtle nesting within or adjacent to fee simple lands on Main Base (B. McFarland, PMRF, personal communication, July 1, 2026), although they do nest elsewhere on Kaua‘i (M. Olry, DLNR-DAR, personal communication, October 7, 2024). Hawksbill turtles are most often found in shallow water around reefs, bays, and inlets and potential habitat is located in the ROI on easements at Polihale State Park.

Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, and KPGO

No ESA-listed reptilian wildlife has been documented at Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, or KPGO. A comprehensive reptile survey has not been conducted on KPGO. There are no terrestrial reptile species native to Hawai‘i; therefore, any reptiles observed would be considered invasive.

3.4.1.4.11 General Invertebrate Wildlife

Main Base

A total of 353 taxa were identified during 2021 terrestrial invertebrate surveys on fee simple lands at Main Base, within the ROI (Magnacca, 2022). Less than 40 of the species identified were native or endemic, including coastal midges and a parasitoid wasp. Most of the native species were aquatic or semi-aquatic flies or sucking bugs. *Bryania bipunctata*, a rare endemic Hawaiian fly that was once an ESA-candidate, was also observed (NAVFAC Pacific, 2023a). Three noteworthy non-native taxa were observed during this 2021 survey: a new invasive stink bug (*Agonoscelis puberula*), a psyllid that feeds on the long-thorn kiawe (*Heteropsylla texana*), and a leafcutter bee (*Megachile* sp.).

Other introduced invertebrates include monarch butterfly (*Danaus plexippus plexippus*), honeybee (*Apis mellifera*), and sonoran carpenter bee (*Xylocopa sonorina*). The survey indicated dominance by invasive ants, which tend to limit native species survivability (Magnacca, 2022). Since the ROI is immediately adjacent to the fee simple lands at Main Base where the invertebrate surveys were conducted and habitat in the ROI is similar, it is reasonable to assume that the same invertebrate species found on fee simple lands have the potential to occur in the ROI.

Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge

Although the 2021 terrestrial invertebrate surveys were not conducted at Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge, most of the general invertebrate wildlife recorded on fee simple lands at Main Base have the potential to occur in the ROI (Magnacca, 2022).

KPGO

A total of 709 taxa were identified during the 2021 terrestrial invertebrate surveys at KPGO, with 690 of those taxa identified to species or morphotype (Magnacca, 2022). Over half the species were identified as endemic and 34 species were new State records. Rare invertebrates discovered during the survey included flightless stag beetle (*Apterocyclus honoluluensis*), click beetles (*Eopenthes* spp. and *Itodacnus* spp.), false click beetles (*Dromaeolus* spp.), flat bark beetles (*Brontolaemus* spp. and *Parandrita* spp.), koa bug (*Coleotichus blackburniae*), and a new species of both a moth (*Tulla exonoma*) and flightless leaf bug (*Nesidiorchestes* n.sp. *nr hawaiiensis*), both previously monotypic genera. Two invasive ambrosia beetles (*Xyleborus* spp.) capable of spreading Rapid ‘Ōhi‘a Death were also found during the survey. The invasive western yellowjacket (*Vespula pensylvanica*), a predatory wasp responsible for the decline of several native insect groups, was also found during the survey. Invasive ants are limited at KPGO (Magnacca, 2022).

Despite small patches of native mesic forest among mixed invasive vegetation, the diversity of invertebrates was extremely high on the leasehold and easement lands at KPGO (Magnacca, 2022).

3.4.1.4.12 Special Status Invertebrate Wildlife

Main Base

No special status invertebrate wildlife were observed during the 2021 invertebrate surveys.

Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge

The 2021 invertebrate surveys were not conducted at Kamokalā Ridge and Mānā Water Well due to dominance of non-native habitat and absence of potential habitat for special status invertebrate species. Recent surveys were not conducted at Mākaha Ridge and Miloli‘i Ridge due to heavy degradation by ungulates; however, ongoing habitat restoration is working to improve native ecosystems. In turn, these native restoration efforts could increase the potential habitat for special status invertebrate species. Although no recent surveys have been conducted in these areas, monitoring and inventory efforts are ongoing as required by the 2023 PMRF INRMP and the 2025 Biological Opinion and described in Table 2-7.

KPGO

Drosophila musaphilia and *Drosophila sharpi*, Hawaiian picture-wing flies, are single-island endemic species to Kaua‘i. *D. musaphilia* were discovered immediately adjacent to the ROI during terrestrial invertebrate surveys in 2021 by a qualified entomologist and conservation biologist (Magnacca, 2022). No additional specialized Hawaiian picture-wing fly surveys were conducted in 2024. However, host trees (koa, ‘ohe, lapalapa [*Cheirodendron platyphyllum*]) at Sites A–E were inspected during spring fauna surveys by qualified biologists. No sap seeps or picture-wing flies were observed.

3.4.1.4.13 Critical Habitat–Wildlife

Main Base

Proposed critical habitat for the green sea turtle is located just north and south on easement lands within the ROI (Figure 3.4-8). Critical habitat for Hawaiian monk seal is located north and south of the ROI. No designated critical habitat for amphibian or invertebrate wildlife is found on leaseholds or easements at Main Base.

Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

No designated critical habitat for avian, reptilian, amphibian, or invertebrate wildlife is found at Kamokalā Ridge, Mānā Water Well, Mākaha or Miloli'i Ridge, or KPGO (Figure 3.4-8).

3.4.2 Environmental Consequences

3.4.2.1 Approach to Analysis

Analysis of the Proposed Action considers potential effects such as (1) physically altering, damaging, or destroying all or part of a resource; (2) changing the habitat or physical features surrounding the resource; (3) introducing stressors such as light, noise, or pollution that diminish the integrity of the surrounding environment; and 4) the duration of effect. The 2023 PMRF INRMP and the 2025 Biological Opinion mandates conservation efforts on PMRF and KPGO lands, to include fee simple, leaseholds, and easement lands, and provides BMPs to reduce potential effects to biological resources.

The criteria considered to assess whether an alternative would result in potential significant impacts on biological resources include the extent to which an alternative would result in the following:

- Reduction of populations or distribution of special status species to include behavior alteration, survival, or reproduction ability.
- Restriction of migratory or wildlife corridors between habitats.
- Habitat fragmentation or degradation, especially designated critical habitat of special status species.
- Increase of invasive species (plant or animal) prevalence or populations.

3.4.2.2 Alternative 1: Succeeding Current Real Estate Agreements

Under Alternative 1, there are no proposed changes to the type or frequency of current activities occurring on leasehold and easement lands. This alternative would not change any use or maintenance of existing infrastructure and would not involve construction, renovation, or demolition of facilities. The activities at these sites would continue as currently used. A summary of effects to biological resources from ongoing Navy and NASA activities on leasehold and easement lands is included below, as well as a summary of currently implemented management strategies. Although no new effects to vegetation, wildlife, and critical habitat would occur, ongoing existing effects would continue under this alternative.



Figure 3.4-8 Critical Habitat for Special Status Wildlife in the Region of Influence

To avoid and minimize adverse effects on biological resources, and to conserve protected and native species and associated areas, the Navy and NASA would continue to operate in accordance with the PMRF INRMP, 2025 Biological Opinion, NASA's SENSE Environmental Management Plan, and SOPs. The Navy's 2023 PMRF INRMP and 2025 Biological Opinion are located in Appendix K of the Final EIS. The Navy's 2023 PMRF INRMP, 2025 Biological Opinion, and NASA's SENSE Environmental Management Plan (for the Space Geodesy facility at Site E) are available on the EIS website (https://www.PMRF-KPGO-EIS.com). The Navy and NASA would continue to implement BMPs and conservation measures, as appropriate; coordinate and implement monitoring and survey programs; and comply with all biological opinions, such as the 2018 Biological Opinion of the USFWS for the Proposed Base-wide Infrastructure, Operations, and Maintenance Activities at PMRF, Island of Kaua'i, Hawai'i. These 2014, 2018, and 2025 Biological Opinions are included in Appendix K and contain information on existing permits for migratory birds and ESA-listed species. The Navy and NASA would continue to comply with HAR Chapter 13-107, *Threatened and Endangered Plants*; HAR Chapter 13-124, *Indigenous Wildlife, Endangered and Threatened Wildlife, Injurious Wildlife, Introduced Wild Birds, and Introduced Wildlife*; and HRS Chapter 195D, *Conservation of Aquatic Life, Wildlife, and Land Plants*, by obtaining the following permits and licenses as necessary:

- Scientific, propagation, and educational permits;
- Protected wildlife permit for the purpose of scientific collection;
- Permits for keeping indigenous wildlife;
- Prohibited activities permit;
- Incidental take license (including habitat conservation plan); and
- Licenses for collecting, possessing, transporting, propagating, and outplanting.

3.4.2.2.1 Vegetation

Main Base

Wildfire

As described in 1998 PMRF Enhanced Capability Final EIS, ongoing launch activities on existing fee simple lands have the potential to ignite vegetation on adjacent leasehold and easement lands. To reduce the effect of wildfire on nearby vegetation, launch regions are sprayed with water ahead of planned launches as discussed in the 2025 PMRF Land-Based Training and Testing Final EA (Department of the Navy [DON], 2024a, 2025a). Additionally, emergency fire crews and firefighting equipment are made available to extinguish any fires. These mitigation measures were set in place from the 1998 PMRF Enhanced Capability Final EIS and are included in the 2023 PMRF INRMP. Such preventative measures would continue and reduce potential effects of wildfire risk upon vegetation within adjacent leasehold and easement lands from ongoing activities. Under Alternative 1, there would be no change to effects to vegetation from wildfire.

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Spread of Invasive Species

As described in the 2008 Hawai'i Range Complex Final EIS/OEIS, invasive plants and animals on existing fee simple lands have the potential to negatively affect ecosystems on adjacent leasehold and easement lands. Effects to ecosystems include destruction of native vegetative communities, increased runoff and

erosion effects, and predation on native avian wildlife. Ongoing actions to reduce or eliminate the introduction or spread of invasive species include a Hazard Analysis and Critical Control Point Plan and EDRR initiatives as discussed in the 2010 PMRF Intercept Test Support EA/Overseas EA (OEA). Although these measures apply mostly to existing fee simple lands, these invasive species, if not controlled, would spread to adjacent leasehold and easement lands in the ROI. Invasive plant and wildlife removal is an ongoing effort at PMRF, and invasive plant removal is often coupled with restoration efforts. Invasive species prevention programs regarding transportation and movement of equipment can be found in the 2008 Hawai'i Range Complex Final EIS/OEIS. Invasive species management plans for plants and animals are addressed in the 2023 PMRF INRMP. These conservation measures would continue and reduce potential effects of invasive species risk from ongoing activities on vegetation and wildlife within the ROI. Under Alternative 1, there would be no change to vegetation from the introduction or spread of invasive species.

3.4.2.2.2 General Wildlife

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Noise

As described in the 1998 PMRF Enhanced Capability Final EIS, noise resulting from launch activity on existing fee simple lands may affect terrestrial wildlife and marine wildlife on beaches by temporarily startling species on leasehold and easement lands outside of the northern part of Main Base. The 2011 Advanced Hypersonic Weapon Program EA and the 2021 Reinitiation of the 2008 Informal Consultation for Ongoing Military Readiness Activities at PMRF indicates that wildlife may be disturbed when sharp, loud noises such as launches occur. The EA concluded that wildlife returns to normal behavior within a short time and noise from launches is infrequent. Under the implementation of Alternative 1, there would be no change to the current effects from noise to wildlife.

Habitat Loss

As described in the 2025 PMRF Land-Based Training and Testing Final EA, routine maintenance of woody vegetation removal from ongoing activities poses a potential risk to wildlife habitat in the ROI. Similarly, the loss of wetland habitat from factors such as invasive species encroachment pose a potential risk to wildlife such as avian, reptilian, and invertebrate species. Habitat management for various wildlife, including management for invasive species encroachment, is addressed in 2023 PMRF INRMP (NAVFAC Pacific, 2023a). Ongoing habitat and invasive species management efforts reduce potential risk of habitat loss for wildlife within leasehold and easement lands from ongoing activities. Under Alternative 1, there would be no change in habitat and invasive species management efforts and thus no habitat loss effects.

Strike

As described in the 2010 PMRF Intercept Test Support EA/OEA, risk of strike from flight operations in the ROI occurs on leasehold and easement lands from ongoing Navy activities on existing fee simple lands. BASH risks are also discussed in detail in the 2023 PMRF INRMP, the Wildlife Hazard Assessment, and the 2014 and 2024 Biological Analyses. While species documented from a strike only included birds, there is a risk of strike for general wildlife as well. Vehicular strike and collision with structures and guy wires are also a potential risk. In order to reduce the potential strikes, measures such as speed limits and

hazing efforts are implemented. Hazing efforts are passive or active control measures used to discourage birds and other wildlife from visiting or utilizing a specific area by creating a less desirable environment. Under Alternative 1, there would be no change in these operations or efforts to reduce effects to wildlife from inadvertent strikes and thus no effect to strikes.

Air Quality

As described in the 2010 PMRF Intercept Test Support EA/OEA, exhaust emissions during launches on existing fee simple lands can occur on adjacent leasehold and easement lands and thereby affect terrestrial wildlife. The exhaust plume may contain concentrations of hydrogen chloride that can irritate the eyes and respiratory membrane of wildlife, such as birds, as addressed in the 2010 PMRF Intercept Test Support EA/OEA. Effects from such emissions would be dispersed and minimal. Birds, and other wildlife, are unlikely to encounter the exhaust plume, because of their flight, or movement, away from the initial launch noise. As there would be no change to operations or management strategies, effects would continue to be minimal and infrequent as the birds would likely leave the area. Under Alternative 1, there would be no change to the current conditions and thus no air quality effects to wildlife.

Conservation Management

REPI projects, such as the predator exclusion fence at Honopū Valley to protect seabird nesting habitat, and a forest and watershed protection agreement with DLNR, have a beneficial effect and are examples of measures that have been implemented to ensure the continued existence of essential habitats for wildlife and plants. Under Alternative 1, these programs would continue to be implemented. As a result, these conservation measures would continue to result in long- and short-term beneficial effects to wildlife and plant habitat in support of conservation management.

Mākaha Ridge

Electromagnetic Radiation and Exposure

As described in the 1998 PMRF Enhanced Capability Final EIS, avian wildlife on leasehold and easement lands can be affected by electromagnetic radiation and exposure originating from existing fee simple lands. The projected radar beams are relatively narrow and the probability they would occur with any frequency is low since avian wildlife would have to remain in the beam along a specific axis for a significant length of time. Due to operation and specifications of radars used at Mākaha Ridge, neither transiting nor grounded birds have any possibility of adverse effects due to the operation of these radars. Under Alternative 1, there would be no change to the current use or operations and thus no effects from electromagnetic radiation to wildlife as a result of implementation.

3.4.2.2.3 Special Status Species

Effects to special status species would be similar to those described above for general vegetation and wildlife stressors. Any unique effects to special status species are described in detail below.

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Habitat Loss

As described in the 2025 PMRF Land-Based Training and Testing Final EA, routine maintenance of woody vegetation removal from ongoing activities poses a potential risk to Hawaiian hoary bat habitat in the ROI. To minimize the loss of suitable habitat, trimming or removal of trees greater than 15 feet during Hawaiian hoary bat pupping season (June 1 through September 15) is not permitted per the 2014 PMRF Biological Opinion. Similarly, the loss of wetland habitat from factors such as invasive species encroachment pose a potential risk to ESA- and MBTA-listed species. Habitat loss, including habitat degradation, also threaten special status plants. Under Alternative 1, there would be no change to management strategies to reduce those risks, actions, and protections; therefore, no effect to special status species.

Lighting

As described in the 2025 PMRF Land-Based Training and Testing Final EA, artificial lighting on existing fee simple land, as well as easements and leaseholds, has the potential to cause fallout of ESA-listed and MBTA seabirds on adjacent leaseholds and easement properties, which can lead to death or injury of affected birds. To reduce this effect, BMPs and conservation measures, such as the Dark Skies Program, are in place as detailed in Table 2-7 and within the 2023 PMRF INRMP (NAVFAC Pacific, 2023a). Previous mitigation measures are addressed in the 2010 PMRF Intercept Test Support EA/OEA and the 2013 Final EA for Hawai'i Joint Services Solar Power Generation. These mitigation measures would continue and reduce potential effects of fallout for nocturnal seabird species that may occur within adjacent leasehold and easement lands. Under Alternative 1, there would be no change to the actions or management strategies and thus no effect to special status species from lighting.

Strike

As described in the 2010 PMRF Intercept Test Support EA/OEA, risk of strike from flight operations in the ROI occurs on leasehold and easement lands from ongoing Navy activities on existing fee simple lands. Birds that have been struck during flight operations or via vehicle include Hawaiian goose, wedge-tailed shearwater, various petrel species, and various albatross species. As part of the Navy's BASH management activities, an albatross air hazard abatement program has been carried out by the Navy since 1988. This program consists of relocating breeding and nonbreeding albatross, as well as albatross eggs from PMRF to an existing albatross breeding colony, primarily Kīlauea Point National Wildlife Refuge on the north shore of Kaua'i to discourage Laysan albatross from nesting on PMRF. In 2014, translocation ceased at Kīlauea Point National Wildlife Refuge and moved to Na 'Āina Kai Botanical Garden (NAVFAC Pacific, 2023a). Potential bird strikes could occur during takeoff and landing operations in the airspace above leasehold and easement lands from ongoing activities, though existing SOPs and aircraft training of military personnel would continue to reduce bird strike hazards. Although collisions with guy wires are prevalent at KPGO for seabirds, such as Newell's shearwater, due to the height of towers above the canopy line and guy wires supporting one tower, collisions have been reduced due to installation of bird diverters (USFWS, 2018; B. Mcfarland, PMRF, personal communication, May 15, 2025). Under Alternative 1, there would be no change to ongoing activities or management strategies and thus no effect to special status species from inadvertent strikes.

Mākaha Ridge

Electromagnetic Radiation and Exposure

Potential effects to Hawaiian hoary bats would be similar to those described above for general wildlife stressors. Conservation measures, as discussed in the 2023 PMRF INRMP, are required in specific circumstances if bats are present (NAVFAC Pacific, 2023a). These conservation measures would continue and reduce potential effects from electromagnetic radiation from ongoing activities on wildlife species that may occur within adjacent leasehold and easement lands. Under Alternative 1, there would be no change to ongoing activities or management strategies and thus no effect from electromagnetic radiation to special status species.

3.4.2.2.4 Critical Habitat

Main Base

USFWS designated critical habitat for lau‘ehu occurs on leaseholds, easements, and existing fee simple lands in the northern region of Main Base, whereas ‘ōhai critical habitat occurs on easement lands only. Threats to these areas are primarily invasive plant infestation and unauthorized off-road vehicle use. Conservation measures in the ROI, referred to in Table 2-7, include invasive species removal and native outplanting to improve the quality of the habitat.

Proposed green sea turtle critical habitat occurs on the shoreline easement in the northern region of Main Base. Threats to this area include destruction of sea turtle nests, lighting, and harassment. During exclusive use of the easement lands for military training activities, the Navy implements protections for this area from the public by limiting access and decreasing activity. The Navy also implements conservation measures in the ROI, identified in Table 2-7, to include education and outreach for marine life and beach surveys. The Navy would continue these protective management measures under Alternative 1 to protect the safety of the critical habitat resulting in significant long-term beneficial effects.

Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, and KPGO

No critical habitat exists in Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge, or KPGO. Therefore, there are no effects to critical habitat as a result of Alternative 1.

3.4.2.2.5 Effect Summary

As described above, Alternative 1 could result in the continued potential for long-term, minor, adverse effects to biological resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloli‘i Ridge, and KPGO. Potential effects to general vegetation, general wildlife, special status species, and critical habitat would continue to occur, similar to current conditions. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would continue under Alternative 1. Alternative 1 includes the ongoing implementation of PMRF INRMP and NASA’s SENSE Environmental Management Plan, implementation of REPI projects, and current mitigation measures (see Table 3.1-4). In addition, Enhanced Engagement-3 (Chapter 5, Table 5.2-1) would increase public transparency of natural resource management activities at PMRF and KPGO. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. State, federal, and military regulations, including SOPs and BMPs, would continue to be implemented, and there would be no change to biological resources. Alternative 1 would

have no effects to listed species that have not been previously analyzed. As a result, there would be no anticipated change to populations of special status species, no further restrictions of wildlife corridors, no further degradation of general habitat or critical habitat, and no increase of invasive species prevalence. **Therefore, the effects of Alternative 1 to biological resources would be adverse but would not be significant**.

3.4.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

Under Alternative 2, there are no proposed changes to the type or frequency of current activities occurring on fee simple lands. This alternative would not change any use or maintenance of existing infrastructure and would not involve foreseeable construction, renovation, or demolition of facilities. The activities and operations at these sites would continue as currently used. A summary of effects to biological resources from ongoing Navy and NASA activities on fee simple lands is included below, as well as a summary of currently implemented BMPs, etc. Although no new effects to vegetation, wildlife, and critical habitat would occur, previously identified effects would continue under this alternative. Since status of species would not alter under this alternative, federal/State protections, or lack thereof, of such species will continue. This alternative would also preserve the Navy-funded conservation management activities on the leasehold and easement lands through REPI. The 2023 PMRF INRMP and NASA's SENSE Environmental Management Plan establish conservation measures, BMPs, and mitigation measures for the long-term implementation of natural resources conservation in the ROI. Since there is no change in effects, there would be no significant effects to biological resources from this alternative.

3.4.2.3.1 Vegetation

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Navy and NASA activities on leasehold and easement lands would not change under Alternative 2. Potential effects to vegetation from ongoing activities would continue to occur as described above in Alternative 1. Alternative 2 would result in long-term, beneficial effects to biological resources due to the implementation of REPI projects and the 2023 PMRF INRMP management actions. REPI projects, such as the predator exclusion fence at Honopū Valley, to protect seabird nesting habitat, and a forest and watershed protection agreement with DLNR, are examples of measures that have been implemented to ensure the continued existence of essential habitats for wildlife and plants and have a beneficial effect. Under Alternative 1, these programs would continue to be implemented and result in long- and short-term beneficial effects to wildlife and plant habitat in support of conservation management.

3.4.2.3.2 General Wildlife

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Navy and NASA activities on leasehold and easement lands would not change under Alternative 2. Potential effects to wildlife from ongoing activities would continue to occur as described above in Alternative 1. Under Alternative 2, there would be no additional effects to wildlife.

3.4.2.3.3 Special Status Species

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Navy and NASA activities on leasehold and easement lands would not change under Alternative 2. Potential effects to special status species from ongoing activities would continue to occur as described above in Alternative 1. Under Alternative 2, there would be no additional effects to special status species.

3.4.2.3.4 Critical Habitat

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Navy and NASA activities on leasehold and easement lands would not change under Alternative 2. Potential effects to critical habitat from ongoing activities would continue to occur as described above in Alternative 1. Under Alternative 2, proposed green sea turtle critical habitat occurs on the shoreline easement in the northern region of Main Base and would not be changed. Threats to this area include destruction of sea turtle nests, lighting, and harassment. The Navy implements protections for this area from the public, limiting access and decreasing activity. The Navy also implements conservation measures in the ROI, referred to in Table 2-7, including education about marine life and surveys. The Navy would continue these protective management measures in the ROI under Alternative 2 to protect the safety of the critical habitat resulting in long-term, beneficial effects for green sea turtle critical habitat.

3.4.2.3.5 Effect Summary

As described above, Alternative 2 could result in the continued potential for long-term, minor, adverse effects to biological resources on former leasehold and easement lands at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloli'i Ridge, and KPGO. Potential effects to general vegetation, general wildlife, special status species, and critical habitat would continue to occur, similar to current conditions. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would continue under Alternative 2. Alternative 2 includes the ongoing implementation of PMRF INRMP and NASA's SENSE Environmental Management Plan, implementation of REPI projects, and current mitigation measures (see Table 3.1-4). In addition, Enhanced Engagement-3 (Chapter 5, Table 5.2-1) would increase public transparency of natural resource management activities at PMRF and KPGO. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 2. State, federal, and military regulations, including SOPs and BMPs, would continue to be implemented, and there would be no change to biological resources. Alternative 2 would have no effects to listed species that have not been previously analyzed. There would be no anticipated change to populations of special status species, no further restrictions of wildlife corridors, no further degradation of general habitat or critical habitat, and no increase of invasive species prevalence. **Therefore, the effects of Alternative 2 to biological resources would be adverse but would not be significant.**

3.4.2.4 No Action Alternative

Under the No Action Alternative, following negotiations with the State, potentially all existing infrastructure in the ROI could be removed. This alternative could alter the use and maintenance of the State lands and could involve demolition of selected facilities. Navy and NASA activities on leasehold and easement lands would no longer occur. Environmental Management and long-term resource protection by Navy and NASA on leasehold and easement lands would discontinue. Management of the land would

transfer back to the State. DLNR would have the sole responsibility, including funding, for the natural and cultural resources and public activities that are presently maintained by the Navy and NASA on the leasehold and easement lands.

3.4.2.4.1 Vegetation

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Management and protection of special status plant species would transfer back from the Navy and NASA to the DLNR. Management and protection of special status plant species would still be enforced by regulating entities such as the USFWS and DLNR; therefore, management and protection of such species would be federally required on these leasehold and easement lands. Effects to vegetation would be dependent on activities performed under new land managers.

Under the No Action Alternative, effects on vegetation from potential wildfires would be reduced by the reduction of launches on fee simple lands on Main Base. Short-term, minor, adverse effects on vegetation could result from demolition activities. Direct effects on vegetation from removal and crushing, and indirect effects from soil compaction and the potential for establishment of invasive species could occur. Crushing and soil compaction could occur when vehicles and equipment access, park, and maneuver during demolition. Additionally, ground disturbance and transport of demolition equipment could increase the potential for the establishment of invasive plant species. Adverse effects on vegetation would be minimized with the use of appropriate BMPs, such as cleaning demolition equipment prior to entering the ROI. In accordance with Executive Order (EO) 13112, *Invasive Species*, active measures would be implemented to help prevent and control dissemination of invasive plant species during ground-disturbing activities.

Once demolition is complete and the site is stabilized, invasive species management on leaseholds and easement areas from the Navy and NASA would cease. Further management would be expected to be continued by the State, such as through projects by KISC or non-profit organizations. Due to cessation of Navy and NASA involvement, invasive species management may be reduced in funding, frequency, and effort. Invasive species management efforts facilitated by the Navy and NASA would no longer protect ecosystems in the ROI. Regularly scheduled surveys and monitoring efforts of native, invasive, or special status species conducted by the Navy and NASA would no longer occur. In addition, invasive plant species removal and native plant restoration efforts conducted by the Navy and NASA throughout the ROI would be non-existent or minimized. This would result in long-term adverse effects to vegetation through the loss of management programs, efforts, and funding from the Navy and NASA. The No Action Alternative would result in long- and short-term effects to plant habitat in support of conservation management at Mākaha Ridge through the loss of management programs. Alternatively, the introduction and spread of invasive species could potentially be minimized if there is a reduction in the number of vehicles, associated with the military and NASA, traversing across leasehold and easement lands to access the various PMRF and KPGO regions. The potential reduction of vehicle traffic is expected to be minimal. The No Action Alterative would result in moderate effects on vegetation.

3.4.2.4.2 General Wildlife

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Management of wildlife species on leasehold and easement lands would transfer to the DLNR. Potential effects to wildlife would depend on how the land is used and would be subject to State regulations.

Under the No Action Alternative, demolition activities would result in short-term, minor, adverse effects to wildlife species and habitat. Adherence to BMPs would minimize unnecessary disturbances to habitat. Temporary displacement of mobile wildlife from noise, lighting, and other disturbances could occur from demolition and restoration activities. High-impact activities that require heavy equipment could cause more-mobile mammals, reptiles, and birds, including breeding migratory birds, to temporarily relocate to nearby similar habitat. This disturbance is expected to be minor and it is assumed that displaced wildlife could return soon after activities conclude. In order to avoid nest abandonment and other adverse effects, surveys may be conducted prior to the start of demolition. These effects could be short-term and BMPs would be implemented to minimize adverse effects. Individuals of smaller, less-mobile species could be inadvertently killed or injured during ground-disturbing activities or transportation of equipment and personnel. Vehicles associated with demolition activities could be used primarily on the established pathways, which would limit the potential for adverse effects on wildlife and wildlife habitat. Returning the land to a natural state has the potential to increase biodiversity by reintroducing native plant species and allowing them to flourish again. Native trees, shrubs, grasses, and evergreens would provide food, shelter, and privacy for many wildlife species. The No Action Alternative would allow nature to reestablish its natural processes and biodiversity primarily at the KPGO parcels. The No Action Alterative would result in moderate effects on wildlife.

3.4.2.4.3 Special Status Species

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Management and protection of special status species would transfer to the DLNR. Management and protection of special status species would still be enforced by regulating entities such as the USFWS and DLNR; therefore, management and protection of such species would be federally required on these lands. Potential effects to special status species would depend on how the land is used and would be subject to federal and State regulations.

Habitat loss, such as with Hawaiian hoary bats, could be reduced if regular trimming of vegetation and trees were no longer required for maintenance and safety concerns. While this could result in minor beneficial effects, changes to required maintenance activities are expected to have a minimal effect, at most, on limited potential habitat areas.

3.4.2.4.4 Critical Habitat

Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Protection of critical habitat would be enforced by regulating entities such as the USFWS and DLNR; therefore, management and protection of critical habitat would be required on the leasehold and easement lands on a federal and State level. DLNR would acquire the management of critical habitat on leasehold and easement lands. Potential effects would depend on how the land is used and would be subject to federal and State regulations. Under the No Action Alternative, the protection of the critical habitat on leasehold and easement lands would now fall solely on the State. This could result in long-term, adverse effects for the potential loss of protection programs, funding, and access control for green sea turtle critical habitat.

3.4.2.4.5 Effect Summary

As described above, the No Action Alternative could result in potential long-term, moderate, adverse effects to biological resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge, and KPGO. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would not continue and the DLNR would assume such responsibilities. The Navy and NASA would no longer conduct regularly scheduled surveys and monitoring efforts of special status species, invasive species control, or native plant restoration efforts. Additionally, the No Action Alternative would result in the loss of conservation and habitat management programs, efforts, and funding from the Navy and NASA. Due to the loss of vegetation and wildlife management programs, conservation efforts, funding by the Navy and NASA, and potential loss of REPI projects, the responsibility of the management of these important biological resources would fall solely on the State. The population of special status species could remain constant due to mandatory requirements by federal agencies. As a result of the loss of conservation management resources and funding currently provided by Navy and NASA, there could be restrictions of wildlife corridors that may reduce survival or reproduction ability or disturb or alter behavior. There also could be degradation of general habitat and an increase in invasive species prevalence. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.5 Land Use and Access

Land use describes the types of human activities at a given place and the way various activities are organized across the landscape. Some examples of these activities include agriculture, residential development, industrial production, or the maintenance of natural conditions. A proposed action's effects on land use could include changes to existing or future activities or the conversion of land from one use to another in ways that are inconsistent with the goals of current land use planning. Access is related to land use and refers to the ability for groups and individuals to have the right, freedom, or ability to enter, approach, or pass to and from public and private lands and their associated facilities for recreational, cultural, spiritual, and other needs as required by the public. This discussion of land use includes current uses and the regulations and zoning ordinances that control Land Use and Access within the ROI. Each alternative is analyzed to identify potential effects to land use and access.

3.5.1 Affected Environment

3.5.1.1 Region of Influence

The ROI for potential effects to land use and access are leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. The ROI for Land Use and Access can be seen in Figure 3.1-2.

3.5.1.2 Regulatory Setting

All leasehold and easement lands held by the Navy and NASA in the land use and access ROI are currently owned by the State of Hawaiʻi. Land use and access in the ROI are governed by statutes, ordinances, and regulations at the federal, State, and County levels.

The Navy, NASA, and DoD manage land use and access at PMRF and KPGO to comply with applicable laws and to be compatible with operational security, ATFP standards, and training programs. Land use planning at PMRF and KPGO is guided by the PMRF Installation Development Plan, Navy instructions, PMRF INRMP, PMRF ICRMP, and NASA environmental management policy (see Appendix E).

At the State level, land use is governed through State Land Use Districts (SLUDs). In 1961, the State Legislature of Hawai‘i passed the State Land Use Law (Act 187–SLH, 1961; now codified as HRS Chapter 205). The current SLUDs are Urban, Rural, Agricultural, and Conservation. Land use districts and subdistricts within the ROI are shown in Figure 3.5-1.

The ROI for land use and access includes lands in the Agricultural and Conservation Districts. Agricultural Districts are used for activities or uses that relate to cultivation of crops, farming, animal husbandry, aquaculture, and other associated uses described in HRS Chapter 205-2(d). Counties have administrative responsibility over Agricultural Districts. In the County of Kaua‘i, the Agriculture SLUD is further zoned as agriculture or open space. Additional information about State and County level regulatory settings governing land use and access can be found in Section 6.1, *Consistency with Government Plans and Policies* and Appendix E. Kaua‘i County zoning boundaries are shown in Figure 3.5-2.

Conservation Districts are used for the protection of water resources, historic areas, park lands, and other natural resources as described in HRS Chapter 205-2(e). Lawful uses within the Conservation District that were in existence prior to October 1964 or before the land was included in a Conservation District—known as “nonconforming uses”—may continue without additional authorizations, provided that certain thresholds for repairs or reconstructions are not exceeded (HAR section 13-5-2; HAR section 13-5-7).

Conservation Districts are further divided into five subzones: Protective, Limited, Resource, General, and Special as described in HAR section 13-5-10. The ROI for land use and access includes lands within the Resource and General subzones. Resource subzones shall ensure, with proper management, the sustainable use of the natural resources of those areas. General subzones shall designate open space where specific conservation uses may not be defined, but where urban use would be premature.

Additional State level land use requirements within the ROI derive from the State’s public trust responsibilities. The “public land trust” is established in Section 5(f) of the Admission Act of 1959 (Act of March 18, 1959, P.L. 86-3, 73 Stat 4), which acknowledges that a large portion of State lands consists of Crown and Government lands of the Kingdom of Hawai‘i that were taken by the Republic of Hawaii and later ceded to the U.S. Government in 1898. The Admission Act conveyed these lands, which are also referred to as the “ceded lands,” to the new State of Hawai‘i. The lands were conveyed with the caveat that the lands and revenues from them are to constitute a public trust to be used for the support of the public schools and other public educational institutions; for the betterment of the conditions of Native Hawaiians, as defined in the Hawaiian Homes Commission Act, 1920, as amended; for the development of farm and home ownership on as widespread a basis as possible for the making of public improvements; and for the provision of lands for public use. These public land trust responsibilities are reiterated in Article XII, Section 4, of the Hawai‘i Constitution. Article XII, Section 5, of the Hawai‘i Constitution establishes OHA as a semiautonomous agency and trust vehicle for the betterment of the conditions of Native Hawaiians. OHA’s nine elected trustees exercise their powers to manage and administer the proceeds from the sale or other disposition of the lands, natural resources, minerals, and income derived from ceded lands for Native Hawaiians. This includes all income and proceeds from a prorated portion of the public land trust. As discussed in Section 3.5.1.4, all State lands in the ROI are ceded lands, and therefore part of the public land trust.



Figure 3.5-1 State Land Use Districts and Subdistricts

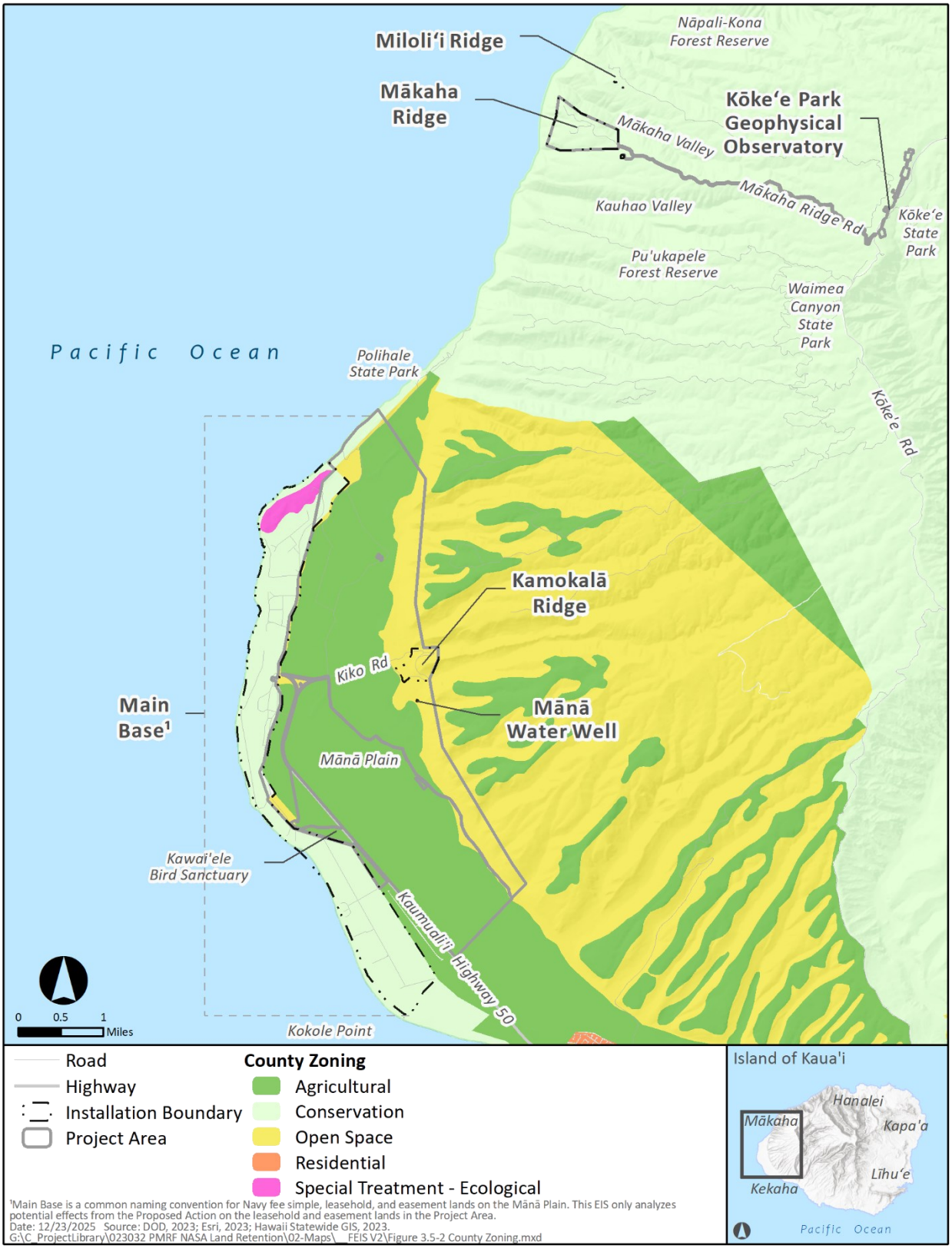


Figure 3.5-2 County of Kaua'i Zoning

3.5.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.5-1 summarizes the predictable environmental trends for Land Use and Access.

Table 3.5-1 Predictable Environmental Trends for Land Use and Access

Predictable Trend	*Influence on Resource*
Rising global temperatures (air/ocean)	• Increasing air temperature can raise land surface temperature making land non-desirable for federal and public uses. • Affected areas would require engineered cooling methods to be implemented to counter air temperature in a localized area.
Change in precipitation patterns	• Increased risk of land instability. • Increased risk of flooding and erosion affecting usability of lands.
Increased frequency and/or intensity of extreme weather events	• Higher rates of erosion and sedimentation on susceptible lands. • Affected areas would require engineered solutions to buffer effects of extreme weather events.
Rising sea levels and associated storm surge	• Loss of coastal land containing beaches used for recreational activities. • Affected areas would require designed solutions to accommodate loss of land if continued access is desired.
Ocean acidification	• Not applicable. No reasonably close causal relationship to land use or access identified.

3.5.1.4 History of Land Tenure in the ROI

Traditional and historic uses of the ROI were not only a product of the natural environmental conditions but also the social, economic, and political context that underlie changes in land tenure in Mānā. Before the arrival of Europeans, Americans, and other foreigners in the late eighteenth century, the ROI was incorporated into traditional agricultural, aquacultural, marine resource use, and settlement patterns. The land (ʻāina) was not simply considered a natural resource, but a genealogical ancestor of the Hawaiian people cared for (mālama) by the people as stewards, not owners. Afterward, subsistence farming and aquaculture were gradually replaced by commercial enterprises.

The Māhele of 1848 divided the lands of the Hawaiian Kingdom into lands belonging to the mōʻī King Kamehameha III, lands belonging to the aupuni (the Hawaiian Government), and lands belonging to the aliʻi (chiefs). Before 1848, Waimea, including the Mānā Plain, had been held by the aliʻi Victoria Kamāmalu, but she relinquished it to the mōʻī during the Māhele proceedings. The mōʻī's lands were initially reserved for himself, his heirs, and his descendants, but later became the inalienable exclusive property of the office of the mōʻī during the reign of Lot Kapuāiwa in 1865 (Beamer and Tong, 2016). These lands became known as the Crown Lands. In the years after the Māhele, King Kamehameha III and his successors leased portions of Mānā Plain to individuals and corporations for a variety of commercial uses. These uses included livestock grazing and farming rice, tobacco, coffee, fruit, and sugarcane (Gonzalez et al., 1990). In 1878, Kawaiʻele Pond was drained to increase the acreage of sugarcane land, and the land became increasingly incorporated into the commercial sugarcane plantation economy—

that is, divided into fields, and dotted with plantation workers' camps, although the ponds and marshes remained on the landscape until the 1920s.

In 1893, the government of the Hawaiian Kingdom was overthrown and the government that was formed to replace it, the Republic of Hawaii, assumed ownership and control of all Crown and Government lands throughout Hawai'i, including those that make up the ROI. When the Republic of Hawaii was annexed by joint resolution of the U.S. Congress as a territory of the U.S. in 1898, it ceded the Crown and Government lands[59] to the U.S., which took ownership in fee simple. During the territorial era, the U.S. set some of the land aside for military and other public purposes. The territorial government leased lands to commercial users. Commercial sugarcane production on leased ceded lands on the Mānā Plain intensified during the following decades, leading to the draining of the ponds and marshes in the 1920s to increase acreage that could be planted. The development of the airfield that became PMRF began at this time as well.

Through the efforts of Prince Jonah Kūhiō, the Hawaiian Homes Commission Act, 1920, was passed by the U.S. Congress to provide benefits to the Native Hawaiian people through a homesteading program sponsored by the federal and territorial governments. The Act designated approximately 200,000 acres of ceded lands as "available lands" under the jurisdiction of the Department of Hawaiian Home Lands (DHHL) to be offered for homesteading by Native Hawaiians. The ROI includes 25.685 acres at Kamokalā Ridge that were part of approximately 15,000 acres of DHHL land in Waimea. This portion of the ROI was included in the 1964 State General Lease S-3852 Tract E-3 Parcel 1 (TMK: 1-2-002-029) (see Appendix D, Figure D-4). In 2020, the parcel was transferred out of the DHHL's administration to the DLNR as part of a land exchange with the DHHL for land at Hanapēpē (Appendix C).

In 1959, Hawai'i became a state through the Admission Act. Within Section 5 of the Admission Act, the U.S. Government conveyed all ceded lands to the State of Hawai'i except for approximately 400,000 acres of land that were retained for military bases, national parks, and other federal uses. The ceded lands are held by the State as part of the public land trust. In 1993, the U.S. Congress passed a joint resolution, known as "the Apology Resolution," in which the U.S. officially apologized to the Native Hawaiian people "for the overthrow of the Kingdom of Hawai'i on January 17, 1893, with the participation of agents and citizens of the United States, and the deprivation of the rights of Native Hawaiians to self-determination" (P.L. 103-150, 1993). The resolution acknowledged the role of the U.S. in the overthrow, but stated that it was not intended to serve as a settlement of any claims against the U.S. The U.S. Supreme Court later ruled in *Hawaii v. Office of Hawaiian Affairs*, No. 07-1372 (Mar. 31, 2009), that the Apology Resolution does not affect the State's right to sell the land granted it by the U.S. when Hawai'i was admitted as a state.

A more detailed history of land use in the ROI is presented in Appendix D and additional summaries can be found in Sections 3.2.1 and 3.3.1.

[59] The term "ceded lands" is used to refer to the government lands of the Kingdom of Hawai'i and the Crown lands that were property of the Hawaiian monarch, which the Republic of Hawaii transferred or "ceded" to the United States government in the Joint Resolution of Annexation approved by President William McKinley on July 7, 1898 (30 Stat. 750). Upon statehood in 1959, the federal government returned to the State of Hawai'i all ceded lands not set aside for its own use in Section 5(f) of the Admission Act. The use of the term "ceded land" is consistent with usage by other State agencies (e.g., https://www.oha.org/about/abouthistory/).

3.5.1.5 Current State Land Use

The State currently manages certain land uses within the ROI. These uses include agriculture, hunting, fishing, and conservation. Public access is available, subject to certain restrictions, within the ROI.

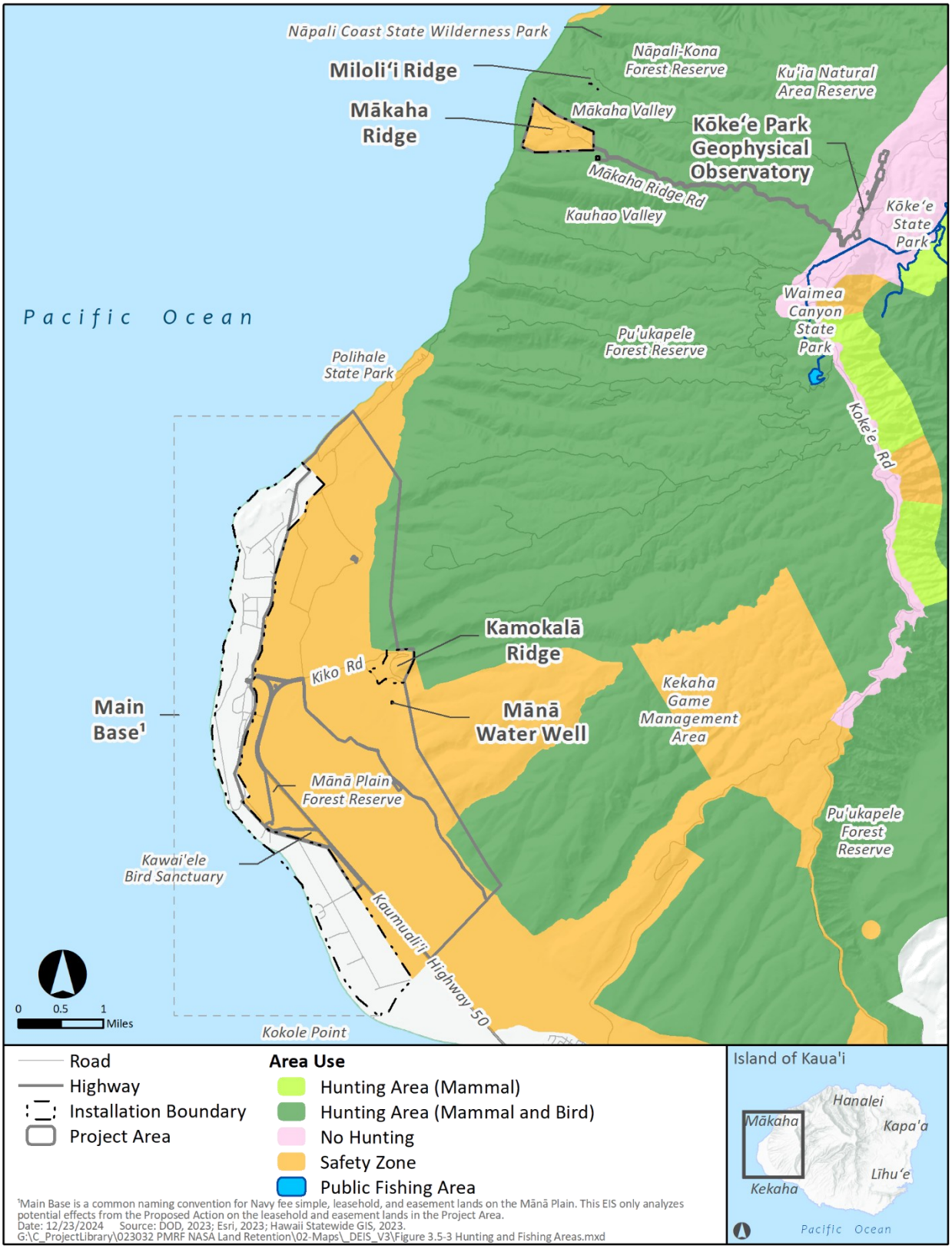
3.5.1.5.1 Agriculture

In 2003, the State of Hawai'i DLNR Land Division set aside State land on the Mānā Plain for agriculture and related purposes to be under the control of the State of Hawai'i ADC through EO 4007. In 2006, under EO 4165, ADC returned 300 acres identified in EO 4007 back to the DLNR. Additional land associated with Waimea and Kōke'e Ditches, not included in EO 4007, was transferred to ADC under EO 4287 in 2009. Although land on the Mānā Plain is controlled by DLNR Land Division, ADC supports the maintenance and licensing of the land. ADC is administratively attached to the State of Hawai'i Department of Business, Economic Development, and Tourism (DBEDT), governed by an 11-member Board of Directors. ADC's mandate is to develop an aggressive and dynamic agribusiness development program to facilitate the transition of agricultural lands and infrastructure from plantation operations into other agricultural enterprises, to carry on the marketing analysis necessary to direct the evolution of the agricultural industry, and to provide the leadership for the development, financing, improvement, and enhancement of the agricultural industry. ADC licenses land to tenants within the restrictive use easements for agricultural use to support their mandate. These ADC tenant farmers, ranchers, and agribusiness companies have a long history, and are currently conducting productive agribusiness activities within the restrictive use easements on the Mānā Plain. The KAA is an association of tenants on the Mānā Plain that supports the management of agricultural infrastructure, and development of economically viable and sustainable farms and agricultural endeavors in Kekaha. ADC and KAA have a MOA signed in 2008 that details the responsibilities for infrastructure maintenance and management on the Mānā Plain for agricultural purposes.

3.5.1.5.2 Hunting

Recreational hunting is defined in HAR Chapter 13-122 for the purpose of regulating game bird hunting, field trails, and commercial shooting preserves. Regulations of hunting game mammals are defined in HAR Chapter 13-123. Hunting in Hawai'i requires a license; this regulation applies to public and private lands. Requirements for hunting on public areas are managed by DOFAW. The DOFAW maintains public hunting areas on the six major islands. DOFAW manages over 100,000 acres of public hunting areas on Kaua'i; these hunting areas serve approximately 2,000 licensed hunters (DOFAW, 2024). These hunting areas are shown in Figure 3.5-3.

Hunting is allowed on portions of the restrictive use easements at Main Base. Access to fee simple parcels on Main Base for hunting and scouting activities is controlled under Pacific Missile Range Facility Instruction (PMRFINST) 1710.2A, *Pacific Missile Range Facility Hunting Instruction.* For safety and security, hunting on fee simple parcels on PMRF is limited to authorized personnel as described in PMRFINST 1710.2A.



¹Main Base is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.
Date: 12/23/2024 Source: DOD, 2023; Esri, 2023; Hawaii Statewide GIS, 2023.
G:\C_ProjectLibrary\023032 PMRF NASA Land Retention\02-Maps_DEIS_V3\Figure 3.5-3 Hunting and Fishing Areas.mxd

Figure 3.5-3 Hunting and Fishing Areas

3.5.1.5.3 Conservation Efforts on PMRF

On 28 September 2023, the Navy and State of Hawai'i signed a cooperative agreement for establishing conservation programs around lands managed by PMRF. The agreement is between DLNR, DOFAW, and the DoD under the Office of the Secretary of Defense REPI program. The goal of the agreement is to use the award toward various conservation and land management projects over the next 5 years. The areas under this agreement are adjacent to and in the upland forests above PMRF.

3.5.1.5.4 Public Access

Public access to State lands in the ROI are subject to conditions of the real estate agreements between the State and the Navy and NASA (Appendix D), which include restrictions on public access related to public safety and federal ATFP guidelines. Public access specifically for traditional cultural uses of land within the ROI is described and analyzed in Section 3.3, *Cultural Practices.*

3.5.1.6 Existing Conditions

3.5.1.6.1 Main Base

The leasehold lands on Main Base are used for PMRF activities that include ordnance assembly, maintenance facilities, material storage, Pass and ID office, operation and maintenance of drainage ditches and pumps to protect adjacent land from flooding, travel along roadways, accessing utilities, and compliance with federal ATFP guidelines regarding setback guidelines, encroachment drainage, and roadway access. The easements at Main Base are used for preserving agricultural purposes and as operational buffers for Navy activities. The Navy itself does not use this land for agriculture. Rather, entities lease this land from the State for that purpose. Appendix D, Table D.1-1 provides a description of current uses, sizes, and original lease conditions of leaseholds and easement areas at Main Base. One 69.562-acre leased parcel, Tract E-1 (TMK: 1-2-002-025), is located in the General subzone of the Conservation SLUD and is used for ordnance assembly, maintenance facilities, and material storage. The remainder of the leasehold and easement lands at Main Base are located in the Agricultural SLUD and are zoned a mix of Agricultural and Open Space by the County of Kaua'i. Many current uses of leasehold and easement lands at Main Base are either lawful uses established before October 1964 or conducted with authorizations received from the Office of Conservation and Coastal Lands (OCCL). For any structures constructed after 1964 or not covered by current authorizations, the Navy would coordinate with the OCCL for permitted use.

Access to DoD installations and other related facilities are controlled under DoD Manual 5200.08, *Volume 3 Physical Security Program: Access to DoD Installations*. Limited access to DoD installations ensures operational security is safeguarded. These circumstances on PMRF are related to Force Protection Condition status, scheduled range operations, and the protection of natural resources. Civilians have the opportunity to access Waiapua'a Bay, Polihale, and other designated beach areas at Main Base throughout the year by participating in the Morale, Welfare, and Recreation Guest Card Program at PMRF allows civilians to access PMRF through the main gate for various recreational activities. The Navy works with DLNR Division of State Parks to ensure the safety of the public during planned missile launches on fee simple lands at Main Base. The public is notified of restrictions of entry to the southern portion of Polihale Beach park prior to launches. Scheduled restrictions to Polihale are intermittent to ensure limited restrictions to the public to access Polihale for recreational and cultural parties. During the public scoping session, a reoccurring complaint was voiced that the public would like

access to more beach areas for recreational activities like (fishing, surfing, kayaking). Further comments regarding increased access to Main Base and beach areas within can be found in Appendix I.

3.5.1.6.2 Kamokalā Ridge

Leaseholds at Kamokalā Ridge are utilized for storage of explosives needed for operational uses by the Navy as described in Section 3.9, *Public Health and Safety*. Easements at Kamokalā Ridge are used for agricultural purposes, preclude encroachment on PMRF activities by development, and are utilized for roadways access and utilities. A description of current uses and sizes of leaseholds and easement areas and original lease conditions at Kamokalā Ridge are found in Appendix D, Table D.1-2. Current leasehold and easement lands at Kamokalā Ridge are located in the Agricultural SLUD and are zoned a mix of Agricultural and Open Space by the County of Kaua‘i. All current uses of leasehold and easement lands at Kamokalā Ridge are lawful uses established before October 1964.

3.5.1.6.3 Mānā Water Well

The leasehold area at Mānā Water Well is used to extract water as the primary source of drinking water for PMRF. A description of current uses and sizes of leasehold and original lease conditions at Mānā Water Well are found in Appendix D, Table D.1-3. The current leasehold at Mānā Water Well is located in the Agricultural SLUD and is zoned Agricultural by the County of Kaua‘i. All current uses of leasehold lands at Mānā Water Well are lawful uses established before October 1964.

3.5.1.6.4 Mākaha Ridge

The leaseholds at Mākaha Ridge house facilities that support PMRF activities. Easements at Mākaha Ridge are used for roadway access. A description of current uses and sizes of leasehold areas and original lease conditions at Mākaha Ridge are found in Appendix D, Table D.1-5 The current leaseholds at Mākaha Ridge are located within the Resource subzone of the Conservation SLUD. Many current uses of leasehold and easement lands at Mākaha Ridge are either lawful uses established before October 1964 or conducted with authorizations received from the OCCL. For any structures constructed after 1964 or not part of current authorizations, the Navy would coordinate with the OCCL for permitted use, as necessary (see Appendix C of the Final EIS).

3.5.1.6.5 Miloli‘i Ridge

The leaseholds at Miloli‘i Ridge houses reflectors used with radar telemetry stations to support PMRF activities. A description of current uses and sizes of leaseholds and original lease conditions at Miloli‘i Ridge are found in Appendix D, Table D.1-4. The current leasehold at Miloli‘i Ridge is located within the Resource subzone of the Conservation SLUD. All current uses of leasehold and easement lands at Miloli‘i Ridge are lawful uses established before October 1964.

3.5.1.6.6 KPGO

The leasehold at KPGO house facilities used by the NASA Space Geodesy Network that enable and support modern positioning, navigation, and satellite observations, as well as scientific and societal applications. NASA’s use of KPGO for data collection is an identified use (B-1) per HAR section 13-5-22. A description of current uses and sizes of the leasehold and original lease conditions at KPGO are found in Appendix D, Table D.3-2. KPGO is located within the Resource subzone of the Conservation SLUD. Many

current uses of leasehold and easement lands at KPGO are either lawful uses established before October 1964 or conducted with authorizations received from the OCCL. For any structures constructed after 1964 or not part of current authorizations, the agency proposing the action (NASA and/or Navy) would coordinate with the OCCL, as necessary (see Appendix C of the Final EIS).

3.5.1.6.6.1 Navy Use of KPGO

NASA issued the Navy a Use Permit in 2016 for portions of KPGO to conduct radar, telemetry, and communication services in support of PMRF activities at the NASA facilities. The Use Permit grants the Navy exclusive use of facilities located at Sites A through D which support surveillance and tracking at the specified facilities. The Use Permit between the Navy and NASA defines the requirements for the Navy's use of the specific facilities and locations at KPGO and establishes roles and responsibilities for both the Navy and NASA at KPGO. In addition to the Use Permit, a MOA was also executed between the Navy, PMRF, and NASA. The MOA contains the terms and conditions that the Navy must adhere to while using KPGO.

3.5.2 Environmental Consequences

3.5.2.1 Approach to Analysis

Analysis of the Proposed Action considers potential effects to land use and access related to (1) consistency with public trust obligations, (2) consistency with State regulations and County zoning requirements, and (3) restrictions to access on State lands. The analysis considers the continuation of current Navy and NASA uses of leaseholds and easement in the ROI. The criteria considered to assess whether the Proposed Action would result in potential significant effects to land use and access is the extent or degree to which the Proposed Action:

- Interferes with the State's ability to fulfill its public trust obligations.
- Is consistent with current federal, State, and local land use and access laws or regulations applicable to the ROI, including management plans prescribed by the Navy and NASA.
- Creates new long-term restrictions on the public's right of access to State lands.

3.5.2.2 Alternative 1: Succeeding Current Real Estate Agreements

Under Alternative 1, there are no proposed changes to the type or frequency of current land use or access activities occurring on State leasehold and easement lands. This alternative would not change any use or maintenance of existing infrastructure. An analysis of the three factors laid out in Section 3.5.2.1 and a summary of effects to land use and access from ongoing Navy and NASA activities on leasehold and easement lands is included below.

3.5.2.2.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Consistency with Public Trust Obligations: Under Alternative 1, the U.S. Government would enter into new leases and easements with the State for fair market value of the leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. Under this alternative, the State would maintain title to the lands and the lands would remain in the public land trust. The State of Hawaiʻi would also derive lease-generated income from these lands to the benefit of the trust. As required by HRS section 10-13.5, 20 percent of lease revenue generated by current real

estate agreements would be paid to OHA. The rest of the revenue would go to the Special Land Development Fund as established in HRS section 171-19. By increasing the amount of funds paid to OHA, Alternative 1 would help increase OHA's ability to provide for the betterment of the conditions of Native Hawaiians. By the same token, the increased amount of funds paid to the Special Land Development Fund would increase the State's ability to fulfill the public land trust obligations. Therefore, Alternative 1 would result in long-term beneficial effects related to consistency with public trust obligations.

Consistency with Regulatory Requirements: Under Alternative 1, leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO would continue to operate under similar conditions as are currently present. Land use by the Navy and NASA would continue to be consistent with applicable law. Therefore, Alternative 1 would not result in adverse effects related to consistency with regulatory requirements.

Restrictions to Public Access: Under Alternative 1, access to and across leaseholds and easement parcels would not change. Therefore, Alternative 1 would not result in adverse effects to public access.

3.5.2.2.2 Effect Summary

As described above, Alternative 1 would result in beneficial effects to land use from fair market value lease payments to the State. These payments could be used in support of the State's public trust obligations. Land use by the Navy and NASA would continue to be consistent with State laws and regulations and County zoning ordinances. Alternative 1 would not result in any change or pose new restrictions on access to State lands within the ROI. In addition, implementation of BMPs (see Table 3.1-4) would continue to occur, and there would be no change to current activities on the leasehold and easement lands under Alternative 1. In addition, Enhanced Engagement-6 (Chapter 5, Table 5.2-1) would help to minimize encroachment or accidental trespass. In summary, land use would be consistent with public trust requirements, consistent with regulatory requirements, and would not create changes or new restrictions to land use or access to State land. **Therefore, the effects of Alternative 1 to land use and access would be adverse but would not be significant.**

3.5.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

Under Alternative 2, the Navy and NASA would pursue a fee simple acquisition at fair market value of the current leaseholds and obtain use of the same easements. There are no proposed changes to the type or frequency of current land use or access activities occurring on the proposed new fee simple and easement lands. This alternative would not change any use or maintenance of existing infrastructure. An analysis of the three factors laid out in Section 3.5.2.1 and a summary of effects to land use and access from a fee simple acquisition of current leaseholds and ongoing Navy and NASA activities in the Project Area is included below.

3.5.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Consistency with Public Trust Obligations: Under Alternative 2, the U.S. Government would acquire the current leasehold parcels in fee simple and would obtain new easements over similar lands to the current easements. Twenty percent of any proceeds from the fair market value purchase of the leasehold parcels, as required by State law, would be paid to OHA, and the rest to the Special Land

Development Fund. These payments would result in a short-term beneficial effect. These proceeds would result in a short-term increase in funds paid to OHA, which would aid OHA's ability to provide for the betterment of the conditions of Native Hawaiians. Furthermore, the increased amount of funds paid to the Special Land Development Fund would aid the State's ability to otherwise fulfill its public trust obligations. Land use would continue to comport with now-existing public trust obligations, and the fair market value received in exchange for the land could be used by the State to otherwise carry out its public trust obligations. The actual value and compensation for fee simple acquisition would be determined through negotiations with the State, which must consider how best to fulfill its public trust obligations. Thus, although any lands acquired by the U.S. Government in fee simple would no longer be part of the State's public land trust, any income received by the State from the purchase could be used in support of the State's public trust obligations. Fair market value lease payments for new easements would also be paid to the State, resulting in a long-term beneficial effect. There is widespread belief, however, that these lands should not be alienated because the State has an obligation to hold these lands in trust for the public benefit, and that there are unrelinquished claims to the ceded lands in the Project Area that have not been reconciled since the 1892 overthrow of the Hawaiian Kingdom. Therefore, Alternative 2 would result in short-term beneficial effects from the purchase of the leasehold parcels and long-term benefits from the lease payments for the new easements, but there would also be a long-term, moderate adverse effect from the removal of the proposed new fee simple lands from the public land trust.

Consistency with Regulatory Standards: Under Alternative 2, the Navy and NASA would pursue the acquisition of current leasehold lands and would negotiate use of required easements with the State. Uses of the newly acquired land would continue to be similar to current conditions. Land under federal jurisdiction is governed by federal law and is not subject to State and County land use laws and regulations. Therefore, the SLUD regulations and County of Kaua'i zoning restrictions would not apply. However, use of the easement lands would continue to be consistent with currently applicable law, and any acquired land would continue to be used in the same manner consistent with now-existing regulatory standards. Therefore, Alternative 2 would not result in adverse effects related to consistency with regulatory standards.

New Restrictions to Public Access: Under Alternative 2, access to and across the leasehold and easement lands would not change. Therefore, Alternative 2 would not result in adverse effects to public access.

3.5.2.3.2 Effect Summary

As described above, Alternative 2 would result in short-term beneficial effects to land use through the purchase of current leasehold lands and long-term beneficial effects from lease payments for the new easements, but also moderate adverse effects from the removal of these lands from the public land trust. Any income received by the State from the purchase could be used in support of the State's public trust obligations. There would be no adverse effects related to consistency with regulatory standards because use of the former leaseholds would continue to be consistent with federal laws and regulations, and use of the easements would continue to be consistent with federal and State laws and regulations and County zoning ordinances. Alternative 2 would not result in any new restrictions on access to State lands within the Project Area. In addition, implementation of BMPs (see Table 3.1-4) would continue to

occur, and there would be no change to current use of the leasehold and easement lands under Alternative 2. In addition, Enhanced Engagement-6 (Chapter 5, Table 5.2-1) would help to minimize encroachment or accidental trespass. In summary, land use would continue to be consistent with the State's exercise of its public trust obligations, consistent with regulatory standards, and would not create changes or new restrictions to land use or access to State land. **Therefore, the effects of Alternative 2 to land use and access would be adverse but would not be significant.**

3.5.2.4 No Action Alternative

The No Action Alternative would revert the management, development, and maintenance of Navy- and NASA-managed lands to State of Hawai'i. The Navy and NASA would no longer maintain use of the leasehold and easement lands currently used to support Navy and NASA operations. Under the terms of the lease agreements, negotiations may result in a final decision to remove all infrastructure on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO. An analysis of the three factors laid out in Section 3.5.2.1 and a summary of effects to land use and access from the return of the lands in the Project Area to the State is included below.

3.5.2.4.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Consistency with Public Trust Obligations: Under the No Action Alternative, the State would continue to be responsible for fulfilling its public trust obligations as outlined in Section 5(f) of the Admission Act. There would be no effect to the public trust obligation.

Consistency with Regulatory Requirements: Under the No Action Alternative, ongoing PMRF and KPGO activities on the leasehold and easement lands by the Navy and its tenants, and NASA, respectively, would cease. The No Action Alternative would cause the Navy and NASA to discontinue the BMPs and environmental management strategies currently being implemented on leasehold and easement lands. The land would be managed by the DLNR, and the burden of implementing conservation practices would become the sole responsibility of the DLNR. The Navy and NASA acknowledge that for some Native Hawaiians, putting ceded lands back into the State's possession could be perceived as a long-term beneficial effect.

New Restrictions on Public Access: Under the No Action Alternative, there could be short-term restrictions to access during any demolition and removal of Navy or NASA facilities. There could be minor beneficial effects on access due to the cessation of PMRF activities that require temporary closure of the current restrictive use easements.

3.5.2.4.2 Effect Summary

As described above, the No Action Alternative could result in potential short-term, minor, adverse effects and long-term beneficial effects to land use and access. The No Action Alternative would have no effect to the public trust obligation because the State would continue to be responsible for fulfilling that requirement. The State lands would be subject to State land use regulations and County of Kaua'i zoning restrictions. Short-term restrictions to access during demolition and removal of facilities could occur, but in the long term, restricted access to former PMRF and KPGO leasehold lands, and the occasional access restrictions due to PMRF activities would cease. Additionally, the return of the lands within the ROI lands to State control from the U.S. Government could be perceived as a beneficial effect by some

Native Hawaiians. As a result, no new restrictions on access to State lands would result from the No Action Alternative. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.6 Socioeconomics

Socioeconomics comprise the basic attributes and resources associated with the human environment, particularly demographics and economic activity. Effects on these fundamental components can also influence other community attributes such as the availability and affordability of housing, the provision of public services (e.g., emergency services, education, health services), and the overall quality of life in a community.

3.6.1 Affected Environment

3.6.1.1 Region of Influence

The Proposed Action would potentially impact the local socioeconomic conditions, such as population and employment levels. Therefore, the ROI for the socioeconomics analysis is Kauaʻi County because this is where the workers at PMRF and KPGO are likely to reside and spend their wages (see Figure 3.1-2). In addition, the County also includes the business and service providers that are likely to meet local requirements for operations and maintenance spending at KPGO and PMRF facilities. The population totals for the State and ROI are included in Table 3.6-1.

Table 3.6-1 Population in the Region of Influence

Location	*Population 2010*	*Population 2020*	*Percentage Population Change 2010–2020 (percent)*	*Population (2017–2022)*	*Population Forecast Estimated (2030)*
State of Hawaiʻi	1,360,300	1,453,490	6.9	1,450,590	1,501,150
Kauaʻi County	67,090	73,250	9.2	73,510	78,360
Waimea Census Defined Place	1,855	2,057	9.8	1,950	N/A

Key: N/A = Not Applicable.
Source: U.S. Census Bureau (USCB), 2021, 2024; DBEDT, 2024.

Housing characteristics in the ROI are shown in Table 3.6-2. Compared to the State of Hawaiʻi, Kauaʻi County has a higher vacancy rate (24 percent) and corresponding lower monthly rents and home values, 10 and 3 percent lower, respectively.

Table 3.6-2 Housing in the Region of Influence (2017–2022 5-year average)

Location	*Housing Units*	*Occupied*	*Vacancy Rate (percent)*	*Median Owner*	*Median Monthly Rental Cost*
State of Hawai'i	560,873	483,906	14	$764,800	$1,868
Kaua'i County	30,326	22,980	24	$742,900	$1,686

Economic indicators of employment and income for the ROI, Kaua'i County, Hawai'i, and the U.S. are included in Table 3.6-3 (USCB, 2022).

Table 3.6-3 Economic Indicators

Location	*Civilian Labor Force 2018–2022*	*Unemployment Rate 2018–2022 (percent)*	*Number of Households 2018–2022*	*Median Household Income 2018–2022*
United States	167,857,207	5.3	125,136,353	$75,149
State of Hawai'i	710,984	5.1	483,906	$94,810
Kaua'i County	37,198	4.1	22,978	$88,869

The U.S. Census Bureau American Community Survey 5-year Estimates reported the median household income for Kaua'i County from 2018–2022 at $88,869 compared to $94,810 for the State overall (USCB, 2022) (Table 3.6-3). The unemployment rate from 2018–2022 was 4.1 percent in Kaua'i County, slightly lower than 5.1 percent for the State of Hawai'i (USCB, 2022) (Table 3.6-3). In 2023, the Bureau of Labor Statistics reported a 2.6 percent unemployment rate in the County of Kaua'i, about the same as the State of Hawai'i (3.0 percent) (Federal Reserve Economic Data Bank, 2024).

Agriculture used to be a dominant economic driver of West Kaua'i (region adjacent to PMRF and KPGO), but this has been replaced by major employers which include the West Kaua'i Medical Center, PMRF, and the State Department of Education (County of Kaua'i, 2020). Workers frequently commute to other areas for jobs since there are more workers than jobs in the region. Lack of economic opportunities in West Kaua'i has contributed to outmigration of young adults (County of Kaua'i, 2020). According to forecasters for the State of Hawai'i, job growth for the State between 2022 and 2030 will be about 5 percent, with Kaua'i adding almost 3,000 jobs (6.5 percent). Job growth is predicted to be fastest in the professional and health services sectors (DBEDT, 2024). The range of services covered by defense contracts has supported many industries, including facility support, construction, and research and development (DBEDT, 2023). PMRF contributes approximately $150 million annually in salaries, contract goods, and services to the local economy (Navy Region Hawaii Public Affairs, 2024).

3.6.1.2 Regulatory Setting

NEPA (42 U.S.C. section 4321 et seq.), HEPA (HRS Chapter 343), and HAR Chapter 11-200.1 require an approach for planning and decision-making that involves evaluation of actions that may have an effect on the human environment, including on social and economic resources. When it is determined that social, economic, physical, or natural environmental effects are interrelated with a proposed action, analysis under NEPA and HEPA must discuss and give appropriate consideration to those effects on the human environment.

See Appendix E for list of regulations and guidance for socioeconomic effect analysis.

3.6.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.6-4 summarizes the predictable environmental trends for socioeconomics.

Table 3.6-4 Predictable Environmental Trends for Socioeconomics

Predictable Trend	Influence on Resource
Rising global temperatures (air/ocean)	• Increased risk to existing infrastructure related to high heat events could disrupt local socioeconomic activity and increase health care and utility costs. Could divert government revenues from critical resources to emergency response such as cooling centers.
Change in precipitation patterns	• Increased risk to existing infrastructure related to floods could disrupt local socioeconomic activity and increase insurance and other costs related to operating and maintaining infrastructure such as roads and structures.
Increased frequency and/or intensity of extreme weather events	• Increased frequency of extreme weather events could disrupt local socioeconomic activity and increase cost of living to cover costs to recover and rebuild after wildfire and flood.
Rising sea levels and associated storm surge	• Increased risk to existing coastal infrastructure related to sea level rise could disrupt local socioeconomic activity and increase construction and operating costs for coastal infrastructure.
Ocean acidification	• Increased food costs related to loss of food fish/shellfish habitat and loss of subsistence food gathering opportunities.

3.6.1.4 Existing Conditions

3.6.1.4.1 Employment and Income Characteristics

The three largest industries in Kaua‘i County, in terms of percentage of the workforce employed within the industry, are accommodation and food services (19.2 percent), retail trade (15.7 percent), and health care and social assistance (14.5 percent). Employment at PMRF and KPGO are in the professional, scientific, and technical services industry which accounts for 4.13 percent of the Kaua‘i County workforce (Federal Reserve Economic Data Bank, 2024).

The unemployment rate within Kaua‘i County decreased from approximately 5 percent in 2013 to 2.5 percent in 2023 (Federal Reserve Economic Data Bank, 2024). In 2022, Kaua‘i County had a median household income of $88,869, compared to the statewide median household income of $94,810.

3.6.1.4.2 Public Services, Public Use, and Public Outreach

The ROI falls within the Waimea-Kekaha Planning District. Specific land uses include agriculture, natural preserve, and parks and recreation (see Section 3.5, *Land Use and Access*). Other public attractions near PMRF are listed in Section 3.13, *Visual Resources*.

Lease revenue generated by current real estate agreements between the U.S. Government and State of Hawai‘i for PMRF and KPGO lands goes to the Special Land and Development Fund administered by the Land Division of DLNR as established in HRS section 171-19; 20 percent of revenue from ceded lands would go to the OHA per act 273. NASA works with the community to welcome educational site visits at KPGO for local schools and organizations (NASA, 2024a). The Navy and NASA work with SENSE and local agencies to support the management of State lands and associated environmental and conservation programs.

3.6.1.4.3 Recreation and Tourism

Recreation and tourism account for a third of Kaua‘i County’s total economic output, and generate a quarter of the jobs in the County (County of Kaua‘i, 2018). Over 1.1 million visitors are drawn to Kaua‘i’s beautiful natural environments and array of cultural and outdoor activities (County of Kaua‘i, 2018). These activities include tourism development that supports recreational activities, (e.g., hotels, resorts, restaurants, marinas, tackle shops, dive shops, and tour companies). These facilities support a variety of activities and experiences such as fishing, scuba diving/snorkeling, scenic tours, hiking, and surfing. Projections estimate that Average Daily Visitor Count would be more than 32,700 by 2030, a growth rate of 4.0 percent per year (County of Kaua‘i, 2018).

The growth of tourism on Kaua‘i can also result in negative social and environmental impacts. The 2015 Kaua‘i Tourism Strategic Plan reported that when Average Daily Visitor Count exceeds 25,000, there is a notable decline in both visitor experience and residential quality of life (Kaua‘i Tourism Strategic Plan, 2018). Kaua‘i visitor destination areas are concentrated on the North Shore, East Kaua‘i, and South Kaua‘i.

KPGO is located within Kōke‘e State Park and is adjacent to Waimea Canyon State Park. The Kōke‘e State Park is open to the public year-round, and public use activities include hiking, camping, hunting, sightseeing, off-roading, and wildlife viewing (DLNR, 2024b). The Waimea Canyon State Park is open to the public daily, and public use activities include fishing, hiking, and sightseeing (DLNR, 2024c). Additionally, a portion of the Navy easement lands used for facilitating launches on Main Base is located in Polihale State Park (see Figure 3.5-3). The Polihale State Park is also open on a daily basis, and public use activities include beachgoing, fishing, swimming, camping, and sightseeing (DLNR, 2024d).

3.6.1.4.4 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge

PMRF is the foundation of technology-based business on Kaua‘i. As the largest high-tech and third largest overall employer on Kaua‘i, PMRF employs about 900 people, including defense personnel and civilian contractors (DBEDT, 2023). PMRF contributes approximately $150 million annually in salaries, contract goods, and services to the local economy (Navy Region Hawaii Public Affairs, 2024).

In addition to economic contributions, PMRF is involved with the local community, including participating in and supporting events in the ROI such as the Waimea Town Celebration, the Veterans Day parade, Armed Forces Day parade, Toys for Tots, United Way, Boy Scouts of America, Girl Scouts of American, Navy League, recycling programs, and the Federal Junior Fellowship Program (County of Kaua‘i, 2020). PMRF air operations, crash fire rescue team, security, base support, emergency medical team, and marine departments all provide services to the communities around PMRF (County of Kaua‘i, 2020).

3.6.1.4.5 KPGO

As of 2022, the staff at KPGO Site E consists of seven full-time local employees who are employed by Peraton Corporation under the SENSE contract to NASA for the operation and maintenance of the observatory (Coughlin, 2022).

3.6.2 Environmental Consequences

3.6.2.1 Approach to Analysis

The socioeconomic analysis evaluates local economic and related effects on resources such as population, employment, income, and public services in the ROI. This includes revenue associated with succeeding and fee simple acquisition of current real estate agreements.

The criteria considered to assess whether an alternative would result in potential significant impacts on socioeconomics include the extent or degree to which an alternative would result in the following:

- Substantial change(s) in the local (Western Kaua‘i County) and regional (i.e., Kaua‘i County) population or demographic distribution.
- Substantial change(s) in local or regional economic indicators such as employment, spending, or earning patterns.

3.6.2.2 Alternative 1: Succeeding Current Real Estate Agreements

Under Alternative 1, lease revenue for PMRF and KPGO would continue to go to the Special Land and Development Fund administered by the Land Division of DLNR under the new real estate agreements which would be based on fair market value of the property.

3.6.2.2.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge

The value associated with payments resulting from succeeding real estate agreements and how they are distributed would be determined by the State. This determination would occur following negotiations between the U.S. Government and DLNR. As there are no details available on the size of the payments, it is not possible to provide a quantified assessment of direct and indirect socioeconomic effects. Since payments to DLNR would be at fair market value and would likely be substantially higher than under existing conditions, there would be an economic benefit to the State and the ROI depending on how the payments are distributed by the State. Furthermore, continued operation of PMRF would continue to benefit the ROI economically by providing employment (approximately 900 personnel) and expenditures of approximately $150 million annually in salaries, contract goods, and services.

The population and demographics on Kaua‘i would likely remain the same under Alternative 1 due to the continued mission described in Section 2.3.1. The distribution of military and civilian personnel and their dependents would continue to be more heavily concentrated in West Kaua‘i due to the proximity to PMRF. Under Alternative 1, current job levels and spending at PMRF would be unchanged and therefore would not affect job opportunities and associated spending in West Kaua‘i or islandwide. At this time, there are not sufficient data to quantify potential future changes in population and associated tax revenues under Alternative 1. The increased lease payments would likely increase revenue for the Special Land and Development Fund administered by the Land Division of the DLNR and OHA. In

addition, PMRF's community program support would continue since there would be no change in personnel or spending.

3.6.2.2.2 KPGO

Under Alternative 1, continued long-term, minor beneficial effects on socioeconomics would result from local jobs and income from employment at KPGO. Additionally, lease revenue would continue to financially benefit the Special Land and Development Fund administered by the Land Division of the DLNR and OHA. The Navy and NASA would continue to be responsible and support the management and conservation of State lands. KPGO would continue to support NASA's SGP and other projects.

3.6.2.2.3 Effect Summary

As described above, Alternative 1 would have moderate, long-term, beneficial effects to socioeconomics. Since lease payments to DLNR would be at fair market value, they would be higher than under current conditions and benefit the State and the ROI economically depending on how the payments are distributed. Furthermore, continued operation of PMRF would continue to benefit the ROI economically by providing employment (approximately 900 personnel) and expenditures of approximately $150 million annually in salaries, contract goods, and services. Continued long-term, moderate, beneficial effects on socioeconomics would result from local jobs and income from employment at KPGO. Under Alternative 1, current job levels and spending at PMRF would be unchanged and therefore would not affect job opportunities and associated spending in West Kaua'i or islandwide. Under Alternative 1, there would be a major increase in value of lease payments to DLNR as compared to current conditions which could be considered beneficial. Additionally, there would be no change to public services, public use, or to areas within the Project Area used for recreational and tourism activities. Finally, the development and continuation of PMRF Kaua'i would establish regular communication channels to strengthen relationships with the Native Hawaiian community and other interested stakeholders as described in Enhanced Engagement-4 (Chapter 5, Table 5.2-1). **Therefore, the effects of Alternative 1 to socioeconomics would not be adverse or significant.**

3.6.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

Under Alternative 2, revenue from the fee simple acquisition and leases would go to the Special Land and Development Fund administered by the Land Division of DLNR and OHA. Depending on the terms of the fee simple acquisition, this revenue could be realized over the short term. Revenue from the restrictive use easements would also go to the Special Land and Development Fund administered by the Land Division of DLNR. This revenue would be realized over the term of the real estate agreement for the easements.

3.6.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO

Under Alternative 2, Navy and NASA activities would be the same as those implemented for Alternative 1. The socioeconomic effects for Alternative 2 would be dependent on the size of payments associated with acquisition of fee simple and easement interests and payments that would be distributed by the State. As there are no details available on the size of the payments, it is not possible to precisely determine the significance of the socioeconomic effects. The amount would likely be higher than under existing conditions and, therefore, would benefit the State and the ROI depending on how

the payments are distributed. Furthermore, continued operation of PMRF and KPGO would benefit the ROI economically by continuing employment, contract spending, and community program support.

3.6.2.3.2 Effect Summary

As described above, Alternative 2 would result in continued long-term, beneficial effects to socioeconomics that would likely be significant. The socioeconomic effects for Alternative 2 would be dependent on the terms of the real estate agreement. As there are no details available on the size of the payments, it is not possible to precisely determine the significance of the socioeconomic effects. However, the amount would be greater than under existing conditions and, therefore, would benefit the State and the ROI. Furthermore, continued operation of PMRF and KPGO would benefit the ROI economically by continuing employment, contract spending, and community program support. Under Alternative 2, current job levels and spending at PMRF and KPGO would be unchanged and therefore would not affect job opportunities and associated spending in West Kaua‘i or islandwide. As a result, there would be a substantial increase in the value of real estate agreements and lease payments to DLNR as compared to current conditions which could be considered beneficial. Additionally, there would be no change to public services or use or to areas within the Project Area used for recreational and tourism activities. Finally, the development and continuation of PMRF Kaua‘i would establish regular communication channels to strengthen relationships with the Native Hawaiian community and other interested stakeholders as described in Enhanced Engagement-4 (Chapter 5, Table 5.2-1). **Therefore, the effects of Alternative 2 to socioeconomics would not be adverse or significant.**

3.6.2.4 No Action Alternative

Under the No Action Alternative, the State would not grant the Navy and NASA any new real estate agreements for the State lands on Kaua‘i after expiration of the existing leases and easements. Pursuant to the terms of the current real estate agreements, at the expiration of the lease and easements, the State of Hawai‘i, Navy, and NASA would collaborate on the extent to which existing infrastructure on the State lands could be removed or remain in place, any remediation required before the State reacquired control of the property, and what additional time the Navy and NASA may need to accomplish these actions following lease and easement expiration.

3.6.2.4.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloli‘i Ridge

Under the No Action Alternative, all existing infrastructure could be removed or remain in place. The socioeconomics effects analysis is based on the assumptions that without real estate agreements with the State, the Navy would reduce operations at PMRF, which in turn would result in a substantial but unquantified reduction in the personnel and expenditures from the current PMRF mission. In the absence of knowing precisely how much the PMRF mission would change and how the State lands would be used after the State takes control of the lands, the analysis presents a qualified assessment of likely socioeconomic effects.

The socioeconomic effects of the No Action Alternative would be related to reduction in operation of PMRF associated with loss of land use and facilities in areas where current real estate agreements would cease. The population and demographics on Kaua‘i would potentially change due to the reduced mission described in Section 2.3.3. The magnitude of the change would be more prominent in West Kaua‘i because a larger portion of military and civilian personnel and their dependents are represented on that part of the island. The possible loss of jobs at PMRF under the No Action Alternative could affect the

unemployment rate in Kaua‘i. The reduction of PMRF expenditures would likely result in direct and indirect decreases in job opportunities and associated spending in West Kaua‘i and, to a lesser extent, islandwide. At this time, there are not sufficient data or information available to quantify potential future changes in population and associated tax revenues under the No Action Alternative. Any reduction in personnel and associated expenditures would likely decrease revenues to local and State agencies on Kaua‘i. In addition, these reductions would diminish the benefits of PMRF's community program support. As PMRF is the third largest employer in the ROI, providing jobs and income to local residents, the No Action Alternative would adversely affect economic growth and job opportunities in the ROI. The No Action Alternative may likely result in adverse socioeconomic effects, and likely exacerbate negative socioeconomic trends such as the out-migration of young workers off-island.

3.6.2.4.2 KPGO

Long-term, minor, adverse effects on the local community would be expected as those working at KPGO would no longer be employed in the area leading to a reduced working population and reduction in spending in the local economy. Long-term, minor adverse effects on the professional, scientific, and technical services industry in Kaua‘i County would be expected as the loss of jobs at KPGO would also result in a decrease in employment within that sector.

The loss of data from KPGO would affect the ability to accurately measure daily changes in the Earth's rotation as well as affecting the ability to accurately include Kaua‘i in the ITRF. Long-term, adverse effects on global positioning and navigation systems would be expected due to the loss of the most accurate measurements of daily changes in the Earth's rotation. Long-term, adverse effects on health and safety at a local, State, and national level would be expected as systems monitoring sea level change, earthquakes, volcano activity, flooding patterns, and glacier dynamics rely on an accurate Terrestrial Reference Frame. Long-term, minor, adverse effects on the State and national economy would be expected as NASA and the scientific community would lose its northern Pacific VLBI and DORIS stations, and two GNSS stations.

Long-term, minor, adverse effects on the State economy would be expected as DLNR would assume sole responsibility, including funding, for the conservation and management and public activities that are presently maintained by the Navy and NASA on the State lands.

3.6.2.4.3 Effect Summary

As described above, the significance of the adverse socioeconomic effects for the No Action Alternative would depend on the number and timing of jobs eliminated at PMRF and KPGO as well as the size of spending reductions associated with these operational changes. All jobs at KPGO would be lost under this alternative. As many of the employees at PMRF are contractors, they might be able to find employment at other locations on Kaua‘i. As a result, the potential reductions to Navy and NASA operations under the No Action Alternative would result in the loss of jobs at KPGO as well as other jobs associated with the potential loss of activities associated with leaseholds and easement areas. Additionally, the disruption of PMRF-supported access to sites within the ROI used for public services or use or to areas within the Project Area used for recreational and tourism activities may be lost and/or limited for a period of time until the State decides to grant access to these areas. The activities that could be eliminated at PMRF and the associated number of jobs that could be lost are not known at this time; however, the potential reduction in spending and employment could result in a significant loss to the local community. **Under the No Action Alternative, details of future Navy, NASA, and State actions**

related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.

3.7 Water Resources

Water resources within the ROI include groundwater, surface water, floodplains, and wetlands. Table 3.7-1 defines and describes common water resource terms.

Table 3.7-1 Definition and Description of Water Resources

Water Resource	*Definition/Description*
Groundwater	Groundwater is water that flows or seeps downward and saturates soil or rock, supplying springs and wells. Groundwater is used for water consumption, agricultural irrigation, and industrial applications. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition. Sole source aquifer designation provides limited protection of groundwater resources that serve as drinking water supplies.
Surface water (including stormwater)	Surface water resources generally include wetlands, lakes, ponds, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Stormwater is rainwater that runs off land and moves away from the area where it originally falls. In urban areas, it is best defined as rain that runs off surfaces where water cannot penetrate such as roofs, driveways, and roads. It is carried away by a series of pipes known as the stormwater drainage network to natural or artificial water bodies. Urban areas have many impermeable and other surfaces where water cannot penetrate, which generates more runoff and leads to higher stormwater volumes and discharges. Stormwater runoff picks up pollutants like trash, chemicals, oils, and dirt/sediment that can harm rivers, streams, lakes, and coastal waters. To protect these resources, communities, construction companies, industries, and others use stormwater control BMPs to filter out pollutants and/or prevent pollution by controlling it at its source.
Floodplains	Floodplains are areas of low-level ground present along 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 descending overland flow reaches the main water body. Floodplain boundaries are most often defined in terms of frequency of inundation, that is, the 100-and 500-year flood. The Federal Emergency Management Agency produces floodplain delineation maps and provides a basis for comparing the locale of the Proposed Action to the floodplains.

Water Resource	*Definition/Description*
Wetlands	Wetlands are jointly defined by EPA and USACE 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 and are considered special aquatic sites per 40 CFR section 230.3." Special aquatic sites are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region.

Key: CFR = Code of Federal Regulations; EPA = United States Environmental Protection Agency; USACE = United States Army Corps of Engineers.

3.7.1 Affected Environment

3.7.1.1 Region of Influence

The ROI for water resources includes leasehold and easement lands held by the Navy at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and NASA at KPGO.

3.7.1.2 Regulatory Setting

Water resources are regulated mainly by DLNR, Hawaiʻi Department of Health (DOH)-Clean Water Branch, the U.S. Environmental Protection Agency (EPA), and the DoD. Water resources are managed primarily in accordance with the Clean Water Act (CWA), CZMA, State of Hawaiʻi water resource management permits, and PMRF and KPGO installation plans. A list of all applicable federal, State, and local policies used to manage water resources within the ROI can be found in Appendix E. A list of SOPs relevant to water resource management at PMRF and KPGO can be found in Table 3.7-2.

Table 3.7-2 List of Best Management Practices and Standard Operating Procedures for Water Management

Protection Focus	*Management Practices*
Groundwater Quality	• All products that could seep into groundwater would be used in accordance with manufacturer's instructions • Qualified accident response team dispatched after unintentional release • Adherence to the PMRF Spill Prevention, Control, and Countermeasure Plan • Adherence to PMRF Spill Response Plan • Regular maintenance of vehicles • Secondary containment for fuel and oil storage tanks • Conduct risk assessments every 2 years on all fuel storage tanks at PMRF and KPGO via a third-party environmental engineering team • Comprehensive soil testing during decommissioning of all underground fuel tanks at PMRF and KPGO • All underground fuel tanks equipped with advanced leak detection systems • Conversion of all cesspools at KPGO to septic tanks
Drinking Water Safety (Mānā Water Well Source)	• Chlorination and fluoridation of drinking water • DOH inspections • Annual water quality testing • Annual Consumer Confidence Reports at PMRF (per EPA)

Protection Focus	*Management Practices*
	• Regular inspection of valves, pumps, and tanks • Monthly coliform testing (per DOH) • Proactive water quality sampling at five locations within potable water systems at PMRF
PFAS Minimization (Mānā Water Well Source)	• Completed phase out of PFAS-containing firefighting foams (per EPA) and replaced with PFAS-free foams • Proactive water quality sampling at all owned and operated water systems on PMRF • Testing for PFAS every 2 years
Surface Water Conservation	• Timer on Kawaiʻele Pump Station pump (only triggered by water level) • Use of irrigation ponds to catch stormwater runoff • NPDES permit requirements (water discharge amount limits) • Use of automated systems to control water pressure (as applicable) • Use of water catchment systems at Mākaha Ridge for stormwater retention
Surface Water Quality	• Use of irrigation ditches for sedimentation opportunity before discharge • NPDES permit requirements (water quality standards/controls) • Subsurface intake pipes at Kawaiʻele Pump Station and Nohili Pump Station (to prevent intake of floating debris/oil) when in use • Quarterly water quality testing for contaminants, oils, and pesticides since 2020 • Commercial sand filter integration in irrigation system • Secondary containment for fuel and oil storage tanks • Adherence to PMRF Spill Prevention, Control, and Countermeasure Plan • Adherence to NASA's SENSE Environmental Management Plan • Adherence to PMRF Spill Response Plan • Regular maintenance of vehicles
Flood Prevention	• Use of Kawaiʻele Pump Station during storm events • Use of irrigation ponds on easement areas adjacent to PMRF as stormwater overflow

Key: DOH = Hawaiʻi Department of Health; EPA = United States Environmental Protection Agency; KPGO = Kōkeʻe Park Geophysical Observatory; NASA = National Aeronautics and Space Administration; NPDES=National Pollutant and Discharge Elimination System; PFAS= Per- and polyfluoroalkyl substances; PMRF= Pacific Missile Range Facility; SENSE= Space Exploration Network Services and Evolution.

3.7.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.7-3 summarizes the predictable environmental trends for water resources.

Table 3.7-3 Predictable Environmental Trends for Water Resources

Predictable Trend	*Influence on Resource*
Rising global temperatures (air/ocean)	• Rising global temperatures would increase the need for water and could contribute to a depletion of groundwater • Groundwater located near the ocean might be more impacted by sea level rise. The rise in sea level could cause changes in groundwater chemistry.
Change in precipitation patterns	• Predicted drying within the ROI would create hotter conditions and increase evaporation, leading to

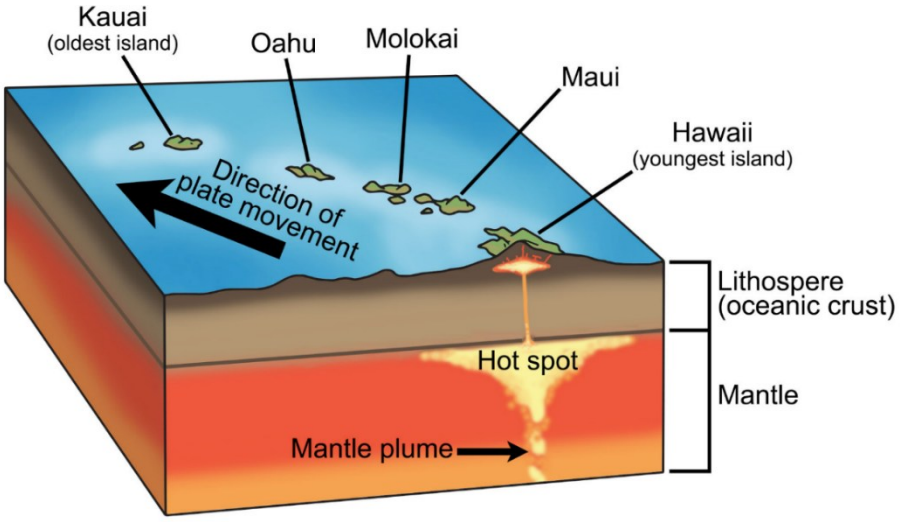
Predictable Trend	*Influence on Resource*
	decreased levels of groundwater recharge from surface waters.
Increased frequency and/or intensity of extreme weather events	• More frequent storm events would increase stormwater runoff, especially in the upland areas, and increase rates of erosion. • More intense storms would also cause more frequent flooding of the Mānā Plain and a greater need for flood reduction strategies.
Rising sea levels and associated storm surge	• Primary implications of rising global temperatures on the ROI are expected to be an increase in precipitation and rising sea levels. A predicted 3.2-foot (1.0-meter) rise in sea level would create a situation of chronic flooding and periods of inundation.
Ocean acidification	• Not applicable. No reasonably close causal relationship to water resources identified.

Key: ROI = Region of Influence.

3.7.1.4 Existing Conditions

3.7.1.4.1 Groundwater

All Hawaiian Islands were formed by the northwesterly tectonic movement of the Pacific plate over the Hawai'i plume, which is a hotspot for volcanic activity. This hotspot rests deep below the Earth's crust, punching basaltic lavas through weak points in the ocean floor. As the Pacific plate slowly migrates in a northwest direction, the hotspot begins forming a new island as time progresses, ultimately creating the Hawaiian Archipelago as shown in Figure 3.7-1 (Granshaw et al., 2014).



Source: Paleontological Research Institution, 2021.

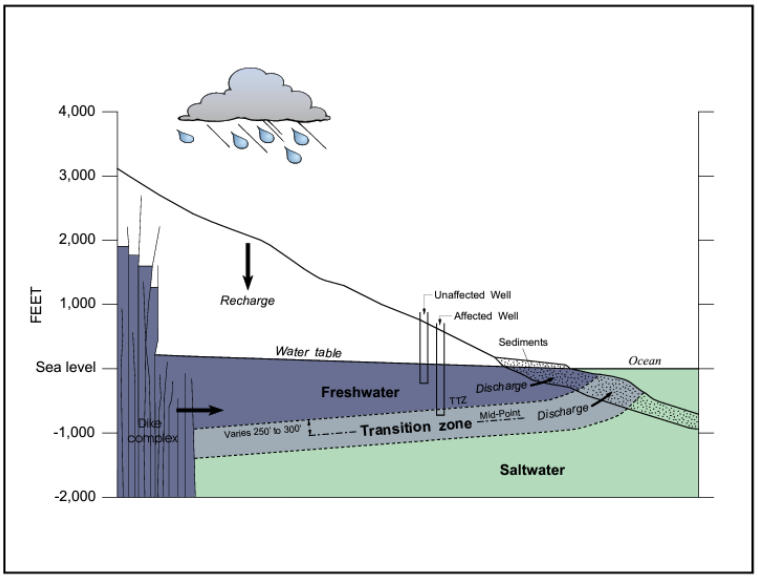
Figure 3.7-1 Pacific Plate Movement and Formation of Hawaiian Islands

The soils beneath the ROI were formed from a residuum of parent material, consisting primarily of igneous rocks and possibly including volcanic ash ejected into the rocks from historic volcanic events.

This parent material has led to soils that are well drained with moderately rapid permeability (USDA and Natural Resources Conservation Service, 2000). These soils are characterized by silty, clay, and loamy textures, which are responsible for the ways in which water permeates and interacts with the soils and environments surrounding and underlying the ROI.

The ROI lies in the northwestern territory of the island of Kaua'i, Hawai'i, resting atop the coastal ridgeline of Kaunuohua Ridge. The terrain is characterized by historic basaltic lava flows, which navigated upward from the Earth's mantle through fissures or craters within the crust and created islands where fresh groundwater underlies the salty groundwater contributed by the ocean (Fetter and Kreamer, 2022).

Groundwater is one of Hawai'i's most important natural resources. It is used for drinking water, irrigation, domestic, commercial, and industrial needs. Freshly introduced groundwater "floats" like a lens atop the denser salt water, and is contained within basaltic rock, which is magma that has cooled and hardened over time (DLNR, 2013). Groundwater provides about 99 percent of Hawaii's domestic water and about 50 percent of all freshwater used in the State of Hawai'i. The amount of recharge available to enter the aquifers is the volume of rainfall, fog drip, and irrigation water that is not lost to runoff or evapotranspiration or stored in the soil. Rainfall is spatially variable because of the islands' topography and the persistent northeasterly trade winds. In dry areas, annual rainfall is less than 10 inches; in wet areas like Mount Wai'ale'ale, annual rainfall is greater than 400 inches. In general, southwestern, leeward sides of the islands are driest. Recharge water is typically about 10 to 50 percent of the total annual rainfall, fog drip, and irrigation water. Runoff is directly related to factors including rainfall, topography, soil type, and land use, and is typically 10 to 40 percent of total annual rainfall. Runoff can be higher in areas where rainfall is high, slopes are steep, and land surfaces are impermeable. Fog drip, which is cloud vapor that is intercepted by vegetation and subsequently drips to the ground, commonly occurs between altitudes of 2,000 and 6,000 feet. This process, known as evapotranspiration, is the loss of water to the atmosphere by the combination of transpiration of plants and direct evaporation from land and water surfaces and can exceed 50 percent of rainfall. Water stored in the soil is available for plants or can eventually flow downward to recharge the aquifer (Oki et al., 1999). Groundwater recharge conditions through rainfall in the ROI are shown in Figure 3.7-2. A list of SOPs and BMPs conducted by the Navy to protect groundwater and drinking water quality is provided in Table 3.7-2.



Source: DLNR, 2024e.

Figure 3.7-2 Groundwater Recharge Diagram

3.7.1.4.1.1 Main Base

Leasehold and easement lands at Main Base are located on the Mānā Plain. The Mānā Plain is in the rain shadow of Mount Waiʻaleʻale and receives under 20 inches of precipitation annually as shown in Figure 3.7-3. The majority of groundwater recharge occurs with storm rainfall, irrigation percolation, and seepage from the caprock sediments, especially where the sediment layer is thin near the inland margin of the Plain. The Kekaha groundwater aquifer in the area of the Mānā Plain contains a lower aquifer in the basalt at depth and an upper aquifer in the sedimentary caprock (Nance, 1994).

Groundwater in the area comes from three hydraulically connected aquifers, the Kekaha, Nā Pali, and Waimea Aquifers shown in Figure 3.7-3. The groundwater increases in salinity as it moves closer to the coast due to the geologic composition of the aquifer systems, resulting in groundwater used for potable uses being drawn primarily from an inland well location 1.5 miles from the coast at Mānā Water Well from the Kekaha Aquifer System. The Kekaha Aquifer is a basal, unconfined freshwater dike aquifer (NAVFAC Pacific, 2023a). This type of aquifer is below the land surface and is directly recharged by precipitation and surface water(s).

A natural drainage network in the ROI conveys water from mauka (mountains) to makai (ocean). Water in the Mānā Plain generally flows from higher elevations in the mountain areas, including Mākaha and Miloliʻi Ridge, downgradient through a combination of natural and manmade features toward the Pacific Ocean. In the 1850s, an extensive canal network was excavated across the Mānā Plain to dewater marshes to use the area for sugar cane production. Today, these canals, together with a system of pumps, siphons, and connections, distribute water primarily for agricultural use throughout the Mānā Plain. The agricultural lands of the Mānā Plain are managed by the State of Hawaiʻi ADC; however, the KAA, Navy, Hawaiʻi DLNR, the County of Kauaʻi, and ADC work collaboratively to manage and maintain the network of ditches, canals, drainages, and reservoirs that convey and store water across the plain (Hart Crowser, 2020).



[1]Main Base is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.
Date: 1/7/2025 Source: DOD, 2023; Esri, 2023; Hawaii Statewide GIS, 2023.
G:\C_ProjectLibrary\023032 PMRF NASA Land Retention\02-Maps_DEIS_V3\Figure 3.8-3 Annual Rainfall and Aquifers.mxd

Figure 3.7-3 Annual Rainfall, Flood Hazard Areas, and Aquifers within the Region of Influence

The highest point of groundwater, or water table, in the Mānā Plain intersects with the series of canals and drainage ditches, filling them with groundwater (rising from below the ditch base) and surface water (entering from rainfall). In this way, the groundwater levels can be determined through the water level within the ditches. Two pump stations, the Nohili Pump Station (currently inactive) and the Kawaiʻele Pump Station, are located on leasehold land and are used to pump water out of the canal and ditch system. By regulating water levels through pumping and other management measures (see Section 3.7, *Floodplains, Main Base*), groundwater levels are controlled, and the canals and ditches are prevented from overflowing. Consequently, the acreage of productive agricultural land in the Mānā Plain is maximized.

Because water within the ditch and canal system is typically a mixture of groundwater and surface water, the role of the Kawaiʻele Pump Station in managing surface water levels is also discussed below (Hart Crowser, 2020).

3.7.1.4.1.2 Mānā Water Well

Groundwater used at PMRF comes from the Mānā Water Well as shown in Figure 3.7-3. This 90-foot-deep, hand-dug well, is located southeast of Kamokalā Ridge and is the main source of potable water for fee simple land. Per a 1960 paper published by the State of Hawaiʻi Division of Hydrography, the Mānā Well was dug by the Kekaha Sugar Company in 1938 (Macdonald et al., 1960). The small shed structure on the parcel was built in 2007 when the Navy acquired the leasehold land. The Mānā Water Well is owned by DLNR and maintained by the Navy, and all operations and maintenance tasks are performed by PMRF personnel.

Potable groundwater within the ROI comes from the shallow, caprock Kekaha Aquifer pumped through the Mānā Water Well. The current average pumping rate at Mānā Water Well is approximately 1,400 gallons per minute (gpm) (DON, 2024b). Water that is pumped from the Mānā Water Well undergoes disinfection before it is distributed throughout the base. Daily water quality monitoring is performed on water from the Mānā Water Well at five established test stations throughout the water distribution system to test for sudden or gradual changes in water parameters. Monthly samples are taken for testing and laboratory analysis by DOH for total coliform contamination. As required, the samples are taken to a certified DOH or EPA laboratory to be tested for specifically defined contamination parameters.

In 2023, the Navy conducted drinking water testing to ensure that PMRF drinking water source met all EPA and State standards. Over 70 regulated contaminants that have the potential to be in drinking water were tested, and in all cases, the levels measured were well within requirements for safe drinking water (DON, 2024c). Per- and polyfluoroalkyl substances (PFAS) were also tested and were all below the reporting limit (DON, 2024c). The Navy repeated drinking water testing in 2024 and 2025 (except PFAS testing, as compliance monitoring is not required until 2027 per the EPA) and similar to 2023 results, all levels measured were within both EPA and State requirements for safe drinking water (DON, 2025b, 2026). As part of the Navy water quality policy, sampling for perchlorate was initiated at PMRF in 2006. The most recent EPA guidance recommends that it not exceed 15 parts per billion in drinking water (EPA, 2014). This level has also been adopted in the Navy Perchlorate Sampling and Management Policy. In accordance with the policy, sampling has been conducted at the two drinking water supply locations. Perchlorate concentrations at both sites were less than the initial screening level of 4.0 parts per billion.

Based on guidance PMRF received from Navy Region Hawai‘i, since the two consecutive samples were less than 4 parts per billion, no further analysis was required. Further discussion on Mānā Water Well distribution system including average use, pump capacity, maintenance programs, water disinfection procedures, and drinking water quality can be found in Section 3.8, *Utilities*.

A sanitary survey of Mānā Water Well was conducted in July 2019 by DOH (DON, 2024c, 2025b). The DOH inspector recommended that the floor opening to the bottom of the shaft be temporarily sealed off to prevent debris from falling into the water and contaminating the drinking water supply as an interim solution until a permanent, DOH-approved solution could be identified. PMRF proposed installation of a permanent seal near the top portion of the well shaft, and DOH reviewed and accepted the proposal. The well system is fully operational, and compliance testing shows that the Navy’s water meets regulatory standards. The design and construction have been completed and are currently in the process of being reviewed by DOH for official close out. As required, the Navy will continue to report updates to Mānā Water Well until this issue is resolved. The Navy also has plans to replace the water lines that run from the Mānā Water Well to PMRF (as discussed in Section 4.1.5*, Past, Present, and Reasonably Foreseeable Future Actions*). There is no expected interruption of water delivery to PMRF from the Mānā Water Well during construction.

3.7.1.4.1.3 Kamokalā Ridge

Leasehold lands at Kamokalā Ridge are located within the Kekaha Aquifer System shown in Figure 3.7-3. A fire hydrant, with water supplied by the Mānā Water Well, is located in the magazine area and is available for use in the unlikely event of an unintentional explosion or fire. Mean annual rainfall at Kamokalā Ridge is 25 inches as shown in Figure 3.7-3.

3.7.1.4.1.4 Mākaha and Miloli‘i Ridges

Mākaha and Miloli‘i Ridges are located on the western portion of Kaua‘i Island within the Waimea Watershed. The Navy holds easements along the road and at the terminus of the ridge for access to the Mākaha Ridge Tracking Station. At the termination of the access road along Miloli‘i Ridge, a small leasehold area is used by the Navy for radar and telemetry operations. There are no active wells at these ridge sites. Mean annual rainfall at Mākaha and Miloli‘i Ridges is 30 inches (NAVFAC Pacific, 2023a).

3.7.1.4.1.5 KPGO

Non-potable water is supplied to KPGO by DLNR from two offsite shallow groundwater wells; there are no active wells on site. Water is delivered to the operational facilities through a pump-assisted gravity system. The water is used primarily for septic and fire suppression. There is no fire hydrant on site. Commercial potable water is purchased in 5-gallon containers. Mean annual rainfall at KPGO ranges from 50 to 60 inches (NAVFAC Pacific, 2023a). KPGO sits roughly 3,600 feet above sea level. The site’s subsurface consists primarily of volcanic rock and weathered material, and the combination of steep slopes and high elevation limits groundwater accessibility for use, though groundwater still remains deep beneath the ground surface and receives recharge through soils and bedrock seepage. Dendritic drainage patterns follow the major valleys.

Historically, individual cesspools have been used for sewage disposal at nearly all KPGO station sites. A total of seven cesspools are present across the four KPGO sites—four at Site A, one at Site B, one at Site

C, and one at Site D. These cesspools are constructed of precast concrete rings with perforations that allow effluent to seep into the surrounding soil and filter through a graded stone layer before reaching the subsurface. Because the system lacks separate drain fields, wastewater percolates directly into the ground. This once-common practice is now recognized as environmentally outdated due to the potential for nutrient and contaminant migration to groundwater and coastal waters. Therefore, NASA plans to coordinate the closure of existing cesspools and the installation of new, permitted septic systems within the next few years, in accordance with Hawai‘i Act 125 and applicable federal and State environmental regulations.

3.7.1.4.2 Surface Water

3.7.1.4.2.1 Main Base

In the ROI, surface water sources come from both natural and engineered features. Rainfall directly on the Mānā Plain and stormwater runoff from the surrounding uplands mix with groundwater in the engineered ditch and canal system. The currently inactive Nohili Pump Station, and Kawai‘ele Pump Station, located on the north and south end of the Main Base leaseholds, respectively, have historically been used to pump water out of the ditch system, up and over the elevated coastal dunes, to the Pacific Ocean. Water that has drained, primarily through the series of canals, from the southern portion of the Plain converges at the Kawai‘ele Pump Station (Figure 3.7-4), where water is pumped to the Kawai‘ele Outlet at Waiapua‘a Bay (Figure 3.7-4). The Nohili Pump Station has also been used during heavy rain events to pump water from drainage canals on the northern portion of Mānā Plain to the Nohili Outlet for discharge to the Pacific Ocean (Figure 3.7-4); however, it is not currently in service. Both pump stations are located on leased premises, and the canals are owned by DLNR (Hart Crowser, 2020). Both Nohili and Kawai‘ele outlets are located on Navy fee simple land.

ADC also manages reservoirs below the Mānā cliffs at the eastern edge of the Mānā Plain to capture surface water runoff from the upland areas of the Waimea and Kekaha Watersheds (see Figure 3.7-4). These reservoirs, and the series of interconnected canals, move the water across the Mānā Plain for drainage. The system provides a continuous gravity-fed irrigation system to agricultural lands within the ROI and conveys stormwater runoff during large storm events (Hart Crowser, 2020).

3.7.1.4.2.2 Mānā Water Well

There are no surface water features at the Mānā Water Well parcel.

3.7.1.4.2.3 Kamokalā Ridge

There is no surface water use at Kamokalā Ridge.

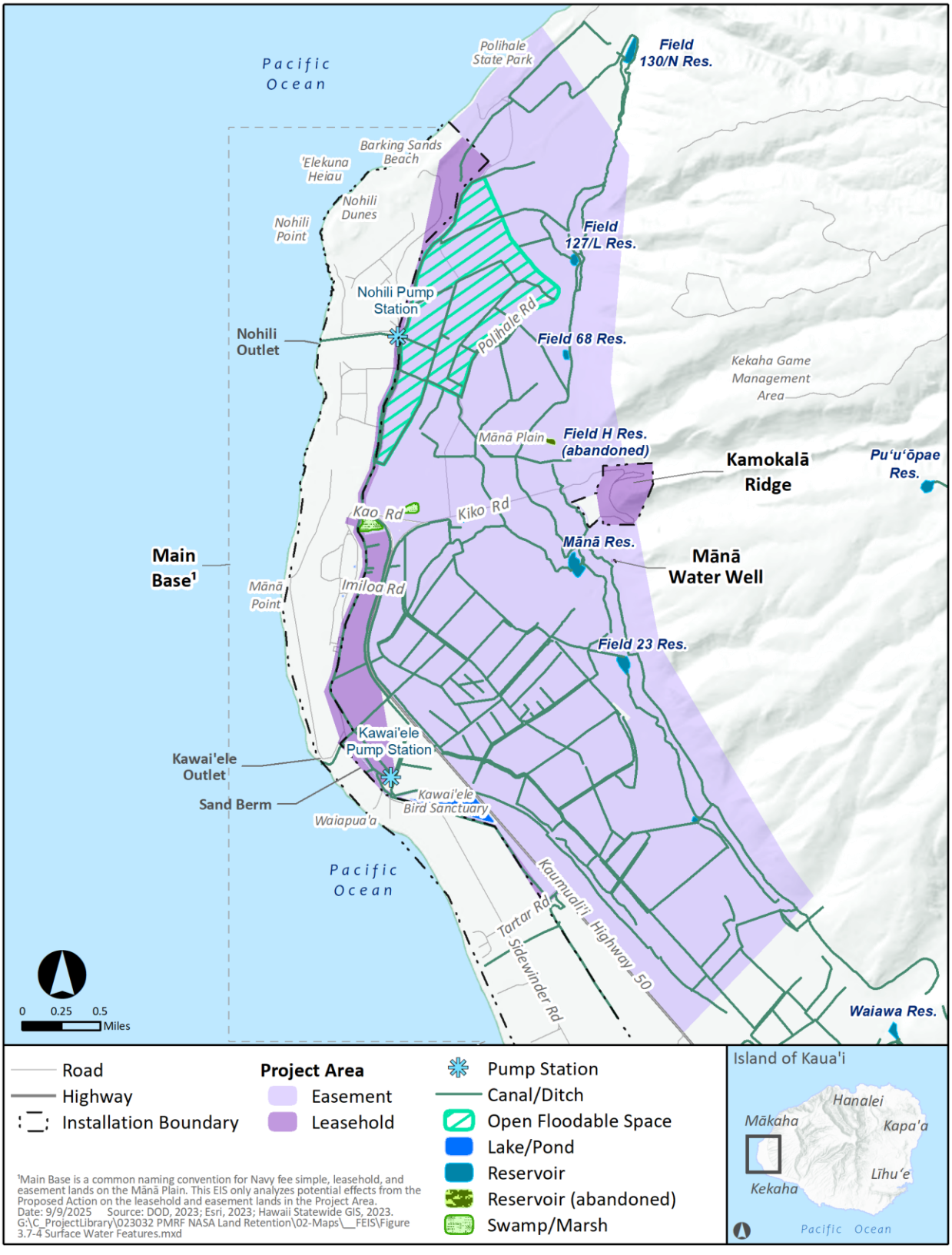


Figure 3.7-4 Surface Water Features

3.7.1.4.2.4 Mākaha and Miloli‘i Ridges

Surface water at Mākaha Ridge is limited to non-potable water use and surface drainage. Stormwater is collected in water catchment basins situated atop several structures at the site and is used for irrigation, wildfire management, and other non-potable uses. The primary non-potable water system, with water received from the Kōke‘e State Park system, is used for irrigation and septic use. The Mākaha Ridge wastewater system is discussed in more detail in Section 3.8, *Utilities.* There are no perennial water features, only intermittent ephemeral streams and surface drainages at Mākaha Ridge. There is no surface water use at Miloli‘i Ridge. Due to the rocky, stony, steep sloped makeup of the terrain on Mākaha and Miloli‘i Ridges, runoff from storms is rapid and erosion prevalent. Areas around Mākaha and Miloli‘i Ridges facilities have been identified as highly eroded; this erosion is exacerbated by the presence of feral ungulates that graze on soil stabilizing vegetation (NAVFAC Pacific, 2023a).

The Navy utilizes numerous BMPs on the parcel to help offset erosion at the site. These include the installation of an ungulate exclusion fence around the facilities which will exclude all classes of ungulates, as well as the periodic control of invasive ungulates within the fenced area. This, combined with the restoration of 6 acres of upland habitat of bare land and outplanting of native species (completed February 2026) allows for sapling growth, revegetation, soil stabilization, and decreased levels of erosion. Grass is also maintained along the perimeter of several impervious structures on the parcel (such as cement slabs) which helps absorb water, stabilize the soil, and prevent rapid runoff. A retaining wall has also been installed. As noted above, the Navy is installing water catchment basins atop structures on the leasehold lands at Mākaha Ridge to capture stormwater for irrigation and other non-potable uses. These catchment basins also help reroute flow from impervious surfaces to a central catchment location which also helps decrease erosion at the site. Combined implementation of these BMPs decreases erosion, reduces sedimentation, and increases water quality in the streams and nearshore environment immediately downslope of the facility. Additionally, the Navy would continue to consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, as defined in DoD Unified Facilities Criteria 1-200-02, *High Performance and Sustainable Building Requirements*.

Navy vehicles traversing to and from the parcels only drive on paved, well-maintained roads, and do not contribute to erosion in the area.

3.7.1.4.2.5 KPGO

Stormwater runoff on KPGO is prevalent in the surrounding area due to highly eroded steep sloped terrain on the ridgeline, and drainage leads to numerous streams located throughout the mountains.

A list of BMPs conducted by the Navy and NASA to protect surface water quality and conservation is provided in Table 3.7-2.

3.7.1.4.2.6 Surface Water Quality

Surface water quality throughout the Mānā Plain is monitored by ADC. ADC has conducted various forms of water quality monitoring at the pump stations and throughout the Plain for over two decades. Since 2020, ADC has implemented quarterly water quality monitoring at various locations throughout the Mānā Plain with a particular focus on the agricultural drainage ditches and upland inputs. As part of this monitoring, *Enterococcus* bacteria, turbidity, and total suspended solids (TSS) were identified as key

parameters that regularly did not meet DOH water quality standards (ADC, 2024). All ADC Mānā Plain water quality monitoring data since September 2020 is publicly available on the ADC website (https://dbedt.hawaii.gov/adc/manaplain/).

Surface water quality in the ditches and canal system is largely dictated by influences within the watershed. This includes the presence of ungulates and high levels of erosion that contribute to the amount of sediment and bacteria in the water. The TSS and bacteria levels are highly elevated during storm events as the system generally discharges significant volumes of flow during storm events. Stormwater runoff on the easements of Main Base does not substantially contribute to changes in surface water quality due to the management actions, dry climate, level topography, and high permeability of the soils. Rather, water quality is affected by the significant volume of stormwater and sediment that flows from upland areas to the drainage sites onto leasehold and easement lands at Main Base. The pollutant loading process is intensified by steep and sparsely vegetated slopes and nutrient pollution from feral ungulates, and stream channels observed upland of the fields show algal blooms, which suggests upland nutrient introduction.

Under normal conditions, the water discharged to the drainage canals is composed of agricultural drainage water, irrigation return flow, rainfall, and groundwater seepage. Adjacent to Main Base, the Sunrise Capital, Inc. Shrimp Farm, located on the western portion of the Mānā Plain on the mauka side of the highway outside of the leasehold and fee simple areas, contributes to the canal network discharge from a series of aquaculture ponds. Discharge from the shrimp farm to the canals is regulated and monitored under National Pollutant Discharge Elimination System (NPDES) permit HI0021654 (issued to Sunrise Capital, Inc.).

Based on the Mānā Plain water quality results, contributions to pollution (e.g., TSS and *Enterococcus*) are lower at the outfalls located on Navy fee simple land compared to the ocean drainage outfall sights that drain from upland and/or at sites located outside of the PMRF boundary (https://dbedt.hawaii.gov/adc/manaplain/).

In an effort to reduce the amount and improve the quality of stormwater runoff discharged from agricultural drainage ditches into the nearshore environment at PMRF, the Navy and KAA are partnering in an initiative supported by the DoD's REPI to create an open floodable space on easement parcels in the Mānā Plain. KAA has proposed to manage a 200-acre open floodable space located on easement parcels adjacent to fee simple land (as discussed in Section 4.1.5, *Past, Present, and Reasonably Foreseeable Future Actions*). This space would also provide additional suitable habitats for native plants and animals.

An NPDES permit (HI0021952) was proposed by DOH to cover discharge points from the Mānā Plain drainage system that discharge to the Pacific Ocean (Waters of the U.S.); the final permit was issued on August 22, 2025 and became effective on October 1, 2025. Permittees are listed as ADC and County of Kaua'i. The NPDES permit requires ADC and County of Kaua'i to design, implement, operate, and maintain appropriate treatment/controls to ensure that discharge does not violate the CWA and HAR Chapters 11-54 and 11-55. The permit also requires ADC and County of Kaua'i to initiate other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations. The permit identifies seven outfall sites; three of the seven are located on Navy fee simple land. Outfall Number 001 is only active during flood events through the natural breach of sand berms

located at the terminus of the outfall (see Figure 3.7-4). Outfall Number 002 flows into the Kawaiʻele outlet, as shown in Figure 3.7-4. Outfall Number 003 is the Nohili Outlet, located on fee simple land (see Figure 3.7-4). The Navy would support ADC and County of Kauaʻi as applicable to ensure compliance of the terms of the NPDES permit. The final permit is available on the DOH website at https://health.hawaii.gov/cwb/final-individual-permits/.

The Navy uses a Spill Prevention, Control, and Countermeasure (SPCC) Plan in accordance with 49 CFR part 112, which requires the prevention of, preparedness for, and response to, oil discharges in surface waters. Additionally, the Navy has equipped the drainage ditches at the Nohili and Kawaiʻele Pump Stations with pollution control measures for when the pumps are in use. These include subsurface intake pipes that prevent the discharge of floating debris and oily substances as well as the use of PVC screens to trap drifting debris, which is then removed on a daily basis (Hart Crowser, 2020). At KPGO, NASA utilizes the SENSE Environmental Management Plan along with the Navy's SPCC Plan to prevent spills and discharges to surface water.

A list of BMPs conducted by the Navy and NASA to protect surface water quality and conservation is provided in Table 3.7-2.

3.7.1.4.3 Floodplains

In accordance with EO 11988, *Floodplain Management*, each federal agency shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

3.7.1.4.3.1 Main Base

The only floodplains in the ROI are on the easements at Main Base, where the primary floodplain hazard is from overflow of the ditches that drain the Mānā Plain. The water within the irrigation ditches and reservoirs do not mix with the drainage system under normal conditions. It is only during flood conditions when these waters may comingle if stormwater inputs overload the system and the divides between the elevated drainage ditches, reservoirs, and irrigations ditches become washed out from heavy flow and enter fields and drainage system. During a storm event, rising water levels in the canal system can also result in shoreline discharge from one or both ditches by erosion of typically latent sand berms. Parts of leasehold and easement lands are located in the Federal Emergency Management Area (FEMA) Special Hazard Flood Area (FEMA, 2021). Special Hazard Flood Areas, areas that have at least a 1 percent chance (or more) of being inundated by a flood event in any given year, are determined by the FEMA Flood Insurance Rate Maps (FEMA, 2024). These areas are shown in Figure 3.7-3.

Although both Kawaiʻele and Nohili Pump Stations are owned by the State, they are located on leased premises. Under the conditions of the existing lease, the Navy pays operation and maintenance costs for the pumps to help manage water levels adjacent to Main Base leaseholds and easements and to reduce flood risk. The Nohili Pump Station is currently inactive. Kawaiʻele Pump Station operates automatically based on real-time water level measurements; pumping floodwaters from the ditch system to the

Kawaiʻele Outlet at Waiapuaʻa Bay (see Figure 3.7-4). As described in Section 3.7, *Groundwater*, this pumping action lowers groundwater levels by removing excess water from the canals, which also reduces surface water levels and flood risk. In addition to the Kawaiʻele Outlet, several other discharge points in the canal system provide capacity to release water during heavy rainfall events. When fully operational, the Nohili Pump Station and Kawaiʻele Pump Station discharge an average of 8 and 19.5 million gallons per day, respectively (Hart Crowser, 2020).

3.7.1.4.3.2 Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

There are no floodplains at the Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, or KPGO parcels.

A list of BMPs conducted by the Navy to increase flood prevention is provided in Table 3.7-2.

3.7.1.4.4 Wetlands

3.7.1.4.4.1 Main Base

Narrow bands of potential wetlands border portions of the ditches and ponds on the easement lands adjacent to PMRF shown in Figure 3.7-5. The ditches, wetlands, and several reservoirs on the Mānā Plain serve as waterbird habitats and sanctuaries. A desktop assessment of the ROI was conducted using the National Wetland Inventory Data shown in Figure 3.7-5. Areas identified in the assessment as having potential for wetlands were subject to a wetland delineation (Appendix L). This delineation suggests that the only potential wetlands within the ROI appear to be hydrologically connected to the ditches, with water likely flowing back and forth between the ditches and wetlands as shown in Figure 3.7-6. These results, however, have yet to be verified by the USACE, and have not been included in USFWS wetland inventories (NAVFAC Pacific, 2023a). The water pumped via the Kawaiʻele Pump Station helps maintain the integrity of this habitat by stabilizing water levels on the Mānā Plain. Finally, as discussed above in Section 3.7, *Surface Water Quality*, the proposed open floodable space project will also provide additional habitat for wetland-dependent wildlife in the area (Figure 3.7-6).

3.7.1.4.4.2 Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

There are no wetlands at the Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, or KPGO parcels.

3.7.2 Environmental Consequences

3.7.2.1 Approach to Analysis

The analysis of water resources determines the potential effects on groundwater, surface water, floodplains, and wetlands. Groundwater analysis focuses on the potential for effects to the quality, quantity, and accessibility of the water. The analysis of surface water quality considers the potential for effects that may change the water quality, including both improvements and degradation of current water quality.

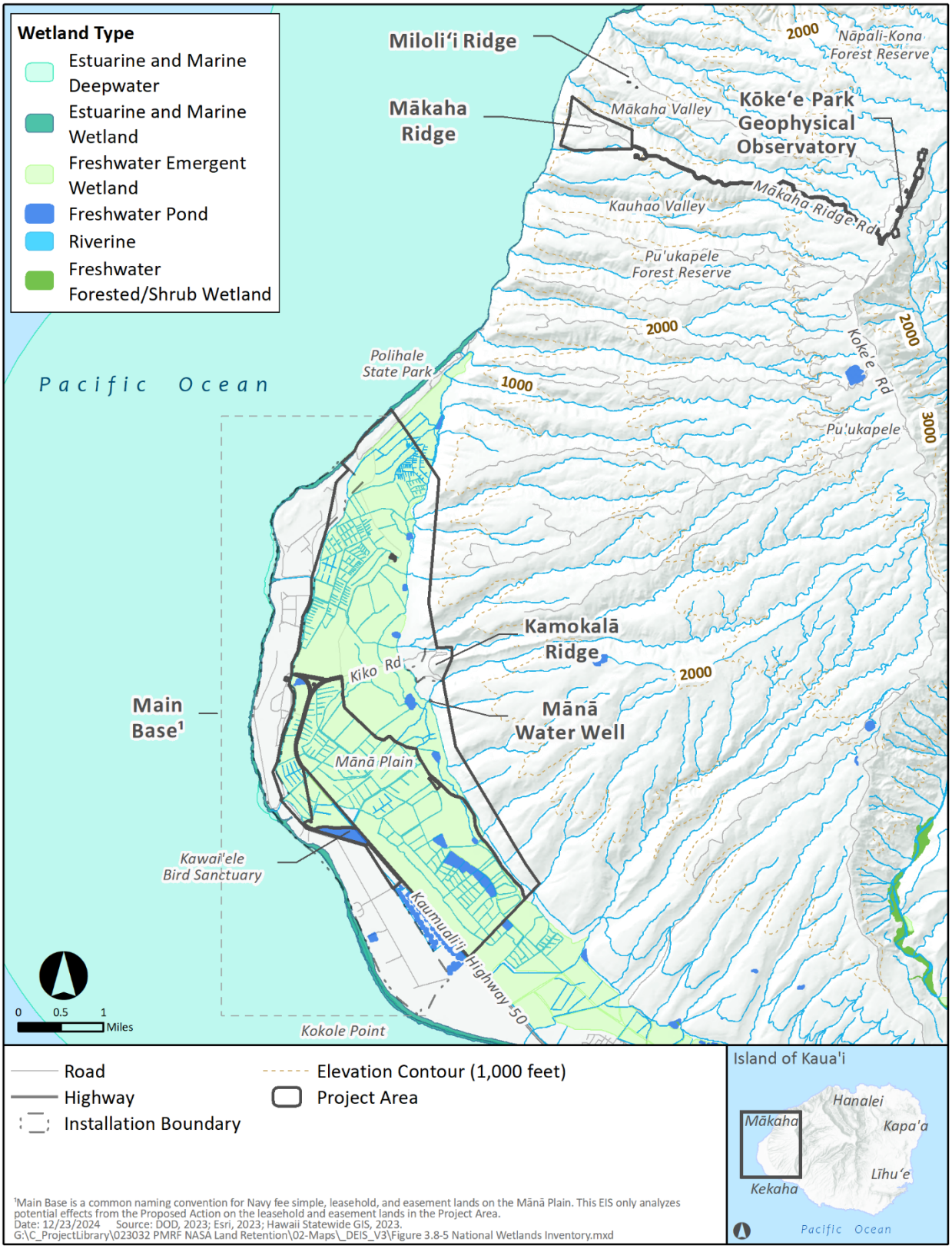


Figure 3.7-5 National Wetlands Inventory and Freshwater Systems in the Region of Influence

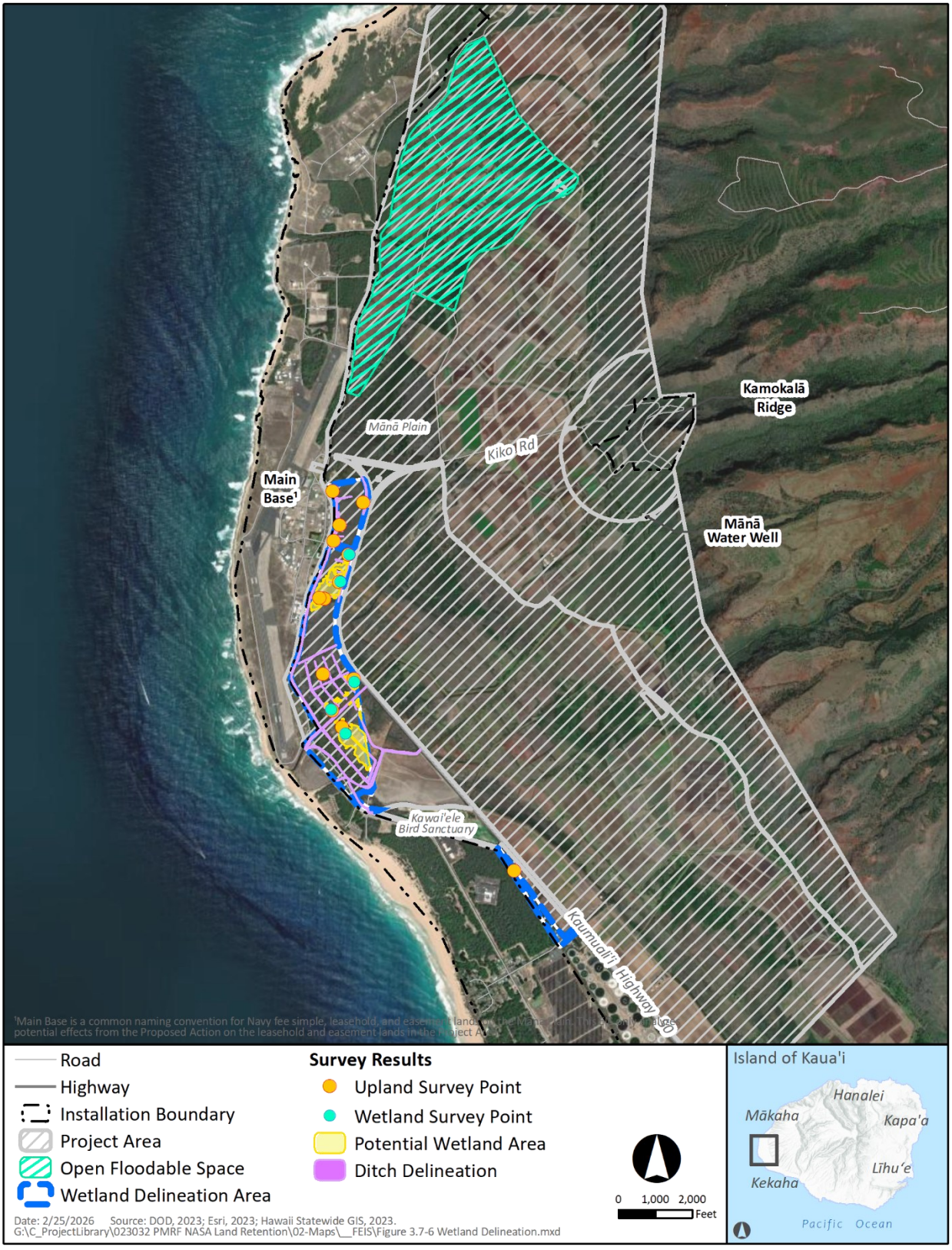


Figure 3.7-6 Wetland Delineation Survey, Potential Wetland Area, and Open Floodable Space

The analysis of floodplains considers if any new construction is proposed within a floodplain or may impede the functions of floodplains in conveying floodwaters. The assessment of wetlands considers the potential for effects that may change the local hydrology, soils, or vegetation that support a wetland. The effects analysis to water resources considers ongoing Navy and NASA activities on leasehold and easement lands. Potential effects to water resources include (1) physically altering, damaging, or destroying all or part of a water resource; (2) changing the habitat or physical features surrounding the resource; or (3) the duration of the effect.

The criteria considered to assess whether the Proposed Action would result in potential significant effects to water resources is the extent or degree to which the Proposed Action:

- Degrades the water quality of surface water or groundwater.
- Reduces the availability of, or accessibility to, one or more of the beneficial uses of a water resource.
- Contaminates a drinking water source.
- Results in noncompliance with any regulatory standard.
- Alters a floodplain's extent or alters a floodway such that the impacts cannot be mitigated.
- Increases flooding or the amount of damage that could result from flooding, including from runoff.
- Impact(s) soils or geological features causing substantial soil erosion or loss.

3.7.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.7.2.2.1 Main Base

Groundwater

Under Alternative 1, the Navy would continue activities on leasehold and easement lands at Main Base. The Navy would continue to pay operation and maintenance costs for the Kawai'ele Pump Station, which would continue to pump water from the ditch system to help manage groundwater levels within the ditch system, and therefore, manage groundwater levels within the Mānā Plain. This would continue to help maximize the acreage of productive agricultural land in the Mānā Plain. Activities do not currently pose a potential effect or threat to quality, quantity, and accessibility of groundwater and would continue not to do so under Alternative 1. There would be no change to the groundwater resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Surface Water

Under Alternative 1, the Navy would continue operations at Main Base as it currently does in support of ongoing activities. Per existing conditions, the Navy would continue to pay operation and maintenance costs for the Kawai'ele Pump Station, and pumps at the station would continue to prevent surface water, which has mixed with groundwater in the canals, from overflowing out of the canals, especially following large storm events. Under Alternative 1, the storage of fuels and oils on leaseholds at Main Base would be managed per existing SOPs. The continuation of procedures and BMPs (see Table 3.7-2) would continue to prevent surface water contamination by identifying potential for discharges, establishing equipment and procedures to prevent the occurrence of a discharge, and providing immediate response and notification should a discharge occur. Existing operations do not change

surface water flow or quality and would continue not to do so under Alternative 1. There would be no change to the surface water resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Floodplains

Under this alternative, per existing conditions, the Navy would continue to pay operation and maintenance costs for the Kawai'ele Pump Station, which would continue to move water as needed from the easement lands and lower-lying areas of the Mānā Plain to help prevent localized flooding, especially following large storm events. Current operations do not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters and would continue not to do so under Alternative 1. There would be no change to the floodplains as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Wetlands

Under Alternative 1, the potential wetland areas located adjacent to Main Base, within leasehold and easement lands, would continue to provide habitat as a sanctuary for waterbirds. The area would continue to be managed as a potential wetland while the USACE continues the wetland inventory verification process. Under this alternative, per existing conditions, the Navy would continue to pay operation and maintenance costs for the Kawai'ele Pump Station to help maintain surface water levels on the Mānā Plain which would help preserve habitat for wetland-dependent wildlife in the area. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of Alternative 1 and therefore no effects would be expected.

3.7.2.2.2 Kamokalā Ridge

Groundwater

Under Alternative 1, the Navy would continue activities on leaseholds and easement areas at Kamokalā Ridge. Current operations do not change quality, quantity, and accessibility of groundwater and would continue not to do so under Alternative 1. There would be no change to the groundwater resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Surface Water

Under Alternative 1, the Navy would continue operations at Kamokalā Ridge as it currently does in support of ongoing activities. Under this alternative, the storage of fuels and oils on Kamokalā Ridge would be managed per existing conditions. The continuation of SOPs and BMPs (see Table 3.7-2) would prevent surface water contamination by identifying potential for discharges, establishing equipment and procedures to prevent the occurrence of a discharge, and providing immediate response and notification should a discharge occur. Current operations do not change surface water hydrology or quality and would continue not to do so under Alternative 1. There would be no change to the surface water resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Floodplains

There are no floodplains at Kamokalā Ridge. Alternative 1 does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no

change to the floodplains as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Wetlands

There are no wetlands at Kamokalā Ridge. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of Alternative 1 and therefore no effects would be expected.

3.7.2.2.3 Mānā Water Well

Groundwater

Under Alternative 1, the Navy would continue activities at leaseholds and easement areas at the Mānā Water Well. The continuation of SOPs and BMPs (see Table 3.7-2) would prevent groundwater contamination by identifying potential for discharges, establishing equipment and procedures to prevent the occurrence of a discharge, and providing immediate response and notification should a discharge occur. The Mānā Water Well would continue to pump water from the shallow caprock Kekaha Aquifer and be used as the main source of potable water for Main Base. The Mānā Water Well and associated parts would continue to be inspected regularly by PMRF personnel and would continue to undergo DOH inspections as needed. The Mānā Water Well would continue to be operated and maintained by the Navy including performing regular maintenance on the distribution equipment, as well as monitoring, water testing and analysis, and water disinfection. Groundwater would continue to be managed by procedures identified in the PMRF SOPs and BMPs in Table 3.7-2. Current operations do not affect the quality, quantity, and accessibility of groundwater and would continue not to do so under Alternative 1. There would be no change to the groundwater as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Surface Water

Under Alternative 1, the Navy would continue activities at the Mānā Water Well. Current activities do not affect surface water hydrology or quality and would continue not to do so under Alternative 1. There would be no change to surface water resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Floodplains

There are no floodplains at Mānā Water Well. Alternative 1 does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to the floodplains as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Wetlands

There are no wetlands at Mānā Water Well. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of Alternative 1 and therefore no effects would be expected.

3.7.2.2.4 Mākaha Ridge

Groundwater

Under Alternative 1, the Navy would continue activities at leaseholds and easement areas at Mākaha Ridge. Current activities do not affect the quality, quantity, and accessibility of groundwater and would continue not to do so under Alternative 1. There would be no change to groundwater resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Surface Water

Under Alternative 1, the Navy would continue operations at Mākaha Ridge as currently implemented in support of ongoing activities. Under Alternative 1, the storage of fuels and oils on Mākaha Ridge would be managed per existing conditions. The continuation of SOPs and BMPs (see Table 3.7-2) would prevent surface water contamination by identifying potential for discharges, establishing equipment and procedures to prevent the occurrence of a discharge, and providing immediate response and notification should a discharge occur. The Navy would continue to implement critical erosion control management actions on Mākaha Ridge such as ungulate removal, ungulate fence installation and maintenance, and upland habitat restoration via native plant outplanting. In addition, through Enhanced Engagement-7 (Chapter 5, Table 5.2-1), the Navy would continue to establish success criteria for erosion management on Mākaha Ridge. Current operations do not affect surface water hydrology or quality and would continue to not do so under Alternative 1. There would be no change to surface water resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Floodplains

There are no floodplains at Mākaha Ridge. Alternative 1 does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to the floodplains as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Wetlands

There are no wetlands at Mākaha Ridge. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of Alternative 1 and therefore no effects would be expected.

3.7.2.2.5 Miloliʻi Ridge

Groundwater

Under Alternative 1, the Navy would continue operations at Miloliʻi Ridge in support of ongoing activities. Current activities on the leased portion of Miloliʻi Ridge are extremely limited; there is no vehicle use in this area, and there is nothing stored on site that could affect water resources. Current operations do not affect the quality, quantity, and accessibility of groundwater and would continue not to do so under Alternative 1. There would be no change to the groundwater resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Surface Water

Under Alternative 1, the Navy would continue operations at Miloliʻi Ridge as it currently does in support of ongoing activities under Alternative 1. Current operations do not affect surface water hydrology or quality and would continue not to do so under Alternative 1. There would be no change to the surface water resources as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Floodplains

There are no floodplains at Miloliʻi Ridge. Alternative 1 does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to the floodplains as a result of the implementation of Alternative and therefore no effects would be expected.

Wetlands

There are no wetlands at Miloliʻi Ridge. There would be no change to wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of Alternative 1 and therefore no effects would be expected.

3.7.2.2.6 KPGO

Groundwater

Under Alternative 1, activities at the leasehold and easement areas at KPGO would continue. There are no active wells on site, and operations do not currently pose a potential effect or threat to quality, quantity, and accessibility of groundwater and would continue not to do so under Alternative 1. There would be no change to groundwater as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Surface Water

Under Alternative 1, activities at KPGO would continue. The storage of fuels and oils on KPGO would be managed per existing conditions. The continuation of SOPs and BMPs (see Table 3.7-2) would minimize the likelihood of groundwater or surface water contamination by identifying potential for discharges, establishing equipment and procedures to prevent the occurrence of a discharge, and providing immediate response and notification should a discharge occur. Operations do not currently pose a potential effect or threat to surface water hydrology or quality and would continue not to do so under Alternative 1. There would be no change to surface water as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Floodplains

There are no floodplains at KPGO. Alternative 1 does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to floodplains as a result of the implementation of Alternative 1 and therefore no effects would be expected.

Wetlands

There are no wetlands at KPGO. There would be no change to wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of Alternative 1 and therefore no effects would be expected.

3.7.2.2.7 Effect Summary

Alternative 1 would not cause any effect to the groundwater, surface water, floodplains, or wetlands on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, or KPGO. The Navy would continue to work with ADC (a State agency) and KAA (a tenant agricultural cooperative) via ADC to monitor water quality, manage the agricultural ditches, and help prevent flooding during large rain events on the Mānā Plain. The Mānā Water Well would continue to be utilized by PMRF as a source of drinking water and would continue to undergo regular inspections and comply with all necessary water quality sampling and standards. The Navy would continue to pay operation and maintenance costs for the Kawaiʻele Pump Station, located on the south end of the Main Base leaseholds, to manage groundwater levels for agricultural purposes and localized flood protection of low-lying areas on the Mānā Plain. At Mākaha Ridge, the Navy would also continue to implement management strategies to minimize soil erosion to improve surface water quality downstream of the Ridge. The ongoing implementation of current mitigation measures (see Table 3.1-4), SOPs and BMPs (see Table 3.7-2) would continue to occur. In addition, Enhanced Engagement-5 (Chapter 5, Table 5.2-1) would improve collaboration between stakeholders (Navy-DLNR-DHHL-KAA-ADC-Kauaʻi County) that manage water resources in West Kauaʻi and Enhanced Engagement-7 would continue the establishment of success criteria for erosion management on Mākaha Ridge. There would be no change to current activities on the leasehold and easement lands under Alternative 1. As a result, Alternative 1 would not degrade water quality, affect beneficial uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. **Therefore, effects of Alternative 1 to water resources would not be adverse or significant.**

3.7.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.7.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 2, Navy and NASA activities and management of water resources would be the same if the land were under federal jurisdiction as it would be under Alternative 1. All water-related site-specific BMPs and SOPs in Table 3.7-2 would continue to be implemented resulting in management of water resources identical to those described for Alternative 1. Under this alternative, the Navy would purchase the leasehold land where Kawaiʻele Pump Station is located.

3.7.2.3.2 Effect Summary

As described above, Alternative 2 would not cause any effect to the groundwater, surface water, floodplains, or wetlands on former leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, or KPGO. The Navy would continue to work with KAA and ADC to monitor water quality, manage the agricultural ditches, and help prevent localized flooding during large rain events on the Mānā Plain. The Mānā Water Well would continue to be utilized by PMRF as a source of drinking water and would continue to undergo regular inspections and comply with all

necessary water quality sampling and standards. The Navy would continue to pay operation and maintenance costs for the Kawaiʻele Pump Station to manage groundwater levels for agricultural purposes and localized flood protection on the low-lying areas of the Mānā Plain. At Mākaha Ridge, the Navy would also continue to implement management strategies to minimize soil erosion to improve surface water quality downstream of the Ridge. The ongoing implementation of current mitigation measures (see Table 3.1-4), SOPs and BMPs (see Table 3.7-2) would continue to occur. In addition, Enhanced Engagement-5 (Chapter 5, Table 5.2-1) would improve collaboration between stakeholders (Navy-DLNR-DHHL-KAA-ADC-Kauaʻi County) that manage water resources in West Kauaʻi and Enhanced Engagement-7 would continue the establishment of success criteria for erosion management on Mākaha Ridge. There would be no change to current activities on the former leasehold and easement lands under Alternative 2. As a result, Alternative 2 would not degrade water quality, affect beneficial uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. **Therefore, effects of Alternative 2 to water resources would not be adverse or significant.**

3.7.2.4 No Action Alternative

3.7.2.4.1 Main Base

Groundwater

Under the No Action Alternative, the Navy would no longer continue activities on leasehold and easement lands at Main Base. All existing infrastructure at the site could be removed or remain in place. All the details regarding potential infrastructure removal on leasehold and easement lands at Main Base are presently unknown and are subject to negotiations between the Navy and the State. Infrastructure on leaseholds of Main Base are located on small areas on impervious surfaces at the coast, and so whether buildings on leaseholds and easement areas are removed or retained, there would be no effect to groundwater availability or quality. The potential loss of access to potable water from the Mānā Water Well could change the groundwater access for users at Main Base as a result of the implementation of the No Action Alternative should the State choose not to operate the well or provide Navy access to the water. This could result in increased demand from the Kauaʻi Department of Water Supply for Main Base potable water needs, as discussed further in Section 3.8, *Utilities*. Under the No Action Alternative, the Navy would no longer pay operation and maintenance costs for the Kawaiʻele Pump Station, which is located on leasehold land. Operation and maintenance costs for the Kawaiʻele Pump Station would revert to the State or State contractors. Should the State choose to cease operations at the Pump Station, there could be a change to the surface water levels within the ditches and groundwater in the shallow caprock aquifer across the Mānā Plain. This increase in shallow groundwater and surface water would not degrade the quality, contaminate, or cause noncompliance with any regulatory standards. With the loss of Navy access to groundwater at Mānā Water Well, a potential minor, long-term adverse effect could occur for potable water users of Main Base as they could no longer have access to water from the Mānā Water Well and would need to rely on the Kauaʻi Department of Water Supply or other sources for Main Base potable water needs.

Surface Water

Under the No Action Alternative, the Navy would not continue activities on leasehold and easement lands at Main Base. Fuels and oils would be moved to fee simple lands on Main Base and would continue to be managed per existing conditions. The continuation of SOPs and BMPs (see Table 3.7-2) help prevent surface water contamination by identifying potential for discharges, establishing equipment and procedures to prevent the occurrence of a discharge, and providing immediate response and notification should a discharge occur. Any removal of buildings, including demolition and clean up, would comply with all applicable regulations (i.e., NPDES permit, Section 401 Water Quality Certification) to prevent any effects to surface water. Under this alternative, the Navy would no longer pay operation and maintenance costs for the Kawai'ele Pump Station, which is located on leasehold land, which could lead to a change in current hydrology as significantly less surface water would be pumped off and out of the Mānā Plain. This loss of pumping would result in a change to surface and groundwater water levels within the shallow caprock aquifer on the Mānā Plain; however, this change does not degrade the water quality of the surface water, impact soil or geological features causing substantial soil erosion or loss, or result in noncompliance with any regulatory standard. Therefore, no effects would be expected to surface water.

Floodplains

Under this alternative, the Navy would no longer pay operation and maintenance costs for the Kawai'ele Pump Station, which is located on leasehold land. The State could choose to no longer operate the Kawai'ele Pump Station during storm events, which would prevent the movement of water from the easement lands and lower-lying areas of the Mānā Plain, and result in flooding of low-lying agricultural fields, some of which are in production. This potential increase in localized flooding in lower-lying areas of the Mānā Plain could result in a minor, long-term adverse effect to the floodplains as a result of the implementation of the No Action Alternative.

Wetlands

Under the No Action Alternative, the Navy's loss of the leasehold and easement lands for these potential wetland areas could affect the State's management strategies for this land. The State would determine continued management of the potential wetland while the USACE continues the wetland inventory verification process. Under the No Action Alternative, this area could no longer continue to provide the same amount of habitat as a sanctuary for waterbirds and other wetland-dependent wildlife due to the loss of the Kawai'ele Pump Station. The loss of pumping capacity could increase the amount of surface water in the Mānā Plain, which could submerge land and vegetation, decreasing nesting and foraging habitat for some wetland-dependent wildlife. If the State chooses not to continue operation of the Kawai'ele Pump Station, there could be a potential change to the wetlands and/or change to the local hydrology, soils, or vegetation that support a wetland as a result of increased surface water levels within wetlands under the implementation of the No Action Alternative. Therefore, a potential minor, long-term, adverse effect could occur.

3.7.2.4.2 Kamokalā Ridge

Groundwater

Under the No Action Alternative, the Navy would not continue activities at leaseholds and easement areas at Kamokalā Ridge. Under this alternative, all existing infrastructure could be removed or remain in place. All the details regarding potential infrastructure removal at this site are presently unknown and are subject to negotiations between the Navy and the State. As impervious surface areas at this site are insignificant, whether buildings on leaseholds and easement areas are removed or not, there would be no effect to groundwater recharge or groundwater quality. Current operations do not affect groundwater and would continue not to do so under No Action Alternative. There would be no change to quality, quantity, and accessibility of groundwater as a result of the implementation of the No Action Alternative and, therefore, no effects would be expected.

Surface Water

Under the No Action Alternative, the Navy would not continue activities at leaseholds and easement areas at Kamokalā Ridge. Under this alternative, all existing infrastructure could be removed or remain in place. Water use is limited at this site; a single fire hydrant, with Mānā Water Well-supplied water, is available for fire suppression. The Navy would lose access to the fire hydrant on site; however, it is likely that it would no longer be needed if ordnance were no longer being stored within the ridge. Any removal of buildings including demolition and clean up would comply with all applicable regulations. Current operations do not currently pose a potential effect or threat to surface water hydrology or quality and would continue not to do so under the No Action Alternative. There would be no change to surface water as a result of the implementation of the No Action Alternative and, therefore, no effects would be expected.

Floodplains

There are no floodplains at Kamokalā Ridge. The No Action Alternative does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to floodplains as a result of the implementation of the No Action Alternative and, therefore, no effects would be expected.

Wetlands

There are no wetlands at Kamokalā Ridge. There would be no change to wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of the No Action Alternative and, therefore, no effects would be expected.

3.7.2.4.3 Mānā Water Well

Groundwater

Under the No Action Alternative, the Navy would not continue activities at leaseholds and easement areas at the Mānā Water Well. The Mānā Water Well would no longer be maintained and operated by the Navy, and future ownership and management of the Mānā Water Well would be negotiated between the Navy and the State.

Under the No Action Alternative, the Navy could no longer have access to the groundwater resources at the Mānā Water Well as the main source of potable water for Main Base and would, therefore, either purchase water from Kaua'i County Water Department or explore other water purchasing options. This could increase demand from Kaua'i County Water Department-supplied water and result in additional pumping from other Kaua'i County Water Department wells in the area to meet the need for continued operations. Other alternative sources such as treatment of surface water or rainfall catchment systems could be considered.

The Navy would also no longer be responsible for regular maintenance, water disinfection, or improvements to the Mānā Water Well. Therefore, the Well, and all associated costs for operation and maintenance, would no longer be funded by the Navy. The Mānā Water Well and associated parts would no longer continue to be inspected regularly by PMRF personnel including no longer performing regular maintenance on the distribution equipment, as well as monitoring, water testing and analysis, and water disinfection. There could be an additional change to the quality, quantity, and accessibility of groundwater resources and the potential for increased demand from Kaua'i County Water Department wells or other wells in the area as a result of the implementation of the No Action Alternative. Therefore, a potential moderate, short-and long-term, adverse effect to groundwater could occur.

Surface Water

Under the No Action Alternative, the Navy would not continue activities at leaseholds and easement areas at the Mānā Water Well. Current activities do not affect surface water hydrology or quality and would continue not to do so under the No Action Alternative. Navy infrastructure could be removed or remain in place. There would be no change to the surface water resources as a result of the implementation of the No Action Alternative and, therefore, no effect could be expected.

Floodplains

There are no floodplains at Mānā Water Well. The No Action Alternative does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to the floodplains as a result of the implementation of the No Action Alternative and, therefore, no effect could be expected.

Wetlands

There are no wetlands at Mānā Water Well. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of the No Action Alternative and, therefore, no effect could be expected.

3.7.2.4.4 Mākaha Ridge

Groundwater

Under the No Action Alternative, the Navy would not continue activities at leasehold and easement lands at Mākaha Ridge. Under this alternative, all existing infrastructure could be removed or remain in place. All the details regarding potential infrastructure removal at this site are presently unknown and are subject to negotiations between the Navy and the State. Current operations do not affect groundwater and would continue not to do so under the No Action Alternative. Whether buildings on leaseholds and easement areas are removed or not, there would be no change to the quality, quantity,

and accessibility of groundwater resources as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

Surface Water

Under the No Action Alternative, the Navy would not continue activities at leasehold and easement lands at Mākaha Ridge. Under this alternative, the Navy would lose access to Mākaha Ridge and would no longer support conservation actions for erosion control such as ungulate fencing, native vegetation outplanting, and predator control. These BMPs are designed to increase vegetation and decrease the presence of vegetation-eating predators. As increased vegetation and decreased predators allows for better soil stability and less erosion, implementation of this alternative could lead to increased erosion and a decrease in surface water quality in the area.

Fuels and lubricants stored at this site would be removed and transported to Navy fee simple land. Per existing conditions, the continuation of SOPs and BMPs (see Table 3.7-2) would prevent surface water contamination by identifying potential for discharges, establishing equipment and procedures to prevent the occurrence of a discharge, and providing immediate response and notification should a discharge occur.

Under the No Action Alternative, there could be a change to the surface waters in the area due to activities associated with the potential demolition and removal of existing infrastructure. Effects to surface water from any air- or water-dispersed debris and particulates could occur, as well as a temporary increase to downstream turbidity and decreased water quality. Debris dispersal could occur during the demolition process as buildings and other survey equipment are deconstructed or destroyed. The area for potential demolition is relatively small as impervious surface areas are insignificant compared to the total area of the leasehold parcel. Soil compaction could occur when vehicles and equipment access, park, and maneuver during demolition and restoration, which affects soil permeability. These potential adverse effects would be short term and minimized by the use of appropriate construction BMPs, such as silt socks and dust control. These BMPs are designed to intercept and trap any potential water-soluble debris that could otherwise flow down the slopes adjacent and into nearby surface streams. Due to the loss of Navy-funded conservation actions for erosion control at this site and a potential change to downstream surface water quality during removal activities, there could be an additional alteration, destruction, or change to the surface water resources as a result of the implementation of the No Action Alternative and therefore short- and long-term, minor to moderate, adverse effects could occur.

Floodplains

There are no floodplains at Mākaha Ridge. The No Action Alternative does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to the floodplains as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

Wetlands

There are no wetlands at Mākaha Ridge. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

3.7.2.4.5 Miloliʻi Ridge

Groundwater

Under the No Action Alternative, the Navy would not continue activities at leaseholds and easement areas at Miloliʻi Ridge. Under this alternative, all existing infrastructure could be removed or remain in place. Any details regarding potential infrastructure removal at this site are presently unknown and are subject to negotiations between the Navy and the State. Current activities on the leased portion of Miloliʻi Ridge are extremely limited, do not include vehicle use in this area, and there is nothing stored on site that could affect water resources. Current operations do not affect groundwater and would continue not to do so under the No Action Alternative. There would be no change to the quality, quantity, and accessibility of groundwater resources as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

Surface Water

Under the No Action Alternative, the Navy would not continue activities at leaseholds and easement areas at Miloliʻi Ridge. Any removal of equipment at Miloliʻi Ridge would comply with all applicable regulations but may contribute to erosion as the equipment could be located near highly erodible soils. Under the No Action Alternative, there could be an alteration or change to the surface waters in the area due to activities associated with the potential demolition and removal of existing infrastructure. The area for potential demolition is relatively small. Effects to surface water from any air- or water-dispersed debris and particulates could occur, as well as a temporary increase to downstream turbidity and decrease to water quality. Debris dispersal could occur during the demolition process as buildings and other survey equipment are deconstructed or destroyed. Soil compaction could occur when vehicles and equipment access, park, and maneuver during demolition and restoration, which affects soil permeability. These adverse effects would be short term and minimized with the use of appropriate construction BMPs, such as silt socks and dust control. These BMPs are designed to intercept and trap any potential water-soluble debris that could otherwise flow down the slopes adjacent to Miloliʻi and into nearby surface streams. There could be a change to the surface water quality as a result of the implementation of the No Action Alternative and therefore a short-term, minor, adverse effect could occur.

Floodplains

There are no floodplains at Miloliʻi Ridge. The No Action Alternative does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to the floodplains as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

Wetlands

There are no wetlands at Miloliʻi Ridge. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

3.7.2.4.6 KPGO

Groundwater

Under the No Action Alternative, activities at KPGO would not continue as they currently do. Under this alternative, all existing infrastructure could be removed or remain in place. All the details regarding potential infrastructure removal at this site are presently unknown and are subject to negotiations between NASA and the State. As impervious surface areas on KPGO parcels are insignificant, whether buildings on the leasehold and easement areas are removed or not, there could not be an effect to groundwater recharge or groundwater quality. Water would no longer be purchased from DLNR for septic use and fire suppression. Current operations do not affect groundwater and would continue not to do so under the No Action Alternative. There would be no change to the quality, quantity, and accessibility of groundwater resources as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

Surface Water

Under the No Action Alternative, activities would not continue at KPGO as they currently do. Under the No Action Alternative, all existing infrastructure could be removed or remain in place. Fuels and lubricants used by the Navy stored on KPGO parcels would be removed and transported to Navy fee simple land. Any removal of buildings, including demolition and clean up, would comply with all applicable regulations to avoid potential effects to surface water.

At KPGO, there could be an alteration or change to the surface waters in the area due to activities associated with the potential demolition and removal of existing infrastructure. Effects to surface water from any air- or water-dispersed debris and particulates could occur, as well as a temporary increase to downstream turbidity and decreased water quality. Debris dispersal could occur during the demolition process as buildings and other survey equipment are deconstructed or destroyed. The area for potential demolition is relatively small. Soil compaction could occur when vehicles and equipment access, park, and maneuver during demolition and restoration, which affects soil permeability. These adverse effects would be minimized with the use of appropriate construction BMPs, such as silt socks and dust control. These BMPs are designed to intercept and trap any potential water-soluble debris that could otherwise flow down the slopes adjacent to KPGO and into nearby surface streams or infiltrate through soils into the groundwater. There could be a change to the surface water quality as a result of the implementation of the No Action Alternative and therefore a short-term, minor, adverse effect could occur.

Floodplains

There are no floodplains at KPGO. The No Action Alternative does not include any new construction within a floodplain or impedance to the functions of floodplains in conveying floodwaters. There would be no change to the floodplains as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

Wetlands

There are no wetlands at KPGO. There would be no change to the wetlands or change to the local hydrology, soils, or vegetation that support a wetland as a result of the implementation of the No Action Alternative and therefore no effects would be expected.

3.7.2.4.7 Effect Summary

On leasehold and easement lands at Main Base, the No Action Alternative could result in potential minor to moderate, long-term, adverse effects to groundwater, surface water, floodplains, and wetlands. The potential loss of operation and maintenance of the Mānā Water Well could change the groundwater quality and access to groundwater at Main Base. The Navy could no longer pay operation and maintenance costs for the Kawaiʻele Pump Station, which is used to alleviate flooding on the Mānā Plain during and after large rain events to help control surface water levels on the Mānā Plain. Should the State choose to not continue to operate the Kawaiʻele Pump Station during or after significant storm events, increased surface water levels could lead to increased localized flooding on the low-lying areas of the Mānā Plain, which could decrease the amount of available land used for viable agricultural purposes on the Mānā Plain. The loss of operation of the Kawaiʻele Pump Station could also increase water levels in wetland areas adjacent to Main Base, which could change the location and size of the available wetland habitat. Therefore, there could be a change and effect to groundwater, surface water, floodplains, and wetlands at leasehold and easement lands at Main Base due to potential increased levels of surface and groundwater from the potential cessation of operations at Kawaiʻele Pump Station during and after significant storm events.

At Kamokalā, there would be no effects to groundwater, surface water, wetlands, or floodplains as a result of the No Action Alternative. The No Action Alternative would not degrade water quality, affect beneficial uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding.

At the Mānā Water Well, the No Action Alternative could result in potential moderate, short- and long-term, adverse effects to groundwater. The Navy would no longer maintain and operate the Mānā Water Well or pump groundwater from the well. The subsequent effect would be loss of access to this groundwater at Main Base and, therefore, increased demand from Kauaʻi County Water Department wells or other wells in the area. The Mānā Water Well and associated parts would no longer continue to be inspected regularly by PMRF personnel including no longer performing regular maintenance on the distribution equipment, as well as monitoring, water testing and analysis, and water disinfection. If the State does not maintain the well or provide Navy access to the water, there could be a change to the quality, quantity, and accessibility of groundwater resources as a result of the implementation of the No Action Alternative. Therefore, potential moderate, short- and long-term, adverse effects to groundwater could occur.

There would be no effects to surface water, wetlands, or floodplains at Mānā Water Well under the No Action Alternative.

At Mākaha Ridge, the No Action Alternative could result in potential short- and long-term, minor to moderate, adverse effects to surface water. There could be a change to surface water quality as the increase in dust and debris during potential demolition and removal of existing infrastructure could result in a decrease in downstream water quality; however, these effects would be short term and minimized by the use of appropriate construction BMPs, such as silt socks and dust control. The Navy would no longer support conservation actions for erosion control at this site, which could lead to increased erosion and a decrease in surface water quality in the area. There would be no effects to groundwater, wetlands, or floodplains at Mākaha Ridge under the No Action Alternative.

At Miloliʻi Ridge and KPGO, the No Action Alternative could result in potential short-term, minor, adverse effects to surface water as the increase in dust and debris during potential demolition and removal of existing infrastructure could result in a decrease in downstream water quality. These potential effects would be short term and minimized by the use of appropriate construction BMPs, such as silt socks and dust control. There would be no effects to groundwater, floodplains, or wetlands at Miloliʻi Ridge and KPGO under the No Action Alternative.

Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.

3.8 Utilities

Utilities comprise systems that include potable water, wastewater, electric, and communications systems.

3.8.1 Affected Environment

3.8.1.1 Region of Influence

The ROI for utility systems includes leaseholds and easement areas at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and KPGO. Leasehold and easement lands at Miloliʻi Ridge do not include utilities or utility services. As such, Miloliʻi Ridge will not be discussed further in this section.

3.8.1.2 Regulatory Setting

Federal laws such as the CWA and the Safe Drinking Water Act apply to the utilities in the ROI. The State of Hawaiʻi Public Utilities Commission standardizes and regulates utility services through statutes, administrative rules, and general rules. NAVFAC has established codes and design criteria that apply to Navy-managed utility systems. NAVFAC code PW6 600-01*, Public Works Utilities Criteria for Design and Construction of Electrical, Sewer, and Water* is applicable to utility systems on Navy properties and implementation of the Proposed Action. NASA-managed facilities conform to NASA Policy Directive 8820.2E *Design and Construction of Facilities*. See Appendix E for a list of relevant regulations pertaining to utilities.

3.8.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.8-1 summarizes the predictable environmental trends for utilities.

Table 3.8-1 Predictable Environmental Trends for Utilities

Predictable Trend	Influence on Resource
Rising global temperatures (air/ocean)	• Rising global temperatures could increase electrical demand by increasing the level of air conditioning in buildings.

Predictable Trend	Influence on Resource
Change in precipitation patterns	• In the event of increased rainfall patterns, more electricity may be used to operate pumps. Increased potential for flooding may increase stormwater infiltration into the sanitary sewer system. • If drought conditions occur, water utility demand could increase, and water capacity could decrease.
Increased frequency and/or intensity of extreme weather events	• Extreme weather events can damage electrical, potable water, wastewater, electrical and communication infrastructure. Flooding may increase stormwater infiltration into the sanitary sewer system. • Extended periods of drought may increase the potential for wildfires causing disruption to electrical services with mandatory power shutoffs. Wildfires may also damage utility infrastructure.
Rising sea levels and associated storm surge	• Rising sea levels can cause localized coastal flooding that can infiltrate and overburden the sanitary sewer system. Flooding may also damage utility infrastructure.
Ocean acidification	• Ocean acidification can cause corrosion of coastal utility infrastructure.

3.8.1.4 Existing Conditions

The utility systems that service Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and KPGO in the ROI provide adequate service for current operations at each location.

3.8.1.4.1 Main Base

Potable Water

The potable water supply for Main Base is supplied from the Kaua'i Department of Water Supply and the Mānā Water Well exclusive easements with DLNR. Water from the Kaua'i Department of Water Supply is distributed from an 8-inch government-owned water line from the Kekaha Water System to the Kokoele Point Pump Station on Main Base. Kokoele Point Pump Station utilizes the following pumps for domestic use at Main Base: two centrifugal pumps for domestic service with the capability to pump 125 gpm, one centrifugal fire pump with a capability to pump 750 gpm, and one centrifugal fire pump with a capability to pump 1,000 gpm.

Water from the Mānā Water Well is pumped through a pipe terminating at the Barking Sands Pump Station, which pumps water as needed to other parts of the base. The Barking Sands Pump Station utilizes the following pumps for domestic use at Main Base: two centrifugal pumps for domestic service with the capability to pump 200 gpm and one centrifugal fire pump with a capability to pump 1,000 gpm. The current average pumping rate at Mānā Water Well is approximately 1,400 gpm (DON, 2024b).

PMRF has established protocols, including the PMRF Potable Water System OMP, for the operation and maintenance of the potable water system. Water from the Mānā Water Well undergoes several levels of

treatment before it is distributed. Once the water is pumped, it flows through 40 mesh strainer screens and undergoes chlorination and fluoridation. In accordance with Navy operating procedure, PMRF Potable Water System OMP, chlorine and fluoride are dosed at approximately 0.2 parts per million (ppm) for chlorine and 0.7 ppm for fluoride throughout the distribution system (DON, 2024b). After treatment, water is stored in two 126,000-gallon tanks at Kokole Point, and in one 420,000-gallon tank and one 100,000-gallon tank at Barking Sands Pump Station. Float valves control the water level for all tanks.

In 2023, the Navy conducted drinking water testing to ensure the PMRF drinking water meets all EPA and State standards. Over 70 regulated contaminants were tested, and in all cases, the levels were well within standards for safe drinking water (DON, 2024c). PFAS were also tested and found within applicable standards (DON, 2024c). The Navy repeated drinking water testing in 2024 and 2025 (except PFAS testing, as compliance monitoring is not required until 2027 per the EPA) and similar to 2023 results, all levels measured were within both EPA and State requirements for safe drinking water (DON, 2025b, 2026).

Daily water quality monitoring for chlorine and fluoride residuals is conducted at five established test stations. Monthly testing is conducted by DOH for total coliform. In all cases, PMRF meets applicable drinking water standards.

As part of the Navy water quality maintenance procedure per the PMRF Potable Water System OMP, sampling for perchlorate was initiated at PMRF in 2006. The most recent EPA guidance recommends that it not exceed 15 parts per billion in drinking water (EPA, 2014). This level has also been adopted in the Navy Perchlorate Sampling and Management Policy. In accordance with the policy, sampling has been conducted at the two drinking water supply locations. Perchlorate concentrations at both sites were less than the initial screening level of 4.0 parts per billion. Based on guidance PMRF received from Navy Region Hawai'i, since the two consecutive samples were less than 4 parts per billion, no further analysis was required.

A sanitary survey of the Mānā Water Well was conducted on July 24, 2019 (DON, 2024c, 2025b). The DOH inspector recommended that the floor opening be temporarily sealed off to prevent debris from falling into the water and possibly contaminating the drinking water supply until a permanent solution could be identified. Currently, the well system is fully operational and compliance testing shows the water meets all regulatory standards. A permanent seal near the top portion of the well shaft has been completed and is in the process of being reviewed by DOH for official close out.

Wastewater

Wastewater services for PMRF include two domestic sewage treatment facilities and a collection system that services PMRF. Both systems discharge effluent into leach fields (DON, 2017).

Electricity

Electric power is supplied to Main Base by three power plants and a 14-megawatt solar facility with a 70-megawatt-hour battery energy storage system on the Main Base. Including routine usage and redundant power, there are no capacity issues. The Main Base power plant provides daily primary power for peak shaving and clean power to the Range. The Mākaha Ridge and Kōke'e power plants that also provide electric power to Main Base are located on leased lands (PMRF Department of Public Works

[DPW], 2024). The Mākaha Ridge power plant is discussed in Section 3.8.1.4.4 and the Kōke'e power plant is discussed in Section 3.8.1.4.5. The additional power is purchased from the Kaua'i Island Utility Cooperative (KIUC). Electricity is provided through both overhead and underground transmission lines (DON, 2017).

Communications

Infrastructure for Main Base includes cable, fiber optics, cellular towers, and communications towers. Table 3.8-2 identifies the easements and infrastructure on Main Base.

Table 3.8-2 Utility Easements and Infrastructure on Main Base

Easement Name	*Grant Type*	*Grant Purpose*	*Description*	*Location*	*Acres*
Easement A Part 1 (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Roadway Easement A Part 1, State General Lease [(1)],-3852, (Note: Amendment 2 includes utilities)	Kiko Road, east of Polihale Road to Kamokalā Ridge Loop Drive	2.141
Easement B (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Roadway Easement B, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kia Road and Kalanamahiki Road from Kaumuali'i Highway-50 to PMRF Installation	3.084
Easement D (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Easement D for Power Line, State General Lease No. S-3852, 15 feet wide	Kiko Road, through intersections of Kao Road and Lio Road to PMRF Installation	1.363
Easement F (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Easement F for Communication Cables, Second Amendment to State General Lease No. S-3852, 10 feet wide	South side of Kalanamahiki Road, south of PMRF Installation	0.049
Easement G Part 1 (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Easement G Part 1 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 15 feet wide	Kiko Road, through intersections of Kao Road and Lio Road to PMRF Installation	0.671
Easement G Part 2 (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Easement G Part 2 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Kiko Road, through intersections of Kao Road and Lio Road to PMRF Installation	0.138

Note: [1]See Appendix D.
Key: PMRF = Pacific Missile Range Facility; ROW = right-of-way; TMK = Tax Map Key.

3.8.1.4.2 Kamokalā Ridge

The utility easements and leases at Kamokalā Ridge are for access and distribution of utilities to Navy fee simple lands by ROWs. There are no utility facilities or structures beyond the utility lines. Electrical power is supplied for lighting and small equipment through purchase and the average usage is 21,700 kilowatt (kW) hours per month (PMRF DPW, 2024). Communications infrastructure comprises telephone service and wired alarm systems. Water lines in this area support fire hydrants in the missile

magazine area. There are no potable water or wastewater services at Kamokalā Ridge. Table 3.8-3 identifies the easements and ROWs that are on Kamokalā Ridge.

Table 3.8-3 Utility Easements and Infrastructure on Kamokalā Ridge

Easement Name	*Grant Type*	*Grant Purpose*	*Description*	*Location*	*Acres*
Easement A Part 2 Portion A (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Roadway Easement A Part 2 Portion A, State General Lease [(1)],-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.627
Easement A Part 2 Portion B (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Roadway Easement A Part 2 Portion B, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.558
Easement A Part 2 Portion C (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Roadway Easement A Part 2 Portion C, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.042
Easement A Part 2 Portion D (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Roadway Easement A Part 2 Portion D, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.221
Easement A Part 3 (TMK: 1-2-002-001 (por.))	Easement	Utilities/ ROW	Roadway Easement A Part 1, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Mānā Water Well Access Road	0.455
Easement G Part 3 (TMK: 1-2-002-001 (por.))	Easement	Utilities	Easement G Part 3 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.153
Easement G Part 4 (TMK: 1-2-002-001 (por.))	Easement	Utilities	Easement G Part 4 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.153
Easement G Part 5 (TMK: 1-2-002-001 (por.))	Easement	Utilities	Easement G Part 5 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.006
Easement G Part 6 (TMK: 1-2-002-001 (por.))	Easement	Utilities	Easement G Part 6 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.021

Notes: [1]See Appendix D.
Some easements above are also listed in the Mānā Water Well table as the feature is found in both areas.

Key: ROW = right-of-way; TMK = Tax Map Key.

3.8.1.4.3 Mānā Water Well

The utility easements and leases at Mānā Water Well are for access and distribution of utilities to PMRF. The Mānā Water Well is located southeast of Kamokalā Ridge on a small, leased area above the Kekaha aquifer. This hand-dug well, now concrete-lined, is approximately 90 feet deep, and is one of the sources of potable water for PMRF. The current average pumping rate at Mānā Water Well is approximately 1,400 gpm (DON, 2024b). There is no water consumption at the Mānā Water Well site. The water pumped from the well to Main Base is 400,000 gallons per day, which is approximately 25 percent of the available well capacity. The Mānā Water Well uses approximately 14,700 kW hours per month of electric power purchased from the KIUC (PMRF DPW, 2024). Electricity is distributed through both overhead and underground transmission lines (DON, 2017). Table 3.8-4 identifies the easements and ROWs that are in the vicinity of the Mānā Water Well.

Table 3.8-4 Utility Easements and Infrastructure on Mānā Water Well

Easement Name	*Grant Type*	*Grant Purpose*	*Description*	*Location*	*Acres*
Easement A Part 1 (TMK: 1-2-002-001 (por.))	Easement (Exclusive)	Utilities	Roadway Easement A Part 1, State General Lease[(1)],-3852, (Note: Amendment 2 includes utilities)	Mānā Water Well Access Road from Kiko Road to well location	0.455
Easement G Part 3 (TMK: 1-2-002-001 (por.))	Easement (Exclusive)	Utilities	Easement G Part 3 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.153
Easement G Part 4 (TMK: 1-2-002-001 (por.))	Easement (Exclusive)	Utilities	Easement G Part 4 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.153
Easement G Part 5 (TMK: 1-2-002-001 (por.))	Easement (Exclusive)	Utilities	Easement G Part 5 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.006
Easement G Part 6 (TMK: 1-2-002-001 (por.))	Easement (Exclusive)	Utilities	Easement G Part 6 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.021
Tract E-4 (TMK: 1-2-002-028)	Easement (Exclusive)	Utilities/Access	Bonham Air Base Water Storage Area Tract E-4, State General Lease No. S-3852	Mānā Water Well Lease (includes access road)	0.264

Easement Name	*Grant Type*	*Grant Purpose*	*Description*	*Location*	*Acres*
Water Lot 12 (TMK: 1-2-002-001 (por.))	Easement (Exclusive)	Utilities/Access	Existing Potable Water Source Lot 12, Sixth Amendment to General Lease No. S-3852, (Amendment 6), CSF 24336	Mānā Water Well Lease (includes access road)	0.026

Notes: [1]See Appendix D.
Some easements above are also listed in the Kamokalā Ridge table as the feature is found in both areas.
Exclusive = The Navy uses the easement or lease exclusively.
Key: TMK = Tax Map Key.

3.8.1.4.4 Mākaha Ridge

Water

The easements and leaseholds on Mākaha Ridge support the operation of the radar site. There is no potable water service at this site. The non-potable water is provided by the State-managed Kōkeʻe system and is used for irrigation and latrine facilities. Capacity is adequate but limited due to reliance on the State's system. The wastewater system at Mākaha Ridge is comprised of septic tanks and cesspools which have no capacity issues (PMRF DPW, 2024).

Electricity

Electrical power is a combination of generated power from the Mākaha Ridge power plant and power purchased from the KIUC. The overall monthly combined use of purchased and generated power is 100,400 kW hours per month. The Mākaha Ridge electrical system infrastructure and power plant was upgraded in 2022. The operational generating capacity for the power plant is 1,820 kW. Two generators are online to support the mission. The average demand on the power plant system is 265 kW. Communications infrastructure is comprised of telephone service and wired alarm systems. Table 3.8-5 identifies the leases and infrastructure on Mākaha Ridge.

Table 3.8-5 Utility Leases and Infrastructure on Mākaha Ridge

Easement Name	*Grant Type*	*Grant Purpose*	*Description*	*Location*	*Acres*
Parcel A – Mākaha (TMK: 1-2-001-006 (por.))	Lease	Utilities/Access	Ingrant ID: 4112, 65-year State of Hawaiʻi General Lease No. S-3952 to United States of America of Parcel A land for Remote Radar Facility	Mākaha Ridge Radar Site – Parcel A (includes roads and access on site)	35.04
Parcel B – Mākaha (TMK: 1-2-001-006 (por.))	Lease	Utilities/Access	Ingrant ID: 4112, 65-year State of Hawaiʻi General Lease No. S-3952 to United States of America of Parcel B land for Remote Radar Facility	Mākaha Ridge Radar Site – Parcel B (includes a small power plant, water tanks, access roads, and other facilities)	167.05

Easement Name	*Grant Type*	*Grant Purpose*	*Description*	*Location*	*Acres*
Bore Site (TMK: 1-2-001-010)	Lease	Utilities/Access	Ingrant ID: 37080, Amendment to 65-year State General Lease No. S-3952 to United States of America for Boresight Tower Site	Boresight Tower Site (includes roads and access on site)	1.012

Key: TMK = Tax Map Key.

3.8.1.4.5 KPGO

Water

Non-potable water at KPGO is supplied by the State of Hawai'i DLNR Division of State Parks. Water is delivered to the operational facilities through a pump-assisted gravity system. There are three NASA-owned water storage tanks at KPGO on Sites A, B, and D. The tanks on Site A and Site D are used for regular water supply. The tank on Site B is used for Fire Suppression. Water is pumped from the tanks and distributed among the sites through underground water lines (NASA, 2024b).

Potable water is purchased in 5-gallon containers and stored on site.

Wastewater

Cesspools are the primary method for disposal of wastewater within the Waimea Canyon and Kōke'e State Parks and are presently utilized at all KPGO sites. KPGO wastewater disposal is part of the existing State Park system, and KPGO does not have a separate system. The only treated sewer system in the parks is located near the Kōke'e Lodge. This treatment system utilizes a leach field system with a design capacity of 12,000 gallons per day. Current utilization is approximately 3,000 to 4,000 gallons per day. The system services the Kōke'e Lodge, Kōke'e Natural History Museum, and Kōke'e Picnic Pavilion, as well as a comfort station in the camping area and 12 rental cabins. A pump station is located at the rental cabin complex to move the influent to the treatment facility. In doing so, the need for frequent pumping of the cesspools, and the potential for cesspool leakage in these areas, has been alleviated. The current system is designed to pump the influent up to the leach field for treatment. During power outages, an emergency generator is used to run the system. However, during periods of high rainfall, the leach field cannot operate properly because the ground becomes saturated (DLNR, 2014a).

At KPGO, the existing cesspools are constructed of precast concrete rings with perforations that allow effluent to infiltrate the surrounding soil and filter through a graded stone layer before reaching the subsurface. These cesspools vary in size based on wastewater volume needs, with diameters ranging from 6 to 8 feet and depths between 12 and 30 feet. A total of seven cesspools are located throughout KPGO facilities, including four at Site A, one at Site B, one at Site C, and one at Site D.

While the limestone and volcanic substrate provide some natural filtration, this method of wastewater disposal allows untreated effluent to enter the subsurface, a practice that is now considered environmentally outdated. NASA's planned replacement of cesspools with permitted septic systems will modernize wastewater management at KPGO and reduce potential risks to groundwater and surrounding ecosystems while ensuring compliance with Hawai'i Act 125 and applicable federal and State environmental regulations.

Electricity

Both parks (Kōkeʻe and Waimea Canyon) are served by electricity and communications (i.e., telephone) service. The Kōke'e Power Plant has a generating capacity of 1,450 kW and the average demand is 179 kW. NASA utilizes an average of 62,200 kW hours per month (PMRF DPW, 2024). The Kōke'e Power Plant's diesel generator provides the primary source of reliable power to Sites A, C, D, and E when range systems at KPGO are supporting range operations. Commercial power from KIUC is used for administration and general requirements, as well as when KPGO systems are not needed to support operations on the range. Electricity is provided through both overhead and underground transmission lines. These transmission lines supply power to all of the KPGO sites. Emergency diesel backup generators also provide alternate power when needed at KPGO (NASA, 2024b).

Communications

Communications infrastructure for KPGO consists of cable, fiber optics, cellular towers, and communications towers. Cellular phone service is very limited and unreliable due to lack of signal coverage. Mobile radio is available. Communication ducts with active fiber serving the Kōkeʻe powerhouse run along both sides of the road leading to a hand hole at Site A. The primary data path is an aerial (utility pole mounted) fiber that has experienced damage in the past due to severe weather (NASA, 2012).

Site C houses a 200-foot free-standing communication antenna tower and a 150-foot guyed antenna tower and communication hut. Both of these towers and associated infrastructure (building houses transmitter, receiver, and network equipment) support various PMRF, KPGO, federal, and State/County systems (NASA, 2024c).

Voice communications are handled by copper wire pairs and one cable connection. The Defense Research and Engineering Network (DREN)-type connection is not currently utilized. Use of this system would be expensive and exact costs are still being determined.

The University of Hawaiʻi manages T1 connection with Hawaiian Telcom as the local carrier. The T1 connection is an acceptable bandwidth to support operations for Satellite Laser Ranging, GNSS, and DORIS (NASA, 2012).

3.8.2 Environmental Consequences

3.8.2.1 Approach to Analysis

This analysis identifies whether there is sufficient capacity, capability, and utility infrastructure on State lands to enable Navy and NASA operations. The criteria considered to assess whether an alternative would result in potential significant impacts on utilities include the extent or degree to which an alternative would result in the following:

- Exceedance of capacity or an unreasonable demand on a utility.
- Loss or reduction of utility capacity such that demand exceeds capacity.
- Noncompliance with a permit or regulation.

3.8.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.8.2.2.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and KPGO

Under Alternative 1, there would not be any change to the infrastructure from the continued use and existing utility demands on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and KPGO. Water would continue to be supplied by the on-site wells and the municipal sources, electrical power would continue to be purchased from KIUC or supplied by Navy or NASA-operated powerplants, and wastewater would continue to be processed in accordance with current procedures.

3.8.2.2.2 Effect Summary

As described above, Alternative 1 would not result in any changes to utility infrastructure or ongoing use of water and electricity that is used to support current operations. Under this alternative, wastewater would continue to be managed pursuant to existing environmental management plans. Potable water from the Mānā Water Well would continue to undergo regular disinfection and testing. Electricity would continue to be conserved as much as possible. Alternative 1 would not result in any change to utilities. As a result, there would be no exceedance of capacity or an unreasonable demand on a utility, loss or reduction of utility capacity such that demand exceeds capacity, and no resulting noncompliance with a permit or regulation. **Therefore, effects of Alternative 1 to utilities would not be adverse or significant.**

3.8.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.8.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and KPGO

Under Alternative 2, there would not be any change to the infrastructure from the continued use and existing utility demands on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and KPGO. Effects on utilities under Alternative 2 would be identical to those described for Alternative 1. All electricity used for operations would be managed under the applicable environmental laws and regulations. Water would continue to be supplied by the on-site wells and the municipal sources, electrical power would continue to be purchased from KIUC or supplied by Navy- or NASA-operated powerplants.

3.8.2.3.2 Effect Summary

As described above, Alternative 2 would not result in any changes to utility infrastructure or ongoing use of water and electricity that is used to support current operations. Under this alternative, wastewater would continue to be managed pursuant to existing environmental management plans, and implementation of this alternative would allow for planned wastewater improvements. Potable water from the Mānā Water Well would continue to undergo regular disinfection and testing. Electricity would continue to be conserved as much as possible. Alternative 2 would not result in any change to utilities. As a result, there would be no exceedance of capacity or an unreasonable demand on a utility, loss or reduction of utility capacity such that demand exceeds capacity, and no resulting noncompliance with a permit or regulation. **Therefore, effects of Alternative 2 to utilities would not be adverse or significant.**

3.8.2.4 No Action Alternative

The No Action Alternative would require negotiating the disposal of existing utilities and infrastructure. The management, development, and maintenance of Navy-managed utilities, NASA-operated facilities, and ROWs in the ROI could potentially revert back to the State of Hawai'i in the ROI. The Navy would no longer maintain utilities and ROWs in any of the easement locations within the Project Area used to support the Navy at PMRF. NASA would no longer maintain utilities and ROWs in any of the easement locations within the ROI used to support NASA operations at KPGO. The water, wastewater, electrical, and communication distribution lines in the ROW easements within the ROI would potentially no longer be used under the No Action Alternative. Under the terms of the leases, negotiations could result in decisions to remove all infrastructure, such as powerlines, poles, transformers, waterlines, pipes, communication conduit, and other associated utility related equipment.

3.8.2.4.1 Main Base and Mānā Water Well

Potable Water

Under the No Action Alternative, Main Base would continue use and may increase its use of potable water supplied by other sources. The Navy may discontinue use of potable water from the Mānā Water Well but this would be dependent on the terms of leases and subsequent negotiations with State of Hawai'i. The Navy could no longer be able to use the well as a potable water source and would therefore either purchase water from Kaua'i County Water Department or explore other water purchasing options. In order to maintain the appropriate water pressure currently needed for operations without use of the Mānā Water Well, PMRF would need to purchase additional water. Specifically, an amount equivalent to the current pumping rate at Mānā Water Well, which is approximately 1,400 gpm. This could increase demand from Kaua'i County Water Department-supplied water. This could result in additional pumping from other Kaua'i County Water Department wells in the area to meet the need for continued operations. Other alternative sources such as treatment of surface water or rainfall catchment systems could be considered. Pending negotiations with the State of Hawai'i, the Navy could also no longer be responsible for regular maintenance, water disinfection, or improvements to the well. Therefore, the well, and all associated costs for operation and maintenance, would no longer be funded by the Navy. The Mānā Water Well and associated parts would no longer continue to be inspected regularly by PMRF personnel including no longer performing regular maintenance on the distribution equipment, as well as monitoring, water testing and analysis, and water disinfection. There could be an additional change to the quality, quantity, and accessibility groundwater resources in the form of potential increased demand for accessibility from Kaua'i County Water Department wells or other wells in the area to meet the need as a result of the implementation of the No Action Alternative, and therefore a moderate, adverse long-term effect could be expected.

Wastewater

Under the No Action Alternative, Main Base would continue use of the existing wastewater infrastructure and treatment plants. There would be no significant effects to wastewater. There is no wastewater system utility at the Mānā Water Well.

Electric

Primary electric power supplied from the KIUC, the Navy-operated power plant, and the solar array and battery energy storage system on fee simple lands at Main Base would continue to be used. Dependent on the terms of leases and subsequent negotiations with State of Hawai‘i, distribution lines could be removed. There could be short- and long-term, minor adverse effects to the electric utility system that would not be significant, because alternate sources of electricity could be obtained.

Communications

Communications infrastructure for leasehold and easement lands at Main Base including cable, fiber optics, and towers could be removed dependent on the negotiations and the terms of the leases. As a result of this removal, there could be short- and long-term, adverse effects to the electric utility system that would not be significant because there could be a temporary reduction in available service capacity.

3.8.2.4.2 Kamokalā Ridge

Under the No Action Alternative, all existing infrastructure could be removed or remain in place dependent on lease terms and negotiations with the State of Hawai‘i. Kamokalā Ridge does not have potable water or wastewater utilities and utilizes purchased electric power only. Short- and long-term, minor adverse effects on electrical and communication utilities could occur from demolition and removal of the existing infrastructure and utilities. The No Action Alternative could result in short-term to long-term, minor adverse effects to the electric utility system that would not be significant if capacity is sufficient or an alternate electricity source could be obtained. The No Action Alternative could result in long-term, moderate adverse impacts to the non-potable water lines in this area that support fire hydrants in the missile magazine area if the waterlines were no longer in place to service this area.

3.8.2.4.3 Mākaha Ridge

Under the No Action Alternative, all existing infrastructure for non-potable water, septic systems, electric, and communications could be removed or remain in place dependent on lease terms and negotiation with the State of Hawai‘i. The power plant electrical power supply could be decommissioned. Short- and long-term, moderate, adverse effects on utilities could occur from demolition and removal of the existing infrastructure and utilities, which could result in a temporary increase in water use, waste production, and electricity use.

3.8.2.4.4 KPGO

Under the No Action Alternative, all existing infrastructure could be removed or remain in place dependent on lease terms and negotiation with the State of Hawai‘i. Short- and long-term, moderate, adverse effects on utilities could occur from demolition and removal of the existing infrastructure and utilities which could result in a temporary increase in water and electricity use. There could also be a potential decrease in electricity service capacity. The No Action Alternative could result in long-term, adverse effects to utilities that would not be significant, as the existing infrastructure and utilities could be removed. Other utility users, such as those at surrounding camp sites, could be adversely affected by the removal of utilities as their access to the utilities could be reduced.

3.8.2.4.5 Effect Summary

As described above, on leasehold and easement lands at Main Base and Mānā Water Well, the No Action Alternative could result in moderate, adverse, short-term to long-term effects to potable water, because there could be a reduction of potable water capacity for PMRF and increased demand on the Kaua'i County Water Department. The No Action Alternative could result in adverse, short-term to long-term effects to electrical utility and communications services because there could be a temporary reduction in available service capacity. However, these effects may be less than significant because alternate sources of electrical and communication services may be obtained to offset the loss of capacity. No effects to wastewater utilities would be anticipated because the wastewater infrastructure at Main Base has sufficient service capacity.

There is no wastewater service at the Mānā Water Well and, therefore, no impacts to wastewater would occur there.

At Kamokalā Ridge, the No Action Alternative could result in short-term to long-term, moderate, adverse effects to the electric utility system and the non-potable waterlines that support the fire hydrants at the missile magazine area because there could be a reduction in service capacity.

At Mākaha Ridge, the No Action Alternative could result in short-term to long-term, minor, adverse effects to electric, and communication utilities because utility capacity may be reduced. If alternative sources of electrical services are obtained, the effect could be less than significant. No effects to wastewater utilities would be anticipated as the septic systems may remain in place and could still meet capacity needs for wastewater service.

At KPGO, the No Action Alternative could result in short- and long-term, moderate, adverse effects to utilities because there may be a reduction in available electrical services at KPGO and the campsites in the area.

However, alternative utility resources could be obtained to offset the loss of capacity and would not put unreasonable demand or exceed capacity of these utilities. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.9 Public Health and Safety

Public health and safety considers hazards associated with actions on State-owned lands that could affect the safety, well-being, or health of the public. Actions with this potential include activities on leaseholds or easement lands that support training and testing, ordnance transportation and storage, radar operations, and wildfire management.

3.9.1 Affected Environment

3.9.1.1 Region of Influence

The ROI with potential effects on public health and safety are the leasehold and easement areas and the ordnance and emergency transportation routes.

3.9.1.2 Regulatory Setting

Public health and safety is regulated by the State of Hawai'i, EPA, Occupational Safety and Health Administration, DoD, and the U.S. Department of Transportation (DOT). Public health and safety is managed primarily in accordance with DoD and PMRF-specific safety Instructions and U.S. DOT regulation 49 CFR parts 100-109. A list of all applicable federal, State, and local policies used to ensure public health and safety within the ROI can be found in Appendix E. A list of SOPs relevant to public health and safety at PMRF and KPGO can be found in Table 3.9-1.

Table 3.9-1 List of Standard Operating Procedures Relevant to Public Health and Safety

SOP/Instruction	*Management Actions*
PMRF SPCC Plan	• Used to prevent and control discharge of oil and oil products from non-transportation-related onshore and offshore activities into navigable Waters of the U.S. or adjoining shorelines and providing immediate response and notification should a discharge occur. • Establishes the minimum spill prevention and containment procedures, methods, appropriate containment and/or diversionary structures or equipment, and other requirements for equipment necessary to prevent and to contain discharge of oil from facilities. • Outlines visual inspection requirements of oil containers and external container surfaces. • Outlines transportation and loading requirements for oil. • Establishes Good Engineering Practices to include the use of advanced leak detection systems on all underground fuel tanks which are tested every 15 days.
Spill Response Standard Operating Procedure, ES-253	• Provide guidance, establish protocols, and support spill response actions to minimize impact to the environment. • Activates spill response and PMRF dispatch, as well as stopping chemical flow (if trained).
PMRF RCRA Contingency Plan	• Provides preparedness, prevention, and emergency procedures in order to minimize the possibility of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste into the air, soil, or surface water. • Outlines operations and maintenance procedures, fire prevention and communication equipment, testing and maintenance, local fire department information (Crash/Fire), vicinity applicability, and emergency response requirements including a quick reference guide.
PMRF Instruction 8020.15A, Ground Hazard Plan	• Provides detailed ground safety procedures to be followed before, during, and after launch operations at PMRF. • Defines GHA radius centered on each missile at the launch pad. • Establishes procedures for roadblocks and zone clearing prior to launch.
PMRF Instruction 8020.16A, Range Safety Policy	• Ensures that all launch activities are conducted in accordance with the specific plans for each operational activity. • Requires complicity with range safety critical system design and certification requirements. • Requires that technical data be provided to Range Safety in order to perform risk analysis and develop safety documentation.
PMRF Instruction 8023.1K, Ammunition Management	• Establishes policies for handling and storing ammunition. • Requires a list of personnel that have access to the magazine area at Kamokalā Ridge. • Sets forth required training and certification guidelines for personnel involved in ordnance handling.

SOP/Instruction	*Management Actions*
PMRF Instruction 8023.2K, Handling and Transportation of Ammunition, Explosives, and Hazardous Materials	• Establishes policies and procedures for handling and transporting explosives and hazardous materials. • References DOT regulations for transportation of hazardous materials. • Details specific requirements for preparation of ordnance for transport, regulations for drivers engaged in transporting hazardous materials and standards for blocking and bracing of explosives. • Provides explosive safety routes.
PMRF Instruction 3440.17B, PMRF Emergency Management Plan, Wildfire Hazards	• Requires that Crash/Fire be present at every launch and be trained in response and recovery for emergencies that involve fire or explosives. • Requires that Crash/Fire conduct rapid decontamination at incident sites. • Requires flammable vegetation in launch area to be regularly mowed and areas adjacent to pads be pre-soaked with water.
NASA SENSE Environmental Management Plan	• Describes procedures and practices to ensure long-term resource protection. • Describes environmental policy, compliance, prevention and pollution, authority and accountability, risk assessments, and emergency procedures. • Outlines waste management, hazardous waste shipment, water management, pesticides, and record keeping.

Key: DOT= Department of Transportation, GHA=Ground Hazard Area, NASA = National Aeronautics and Space Administration; PMRF= Pacific Missile Range Facility; RCRA= Resource Conservation and Recovery Act; SENSE = Space Exploration Network Services and Evolution; SPCC = Spill Prevention, Control, and Countermeasure; U.S. = United States.

3.9.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.9-2 summarizes the predictable environmental trends for public health and safety.

Table 3.9-2 Predictable Environmental Trends for Public Health and Safety

Predictable Trend	Influence on Resource
Rising global temperatures (air/ocean)	• Increased temperatures create cumulative stress on the body and increase the risk of illness and/or death from heat exposure. Increased temperatures can also cause loss of health service capacity due to heatwave-associated disruption of health facilities. • Increased temperatures could also increase the risk for more wildfires, specifically on the dry plains within the ROI.
Change in precipitation patterns	• Drought events threaten food security and access to drinking water worldwide. Drought can lead to increased wind-blown dust events, negatively affecting air quality. Floods and extreme precipitation can contaminate freshwater sources, heighten the risk of waterborne disease, and create breeding grounds for disease-causing insects (e.g., mosquitoes). These events can increase the risk of drowning, injury or illness, and property damage and disrupt medical and health services. Floods and extreme precipitation increase the risk of indoor mold and respiratory disease.

Predictable Trend	Influence on Resource
	• Increased temperatures could also increase the risk for more wildfires, specifically on the dry plains within the ROI.
Increased frequency and/or intensity of extreme weather events	• Floods and extreme precipitation can contaminate freshwater sources, heighten the risk of waterborne disease, and create breeding grounds for disease-causing insects (e.g., mosquitoes). These events can increase the risk of drowning, injury or illness, and property damage and disrupt medical and health services. Floods and extreme precipitation increase the risk of indoor mold and respiratory disease.
Rising sea levels and associated storm surge	• Sea level rise and associated storm surges increase the risk for drowning, injury, and displacement. Saltwater intrusion into groundwater basins can adversely affect safe drinking water.
Ocean acidification	• Ocean acidification increases the risk of fishery collapse, leading to food insecurity for those who rely on subsistence fishing in Hawai'i and worldwide.

Key: ROI = Region of Influence.

3.9.1.4 Existing Conditions

3.9.1.4.1 Main Base

Launch Activities

Missile launches at PMRF occur on fee simple lands and on leasehold areas at the KTF (Tract E-1, TMK: 1-2-002-025). KTF is a launch facility operated by Sandia National Laboratories for the DOE. It is located on the north end of the fee simple parcel of PMRF, situated partially on leasehold lands. Hazardous operations at launch sites include missile launches, movement of ordnance, and transportation of fuel and oils.

Tract E-1 (TMK: 1-2-002-025) contains a missile assembly building, a generator building, fuel tanks, and a portion of the KTF launch missile assembly area. All missile launches conducted on leaseholds or fee simple lands are performed pursuant to PMRF Instruction and SOPs including ordnance safety, pre-launch and hazardous operations control, ordnance handling and storage facilities, liquid fuels storage and handling, and launch pad operations. Ordnance components used in launching activities are stored in explosive storage magazines on fee simple land, except when needed for processing, assembly, and launch. The movement of explosives and other hazardous materials between PMRF and KTF Tract is conducted in accordance with PMRF Instruction 8023.2K, *Handling and Transportation of Ammunition, Explosives, and Hazardous Materials* and PMRF Instruction 8020.16A, *Range Safety Policy*. All launch areas are excluded from the public at all times through perimeter fencing and restrictive access at installation gates.

Range Safety

Public health and safety is paramount during the planning and execution of missile launch activities at PMRF. The PMRF Range Control Branch (commonly known as "Range Safety") establishes and enforces

safety restrictions related to explosives, physical impact, and electromagnetic hazards and potential hazards from chemical contamination, ionizing and non-ionizing radiation, and radioactive materials. Potential issues related to health and safety include mishaps during the transportation of missile components, toxic and explosive risks during missile integration and assembly, mishaps during handling, and launch associated debris and emissions.

Missile launches by nature involve some degree of risk, and it is for this reason that the DoD and PMRF have specific launch and range safety policies and procedures to ensure any potential risk to the public is minimized. Range Safety conducts surveillance, clearance, and real-time range safety precautions before, during, and immediately after launch events. The Range Safety Approval and the Range Safety Operation Plan documents are required for all weapons systems at Main Base. To protect people from injury from either nominal launches or accidents, two primary mitigation measures are in place: flight termination and establishment of GHAs.

Flight Termination

The Flight Safety Officer performs flight termination if a missile malfunctions and leaves a predefined region or violates other predefined mission rules. The Missile Flight Safety Officer monitors, in real-time, missile performance and evaluates flight termination criteria. The Flight Termination System (FTS) provides a mechanism to protect the public with very high reliability—it is designated to activate a destruct command in the unlikely case of a missile malfunction.

Ground Hazard Areas

The GHA is an area that may be at risk from missile failure very early in flight. PMRF Instruction 8020.16A and 8020.15A, *Ground Hazard Plan* require that a GHA must be established before the commencement of any launch activities. To ensure that the public is excluded from any area that would be at risk from an errant missile, PMRF activates the restrictive easement on lands adjacent to PMRF which make up a portion of the GHA. The GHAs are determined by size and flight characteristics of the missile, individual flight profile of each exercise or flight test, and reaction time between recognition of a flight malfunction and the decision to terminate flight. Any failure of the missile system that would cause potentially hazardous debris to fall outside the GHA would be detected by the Missile Flight Safety Officer, who would terminate the missile flight before it could escape the hazard boundary. To further minimize the potential for launch associated hazards, PMRF has a Missile Accident Emergency Team assembled for all launches and on-call status for PMRF launches. SOPs for implementing GHAs can be found in Table 3.9-1.

Air Traffic Control

Use of the airspace by the FAA and PMRF is established by a Letter of Agreement between the two agencies. Under this agreement, PMRF is required to notify the FAA by 2:00 p.m. the day before range operations would infringe on a designated airspace. The Range Control Branch and the FAA are in direct, real-time communication to ensure the safety of all aircraft using the airways, jet routes, and special use airspace. All launches are scheduled to ensure implementation of the *Ground Hazard Plan*.

Ordnance Management

Ordnance management and safety includes procedures to prevent premature, unintentional, or unauthorized detonation of ordnance. Ordnance is temporarily stored at the missile assembly building

before launch activities. In accordance with DoD and Navy ordnance storage standards, PMRF has defined ESQD arcs that represent the prescribed minimum distance between sites storing explosive material and specified locations (e.g., inhabited buildings, public highways) to afford an acceptable degree of protection and safety. The size of the ESQD arc is proportional to the net explosive weight present and is incorporated into GHA calculations. Some ESQD arcs overlay portions of easement lands that are adjacent to Main Base, while other ESQD arcs are contained entirely within fee simple land.

Per PMRF Instruction 8020.16A, all programs require an Explosive Safety Approval before ordnance is allowed on PMRF or used on a test range. This approval addresses all relevant details such as characteristics of missiles or explosives, procedures for surveillance and controlled access, safety personnel, and proper handling of ordnance.

Fuel and Oil Storage

Fuel and oil are stored on Tract E-1 (TMK: 1-2-002-025). The fuel and oil storage tanks are above ground and are equipped with appropriate secondary containment devices. Fuels and oil on leasehold areas are discussed in greater detail in Section 3.12, *Hazardous Materials and Waste.*

Transportation Safety

Ordnance

Ordnance is transferred either directly to PMRF by air or by truck via Port Allen. Barges carrying ordnance to Port Allen are met by trained ordnance personnel and special vehicles for transit and delivery to PMRF via Highway 50 (Figure 3.9-1). Ordnance is transported in accordance with PMRF Instruction 8023.2K and U.S. DOT regulation 49 CFR parts 100–109.

Missile components, including any propellant, are transported in U.S. DOT and military designed and approved shipping containers. ESQDs that move with the transport vehicle are established along transportation corridors as applicable. On arrival at PMRF, support equipment is placed in secure storage until assembly and launch preparation and ESQDs are established around ordnance storage and Missile Assembly Buildings. Access to storage and support facilities is limited to trained and authorized PMRF/mission critical personnel. No mishaps involving the use or handling of ordnance have ever occurred on State lands in the ROI.

Liquid Propellant

All commercial tank truck transporters of oil or liquid propellants to and from PMRF are required to follow site-specific safety procedures and follow the minimum requirements and regulations established by the U.S. DOT regulation 49 CFR parts 100–109 and Instruction 8023.2K. Even in the event of a transportation accident, there is an extremely high probability that solid propellants would not be ignited, and if so, the probability of an explosion is extremely remote. The solid propellants would release combustion products, specifically hydrogen chloride, which would irritate the eyes and skin of people nearby. All commercial tank truck transporters of oil or liquid propellants to and from PMRF are required to follow site-specific safety procedures and follow the minimum requirements and regulations established by the U.S. DOT. In the event of an unintentional release or propellant mishap during transportation, PMRF has developed comprehensive response procedures, per the SPCC Plan and the Spill Response SOP. The spill response procedure (dependent on the size and quantity of the spill) is summarized below.



Figure 3.9-1 Ordnance Transport, Emergency Medical Services Route, and Landfill

1. Immediately notify PMRF dispatch of any propellant spills into the environment, including into navigable waters (within 10 minutes of discovery) for any quantity of spill. Notify the emergency response personnel of the nature and location of the spill.
2. If possible, determine the cause of the propellant spill and stop further spillage. Prevent the diluted/neutralized propellant from running off into storm drains, sewers, streams, and other areas by building dikes with absorbent and/or inert materials or spill pillows.
3. Notify the Hawai'i State Emergency Response Commission (through the Hazard Evaluation and Emergency Response Office) within 30 minutes of discovery if there is a release into the environment of a hazardous substance that is equal to or exceeds the minimum reportable quantity in any 24-hour period as set forth in the regulations.

Fire Protection and Medical Services

PMRF provides fire protection, firefighting services, base safety programs, emergency, and basic life support services at PMRF. Under a MOA between Crash/Fire and Rescue and the City and County of Kaua'i Fire Department, Crash/Fire and Rescue provides firefighting services to the County on non-DoD use lands. Personnel are trained to respond to activities in support of airfield operations, hazardous material incidents, confined space rescue, hypergolic fuel releases, structural and brush firefighting, fire prevention instruction, and fire inspections. More extensive emergency medical services are available from the West Kaua'i Medical Center in Waimea 10 miles from the PMRF main gate (see Figure 3.9-1).

PMRF ensures that launch areas are maintained free of flammable vegetation and therefore have minimal fire potential. Non-native areas are regularly mowed, areas adjacent to pads are pre-soaked with water prior to a launch, and fire and emergency service crews are present at every launch.

Emergency mitigation plans for leasehold and easement lands are shared with all PMRF staff. The Navy is willing to share any emergency management plan that pertains to non-DoD staff on request, as permitted.

Other

South of the fee simple land, a former landfill is located in close proximity to leasehold land. There are no materials that could be considered hazardous to the public in the former landfill, and all combustible items were incinerated prior to burial. Near the former landfill site, PFAS were identified in the soil and groundwater at a former firefighting training site. A discussion on the PFAS site and former landfill can be found in Section 3.12, *Hazardous Materials and Waste*. The DOH is aware of the presence of PFAS in this area and a Remedial Investigation is anticipated to begin in Fiscal Year 2026. The area is off limits to the public.

3.9.1.4.2 Kamokalā Ridge

Kamokalā Ridge provides ordnance storage for the Navy, Hawai'i Air National Guard, DOE, and other military commands. The site consists of 12 ordnance storage magazines that have been excavated into the cliff face of Kamokalā Ridge. The health and safety concerns for Kamokalā Ridge are associated with the transfer and storage of ordnance. Operational sites, including roadways to access utilities, are on leasehold or easement lands. All ordnance is transported in accordance with PMRF Instruction 8023.1K, *Ammunition Management*, and U.S. DOT regulations 49 CFR parts 100–109. To ensure public health and

safety, the Kamokalā Magazines, and all land that lies within the magazine ESQD arc, is surrounded by perimeter fencing.

Kamokalā Ridge also serves as the tsunami evacuation muster point for PMRF personnel[60]. Additionally, decommissioned caves at Kamokalā Ridge would be used to shelter PMRF staff and civilians living adjacent to the base in the event of an emergency.

3.9.1.4.3 Mānā Water Well

The Mānā Water Well is the main potable water source for PMRF and located on leasehold lands. Activities on leasehold lands include maintenance and use of the Mānā Water Well. SOPs are followed for well maintenance and water testing. There are no operational activities at this site that affect public health and safety.

3.9.1.4.4 Mākaha Ridge

The leaseholds and easement portions of Mākaha Ridge support secondary missile tracking and surveillance at the Mākaha Ridge Tracking Station. This area utilizes tracking radars, command and control facilities, communication buildings, and various base support facilities, including an emergency power generation system. Activities on easement lands at Mākaha Ridge include roadways to and around the features. Due to the sensitivities of the technology, steepness of the terrain, and ongoing erosion at Mākaha Ridge, public access is restricted at this location.

The main hazard to personnel at Mākaha Ridge is due to the Electromagnetic Radiation (EMR) zones around transmitter sites and tracking radars. High-density electromagnetic power may constitute a hazard to personnel (Hazards of Electromagnetic Radiation to Personnel [HERP]) or fuels (Hazards of Electromagnetic Radiation to Fuels [HERF]). As directed by Navy procedures, PMRF uses a combination of safety zones and sector blanking (a feature that prevents radar from transmitting to unwanted angles/reflections and improves accuracy) in order to avoid potential EMR exposure. The Navy conducts regular radiation hazard surveys every 5 years and before any modifications to a unit are made or when new radar equipment is installed. In addition, all radar units have red (radar unit is on) and blue (radar unit is emitting EMR) warning lights. EMR generated from radar units at Mākaha Ridge do not expose the public to any hazardous radiation.

An analysis of EMR, HERP, and Hazards of Electromagnetic Radiation to Ordnance (HERO) at PMRF was completed in September 2020, and a radiation hazard control certification was granted for all sites containing radar (Dahlgren, 2020).

The Navy helps maintain a firebreak within the Pu‘u Ka Pele Forest Reserve, which includes Mākaha Ridge. The PMRF Brush and Wildland Firefighting Plan, which establishes procedures for firefighting, also includes Mākaha Ridge. This plan is publicly available and can be found on the EIS website (https://pmrf-kpgo-eis.com/documents/).

[60] The coastal location and low elevation of the fee simple portion of Main Base make this area susceptible to tsunamis and tidal waves, and some portions are within the tsunami evacuation area. Several tsunamis have occurred in the past 70 years; the most damaging occurring in 1946 when a wave inundated an area of the Main Base.

3.9.1.4.5 Miloliʻi Ridge

Activities at Miloliʻi Ridge include the passive use of the frequency shift reflectors (a specific type of antenna system) to support radar calibration for instrumentation on Mākaha Ridge. The reflectors are located on small parcels of leasehold lands at the end of Miloli'i Ridge, well beyond the proximity of publicly traveled roadways. Base personnel access this site to maintain or replace the shift reflector batteries as needed (approximately every 5 years).

3.9.1.4.6 KPGO

The Navy holds a Use Permit and MOA with NASA for portions of KPGO to utilize NASA's facilities for the purpose of conducting PMRF mission support with radar, telemetry, and communications services at the NASA facilities. On NASA portions of KPGO, early warning data on global (and Hawaiian) sea level change, earthquakes, volcano deformation, flooding patterns, and glacier dynamics is collected through radar and other appropriate instrumentation.

Public access is restricted at this location, minimizing effects to the health and safety of the public. The main concerns regarding health and safety at KPGO are HERP or HERF due to the EMR zones around transmitter sites and tracking radars. Due to access restrictions, the public is not exposed to any unsafe EMR levels. KPGO uses the same combination of safety zones and sector blanking (a feature that prevents radar from transmitting to unwanted angles/reflections and improves accuracy) to avoid potential EMR exposure to personnel as mentioned above.

NASA operations at KPGO do not generate ionizing radiation. The facility operates ground-based antennas for satellite communication and tracking, which emit non-ionizing radiofrequency energy similar to other communications facilities. Emissions are intermittent (only during satellite passes), and are conducted in compliance with Federal Communications Commission, National Telecommunications and Information Administration, and DoD exposure standards. Radiofrequency exposure above regulatory limits is confined to restricted areas immediately adjacent to transmitting antennas. No hazardous levels extend into publicly accessible areas, including lands at Kōkeʻe State Park. Other potential hazards are limited to routine occupational and facility safety considerations (e.g., electrical or mechanical risks), which are managed under established NASA safety programs. Accordingly, KPGO operations pose no ionizing radiation risk and no adverse effects to park visitors or surrounding communities.

Fuels and lubricating oils are stored at KPGO. Storage tanks are above ground and are equipped with appropriate secondary containment devices; the fuels and oils at KPGO are discussed in greater detail in Section 3.12, *Hazardous Materials and Waste*.

KPGO has an on-site fire suppression system, and all other emergency and response services would be provided by the Kauaʻi Fire Department, located approximately 18 miles south of KPGO in Waimea. In the event of an emergency, the Kauaʻi Fire Department provides fire protection and suppression, hazmat and emergency medical services (basic life support), and various types of pre-fire planning for KPGO (County of Kauaʻi, 2024). The closest medical facility is West Kauaʻi Medical Center, located approximately 18 miles south of KPGO (see Figure 3.9-1).

3.9.2 Environmental Consequences

3.9.2.1 Approach to Analysis

The analysis considers the types of activities, introduction of new health or safety risks, locations of hazardous operations and activities with respect to proximity to the public, and adequacy of established safety-related planning and procedures.

The criteria considered to assess whether the Proposed Action would result in potential significant effects to public health and safety is the extent or degree to which the Proposed Action:

- Violates applicable regulations and policies designed to prioritize public health and safety.
- Substantially increases or introduces wildfire risks within the ROI.
- Causes imminent or chronic human health and increases safety risks.

3.9.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.9.2.2.1 Main Base

Under Alternative 1, there would be no change in missile launching activities conducted on PMRF. All launch activities would continue to operate under strict adherence to range operation guidance pertaining to ordnance safety, pre-launch and hazardous operations control, and ordnance handling and storage facilities. Ordnance movement would continue to follow PMRF Instruction 8023.1K and 8023.2K. Range Safety would continue to enforce safety restrictions during launch activities including the establishment of appropriate safety zones via the use of restrictive easements. Real-time surveillance would also continue through the use of Flight Termination as discussed in the 2008 Hawaii Range Complex Final EIS/OEIS. Fuel and oil would continue to be stored on Tract E-1 (TMK: 1-2-002-025), and applicable SOPs[61] would stay in place in order to minimize any unintentional release of fuel or oil (see Table 3.9-1). All commercial tank truck transporters of oil or liquid propellants to and from PMRF would continue to follow site-specific procedures and U.S. DOT regulations 49 CFR parts 100–109.

Under Alternative 1, ordnance management and safety procedures will continue to be followed to prevent any premature, unintentional, or unauthorized detonation of ordnance. ESQD arcs would continue to be implemented where ordnance is located, and some arcs will continue to overlay easement lands adjacent to Main Base. Any ordnance transported from Port Allen would be conducted by trained ordnance personnel and in accordance with PMRF Instruction 8023.2K and U.S. DOT regulation 49 CFR parts 100–109. Any ordnance component would continue to be shipped in specialized containers that absorb the shock required to cause an explosion.

PMRF would continue to provide fire protection, firefighting services, base safety programs, emergency, and basic life support services at PMRF. PMRF would uphold the MOA between Crash/Fire and Rescue and the City and County of Kaua‘i Fire Department for firefighting services and would continue to respond to medical or wildfire-related emergencies outside of the PMRF. Launch areas would also continue to be maintained to ensure minimal fire potential.

[61] The SOPs are procedures that the Navy and/or NASA currently implement to minimize risk and reduce the effects of designated activities, functions, or processes that would cause an adverse effect to public health and safety.

3.9.2.2.2 Kamokalā Ridge

Under Alternative 1, the activities, infrastructure, and types and amounts of ordnance and hazardous materials stored and used at Kamokalā Ridge would be identical to existing conditions. As such, there would be no new or additional effects to public health and safety.

Kamokalā Ridge would also continue to serve as tsunami evacuation site for PMRF personnel.

3.9.2.2.3 Mānā Water Well

Under Alternative 1, there would continue to be no public health and safety issues associated with ongoing operations in this leasehold area. Activities at the Mānā Water Well would continue to be comprised of well maintenance, water disinfection, and use as the main source of drinking water for PMRF.

3.9.2.2.4 Mākaha Ridge

Under Alternative 1, there would be no change in the type of tracking or surveillance activities at this site. Regular radiation hazard surveys would continue to be implemented to ensure that safety systems in place are operational (such as warning lights when EMR is being emitted) as discussed in the 1998 PMRF Enhanced Capability Final EIS (see Table 3.1-4).

3.9.2.2.5 Miloli'i Ridge

Under Alternative 1, activities at Miloliʻi Ridge would continue to have no effects to the health and safety of the public. Activities at Miloliʻi Ridge would continue to be comprised of access by base personnel to maintain the shift reflector batteries as needed.

3.9.2.2.6 KPGO

Under Alternative 1, there would be no change in operations at this site. Safety precautions relating to EMR, HERP, and HERO would be the same as described above. Fuel and oils on site would continue to be stored in accordance with the appropriate and relevant SOPs. Additionally, restricted access to the area would continue to decrease risk and limit effects to public health and safety. State and County departments would continue to provide firefighting, police, and medical services to, and within areas proximate to KPGO. The Use Permit held between the Navy and NASA would continue to allow Navy use of KPGO facilities for PMRF mission support by providing radar, telemetry, and communications services at the NASA facilities. NASA operations would continue to provide early warning data on global (and Hawaiian) sea level change, earthquakes, volcano deformation, flooding patterns, and glacier dynamics.

3.9.2.2.7 Effect Summary

Alternative 1 would result in minor, potential adverse effects to public health and safety from the ongoing use and storage of fuels and oils, missile assembly, ordnance storage and movement, and radar operations on leasehold and easement lands at Main Base, Kamokalā Ridge, Mākaha Ridge, and KPGO. There would be no effects at Mānā Water Well or Miloliʻi Ridge. Alternative 1 would also result in minor, short- and long-term beneficial effects to public health and safety as NASA would continue to collect critical weather data. The ongoing implementation of current mitigation measures (see Table 3.1-4) and SOPs (see Table 3.9-1) would occur under Alternative 1. In addition, Enhanced Engagement-6 (Chapter 5,

Table 5.2-1) would increase public health and safety by improving closure protocol and public notification during launch activities and minimize accidental trespass from adjacent land. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, applicable regulations and policies designed to prioritize public health and safety would continue to be implemented so that there would be no change to imminent or chronic human health and safety risks or increased wildfire risk within the ROI. **Therefore, effects of Alternative 1 on public health and safety would be adverse but would not be significant.**

3.9.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.9.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 2, there would be no change to existing conditions resulting from the transfer of ownership of leasehold lands to Navy or NASA. All site-specific SOPs and Instructions in Table 3.9-1 would be implemented under fee simple acquisition of the land, and so guidelines pertaining to public health and safety would be identical to those described above for Alternative 1. Therefore, effects to public health and safety on leasehold and easement lands under Alternative 2 would be the same as Alternative 1.

3.9.2.3.2 Effect Summary

As described above, Alternative 2 would result in minor, long-term, adverse effects to public health and safety from the ongoing use and storage of small amounts of hazardous materials, storage of fuels and oils, missile assembly, ordnance storage and movement, and radar operations at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge, and KPGO. There would be no effects at Mānā Water Well or Miloliʻi Ridge. Effects to public health and safety under Alternative 2 would be identical to those described for Alternative 1 as they are not changed by land acquisition method. The ongoing implementation of current mitigation measures (see Table 3.1-4) and SOPs (see Table 3.9-1) would occur under Alternative 2. In addition, Enhanced Engagement-6 (Chapter 5, Table 5.2-1) would increase public health and safety by improving closure protocol and public notification during launch activities and minimize accidental trespass from adjacent land. There would be no change to current operations or activities on the former leasehold and easement lands under Alternative 2. As a result, applicable regulations and policies designed to prioritize public health and safety would continue to be implemented so that there would be no change to imminent or chronic human health and safety risks or increased wildfire risk within the ROI. **Therefore, effects of Alternative 2 to public health and safety would be adverse but would not be significant.**

3.9.2.4 No Action Alternative

3.9.2.4.1 Main Base

Under the No Action Alternative, the Navy would no longer maintain use of leasehold lands and the easement lands adjacent to Main Base. Without the ability to utilize the airspace or activate restrictive easements to implement the GHA or ESQD arcs, launch activities could be severely restrained. Ordnance would no longer be stored at the missile assembly building on Tract E-1 (TMK: 1-2-002-025) due to the range of the established ESQD arcs over leasehold and easement lands and would therefore be

transported to another appropriate holding facility on lands under Navy jurisdiction. Vehicles and personnel responsible for moving ordnance would follow PMRF Instruction 8023.1K and 8023.2K.

Under the No Action Alternative, some or all existing infrastructure could be removed or remain in place. Fuel and oil on the leasehold portion of Main Base could be removed and moved to another appropriate holding site on lands under Navy jurisdiction according to the U.S. DOT regulation 49 CFR parts 100–109 and the SPCC. If, during infrastructure removal, emerging contaminants that increase risk to public health and safety are found, the removal process could be similar to what is described for Alternative 1. All the details regarding the relocation of ordnance, fuel and oil, infrastructure removal on Tract E-1 (TMK: 1-2-002-025), and management of the landfill and PFAS sites are presently unknown and are subject to negotiations between the Navy and the State.

Under this alternative, the Navy would lose access to roads on easements that lead to a secondary access gate used for ensuring a safe ordnance route to and from the Main Base. In order to maintain ordnance transportation safety standards, all vehicular access through the main gate would be restricted during active ordnance transfer, including vehicles in need of access to the base in case of an emergency.

The Navy would no longer monitor wildfire risk, assess daily fire danger, or reduce natural fuels (such as dry grasses) on the leasehold and easement lands. A decrease in missile launch activities would decrease the wildfire hazards associated with military activity; however, the SOPs discussed above greatly reduce the chance of a launch-related (or non-launch-related) wildfire under normal operations. Loss of road access and infrastructure would reduce the ability for PMRF to permit and coordinate training and other activities for State and County emergency service agencies and restrict PMRF from providing community services that extend beyond the PMRF boundary, such as wildfire fighting support.

3.9.2.4.2 Kamokalā Ridge

Under the No Action Alternative, the Navy would no longer maintain use of leasehold and easement lands for ordnance storage, ordnance transportation, and as a tsunami muster area. Due to the loss of safety and buffer areas on easement lands, ordnance could no longer be stored at Kamokalā Ridge and would be removed from the site and relocated. Vehicles and personnel responsible for moving ordnance would follow PMRF Instruction 8023.2K and U.S. DOT regulation 49 CFR parts 100–109.

Under the No Action Alternative, some or all existing infrastructure could be removed or remain in place. If, during infrastructure removal, emerging contaminants that increase risk to public health and safety are found, the removal process could be similar to what is described in Alternative 1. All the details regarding infrastructure removal and the relocation of ordnance at Kamokalā Ridge are presently unknown and are subject to negotiations between the Navy and the State.

Under the No Action Alternative, the Navy would relocate the tsunami muster point. The new location would continue to meet the recommended elevation and distance requirements for tsunami evacuation routes. Additionally, decommissioned caves at Kamokalā Ridge would be used to shelter PMRF staff and civilians living adjacent to the base in the event of an emergency.

3.9.2.4.3 Mānā Water Well

Under the No Action Alternative, the Navy would no longer maintain use of the Mānā Water Well, which provides the majority of the water for PMRF. Under this alternative, the use or removal of the Mānā Water Well and associated infrastructure would be negotiated between the Navy and the State. Depending on negotiation terms, the Navy would either purchase water from the State or explore other water purchase options in the area.

3.9.2.4.4 Mākaha Ridge

Under the No Action Alternative, the Navy would lose access to Mākaha Ridge and would need to relocate equipment to be able to calibrate instrumentation and antennas that are used to ensure safety on the ranges located on fee simple parcels. As a result, launching operations would be severely reduced.

Under the No Action Alternative, some or all existing infrastructure could be removed or remain in place. Fuel and oil would be transported from Mākaha Ridge to a site on fee simple property or another appropriate holding site according to the U.S. DOT regulation 49 CFR parts 100–109 and the SPCC. If, during infrastructure removal, emerging contaminants that increase risk to public health and safety are found, the removal process would be similar to what is described in Alternative 1. All the details regarding infrastructure removal and the relocation of fuel and oil at Mākaha Ridge are presently unknown and are subject to negotiations between the Navy and the State.

3.9.2.4.5 Miloli‘i Ridge

Under the No Action Alternative, the Navy would no longer be able to operate or service the frequency shift reflectors on Miloli‘i Ridge. Without the support of these antennas, in addition to the loss of access to the tracking center at Mākaha Ridge, the capabilities of missile tracking systems would be affected, which could result in a decrease in launch operations.

Under the No Action Alternative, some or all existing infrastructure could be removed or remain in place. If, during infrastructure removal, emerging contaminants that increase risk to public health and safety are found, the removal process would be similar to what is described in Alternative 1. All the details regarding infrastructure removal at Miloli‘i Ridge are presently unknown and are subject to negotiations between the Navy and the State.

3.9.2.4.6 KPGO

Under the No Action Alternative, the Navy would lose access to the tracking radars and telemetry systems on the Permit Use Areas at KPGO, resulting in ineffective data collection during launch operations. Without the support of the tracking radar, the capability of missile tracking systems would be affected, which could lead to a reduction in launch operations. NASA could no longer collect geodetic data at this site, which would severely affect collection of early warning data on global (and Hawaiian) earthquakes, flooding patterns, volcano deformation, sea level change, and glacier dynamics.

Under the No Action Alternative, some or all existing infrastructure could be removed or remain in place. Fuel and oil would be transported from KPGO to Navy fee simple land or another appropriate holding site according to the U.S. DOT regulation 49 CFR parts 100–109 and the SPCC. All the details

regarding the relocation of fuel and oil and infrastructure removal at KPGO are presently unknown and are subject to negotiations between NASA and the State.

Local departments would continue to provide firefighting, police, and medical services to, and within areas proximate to, KPGO.

3.9.2.4.7 Effect Summary

The No Action Alternative could result in potential minor to moderate, short-term, adverse effects to public health and safety on leasehold and easement lands at Main Base, Kamokalā Ridge, and KPGO as hazardous materials such as fuel, oil, and ordnance would no longer be stored or used on leaseholds or easement land and would need to be transported to another appropriate holding site. The removal and transportation of ordnance from both Kamokalā Magazines and the missile assembly building on Tract E-1 (TMK: 1-2-002-025) to fee simple land or another appropriate holding site could temporarily increase the risk to public health and safety during transport; however, this could be greatly reduced by BMPs, and the possibility of unintentional detonation is extremely unlikely. There would be no effects at the Mānā Water Well. Without access to the telemetry and missile tracking infrastructure on Mākaha Ridge, missile launches could be substantially decreased. Radar operations and associated hazards with EMR could also decrease on leasehold and easement lands at Main Base, Mākaha Ridge, and KPGO. NASA could no longer collect geodetic data at this site, so early warning data on global (and Hawaiian) sea level change, earthquakes, volcano deformation, flooding patterns, and glacier dynamics could be impacted. The Navy would no longer manage wildfire risk, assess daily fire danger, or reduce natural fuels (such as dry grasses) on the leasehold and easement lands. As details regarding the State's potential management of these lands are not known, the potential risk to public health and safety cannot be quantified**. Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.10 Air Quality and Greenhouse Gases

Air quality is defined by atmospheric concentrations of specific air pollutants the U.S. EPA determined may affect the health or welfare of the public. The major air pollutants of concern, criteria air pollutants, are carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, particulate matter, and lead. The concentration of various pollutants in the atmosphere defines the air quality in a region or a specific location. Many factors influence a region's air quality, including the type and quantity of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. Most air pollutants originate from human-made sources, including mobile sources (e.g., aircraft, cars, trucks, buses) and stationary sources (e.g., factories, refineries, power plants), as well as indoor sources (e.g., some building materials and cleaning solvents). Natural sources, such as volcanic eruptions and forest fires, also release pollutants into the air.

3.10.1 Affected Environment

3.10.1.1 Region of Influence

The ROI for air quality analysis is Kaua‘i County. With regard to HEPA’s requirement to analyze GHGs, the ROI for GHGs is global (see Figure 3.1-2).

3.10.1.2 Regulatory Setting

3.10.1.2.1 Federal

Under the authority of the Clean Air Act (CAA) and subsequent amendments, the EPA has divided the country into geographical regions known as air quality control regions to evaluate compliance with the criteria pollutant National Ambient Air Quality Standards (NAAQS). In accordance with CAA requirements, the air quality in each air quality control region is measured by the concentration of these pollutants in the ambient air, and their concentrations are evaluated against the NAAQS. If the air quality in a geographic area meets or exceeds a national standard, it is called an “attainment” area for that criteria pollutant (designated attainment or attainment/unclassifiable); areas that do not meet the NAAQS are designated “nonattainment” areas. For some criteria pollutants, there are degrees of nonattainment. For example, ozone (O_3) nonattainment areas are further classified from marginal nonattainment to extreme nonattainment.

In some cases, the EPA is not able to determine an area’s status, usually due to a lack of available monitoring data; those areas are designated as unclassifiable. Once designations take effect, state and local governments with nonattainment areas must develop State Implementation Plans outlining how areas will attain and maintain the NAAQS by reducing air pollutant emissions. If air quality improves in a region that is classified as nonattainment, and the improvement results in the region meeting the criteria for classification as attainment, then that region is reclassified as a “maintenance” area.

Federal actions are required to conform with the approved State Implementation Plan for those areas of the U.S. designated as nonattainment or maintenance areas for any criteria air pollutant under the CAA (40 CFR section 93.158). The purpose of the General Conformity Rule is to ensure that applicable federal actions, such as the Proposed Action, would not cause or contribute to a violation of an air quality standard and that the Proposed Action would not adversely affect the attainment and maintenance of any NAAQS.

3.10.1.2.2 State and Local

Hawai‘i has been granted the authority to implement and enforce its own air quality programs in accordance with federal standards. The DOH Clean Air Branch (CAB) is responsible for air pollution control in the State. Air pollution requirements are implemented through HAR, Title 11, Chapter 60.1. The State of Hawai‘i has established ambient air quality standards for the six criteria pollutants and a State standard for hydrogen sulfide. Permits are required for Covered and Noncovered emission sources. Mobile sources are exempt from permit requirements.

Table 3.10-1 presents the current NAAQS and Hawai‘i Ambient Air Quality Standards for criteria pollutants.

Table 3.10-1 Federal and State Ambient Air Quality Standards

Air Pollutant	*Averaging Time[1]*	*Hawai'i Standard*	*Federal Primary Standard[2]*	*Federal Secondary Standard[3]*
Carbon monoxide (CO)	1-hour[5]	9 ppm	35 ppm	None
	8-hour[5]	4.4 ppm	9 ppm	None
Nitrogen dioxide (NO_2)	1-hour[6]	None	100 ppb	None
	Annual[7]	0.04 ppm	53 ppb	Same as primary
Particulate matter less than or equal to 10 microns in diameter (PM_{10})	24-hour[8]	150 µg/m^3	150 µg/m^3	Same as primary
	Annual[9]	50 µg/m^3	None	None
Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$)	24-hour[10]	None	35 µg/m^3	Same as primary
	Annual[11]	None	9 µg/m^3	15 µg/m^3
Ozone (O_3)	8-hour[12]	0.08 ppm	0.070 ppm	Same as primary
Sulfur dioxide (SO_2)	1-hour[13]	None	75 ppb	None
	3-hour[5]	0.5 ppm	–	0.5 ppm
	24-hour[5]	0.14 ppm	None	–
	Annual[7]	0.03 ppm	None	–
Lead (Pb)	3-month	1.5 µg/m^3 [4]	0.15 µg/m^3	Same as primary
Hydrogen sulfide (H_2S)	1-hour[5]	25 ppb	None	None

Key: ppb = parts per billion, ppm = parts per million, µg/m^3 = micrograms per cubic meter.

Notes: [1]Short-term standards are designed to protect against acute or short-term effects, while long-term standards were established to protect against chronic effects.
[2]Primary Standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly.
[3]Secondary Standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.
[4]The State standard is based on calendar quarter.
[5]May not be exceeded more than once per year.
[6]The 3-year average of the 98th percentile daily maximum 1-hour averages must not exceed the standard.
[7]Average of all 1-hour values in the year may not exceed the level of the standard.
[8]Must not be exceeded more than 1 day per year, after compensating for days when monitoring did not occur (estimated number of exceedances).
[9]Average of all 24-hour values in the year may not exceed the level of the standard.
[10]The 3-year average of the 98th percentile 24-hour concentrations must not exceed the level of the standard.
[11]The 3-year average of 24-hour values must not exceed the level of the standard.
[12]The 3-year average of the fourth highest daily maximum value must not exceed the level of the standard.
[13]The 3-year average of the 99th percentile daily maximum 1-hour averages must not exceed the standard.
[14]Average of all 24-hour values in any rolling 3-month period may not exceed the level of the standard.

Sources: EPA, 2024b; DOH, 2023.

3.10.1.2.3 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are pollutants for which there are no NAAQS but are still regulated under the federal CAA because of their potentially adverse effects on human health and the environment. Also known as "air toxics," these pollutants are composed of a wide array of organic and inorganic compounds (e.g., formaldehyde, 1 acetaldehyde, benzene, toluene, acrolein, 1,3-Butadiene, xylene, lead, naphthalene, and propionaldehyde).

People exposed to toxic air pollutants at sufficient concentrations and durations may have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility),

developmental, respiratory, and other health problems. In addition to exposure from breathing air toxics, some toxic air pollutants such as mercury can deposit onto soils or surface waters, where they are taken up by plants and ingested by animals and are eventually magnified up through the food chain (EPA, 2024a).

See Appendix E for a list of applicable regulations related to Air Quality and GHGs.

3.10.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.10-2 summarizes the predictable environmental trends for air quality and GHGs.

Table 3.10-2 Predictable Environmental Trends for Air Quality and Greenhouse Gases

Predictable Trend	*Influence on Resource*
Rising global temperatures (air/ocean)	• Meteorology over the U.S. is expected to change in several ways that will directly degrade air quality. For example, ozone levels are higher on warm, sunny days because the chemical reactions that produce ozone speed up with temperature and sunlight (USGCRP, 2023). • The frequency and severity of wildfires are increasing, which will degrade air quality. Wildfires emit $PM_{2.5}$ and other air pollutants, including VOCs, NO_x (which contribute to O_3 generation in plumes), and toxic gaseous and particulate species (USGCRP, 2023).
Change in precipitation patterns	• Increasing precipitation may remove $PM_{2.5}$ from the atmosphere. In contrast, greater humidity is expected to worsen $PM_{2.5}$ air quality in some regions (USGCRP, 2023).
Increased frequency and/or intensity of extreme weather events	• Increasing frequency and intensity of heatwaves, storms, and floods can also intensify aeroallergen exposures. Mold proliferation is increased by floods. Thunderstorms can exacerbate respiratory allergy and asthma in patients with hay fever, and similar phenomena have been observed for molds (USGCRP, 2023)
Rising sea levels and associated storm surge	• Not applicable. No reasonably close causal relationship to air quality and GHGs identified.
Ocean acidification	• Not applicable. No reasonably close causal relationship to air quality and GHGs identified.

Key: GHG = greenhouse gas; NO_x = nitrogen oxides; O_3 = ozone; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; U.S. = United States; USGCRP = United States Global Change Research Program; VOC = volatile organic compound.

3.10.1.4 Existing Conditions

Weather is an important factor in the disbursement of air pollutants. Main Base is located just south of the Tropic of Cancer and has a mild and semi-tropical climate. Over the course of the year, the temperature typically varies from 66 degrees Fahrenheit (°F) to 86°F and is rarely below 60°F or above 88°F (WeatherSpark, 2024).

The average hourly wind speed at PMRF experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 2.6 months, from June 5 to August 24, with average wind

speeds of more than 14.4 miles per hour. The windiest month of the year at PMRF is July, with an average hourly wind speed of 15.7 miles per hour. The calmer time of year lasts for 9.4 months, from August 24 to June 5. The calmest month of the year at PMRF is January, with an average hourly wind speed of 12.9 miles per hour. The predominant average hourly wind direction at PMRF is from the east throughout the year (WeatherSpark, 2024).

Figure 3.10-1 shows wind rose data collected by the weather station at PMRF.

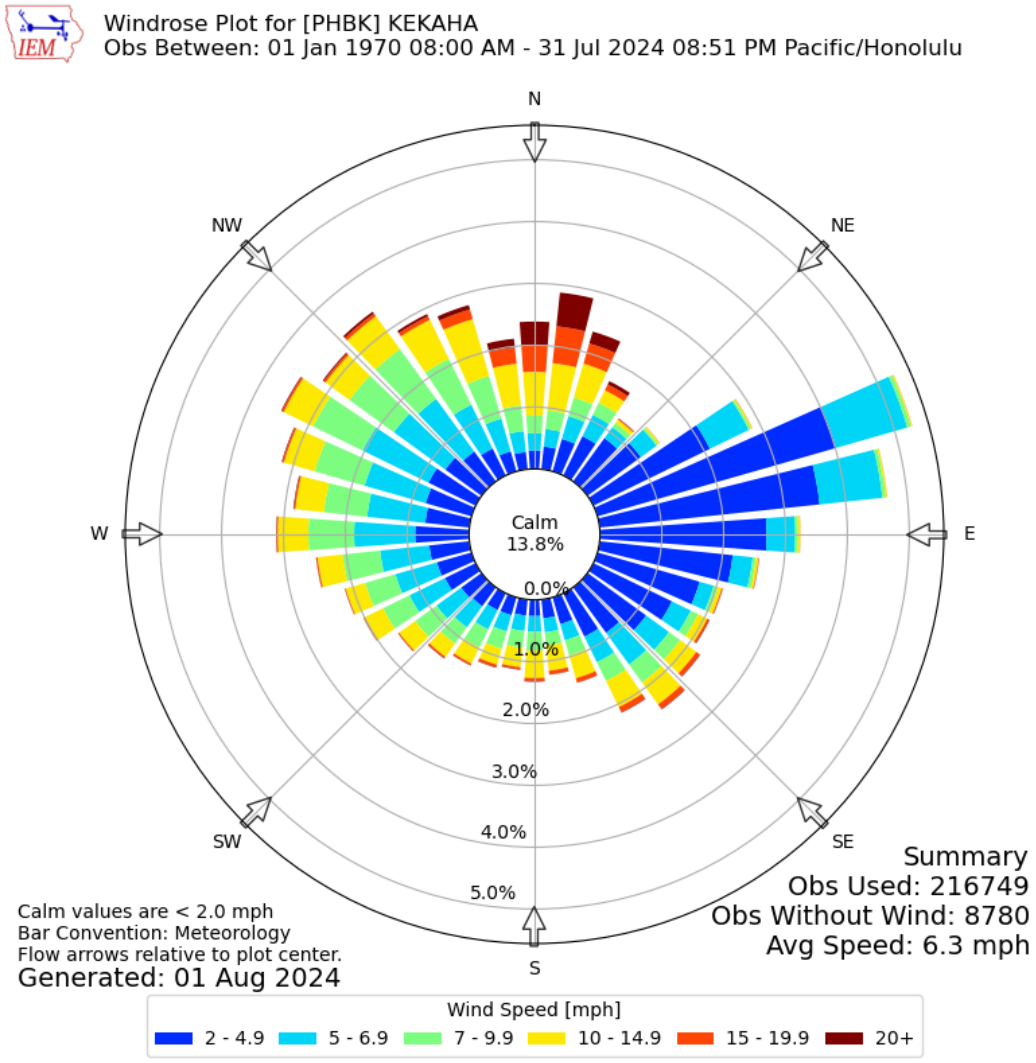


Figure 3.10-1 Windrose Plot for Kekaha

The DOH-CAB plans, operates, and maintains the statewide ambient air quality monitoring network. A Special Purpose Monitoring station on Kaua‘i was established to measure sulfur dioxide from cruise ship emissions. Monitoring for nitrogen dioxide and particulate matter less than or equal to 2.5 microns in diameter on Kaua‘i was discontinued at the site on 31 March 2022 (DOH, 2023). Air quality in Hawai‘i is generally good because of the small number of major stationary sources and strong ventilation provided by frequent trade winds.

Based on ambient air monitoring results, the EPA has designated the entire island of Kauaʻi as attainment or unclassified for all criteria pollutants (EPA, 2024c). This designation means the General Conformity Rule is not applicable to federal actions occurring at PMRF or KPGO. Based on air monitoring data, there have been no recent exceedances of federal or State ambient air quality standards (DOH-CAB, 2021; DOH, 2021).

3.10.1.4.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

Air Quality

Main Base is the principal operations area for PMRF and supports surface, subsurface, air, and space activities. Operations that occur within fee simple lands nevertheless contribute to emissions within the ROI. Activities on the leasehold parcels at the Main Base include ordnance assembly, operation and maintenance of drainage ditches and pumps to protect adjacent land from flooding, travel along roadways, and accessing utilities. Additionally, undeveloped land serves as safety zone buffers for missile/target launch operations and explosives safety. Kamokalā Ridge, Mānā Water Well, Miloliʻi Ridge, and Mākaha Ridge also include access roads to various Navy facilities (DON, 2008).

The only major stationary sources for pollution at Main Base are diesel generators that serve as a backup to the utility power system. These generators are located on fee simple lands and not within State lands. Emissions from Navy activities also include aircraft and rocket launches (DON, 2008).

Sources of air emissions from the Navy on State lands at the Main Base include emissions from vehicle traffic from personnel commutes and transportation of ordnance.

The primary air pollutant emissions at Mākaha Ridge are from diesel generators. The two 600-kW and two 320-kW generators are permitted by the State of Hawaiʻi under a Noncovered Source Permit (NSP-0120-01-N) (DON, 2020). Other sources of emissions include vehicle traffic from personnel commutes and transportation of ordnance.

The primary air pollutant emissions associated with Kamokalā Ridge, Mānā Water Well, and Miloliʻi Ridge come from vehicle traffic from personnel commutes and transportation of ordnance.

GHGs

The climate of Kauaʻi is sub-tropical, characterized by mild temperatures that typically range between 69 and 85°F. August tends to be the warmest month of the year. Kauaʻi has multiple regions with various climates; these include dry sand dune complexes in the west, cool mountain forests around Nā Pali and Waimea Canyon, interior tropical rain forests, pastoral plains in the east, and semi-arid tropical weather in the south. The variability of climates on Kauaʻi is partially a result of the island's mountains, with peaks in excess of 5,000 feet (1,524 meters), which influence rainfall patterns. One of the wettest places on earth is found on Kauaʻi; Mount Waiʻaleʻale (5,148 feet [1,569 meters]) receives an annual average of 486 inches (1,234 centimeters) of rainfall (Western Regional Climate Center, 2024), whereas the western part of Kauaʻi receives an annual average of 20 inches (52 centimeters) of rainfall. The dry season in the western part of Kauaʻi occurs between June and August while the rainy season runs from October through March with most rain falling from November through January (DLNR Division of Aquatic Resources [DAR], 2009).

Hawai‘i and other Pacific Islands are experiencing increased average ocean and air temperatures, changes in precipitation patterns, and sea level rise (Frazier et al., 2023). Increased annual rainfall may lead to increased occurrence of flash floods, which have the potential to damage roads and infrastructure, and can lead to increased rates of erosion on the Alaka‘i plateau and throughout Kōke‘e State Park as water flows to lower elevations toward Waimea Canyon or the Pacific Ocean.

3.10.1.4.2 KPGO

Air Quality

Stationary sources of air emissions at KPGO include one 250-kW, one 350-kW, and two 500-kW diesel generators at Site B (Kōke‘e Power Plant), which are operated by the Navy. Site B generators meet EPA Tier II standards for non-emergency stationary generators and are permitted for operation under a Noncovered Source Permit (NSP-0119-01-N) in accordance with HAR Chapter 11-60.1. The permit limits operating hours to a maximum of 6,000 hours in a 12-month period. In 2023, the four generators at Site B operated for approximately 905 total hours (DON, 2024d). Stationary sources of air emissions at KPGO also include one 25-kW and two 60-kW emergency diesel generators at Site E, which are operated by NASA and can be used to power the dish antennas at the site. Site E generators meet EPA Tier II standards for emergency generators. There are no stationary sources of air emissions at Sites A, C, or D. Estimated annual emissions from stationary sources at KPGO are shown in Table 3.10-3. Other sources of air emissions at KPGO include internal combustion engines in maintenance equipment, vehicles traveling on Kōke‘e Road and throughout KPGO, and landscaping equipment. Indirect activities required to support KPGO operations, such as off-site manufacturing and delivery of materials, may produce additional criteria pollutants and GHGs, though emissions from these activities are considered to be minor.

Table 3.10-3 Estimated Annual Stationary Source Emissions at KPGO

	VOC	***NO_X***	***CO***	***SO_X***	***PM_{10}***	***$PM_{2.5}$***	***Pb***	***CO_2e***
Annual Emissions (tpy)	0.512	2.133	1.414	0.430	0.460	0.460	<0.001	212.48

Notes: To calculate the total CO_2e, all GHGs are multiplied by their global warming potential and the results are added together. Global warming potentials are published in 40 CFR part 98 (revised April 2024). The global warming potentials used to calculate CO_2e are as follows: CO_2 = 1; CH_4 = 28; N_2O = 265.

Key: CO = carbon monoxide; CO_2e = equivalent emissions of carbon dioxide; NO_X = nitrogen oxides; Pb = lead; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; SO_X = sulfur oxides; tpy = tons per year; VOC = volatile organic compounds

Sources: DON, 2024d; NASA, 2024d.

GHGs

KPGO’s climate is influenced by its topography and high elevation. KPGO is located on the Alaka‘i plateau, which ranges between 3,200 and 4,200 feet above sea level and experiences temperatures that are generally 15°F cooler than at sea level. The Kanalohuluhulu station, approximately 0.5 mile northwest of KPGO on the Alaka‘i plateau, monitors the meteorological and climate conditions of the area. Between 1991 and 2020, the area has had an average temperature of 64.8°F in the hottest month of August, with high temperatures that have exceeded 72°F, and an average temperature of 56.1°F in the coldest month of January, with low temperatures that fell below 48°F. Over the same period, the average annual precipitation was 57.3 inches. The wettest month of the year was December with an average precipitation of 9.58 inches (NOAA, 2021). As wind and clouds progress over the downwind

slope, reduced moisture levels and changes in temperature and pressure diminish cloud formation, resulting in a rapid decline of rainfall levels as elevation decreases. Average rainfall along Kōkeʻe Road varies widely from 118 inches per year at the Puʻu o Kila Lookout, approximately 2.5 miles north of KPGO, to 59 inches per year at the Kōkeʻe State Park entrance adjacent to Site A, to 39 inches per year at the entrance to Waimea Canyon State Park, approximately 7 miles south of KPGO (DLNR, 2014b). The high average rainfall of KPGO reduces the likelihood of wildfires; however, as elevation and rainfall decreases to the south, the risk of drought and wildfire increases. Between 2012 and 2020, there have been no records of fire ignitions within KPGO, and less than five records of fire ignitions within the rest of Kōkeʻe State Park (University of Hawaiʻi at Manoa, 2024).

In 2021, Hawaiʻi produced 20.18 million metric tons (22.24 million tons) of equivalent emissions of carbon dioxide (CO_2e) (DOH, 2024). In 2023, operations at KPGO produced an estimated 212.48 tons of CO_2e, which is less than 0.001 percent of statewide CO_2e emissions for 2021. By comparison, 212 tons of CO_2e is the approximate GHG footprint of 46 passenger vehicles driven for 1 year or 25 homes' energy use for 1 year (EPA, 2024c).

3.10.2 Environmental Consequences

3.10.2.1 Approach to Analysis

Air quality effects within the ROI were reviewed relative to federal, State, and local air pollution standards and regulations. Effects are qualitatively analyzed based on the potential to cause a violation, contribute to a new violation, or contribute to an ongoing violation of the NAAQS or Hawaiʻi Ambient Air Quality Standards. A significant effect would also occur if HAP emissions would cause significant and unacceptable health effects to populations, including sensitive receptors.

With regard to HEPA's requirement to analyze GHGs, these potential effects are qualitatively analyzed to determine if there would be a significant increase in GHGs or any environmental changes such as sea level rise.

3.10.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.10.2.2.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

Air quality conditions under Alternative 1 would not differ from existing conditions. Navy activities with potential to affect air quality include emergency generators, aircraft operations, diesel- and gasoline-fueled vehicles, and rocket launches. It should be noted that aircraft operations and rocket launches occur within fee simple lands but contribute to the overall air quality within the ROI. Effects from these actions have been previously analyzed in Navy NEPA documents such as the 1998 PMRF Enhanced Capability Final EIS and the 2008 Hawaii Range Complex Final EIS/OEIS.

Air emissions would occur from the use of facility electrical generators used for emergency backup power at PMRF. The existing power generators would continue to be operated in accordance with limits set forth in the PMRF Title V Permit and therefore would not have a significant effect on the air quality in the basin.

Existing aircraft exercises and support would continue from the PMRF airfield under Alternative 1. Anti-Air Warfare training and other training that requires missile launches from Main Base would continue to

occur at current levels. Missile and rocket launches are characterized by intense combustive reactions over a short period, which result in exhaust streams of varying sizes, depending on the size of the launch vehicle. The tempo of launch events would be managed by range activities to stay within the limits of current guidelines established by governmental agencies or professional organizations. Analysis of launch-related effects is covered in the 1998 PMRF Enhanced Capability Final EIS. Analysis of typical launch vehicles at PMRF determined that exhaust emissions would not produce short-term exceedances of either the NAAQS or health-based guidance levels in areas to which the general public would have access. As noted above, these activities would occur on fee simple lands and would not change in tempo or location.

Personnel (whether active duty or training, both military and civilian) have the potential to affect air quality. Sources of air emissions to consider include vehicle miles traveled by on-base government-owned vehicles, vehicle miles traveled of employees not living on base and commuting, and operation of office/residential space for employees working/living on base. Emissions from vehicle traffic from personnel and transportation of ordnance would continue at the same levels as the existing conditions, as there would be no change in operations.

GHGs would continue to be released into the atmosphere from PMRF activities and are not anticipated to change with the Proposed Action. GHG emissions would continue from indirect activities that support activities at PMRF such as off-site manufacturing and delivery of materials. Under this alternative, the continued production of similar levels of GHGs would not meaningfully contribute to global GHG levels and associated environmental changes.

Predictable environmental trends include increased temperature, and changes in storm and precipitation patterns, which are expected to result in minor increases in temperature and rainfall. The facilities at PMRF have been designed and are maintained to adapt to these meteorological changes. The Navy would continue to consider resiliency while operating and maintaining infrastructure at PMRF.

3.10.2.2.2 KPGO

Under Alternative 1, the Navy and NASA would continue KPGO operations in the same manner as current conditions. Long-term, minor, adverse effects on air quality would continue as air emissions sources would remain as described above and would emit criteria pollutants and GHGs at identical or similar levels as current conditions (see Table 3.10-2). No changes to ambient air quality conditions and no exceedances of federal or State ambient air quality standards would occur from the continuation of these air emissions. Operations at KPGO would continue to be consistent with all federal, State, and local air regulations including HAR Chapters 11-59 and 11-60.1, and HRS sections 342B and 342C.

GHGs would continue to be released into the atmosphere from KPGO operations. Annual GHG emissions would be identical or similar to those shown in Table 3.10-3. In addition, GHG emissions would continue to be produced from indirect activities such as off-site manufacturing and delivery of materials. The continued production of identical or similar levels of GHGs would not meaningfully contribute to global GHG levels and associated environmental changes.

Predictable environmental trends include the potential to increase temperature and change precipitation patterns at KPGO, which are expected to result in minor increases in temperature and rainfall. These meteorological changes are unlikely to change or impair continued KPGO operations.

Increased rainfall may lead to an increased occurrence of flash floods at KPGO. The Navy and NASA would continue to consider resiliency while operating and maintaining infrastructure at KPGO.

3.10.2.2.3 Effect Summary

As described above, Alternative 1 could result in potential long-term, minor, adverse effects to air quality and GHGs in the ROI. The ongoing implementation of current mitigation measures (see Table 3.1-4) and no change to current operations or activities on the leasehold and easement lands under Alternative 1 mitigate these potential effects. As a result, there are no changes to ambient air quality conditions and no exceedances of federal or State ambient air quality standards that would occur from the continuation of these air emissions under Alternative 1. **Therefore, effects of Alternative 1 to air quality and GHGs would be adverse but would not be significant.**

3.10.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.10.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 2, long-term, minor, adverse effects on air quality would continue as air emissions sources would remain and would continue to emit the same number of criteria pollutants and GHGs. GHGs would continue to be released into the atmosphere from PMRF activities, and personnel would continue to affect air quality through vehicle use at the same rate. Operations at PMRF and KPGO would continue pursuant to all applicable federal, State, and local air regulations. The Navy and NASA would continue to consider resiliency while operating and maintaining infrastructure at KPGO.

3.10.2.3.2 Effect Summary

As described above, Alternative 2 could result in potential long-term, minor, adverse effects to air quality and GHGs in the ROI. The ongoing implementation of current mitigation measures (see Table 3.1-4) and no change to current operations or activities on the former leasehold and easement lands under Alternative 2 mitigate these potential impacts. As a result, there are no changes to ambient air quality conditions and no exceedances of federal or State ambient air quality standards that would occur from the continuation of these air emissions under Alternative 2. **Therefore, effects of Alternative 2 to air quality and GHGs would be adverse but would not be significant.**

3.10.2.4 No Action Alternative

3.10.2.4.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

Under the No Action Alternative, there could be short-term air quality effects due to demolition/construction activity related to the decommissioning of any facilities. Short-term, adverse effects on air quality could result from demolition activities. Emissions of criteria pollutants and GHGs could be directly produced from activities such as operation of heavy equipment; operation of construction generator sets, heavy duty diesel vehicles hauling construction materials and debris to and from the ROI, dust generated during demolition and hauling activities, workers commuting daily to and from the ROI in their personal vehicles, and ground disturbance. All such emissions would be temporary in nature and produced only when demolition activities are occurring.

The island of Kaua‘i is in attainment or unclassified for all criteria pollutants. Therefore, the General Conformity Rule de minimis thresholds would not apply to emissions of criteria pollutants from the No Action Alternative. Instead, criteria pollutant emissions were evaluated against the Prevention of Significant Deterioration (PSD) thresholds, as defined by EPA, of 250 tons per year (tpy) for volatile organic compounds (VOCs), nitrogen oxides (NO_X), carbon monoxide (CO), sulfur oxides (SO_X), particulate matter less than or equal to 10 microns in diameter (PM_{10}), and particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and 25 tpy for lead. The PSD thresholds do not denote a significant effect; however, they do provide a threshold to identify actions that have insignificant effects to air quality and any action that results in net emissions below the PSD threshold is considered so insignificant that the action would not cause or contribute to an exceedance of the NAAQS for that pollutant. The net increase of annual air emissions during demolition could not be expected to exceed the PSD thresholds; therefore, short-term, adverse effects to air quality would not be significant.

Long-term air quality effects under the No Action Alternative would be reduced if operational activities are subsequently reduced at PMRF. The level of reduction cannot be quantified, but any reduction in operations would result in a reduction in all air-emitting activities associated with these activities. Therefore, long-term air quality effects would be reduced compared to existing levels.

GHGs from some PMRF activities would cease, although it is not known which operations would cease after implementation of the Proposed Action. GHG emissions would continue from indirect activities that support activities at PMRF such as off-site manufacturing and delivery of materials, although would likely be reduced once some operations cease. Under the No Action Alternative, long-term, minor, beneficial effects would occur from the discontinuation of some operations at PMRF.

Predictable environmental trends are unlikely to impair or preclude demolition activities under the No Action Alternative. The discontinuation of operations at PMRF would not be considered a meaningful decrease of GHG emissions for the region. Predictable environmental trends in the area, including increased temperatures and precipitation, would continue into the future. Removal of impervious surfaces if demolition were to occur may reduce stormwater runoff and frequency of flooding, minimizing water flows to lower elevations; however, the predicted increase in rainfall intensity and likelihood of flash flooding would not change.

Following demolition, the leasehold and easement lands would be returned to the State and would fall under DLNR responsibility. This analysis does not include an evaluation of air emissions from construction, operation, or maintenance activities that would be conducted by DLNR or the State following expiration of the leases and easements, as those activities are unknown at this time and are not included in the Proposed Action.

3.10.2.4.2 KPGO

Under the No Action Alternative, some or all existing infrastructure could be removed or remain in place. Under the scenario where all existing infrastructure is demolished and removed, the No Action Alternative would result in short-term, minor, adverse effects and long-term, minor, beneficial effects to air quality. Short-term effects could occur during the demolition phase, which was assumed to occur following expiration of the lease and easement agreements. Emissions of criteria pollutants and GHGs could be directly produced from operation of heavy equipment, operation of generator sets, demolition of buildings and infrastructure, heavy duty diesel vehicles hauling debris from KPGO to local landfills and

recycling centers, demolition workers commuting daily to and from KPGO in their personal vehicles, and ground disturbance. All emissions from demolition and removal activities would be temporary in nature and produced only when such activities are occurring.

The net increase of annual air emissions during demolition would not be expected to exceed the PSD thresholds; therefore, short-term, adverse effects to air quality would not be significant.

In addition to the potential emissions from demolition, a net decrease in emissions would occur from the discontinuation of KPGO operations. It was assumed all existing operational emissions could cease prior to demolition, resulting in a net decrease of annual emissions from KPGO.

When combined, demolition activities and the discontinuation of operations could result in a net decrease of VOC, SO_X, and $PM_{2.5}$ emissions. During demolition, a net increase of NO_X, CO, PM_{10}, and CO_2e could occur. If demolition were required, particulate matter (i.e., fugitive dust) could be produced from earthmoving activities and from breaking down structures and drilling or crushing paved surfaces. To minimize fugitive dust emissions, emission reduction measures—such as limiting heavy duty diesel vehicle idling times, using diesel particulate filters and diesel oxidation catalysts in equipment, and applying dust suppressants—could be incorporated. Particulate matter emissions would cease once demolition is complete.

Short-term, minor, adverse effects from GHGs could occur during the KPGO demolition period. Net GHG emissions produced from demolition could be minor in the context of islandwide or statewide GHG emissions. As such, net GHG emissions produced during demolition would not considerably increase the total CO_2e emissions produced by Kaua‘i County or the State.

Long-term, minor, beneficial effects would occur from the discontinuation of KPGO operations, which would eliminate criteria pollutant emissions produced at the site. However, beneficial effects from reduced GHG emissions would be minor.

The discontinuation of operations at KPGO would not be considered a meaningful decrease of GHG emissions for the region. Predictable environmental trends in the area, including increased temperatures and precipitation, would continue into the future. Removal of impervious surfaces if demolition were to occur may reduce stormwater runoff and frequency of flooding, minimizing water flows to lower elevations; however, the predicted increase in rainfall intensity and likelihood of flash flooding would not change.

Following demolition, the leasehold and easement lands would be returned to the State and would fall under DLNR responsibility. This analysis does not include an evaluation of air emissions from construction, operation, or maintenance activities that would be conducted by DLNR or the State following expiration of the leases and easements, as those activities are unknown at this time and are not included in the Proposed Action.

3.10.2.4.3 Effect Summary

As described above, the No Action Alternative would result in potential short-term, minor, adverse effects, as well as minor, long-term, beneficial effects to air quality and GHGs. Per the lease agreements, any structures or infrastructure could be removed or could remain in place. Short-term, adverse effects

could occur during demolition activities associated with the decommissioning of any facilities. Emissions of criteria pollutants and GHGs would be directly produced from:

- Operation of heavy equipment;
- Operation of construction generator sets;
- Heavy duty diesel vehicles hauling construction materials and debris to and from the ROI;
- Dust generated during demolition and hauling activities;
- Workers commuting daily to and from the ROI and personal vehicles; and
- Ground disturbance.

All such emissions would be temporary in nature and produced only when activities are occurring.

Additionally, the discontinuation of operations would result in minor, long-term, beneficial effects to air quality. As details of the potential reduction of operations are not known, the level of reduction cannot be quantified. However, any reduction in operations would result in a reduction in all air-emitting activities associated with these operations and long-term air quality effects would be slightly reduced compared to existing levels. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.11 Transportation

Transportation considers the existing roadway network, the access to the facilities, the leaseholds, and easement lands at the Proposed Action locations. The discussion includes the roadways used to access the facilities and the surrounding gates on the leasehold and easement lands.

3.11.1 Affected Environment

3.11.1.1 Region of Influence

The ROI for transportation includes the roadways on the leasehold and easement lands, and the access points and areas around the access points to Main Base and other facilities involved with the Proposed Action.

3.11.1.2 Regulatory Setting

The DoD, U.S. DOT, State of Hawai‘i DOT, and the County of Kaua‘i Department of Public Works manage the regulatory environment for transportation. The roads should follow the federal, State, and local standards. The entry control facilities/access control points should follow federal standards. A list of all the applicable federal, State, and local standards used for transportation can be found in Appendix E.

3.11.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.11-1 summarizes the predictable environmental trends for transportation.

Table 3.11-1 Predictable Environmental Trends for Transportation

Predictable Trend	*Influence on Resource*
Rising global temperatures (air/ocean)	• Not applicable. No reasonably close causal relationship to transportation identified.
Change in precipitation patterns	• Not applicable. No reasonably close causal relationship to transportation identified.
Increased frequency and/or intensity of extreme weather events	• Not applicable. No reasonably close causal relationship to transportation identified.
Rising sea levels and associated storm surge	• Sea level rise could potentially affect the usability of low-lying roads in the ROI such as Kaumualiʻi Highway. • It could also affect properties such as the water table of the area, which would affect the structure of the roadway network.
Ocean acidification	• Not applicable. No reasonably close causal relationship to transportation identified.

Key: ROI = Region of Influence.

3.11.1.4 Existing Conditions

The existing roadways within the ROI include Kaumualiʻi Highway (State Route 50), Kao Road, North Nohili Road, Imiloa Road, Kiko Road, Kalanamahiki Road, Polihale Road, Tartar Drive, Kamokalā Ridge Loop Drive, Mānā Water Well Access Road, Mākaha Ridge Access Road, Miloliʻi Ridge Access Road, and the various access roads to the facilities (Table 3.11-2, Figures 3.11-1 through 3.11-6).

3.11.1.4.1 Main Base

Kaumualiʻi Highway is a principal traffic arterial that provides regional mobility for west side of the island of Kauaʻi. It runs along the south side of the island that begins in Līhuʻe and ends in the vicinity of PMRF. It also serves as the main access route to the Main Base. It provides access to the North Gate for PMRF. In the vicinity of PMRF, Kaumualiʻi Highway is an undivided, two-lane, paved roadway with shoulders. There are several intersections with median left-turn and right-turn lanes. The posted speed limit is 50 miles per hour. From the Hawaiʻi DOT traffic station maps, Kaumualiʻi Highway, between Imiloa Road and Lio Road, had 24-hour traffic volumes of 533 vehicles and 485 vehicles on 2 days, respectively, in 2015, the most recent data available. Further southeast, between Tartar Drive and Kia Road, Kaumualiʻi Highway had 24-hour volumes on 2 days of 2,633 vehicles and 2,765 vehicles, respectively, in 2015.

Kao Road is a roadway that runs east-west in the vicinity of PMRF. It transitions from Kaumualiʻi Highway and then transitions to Kiko Road when heading east. Kao Road appears to be an undivided, two-lane, paved roadway with no shoulders.

North Nohili Road is a road that runs north-south in the vicinity of the PMRF Airport and Sandia National Laboratories. South of its intersection with Kaumualiʻi Highway, it transitions to Lower Saki Mānā Road. North Nohili Road appears to be an undivided, two-lane, paved roadway with no shoulders.

Imiloa Road is an east-west road that is located near the PMRF Range Operations Building. Imiloa Road provides access to the Main Gate for Main Base. It terminates at its intersection with Kaumualiʻi Highway. It provides direct access with Kaumualiʻi Highway from Main Base. Imiloa Road appears to be an undivided, two-lane, paved roadway with a posted speed limit of 20 miles per hour.

Kiko Road is an east-west road that transitions from Kao Road and Kaumualiʻi Highway. It provides direct access to the PMRF Kamokalā Ridge facility. It appears to be a one-lane, paved roadway with no shoulders.

Kalanamahiki Road is a road that runs parallel with Kaumualiʻi Highway in the PMRF area. It appears to be an undivided, two-lane, paved roadway with shoulders.

Polihale Road transitions to Lower Saki Mānā Road and runs north-south in the vicinity of PMRF. It provides access to Polihale State Park. It appears to be an unpaved roadway with sufficient width to fit two lanes of vehicular traffic.

Tartar Drive is a road near a Navy Exchange facility that runs northeast-southwest. It terminates at the intersection with Kaumualiʻi Highway. It appears to be a paved, undivided, two-lane roadway with no shoulders.

Table 3.11-2 details the specific transportation leases and easements at Main Base including the description, location, and approximate area. Figures 3.11-1 through 3.11-3 show the roadway network at Main Base.

Table 3.11-2 Transportation Leases and Easements at Main Base

Easement Name	*Grant Type*	*Grant Purpose*	*Description*[1]	*Location*	*Acres*
Lot 3 (TMK: 1-2-002-001 (por.))	Easement	Access	Lot 3 for Roadway, Fifth Amendment to State General Lease No. S-3852, CSF 24332	Intersection of Nohili Road, Kao Road, and Kaumualiʻi Highway-50	0.232
Lot 13 (TMK: 1-2-002-001 (por.))	Easement	Access	Lot 13, Fifth Amendment to State General Lease No. S-3852, CSF 24335	Imiloa Road, between Kaumualiʻi Highway-50 and Kalanamahiki Road	0.434
Easement A Part 1 (TMK: 1-2-002-001 (por.))	Easement	Roadway	Roadway Easement A Part 1, State General Lease S-3852 (Note: Amendment 2 includes utilities)	Kiko Road, east of Polihale Road to Kamokalā Ridge Loop Drive	2.141
Easement 107 (TMK: 1-2-002-001 (por.))	Easement	Roadway	Non-Exclusive Roadway Easement No. S-5804, CSF 24342, 20 feet Wide	Mānā Water Well Access Road	0.17
Easement B (TMK: 1-2-002-001 (por.))	Easement	Roadway	Roadway Easement B, State General Lease S-3852 (Note: Amendment 2 includes utilities)	Kia Road and Kalanamahiki Road from Kaumualiʻi Highway-50 to PMRF Installation	3.084
Easement B-1 (TMK: 1-2-002-001 (por.))	Easement	Roadway	Grant of Non-Exclusive ROW and Roadway Easement B1	Kalanamahiki Road ROW	0.069
Easement B-2 (TMK: 1-2-002-001 (por.))	Easement	Roadway	Grant of Non-Exclusive ROW and Roadway Easement B2	Kalanamahiki Road ROW	0.069

Easement Name	*Grant Type*	*Grant Purpose*	*Description*[1]	*Location*	*Acres*
Easement B-3 (TMK: 1-2-002-001 (por.))	Easement	Roadway	Grant of Culvert and Slopes Drainage Easement B-3 No. S4597	Kalanamahiki Road ROW	0.044
Easement B-4 (TMK: 1-2-002-001 (por.))	Easement	Roadway	Grant of Culvert and Slopes Drainage Easement B-4 No. S4597	Kalanamahiki Road ROW	0.067
Easement E (TMK: 1-2-002-001 (por.))	Easement	Roadway	Easement E Part 2 for Roadway, Second Amendment to State General Lease No. S-3852, 30 feet wide	Tartar Drive, west of Kaumualiʻi Highway-50 to PMRF Installation	0.441
Easement H (TMK: 1-2-002-001 (por.))	Easement	Roadway	Easement H for Roadway, Fifth Amendment to State General Lease No. S-3852	Kao Road, east of Kalanamahiki Place, connects to Kaumualiʻi Highway-50	0.028

Note: [1]See Appendix D.
Key: PMRF = Pacific Missile Range Facility; ROW = right-of-way; TMK = Tax Map Key.

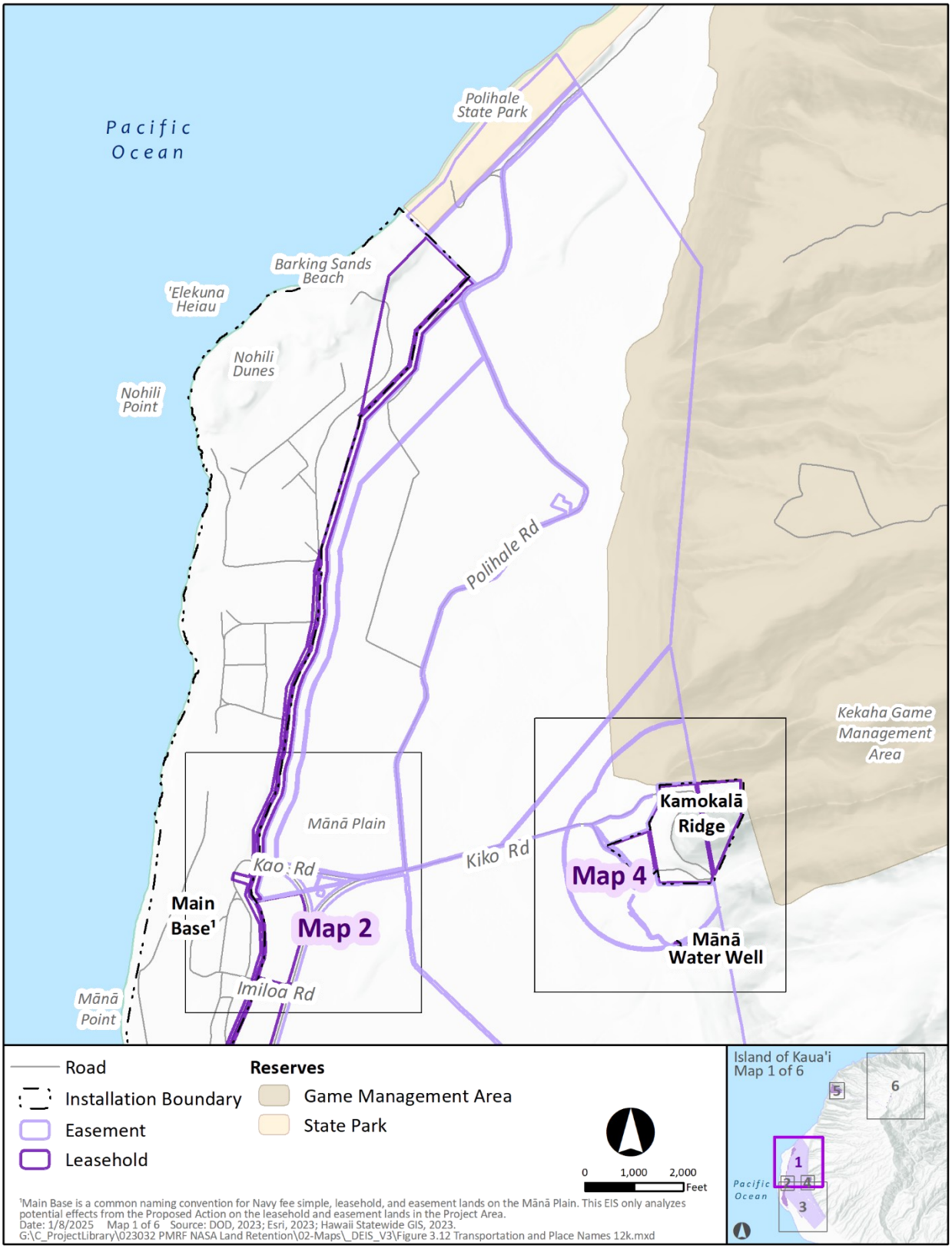


Figure 3.11-1 Transportation Routes North

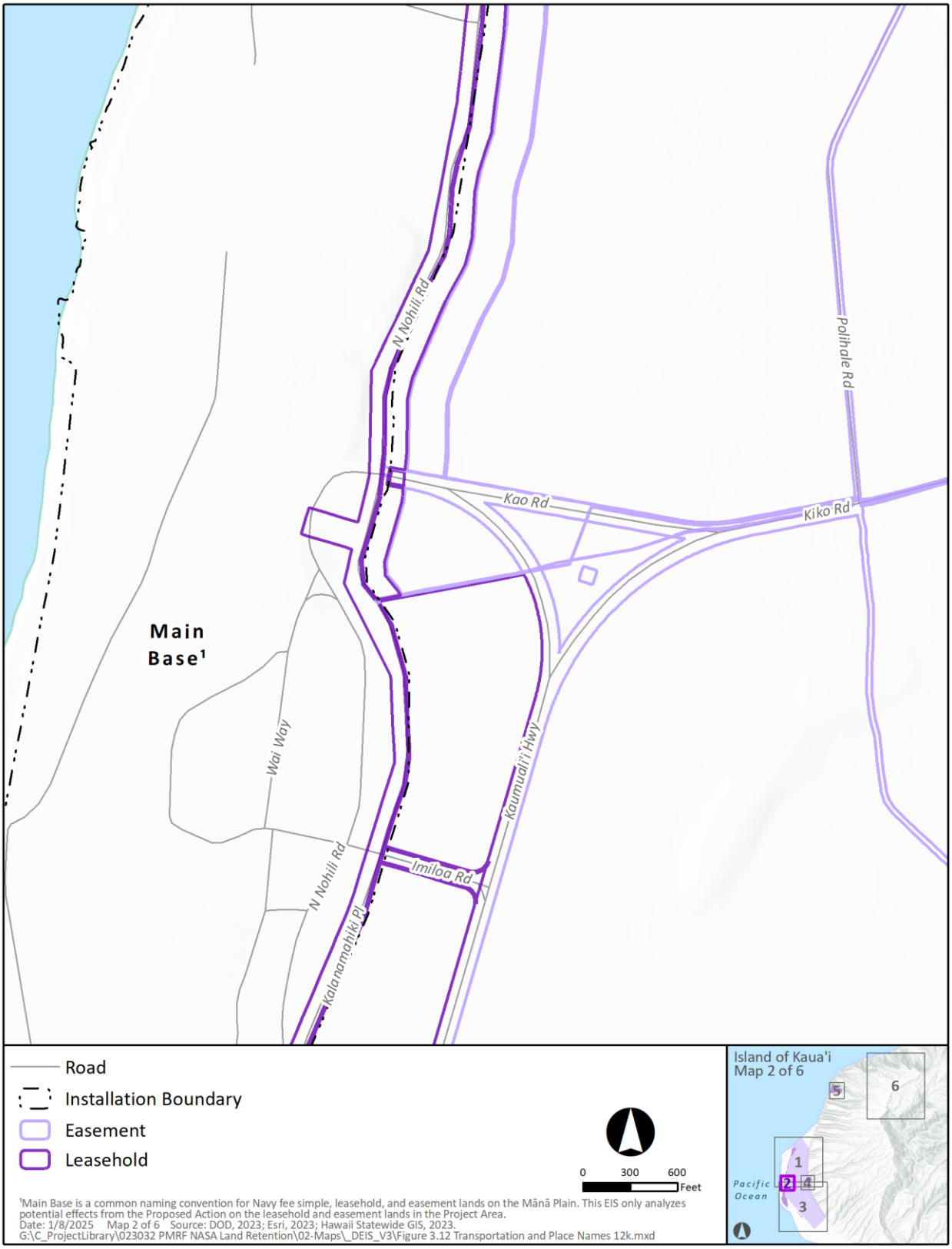


Figure 3.11-2 Transportation Routes Central

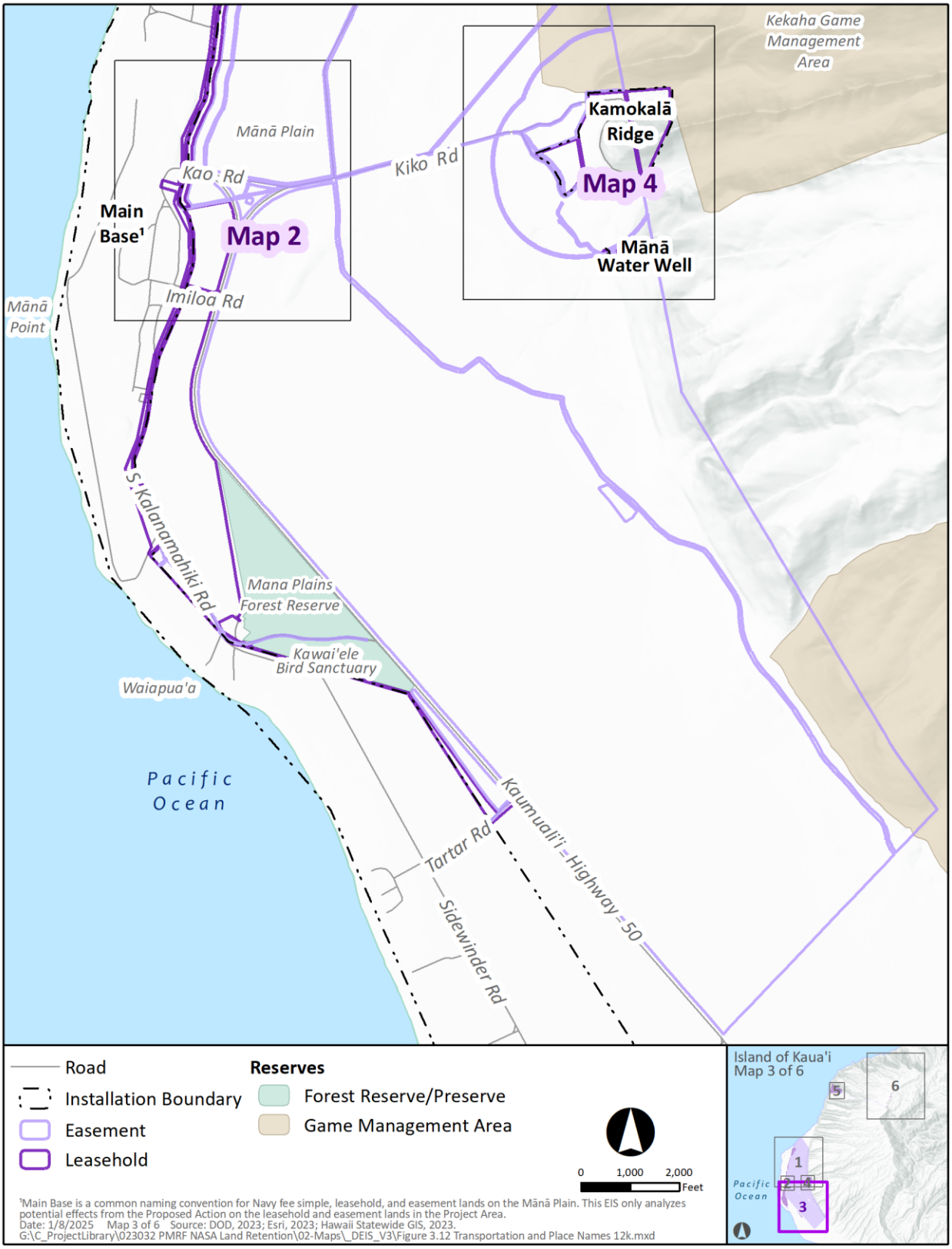


Figure 3.11-3 Transportation Routes South

3.11.1.4.2 Kamokalā Ridge

Kamokalā Ridge Loop Drive is the roadway that loops around the PMRF Kamokalā Ridge facility. It transitions from Kiko Road to the west. It is a paved roadway with sufficient width for one lane of vehicular traffic. Approximately 6–10 vehicles per day travel on this road, which include security patrols and trips for operations of the facility. Table 3.11-3 includes the specific transportation easements at Kamokalā Ridge. Figure 3.11-4 shows the roads at Kamokalā Ridge.

Table 3.11-3 Transportation Easements at Kamokalā Ridge

Easement Name	*Grant Type*	*Grant Purpose*	*Description*[1]	*Location*	*Acres*
Easement A Part 2 Portion A (TMK: 1-2-002-001 (por.))	Easement	Access/Roadway	Roadway Easement A Part 2 Portion A, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.627
Easement A Part 2 Portion B (TMK: 1-2-002-001 (por.))	Easement	Access/Roadway	Roadway Easement A Part 2 Portion B, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.558
Easement A Part 2 Portion C (TMK: 1-2-002-001 (por.))	Easement	Access/Roadway	Roadway Easement A Part 2 Portion C, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.042
Easement A Part 2 Portion D (TMK: 1-2-002-001 (por.))	Easement	Access/Roadway	Roadway Easement A Part 2 Portion D, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Kamokalā Ridge Loop Drive, east of Kiko Road to Navy Leasehold Area	0.221

Note: [1]See Appendix D.
Key: TMK = Tax Map Key.

3.11.1.4.3 Mānā Water Well

Mānā Water Access Road provides access to Mānā Water Well and is accessible from Kiko Road. It is an unpaved roadway with sufficient width for two lanes of vehicular traffic. The daily traffic volume is approximately 6–8 vehicles per day, which include security patrols and trips needed for maintenance. Table 3.11-4 includes the specific transportation leases and easements at Mānā Water Well. Figure 3.11-4 shows the roads accessing the Mānā Water Well.

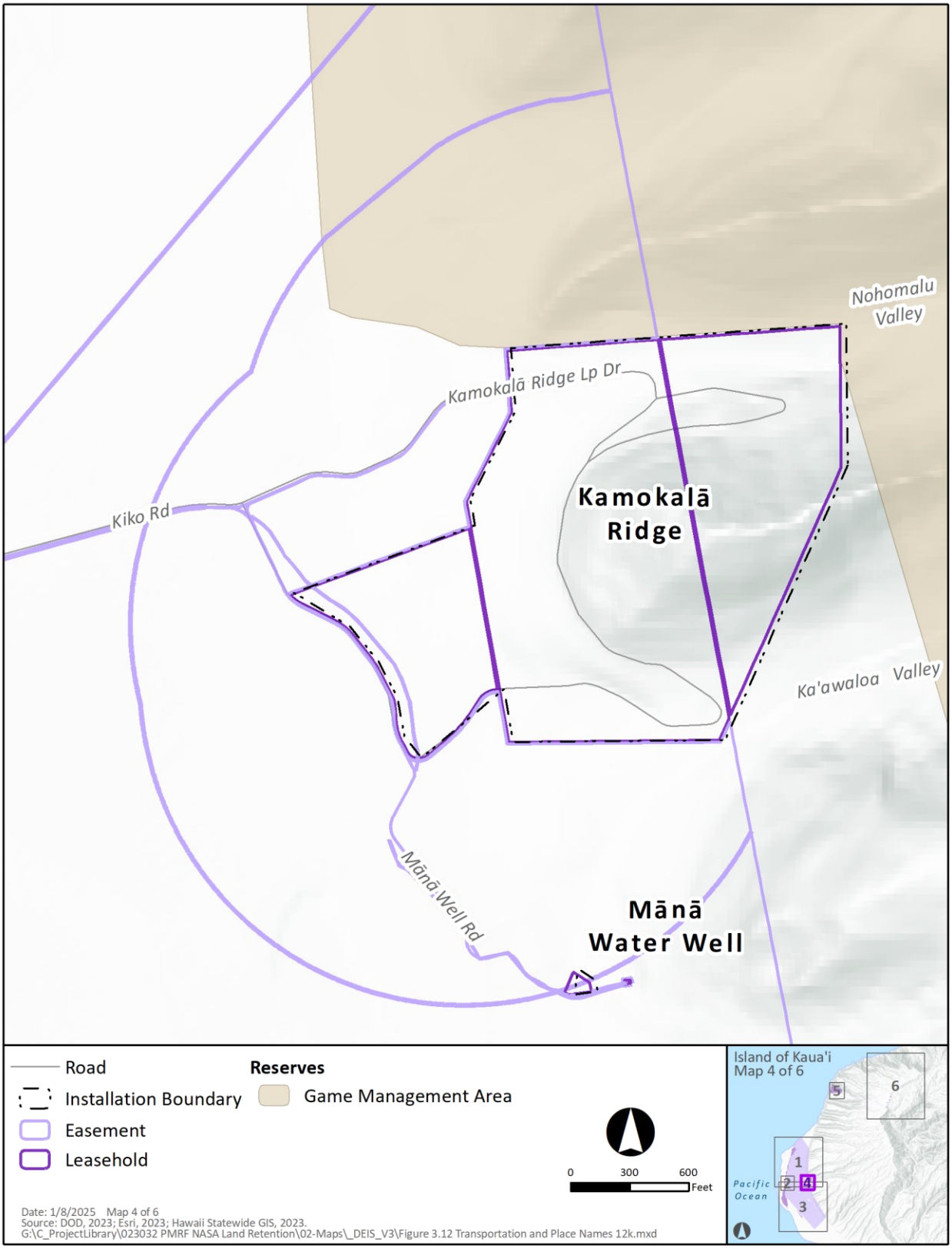


Figure 3.11-4 Transportation Routes Kamokalā

Table 3.11-4 Transportation Leases and Easements at Mānā Water Well

Easement Name	*Grant Type*	*Grant Purpose*	*Description*[1]	*Location*	*Acres*
Easement 107 (TMK: 1-2-002-001 (por.))	Easement	Roadway	Non-Exclusive Roadway Easement No. S-5804, CSF 24342, 20 feet Wide	Mānā Water Well Access Road	0.17
Easement A Part 2 Portion A (TMK: 1-2-002-001 (por.))	Easement	Utilities/Access	Roadway Easement A Part 1, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Mānā Water Well Access Road from Kiko Road to well location	0.627
Easement A Part 1 (TMK: 1-2-002-001 (por.))	Easement	Utilities/Access	Roadway Easement A Part 1, State General Lease S-3852, (Note: Amendment 2 includes utilities)	Mānā Water Well Access Road from Kiko Road to well location	0.455
Easement G Part 3 (TMK: 1-2-002-001 (por.))	Easement	Utilities/Access	Easement G Part 3 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.153
Easement G Part 4 (TMK: 1-2-002-001 (por.))	Easement	Utilities/Access	Easement G Part 4 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.153
Easement G Part 5 (TMK: 1-2-002-001 (por.))	Easement	Utilities/Access	Easement G Part 5 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.006
Easement G Part 6 (TMK: 1-2-002-001 (por.))	Easement	Utilities/Access	Easement G Part 6 for Water Pipeline, Second Amendment to State General Lease No. S-3852, 5 feet wide	Mānā Water Well Access Road Utility Easement for Water Pipeline	0.021
Tract E-4 (TMK: 1-2-002-028)	Lease	Utilities/Access	Bonham Air Base Water Storage Area Tract E-4, State General Lease No. S-3852	Mānā Water Well Lease (includes access road)	0.264
Water Lot 12 (TMK: 1-2-002-001 (por.))	Lease	Utilities/Access	Existing Potable Water Source Lot 12, Sixth Amendment to General Lease No. S-3852, (Amendment 6), CSF 24336	Mānā Water Well Lease (includes access road)	0.026

Note: [1]See Appendix D.
Key: TMK = Tax Map Key.

3.11.1.4.4 Mākaha Ridge

Mākaha Ridge Road is the road used to access PMRF activities on Mākaha Ridge. It is an undivided, two-lane, paved roadway with grass shoulders. It is approximately 4 miles from the start of the road to the Mākaha Ridge Tracking Station gate. The speed limit is 20 miles per hour. The daily traffic volume on this road is approximately 25–30 vehicles per day. Table 3.11-5 includes the specific transportation easements and leases at Mākaha Ridge. Figure 3.11-5 shows the roads at Mākaha Ridge.

Table 3.11-5 Transportation Leases and Easements at Mākaha Ridge

Easement Name	*Grant Type*	*Grant Purpose*	*Description*[1]	*Location*	*Acres*
Easement for Access ROW (TMK: 1-2-001-006 (por.))	Easement	Access/ROW	Ingrant ID: 36500, Amendment to 65-year State General Lease No. S-3952 to United States of America for Non-Exclusive Easement for Access ROW	Bore Site Access Road	0.613
Parcel C Road (TMK: 1-4-001-002 (por.), 1-4-001-013 (por.))	Easement	Access Road	Ingrant ID 36500, 65-year State of Hawai'i General Lease No. S-3952 to United States of America of Parcel C land for Access Road	Mākaha Ridge Access Road	10.82
Parcel D Road (TMK: 1-2-001-006 (por.), 1-4-001-014 (por.))	Easement	Access Road	Ingrant ID 36500, 65-year State of Hawai'i General Lease No. S-3952 to United States of America of Parcel C land for Access Road	Mākaha Ridge Access Road	26.25
Parcel E Road (TMK: 1-2-001-006 (por.))	Easement	Access Road	Ingrant ID: 36500, 65-year State of Hawai'i General Lease No. S-3952 to United States of America of Parcel D land for Access Road	Mākaha Ridge Access Road	4.53
Parcel A – Mākaha (TMK: 1-2-001-006 (por.))	Lease	Utilities/Access	Ingrant ID: 4112, 65-year State of Hawai'i General Lease No. S-3952 to United States of America of Parcel A land for Remote Radar Facility	Mākaha Ridge Radar Site – Parcel A (includes roads and access on site)	35.04
Parcel B – Mākaha (TMK: 1-2-001-006 (por.))	Lease	Utilities/Access	Ingrant ID: 4112, 65-year State of Hawai'i General Lease No. S-3952 to United States of America of Parcel B land for Remote Radar Facility	Mākaha Ridge Radar Site – Parcel B (includes roads and access on site)	167.05
Bore Site (TMK: 1-2-001-010)	Lease	Utilities/Access	Ingrant ID: 37080, Amendment to 65-year State General Lease No. S-3952 to United States of America for Boresight Tower Site	Boresight Tower Site (includes roads and access on site)	1.012

Key: ROW = right-of-way; TMK = Tax Map Key.
Note: [1]See Appendix D.

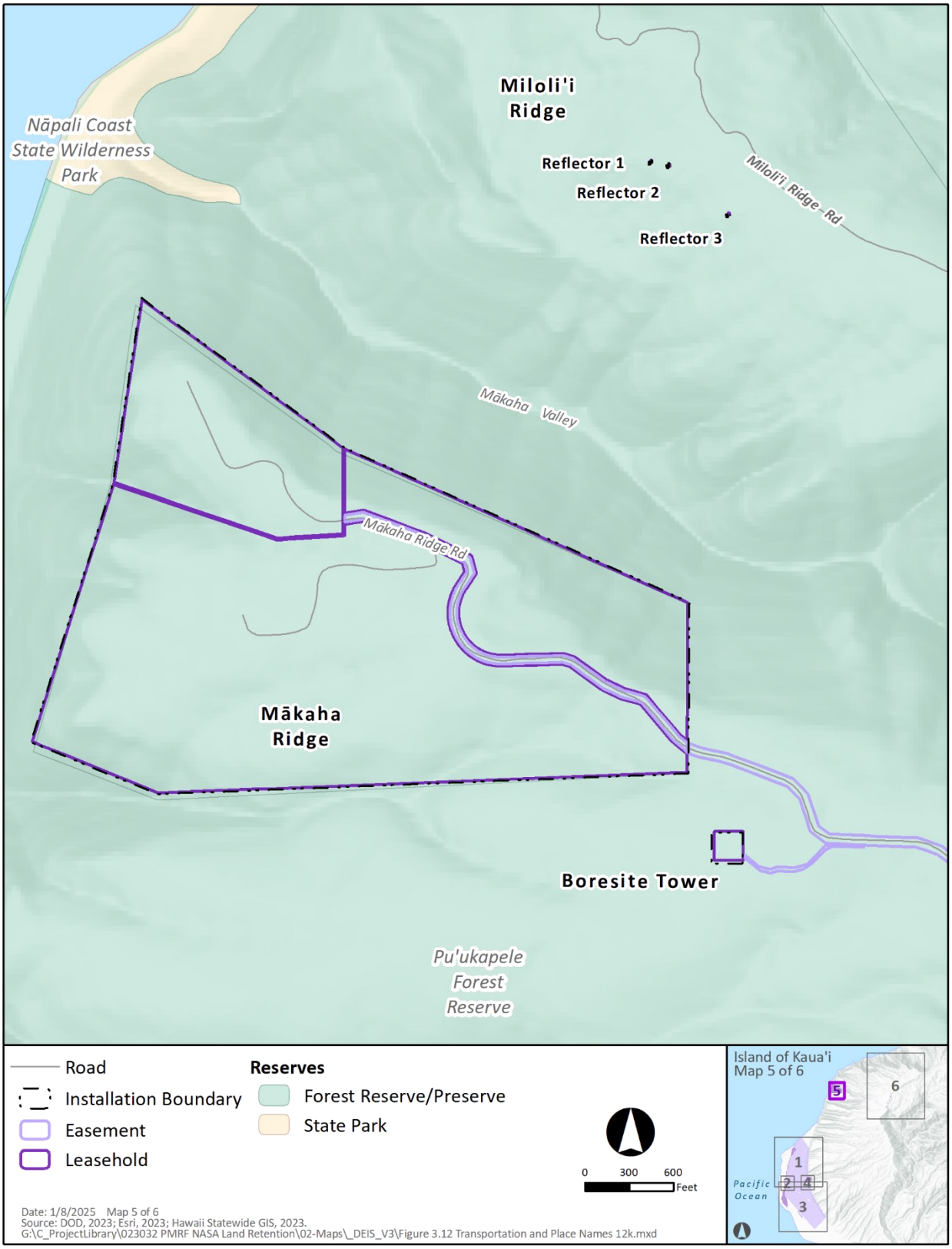


Figure 3.11-5 Transportation Routes Mākaha

3.11.1.4.5 Miloli‘i Ridge

The reflectors are accessed from an unmarked, unpaved dirt path. Figure 3.11-5 shows the roads surrounding Miloli’i Ridge.

3.11.1.4.6 KPGO

Kōke‘e Road (State Route 550), which is the road used to access KPGO, is a paved two-lane road with a posted speed limit of 25 miles per hour. Portions of KPGO are located along Faye Road, which is a paved road with no lane designations. KPGO employs seven full-time staff and offers site visits to the public. Site visits are limited to the hours of 10:00 a.m. and 12:00 p.m. with a maximum of 20 individuals per visit (NASA, 2024a). Kōke‘e Road is also used to access the Kōke‘e State Park. According to the 2015 Kōke‘e and Waimea Canyon State Parks Master Plan, there were 258,170 visitors for the 2003 calendar year (R.M. Towill, 2014). Figure 3.11-6 shows the roadway network of the KPGO.

3.11.2 Environmental Consequences

3.11.2.1 Approach to Analysis

The effects of the Proposed Action on transportation include whether the Proposed Action would increase the level of service (LOS) on any roadway or intersection, affect the existing traffic volumes that impact a roadway’s capacity or safety, and affect the physical existing condition of the roadways. LOS is a qualitative index that references a performance measure such as intersection delay to express the quality of traffic services ranging from A, little to no delay, to F, significant delay. The potential effects could be considered a short-term or long-term effect, direct or indirect, and beneficial or adverse to the transportation network.

3.11.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.11.2.2.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, and KPGO

Under Alternative 1, the Navy and NASA would continue operations and associated traffic at current levels on the transportation network, resulting in no change or new effects within the ROI. The Navy would continue to maintain the roads, roadway drainage, bike path/trails, or other forms of access in the ROI. Security-related access on leasehold areas would continue to be managed by the Navy, including patrols, vegetation clearing and maintenance of security gates, fencing, or signage within the leasehold areas. Under Alternative 1, existing long-term, minor, adverse effects from traffic and vehicle movements associated with site personnel entering and exiting the facilities would continue.

There would be no addition or change to the roadways located within the ROI at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli‘i Ridge, and KPGO areas as a result of Alternative 1.

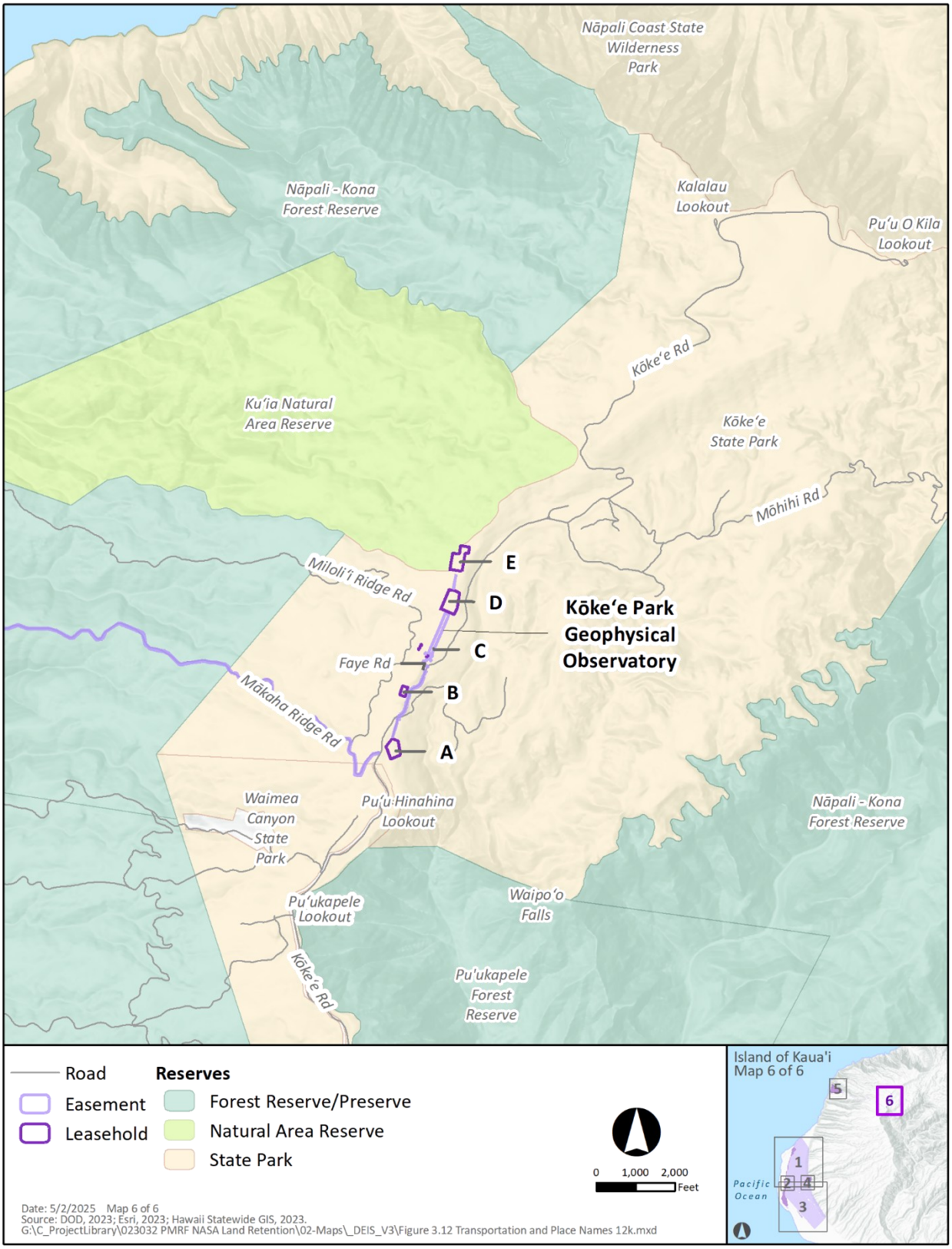


Figure 3.11-6 Transportation Routes KPGO

3.11.2.2.2 Effect Summary

As described above, Alternative 1 would not result in adverse effects to the transportation network within the ROI. Alternative 1 would not result in any change in traffic volumes accessing the facilities and on the existing roadway network in the ROI. Site personnel access to the facilities would continue. The ongoing implementation of current mitigation measures (see Table 3.1-4) would be maintained and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, there would be minimal, if any, effects on the roadway and intersection LOS. **Therefore, effects of Alternative 1 to transportation would not be adverse or significant.**

3.11.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.11.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 2, the Navy and NASA would continue the current use and maintenance of the existing roadway network. Under this alternative, there could be a potential transfer of ownership and maintenance responsibilities for North Nohili, Kōkeʻe, and Faye Roads. These roads would no longer be State- or County-owned and would come under federal jurisdiction. Road maintenance responsibilities of North Nohili Road would cede to PMRF, and maintenance responsibilities for Kōkeʻe and Faye Roads would cede to NASA. NASA and PMRF would adhere to applicable U.S. DOT, Hawaiʻi DOT, and Kauaʻi County regulations pertaining to road maintenance. There would be no effects to the remainder of the roadways situated on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge under Alternative 2. Similar to Alternative 1, long-term, minor, adverse effects associated with site personnel entering and exiting the facilities would continue.

3.11.2.3.2 Effect Summary

As described above, Alternative 2 would not result in adverse effects to the transportation network within the ROI. Alternative 2 would not result in any change in traffic volumes accessing the facilities and on the existing roadway network in the ROI. Site personnel access to the facilities would continue. Any State- or County-owned road that would become a federal road would be maintained according to all applicable local, State, and federal regulations pertaining to road maintenance. There would be no change to the maintenance and use of the remainder of the roads situated on former leasehold and easement lands. The ongoing implementation of current mitigation measures (see Table 3.1-4) would be maintained and there would be no change to current operations or activities on the former leasehold and easement lands under Alternative 2, regardless of the land tenure mechanisms. As a result, there would be minimal, if any, effects on the roadway and intersection LOS. **Therefore, effects of Alternative 2 to transportation would not be adverse or significant.**

3.11.2.4 No Action Alternative

3.11.2.4.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under the No Action Alternative, the ownership, management, development, and maintenance of Navy- and NASA-managed roads and access ROWs would revert to the State of Hawaiʻi. The Navy and NASA would no longer maintain the roads, roadway drainage, bike path/trails, or other forms of access in any of the roadway/access easements or leasehold lands. Security-related access on leasehold areas would

no longer be managed by the Navy or NASA, including patrols, vegetation clearing and maintenance of security gates, fencing, or signage within the leasehold areas. Per the lease agreements, any structures or infrastructure could either be removed or remain in place. Demolition activities may result in the closure of roads and an increased presence of contractor and construction vehicles at and around the ROI and could cause congestion on roadways in the area. For this reason, short-term, minor, adverse effects to transportation could be expected.

Under the No Action Alternative, any vehicular or transportation-related access to fee simple lands via an easement across State lands would need to be re-evaluated and, dependent upon future State decisions after lease expiration, may require re-routing or alternate methods of providing access to the installation's fee simple properties. The roadway and access easements support a minor amount of vehicle traffic and are largely associated with access to utilities and other infrastructure.

If, under this alternative, the State manages the roadways in a way that maintains both public and military access, the resulting transportation-related effects would be minor.

3.11.2.4.2 Effect Summary

As described above, the No Action Alternative could result in minor, short-term, adverse effects to transportation, but would not result in any long-term adverse effects to transportation in the ROI. Under the No Action Alternative, the ownership, management, and maintenance of Navy and NASA-managed roadways and access ROWs would revert to the State of Hawai'i. Per the lease agreements, any structures or infrastructure could be removed or could remain in place. Potential demolition activities could result in the temporary closure of roads and a temporary increase in traffic volumes on the roadways within the ROI. The road closures and any additional vehicles added into the roadway network for the demolition work would be short term and should not affect the roadway and intersection LOS in the long term. To address any potential effects resulting from the potential demolition activities, additional evaluation would be conducted with more detailed information of demolition activities to develop traffic control plans and/or traffic management plans to detail how the traffic and roadways will be managed during the work.

The roadways and access easements currently support a minor volume of vehicular traffic. The State may decide to re-route or provide alternative access methods to maintain public and military access to the fee simple properties. If a re-route or alternative methods are implemented, the existing traffic patterns and volumes would adjust accordingly. As a result, this change would not affect the roadway or intersection LOS due to the minor volume of vehicles that would be affected. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.12 Hazardous Materials and Waste

The generation, use, storage, transport, and disposal of hazardous materials and hazardous waste is regulated on both the federal and State level. In general, they include substances that, if released, could present substantial danger to public health or welfare, or the environment due to their quantity, concentration, or physical, chemical, or toxic characteristics. Universal waste (a subset of hazardous

waste) is defined as a waste that contains hazardous materials but has lower immediate risk when managed properly (EPA, 2024d). Hazardous waste that is considered universal waste includes batteries, pesticides, mercury-containing equipment, lamps, aerosol cans, and used/containerized oil. Solid waste refers to non-hazardous waste typically in the form of standard office trash, metals, or recyclable materials.

3.12.1 Affected Environment

3.12.1.1 Region of Influence

The ROI for hazardous materials, hazardous waste (including universal waste), and solid waste includes the leasehold and easement lands held by the Navy at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and by NASA at KPGO.

3.12.1.2 Regulatory Setting

Hazardous materials and wastes are managed by the State of Hawaiʻi, EPA, USACE, DoD, and U.S. DOT. Hazardous substances are managed primarily in accordance with the CWA, the Resource Conservation and Recovery Act (RCRA), and the Pollution Prevention Act. A list of all applicable federal, State, and local policies used for the management of hazardous materials and waste within the ROI can be found in Table 3.12-1 and in Appendix E.

Table 3.12-1 Standard Operating Procedures and Instructions Utilized in Management of Hazardous Materials and Waste at PMRF and KPGO

SOP/Instruction	*Management Actions*
PMRF SPCC Plan	• Used to prevent and control discharge of oil and oil products from non-transportation-related onshore and offshore activities into navigable Waters of the U.S. or adjoining shorelines and providing immediate response and notification should a discharge occur. • Establishes the minimum prevention and containment procedures, methods, appropriate containment and/or diversionary structures or equipment, and other requirements for equipment necessary to prevent and to contain discharge of oil from facilities. • Outlines visual inspection requirements of oil containers and external container surfaces. • Outlines transportation and loading requirements for POLs. • Establishes Good Engineering Practices to include the use of advanced leak detection systems on all underground fuel tanks which are tested every 15 days.
PMRF Oil and Hazardous Substance Spill Contingency Plan	• Contains immediate procedures to be carried out by personnel once a discharge is detected, notification and reporting requirements, response equipment, hazard analysis, recommended spill actions and cleanup, training, environmental protection, and SDS.
Spill Response Standard Operating Procedure, ES-253	• Provide guidance, establish protocols, and support spill response actions to minimize impact to the environment. • Activates spill response and PMRF dispatch, as well as stopping chemical flow (if trained).

SOP/Instruction	*Management Actions*
PMRF RCRA Contingency Plan	• Provides preparedness, prevention, and emergency procedures in order to minimize the possibility of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste into the air, soil, or surface water. • Outlines operations and maintenance procedures, fire prevention and communication equipment, testing and maintenance, local fire department information (Crash/Fire), vicinity applicability, and emergency response requirements including a quick reference guide.
PMRF Hazardous Waste Management Plan	• Compiles applicable regulations, guidelines, and establishes protocols and procedures for basic waste management at PMRF. • Designed to protect the environment and safety and health of personnel and reduce liability by providing a mechanism for proper waste management. • Outlines training, recordkeeping, and annual reporting requirements, container labeling and inspection requirements, and water disposal approval request from tenant activities.
PMRF Instruction 3440.17B, PMRF Emergency Management Plan, Wildfire Hazards	• Requires that Crash/Fire be present at every launch and be trained on response and recovery for emergencies that involve release of hazardous materials in the event of a missile failure. • Requires that Crash/Fire conduct decontamination at incident sites.
CHRIMP	• DoD program utilized to reduce hazardous materials that are procured, stored, distributed and disposed of as waste by using a centralized control and inventory management point. • Provides materials tracking and environmental reporting. • Ensures that all unopened containers of hazardous materials are collected at the inventory management point for proper marking and transportation procedures. • Ensures SDS sheets are stored with the hazardous material.
PMRF Instruction 8023.1K, Ammunition Management	• Establishes policies for handling and storing ammunition. • Requires a list of personnel that have access to magazine area at Kamokalā Ridge. • Sets forth required training and certification guidelines for personnel involved in ordnance handling.
PMRF Instruction 8023.2K, Handling and Transportation of Ammunition, Explosives, and Hazardous Materials	• Establishes policies and procedures for handling and transporting explosives and hazardous materials. • References DOT regulations for transportation of hazardous materials. • Details specific requirements for preparation of ordnance for transport, regulations for drivers engaged in transporting hazardous materials, and standards for blocking and bracing of explosives. • Provides explosive safety routes.
KTF Site Sustainability Plan	• Outlines BMPs that are implemented at KTF to decrease environmental effects from the use of hazardous materials on site. • Establishes policies for pesticide use, waste management, and fuel and oil usage.
PMRF Installation Pest Management Plan	• Least hazardous pesticides such as gel baits and non-lethal traps are used as often as possible; spray applications used only when needed. • Only chemicals registered and methods approved by the EPA are employed. • Work performed by State-certified pesticide applicator only. • No pesticides are applied in wetland areas unless specifically approved on label. • Disposal procedures include triple rinse and puncture of containers.

SOP/Instruction	*Management Actions*
NASA Environmental Management Plan	• Describes procedures and practices to ensure long-term resource protection. • Describes environmental policy, compliance, prevention and pollution, authority and accountability, risk assessments, and emergency procedures. • Outlines air quality, waste management, hazardous waste shipment, water management, pesticides, and record keeping.

Key: BMP = Best Management Practice; CHRIMP = Consolidation Hazardous Material Reutilization and Inventory Management Program; DoD = Department of Defense; DOT = Department of Transportation; EPA = United States Environmental Protection Agency; KPGO = Kōkeʻe Park Geophysical Observatory; KTF=Kauaʻi Test Facility; NASA = National Aeronautics and Space Administration; PMRF= Pacific Missile Range Facility; POL= Petroleum, Oil and Lubricants; RCRA = Resource Conservation and Recovery Act; SDS= Safety Data Sheets; SOP = Standard Operating Procedure; SPCC = Spill Prevention, Control, and Countermeasure; U.S. = United States.

3.12.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.12-2 summarizes the predictable environmental trends for hazardous materials and wastes.

Table 3.12-2 Predictable Environmental Trends for Hazardous Materials and Wastes

Predictable Trend	*Influence on Resource*
Rising global temperatures (air/ocean)	• Increases in temperature could increase volatilization of persistent organic chemicals, thereby causing greater concentrations to become airborne and travel longer distances. • Increases in temperature and changes in air moisture content may alter the persistence of chemicals. • Rising air temperatures may cause land surfaces to retain less moisture, allowing contaminated soil to readily become airborne. • Pesticides could volatilize more readily, and residues may also readily degrade in warmer soil and surface waters. • Volatiles could dissipate more readily, thereby possibly decreasing volatile concentrations in the air and ocean. • Increased heat could destabilize unexploded ordnance, resulting in explosion.
Change in precipitation patterns	• Increases in rainfall could cause inundation of contaminated land and sediment and may allow contaminants to cross-contaminate clean areas, such as freshwater and marine environments. • Increases in rainfall could cause runoff of pollutants such as metals, pesticides, and dioxins into water bodies. • High rainfall events could increase resuspension of contaminated sediments in surface waters. • Periodic exchanges of wet and dry periods could lead to less stable heavy metal contaminants and increase their bioavailability. • Less cloud cover and rain could cause chemicals to decompose from additional light exposure, causing higher concentrations of free radicals in the air,

Predictable Trend	*Influence on Resource*
	which could form chemical compounds that may be more toxic and persistent than the original compound. • High rainfall could dilute pollutants by increasing water volume or runoff.
Increased frequency and/or intensity of extreme weather events	• Increases in extreme weather events, such as floods and droughts, could alter the mobility of chemicals. For example, it has been observed that flood events can transport dioxins, metals, and hydrocarbons from contaminated areas to noncontaminated areas. • Flooding events could remobilize chemicals that were adsorbed into soil and sediment. • Flooding could dilute pollutants due to increased water volume in surface water bodies. • Hurricanes and high winds could damage buildings and chemical storage facilities. Contaminants could disseminate overpopulated areas or dissolve into rainwater. • Droughts may decrease the leaching of metals and contamination of groundwater.
Rising sea levels and associated storm surge	• Storage tanks and hazardous waste storage facilities may have increased failure due to corrosion caused by rising sea levels and storm surges. • Coastal erosion from sea level rise would result in pollutant runoff and could provide new sources of contaminant pathways from existing contaminated sites not designed to withstand flood conditions.
Ocean acidification	• Propagation of contaminants through the ocean can be increased by ocean acidification, which would change the bioavailability of pollutants and intensify exposure to, and bioaccumulation of, mercury, metals, and other contaminants.

3.12.1.4 Existing Conditions

3.12.1.4.1 Main Base

Kauai Test Facility (KTF) is a launch facility located on the north end of PMRF and is operated by Sandia National Laboratories for DOE. A portion of KTF (Leased Tract E-1, TMK: 1-2-002-025) is situated on the PMRF leasehold land. This parcel contains the missile assembly building, a generator building, fuel tanks, oil tanks/drums, and a portion of the launch missile assembly area. This is the only area on the leasehold portion of Main Base that contains hazardous materials and waste (including universal and solid waste).

Hazardous Materials

As an active test facility in a relatively remote area, KTF contains a chemical inventory for facility maintenance and test operations. The inventory consists of aerosols, gases, liquids, and solids, mostly in "cabinet-scale" quantities, with the exception of fuels. Small quantity materials (less than 1 gallon or 10 pounds) are typically paints or coatings, lubricants, adhesives, cleaning agents, and caulking compounds. All chemicals are tracked by the DOE, and all activities involving chemical use and storage are performed

in accordance with DOE requirements on hazards and controls related to the environment and industrial hygiene, as well as preparation for and management of emergencies.

During testing activities, additional hazardous materials are temporarily brought to the leasehold land, usually as part of launch vehicles. Solid and liquid propellants contained in launch vehicles include commercial products, including, but not limited to cyclotrimethylene-trinitramine, lead azide, hydrazine, and Composition 4. All explosives are contained and are not in open powder form, so are not directly handled. All processes involving high-energy source use and storage are performed in accordance with DOE Explosives Order and 10 CFR part 851 requirements for industrial safety and hygiene.

As of 2025, all firefighting foams containing PFAS, typically known as Aqueous Film Forming Foams, have been removed from stockpile and are no longer used on fee simple, leasehold, and easement lands at PMRF. All materials and infrastructure, including all associated piping, hoses, valves, and pumps, were removed and disposed of per EPA guidance. Mobile firefighting equipment that previously used Aqueous Film Forming Foams has also been removed and disposed of in accordance with federal guidance, and has been replaced with Fluorine Free Foam, which contains no fluorinated compounds or PFAS.

Fuels and lubricants are also stored on Tract E-1 (TMK: 1-2-002-025) and include diesel fuel, gasoline, and motor oils. Four diesel storage tanks are used to power trucks, generators, and other equipment across leasehold areas. Lubricating oils are present, and are used for vehicles and mechanical equipment. Additional oil storage capacity in 55-gallon drums, mobile and portable containers, mobile refuelers, and oil-filled operational equipment (e.g., transformers, hydraulic elevators) occur throughout the site on an as-needed basis. Table 3.12-3 includes a summary of fuel storage tanks on Tract E-1 (TMK: 1-2-002-025) and their respective containment devices.

Table 3.12-3 Fuel and Oil Storage on Tract E-1 (TMK: 1-2-002-025)

Product/Type	*Quantity*	*Capacity (nominal capacity) in gallons*	*Usage*	*Secondary Containment*
Diesel ST	1	150	Standby generator use	Steel basin
Diesel ST	1	250	Power Generation	Double-walled steel tank
Diesel ST	2	100	Generator use	Steel basin
Oil drum or ST	As needed	55+	Hydraulic maintenance	Per the SPCC

Key: SPCC= Spill Prevention, Control, and Countermeasure; ST = storage tank.

KTF is included in the PMRF SPCC Plan which describes oil storage facilities on this portion of leased land, and the mitigation controls in place to prevent inadvertent discharges of petroleum, oils, and lubricants (POLs). The SPCC fulfills the requirements of 40 CFR part 112, *Oil Pollution Prevention and the Clean Water Act*, which require that any facility having an aggregate aboveground oil storage capacity greater than 1,320 gallons, and a reasonable expectation of an oil discharge affecting navigable Waters of the U.S. or adjoining shorelines, to develop and implement an SPCC Plan with requirements for the prevention of, preparedness for, and response to oil discharges.

All underground fuel storage tanks at PMRF are equipped with advanced leak detection systems and the efficacy of these systems is tested every 15 days, double the current federal requirement. These leak

detection systems include high- and low-level audio and visual alarms. Risk assessments are conducted for all storage tanks at PMRF by a third-party environmental engineering firm every 2 years, which determines if updates to site-specific response plans are needed. Per DOH regulations, PMRF conducts comprehensive soil testing during the decommissioning phase of all underground storage tanks. The soil samples are tested to ensure concentrations of POLs in the soil, if found, are below levels allotted by the DOH. PMRF is in the process of converting all underground storage tanks to aboveground storage tanks. As regulated, soil samples will be conducted within and around the former pits during the decommissioning phase.

Hazardous Waste

Hazardous waste produced from the flight termination of a missile is limited to unused fuels. Soil contamination could potentially occur from rocket emissions forming hazardous materials, or in the event of an early flight termination, burning fuel may reach the ground, resulting in local contamination; however, most or all of the fuel from the missile would likely burn up before being extinguished. This could require soil sampling and analysis to determine if any cleanup is required and could result in increased environmental exposure to hazardous materials, although no changes to soil chemistry are predicted to occur. All potentially hazardous materials that could result in hazardous waste resulting from an accident from launch activities or transportation will be contained entirely within the GHA and would be removed by trained Crash/Fire Personnel in accordance with PMRF Instruction 3340.17B, *PMRF Emergency Management Plan*. Any remaining fuel would be collected and disposed of as hazardous waste per the PMRF Hazardous Waste Management Plan and PMRF RCRA Contingency Plan, which each compile applicable regulations, guidelines, and establish protocols and procedures for basic waste management at PMRF and establish readiness and method requirements as instructed in 40 CFR sections 262.250 through 262.265. If materials are classified as non-hazardous, they would be disposed of based on concentrations as solid waste (see Main Base*, Solid Waste* section below). The DOE conducted soil studies to evaluate the effect to soils from launch operations. Results showed that minor amounts of aluminum oxide are produced from launches, and aluminum levels are minimal in comparison to background levels of aluminum in the soil in the Mānā Plain (PMRF, 2010).

The PMRF Fire Department and Spill Response Team are trained in the appropriate procedures to handle the materials associated with launches if a mishap occurs. All personnel involved in this training will wear protective clothing and receive specialized training in spill containment and cleanup.

Hazardous waste on Tract E-1 (TMK: 1-2-002-025) is handled and managed in compliance with the Federal Facility Compliance Act, RCRA, and the Pollution Prevention Act. KTF is currently a conditionally exempt, small quantity hazardous waste generator. Per EPA regulations, KTF operates under a site-specific waste ID, which tracks the production and disposal of all hazardous waste. A Site Sustainability Plan is required for sites operating under the DOE. Pollution prevention and waste minimization are reported in the KTF Site Sustainability Plan.

Asbestos is managed in accordance with EPA 40 CFR part 763, Subpart E for control prior to disposal. Asbestos-containing building materials (ACBMs) fall under the category of hazardous materials. However, ACBMs may be classified as hazardous waste (based on asbestos concentration and condition) during demolition activities. The Sandia National Laboratories' Asbestos Management Team conducted

a comprehensive asbestos survey in July 2008. A total of 110 cubic yards of ACBMs at KTF were identified and disposed of during construction operations at that time (DOE, 2019).

Operations on Tract E-1 (TMK: 1-2-002-025) produce small quantities of universal waste. Over the 5-year period from 2013 through 2017, a total of 373 gallons of used oil (e.g., motor oil, hydraulic fluid) and oil filters from vehicles and generators were collected by local disposal or recycling companies (DOE, 2019). Mercury-containing items, including switches, thermometers, batteries, and projection lamps were collected and picked up once during the 5-year period (DOE, 2019). Spent lead-acid batteries are collected by a vendor upon replacement.

South of the fee simple land, PFAS were identified in the soil and groundwater at a former firefighting training site that was used at PMRF in the 1960s. The PFAS site is located near a former landfill site in close proximity to leasehold land (see Section 3.12, *Solid Waste*, below for more information on landfill site). Stochastic samples were collected at the PFAS site following DOH sample methodology, and samples were properly disposed of according to hazardous material management plans. In compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a Preliminary Assessment to identify areas of interest where PFAS may have been stored, used, or released at PMRF was completed in December 2023. A concurrent Site Inspection to sample for the presence or absence of PFAS in soil and groundwater was completed in November 2023. In August 2025, the Navy responded to comments from the DOH and USFWS through a Site Inspection Errata package and made necessary updates to the Preliminary Assessment recommendations. Five sites investigated in the Site Inspection where PFAS was detected above the EPA screening levels, plus an area associated with a helicopter crash at PMRF in 2022, will be further evaluated in a Remedial Investigation. The Remedial Investigation is anticipated to begin in Fiscal Year 2026. The Navy will continue to work with the DOH during the Remedial Investigation process. Approximate locations of the landfill and PFAS site are identified in Figure 3.9-1.

Solid Waste

Some solid waste is generated on Tract E-1 (TMK: 1-2-002-025). All non-hazardous debris and solid waste is disposed of at the Kaua‘i County Kekaha landfill, located adjacent to the southern end of the PMRF. Waste minimization and recycling are incorporated whenever possible to minimize the quantities of solid waste generated. PMRF maintains a recycling program for aluminum cans, glass, paper, and cardboard, all of which are collected biweekly. Green waste is collected and chipped for composting and use on the base (PMRF, 2008). Pollution prevention and waste minimization data are reported in the KTF Site Sustainability Plan.

A former landfill site, located south of the fee simple land, was used for the burial of trash, wrecked aircraft, and concrete rubble in the 1960s (see Figure 3.9-1). None of the buried items would be considered hazardous or contain a hazardous constituent, and all combustible items were incinerated prior to burial. The landfill was closed in the 1960s and is no longer in use.

3.12.1.4.2 Kamokalā Ridge

Hazardous Materials

The magazines at Kamokalā Ridge are a secured area and are used for ordnance storage. Hazardous materials stored at the Kamokalā Magazines are solid propellants and ordnance. The materials within

the Kamokalā Magazines are contained and managed with proper ventilation, marking, and placarding according to PMRF Instruction 8023.1K. Ordnance is transported to and from the site in accordance with PMRF Instruction 8023.2K. For ordnance storage and safety requirements, see Section 3.9, *Public Health and Safety*. There are no other hazardous materials stored at this location.

Hazardous Waste

No hazardous waste is generated from operations at this site.

Solid Waste

Small amounts of solid waste, typically office trash or small recyclable materials, are generated at this site. All waste is collected and disposed of at the Kekaha landfill, recycled, or utilized as green waste.

3.12.1.4.3 Mānā Water Well

Hazardous Materials

A small amount of sodium fluoride, used for water fluoridation, is kept in a storage locker located on leasehold portions of the Mānā Water Well site. The sodium fluoride is stored in a chemical drum within a secondary containment device and with the appropriate Safety Data Sheets (SDSs). The Navy maintains updated SDS for all hazardous substances used in accordance with Occupational Safety and Health Administration regulation 29 CFR section 1910.1200, *Hazard Communication*. For more information regarding chemical use during the fluoridation process at Mānā Water Well, see Section 3.8, *Utilities*.

Hazardous Waste

No hazardous waste is produced from operation and maintenance activities at this site.

Solid Waste

Small amounts of solid waste, typically office trash or small recyclable materials, are generated at this site. All waste is collected and disposed of at the Kekaha landfill, recycled, or utilized as green waste.

3.12.1.4.4 Mākaha Ridge

Hazardous Materials

Hazardous materials on leasehold lands on Mākaha Ridge include fuel, oils, pesticides, and small amounts of aerosols/solvents, mostly in “cabinet-scale” quantities. Pesticides and aerosols/solvents at this site are administered through the Navy’s Consolidated Hazardous Materials Reutilization and Inventory Management Program (CHRIMP). CHRIMP mandates procedures to control, track, and reduce the variety and quantities of hazardous materials in use at facilities and established Hazardous Materials Minimization Centers as the inventory controllers for Navy facilities. The Hazardous Materials Minimization Center for PMRF is located on fee simple lands at Main Base.

Per the PMRF Installation Pest Management Plan, all pesticide use on leasehold areas of Mākaha Ridge follows EPA requirements, and all pesticides used are approved by the EPA. Only State-certified pesticide applicators perform work. Least hazardous pesticides such as gel baits and non-lethal traps are used as often as possible, and no pesticides are applied in wetland areas unless specifically approved on the label. Spray applications are employed only as a last resort and are not used if wind speeds exceed

5 miles per hour. Disposal of containers includes triple rinsing of bottles and puncturing of bottles to ensure no possibility of reuse. However, metal containers can be rinsed and recycled, and rinse water can be reused for future mixing. All pesticides used at PMRF are stored under a covered, concrete area which is curbed to contain pesticide spills. A pesticide inventory including pesticide name, manufacturer unit of issue, concentration, Material Safety Data Sheets, and quantity is kept on file and updated quarterly.

All fuel and oil at Mākaha Ridge are handled in accordance with the PMRF SPCC Plan. All fuel and oil storage tanks are above ground and are equipped with appropriate secondary containment devices. Table 3.12-4 includes a summary of fuel and oil storage on Mākaha Ridge.

Table 3.12-4 Fuel and Oil Storage on Mākaha Ridge Leasehold Lands

Product/Type	*Quantity*	*Capacity (nominal capacity) in gallons*	*Usage*	*Secondary Containment*
Diesel ASTs	2	8,000	Power generation	Double-walled steel tank
Diesel ASTs	4	275	Generator use	Double-walled steel tank
Lube oil ST	1	280	Lube oil tank	Double-walled steel tank
Used oil ST	1	280	Used oil tank	Double-walled steel tank

Key: AST = aboveground storage tank; ST = storage tank.

Hazardous Waste

Hazardous waste is not produced at this site. There is potential ACBM associated with structures at Mākaha Ridge—ACBM is managed according to the same procedures as discussed above in 3.12, *Main Base*.

Universal waste at this site includes used oil, aerosol/solvent containers, and pesticides. PMRF maintains a Used Oil Transporter/Processor Permit through the DOH. Spent aerosol/solvent containers and generated used oil in containerized 55-gallon drums are transported to fee simple lands on Main Base to be recycled in accordance with the SPCC and the PMRF Hazardous Waste Management Plan.

Solid Waste

All solid waste generated at this site, typically in the form of office trash or recyclable materials, is collected and disposed of at the Kekaha landfill, recycled, or utilized as green waste.

3.12.1.4.5 Miloli‘i Ridge

Hazardous Materials

Hazardous material at this site is limited to the use of lead-acid batteries. The passive frequency shift reflectors are powered by solar panels and require the use of batteries for power generation. The batteries are changed approximately every 5 years by PMRF personnel.

Hazardous Waste

As applicable, spent lead-acid batteries (considered hazardous waste) from this site are disposed of in accordance with the PMRF Hazardous Waste Management Plan and recycled at a local retailer.

Solid Waste

Minor amounts of solid waste, typically office trash or small recyclable materials, are generated at this site. All waste is collected and disposed of at the Kekaha landfill, recycled, or utilized as green waste.

3.12.1.4.6 KPGO

Hazardous Materials

Hazardous materials at KPGO include fuel, oils, pesticides, and small amounts of aerosols/solvents (mostly in "cabinet-scale" quantities). These are managed in accordance with the PMRF Hazardous Waste Management Plan, the NASA Environmental Management Plan, and the Base Service Agreement between NASA and the Navy. Pesticides and aerosols/solvents at this site are administered through CHRIMP. All pesticides are applied in accordance with the instructions on the label and by a DoD or State-certified applicator and follow EPA requirements (PMRF, 2008; NAVFAC Pacific, 2023a). Pesticide use at KPGO is in accordance with the same policies and procedures as discussed above in Section 3.12, *Mākaha Ridge, Hazardous Materials.* Fuel and oil at KPGO are handled in accordance with the PMRF SPCC Plan, PMRF RCRA Contingency Plan, and NASA Environmental Management Plan (see Table 3.12-1). Site walkthroughs and environmental trainings are also performed annually. All fuel and oil storage tanks are equipped with appropriate secondary containment devices. Table 3.12-5 includes a summary of fuel and oil storage at KPGO.

Table 3.12-5 Fuel and Oil Storage at KPGO

Product/Type	*Quantity*	*Capacity (nominal capacity) in gallons*	*Usage*	*Secondary Containment*
Diesel ST*	2	25,000	Power generation	Concrete berm
Diesel ST	1	500	Power generation	Concrete base with CMU wall
Used Oil drums	4	55	Storage and supply	Storage locker with built-in containment

Note: *Only one 25,000-gallon ST is active.
Key: CMU = concrete masonry units; ST = storage tank.

Hazardous Waste

Minimal amounts of hazardous wastes are generated from minor maintenance activities associated with corrosion control, diesel generator overhauls, regular radar maintenance, and from materials that have the potential to contain ACBMs or lead-based paint (LBP). These are managed in accordance with the PMRF Hazardous Waste Management Plan, the NASA Environmental Management Plan, and the Base Service Agreement between NASA and the Navy. There are no polychlorinated biphenyl (PCB)-containing transformers at KPGO; however, the radar facilities have capacitors and other components that contain PCBs. When these oil-containing parts are no longer functional and require disposal, they are disposed of in accordance with the PMRF Hazardous Waste Management Plan. Additionally, when a component suspected to contain PCBs needs to be disposed of, a sample is taken and sent for testing, and the manufacturer is contacted to determine whether PCBs are present in that part. There are no environmental contamination sites at KPGO (PMRF, 2008). All historical releases identified during the Phase 1 Environmental Site Assessment have been remediated by NASA (NASA, 2025).

Universal waste produced at this site includes used oil, pesticides, and small amounts of spent aerosol/solvent containers. Small aerosol solvents used for electrical parts/radar maintenance are recycled. Diesel generators are overhauled after 1,000 hours of operation and generate 55 gallons of used oil (PMRF, 2008). Hydrostatic oil associated with radar units is replaced every 4 years and generate approximately 55 gallons of used oil (PMRF, 2008). All used oil is sent to Main Base on fee simple land to be recycled in accordance with the NASA Environmental Management Plan, the SPCC, and the PMRF Hazardous Waste Management Plan. All waste is disposed of and managed under a site-specific EPA identification number.

State of Hawai'i DLNR drums containing refuse and paint are stored at Site C. NASA has requested that these drums be removed and disposed of by the State of Hawai'i. Additionally, the State of Hawai'i previously stored automobiles and boats at Site C. Therefore, NASA has requested a soil survey to determine whether there is a potential for contamination at Site C (NASA, 2024c).

Solid Waste

All solid waste generated at this site, typically in the form of office trash or recyclable materials, is collected and disposed of at the Kekaha landfill, recycled, or utilized as green waste.

3.12.2 Environmental Consequences

3.12.2.1 Approach to Analysis

The analysis considers the types of activities that have the potential to increase or decrease the effect to the storage and management of hazardous materials, hazardous waste (including universal waste), and solid waste. The analysis considers the types of activities, introduction of new risks, and adequacy of established procedures pertaining to hazardous materials and waste.

The criteria considered to assess whether the Proposed Action would result in potential significant effects to public health and safety is the extent to which the Proposed Action could result in:

- An increase in the use or generation of hazardous substances, hazardous wastes, or solid wastes.
- An increase in the risk of a spill or release of a hazardous material such that existing management plans and procedures are not sufficient to mitigate the risk and additional measures must be established.

3.12.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.12.2.2.1 Main Base

Hazardous Materials

Under Alternative 1, there would be no change to the types or amounts of hazardous materials used at Tract E-1 (TMK: 1-2-002-025). Fuel and oil will continue to be stored at this site. Ongoing procedures, developed to minimize the potential for any unintentional fuel release during transportation at this site, are covered in the 2010 PMRF Intercept Test Support EA (see Table 3.1-4). Testing activities would continue to cause the potential for soil contamination and sampling; analysis and removal would be performed, as necessary. Alternative 1 includes the continuation of strict adherence to SOPs that

minimize potential adverse effects to the management of hazardous materials at Tract E-1 (TMK: 1-2-002-025). These SOPs are listed in Table 3.12-1.

Hazardous Waste

There would be no change to the types or amounts of hazardous waste produced at this site. Hazardous waste, including unused fuel and potential ACBM, would continue to be handled and managed in accordance with federal regulations and applicable SOPs (see Table 3.12-1), reportable through the Site Sustainability Plan. Under this alternative, no structures potentially containing ACBMs would be demolished. Any hazardous waste identified during the normal course of operations would continue to be disposed of per the PMRF Hazardous Waste Management Plan. Small amounts of universal waste, such as spent aerosols and solvents, batteries, and small mercury-containing items would continue to be disposed of or recycled per the PMRF Hazardous Waste Management Plan.

Under Alternative 1, the Navy would continue to coordinate with the USFWS and DOH in compliance with CERCLA during the forthcoming Remedial Investigation at the former firefighting site where PFAS have been identified.

Solid Waste

There would be no change to the types or amounts of solid waste produced at this site. All non-hazardous, non-recyclable waste would continue to be disposed of at the Kekaha landfill. Green waste would continue to be used as compost, and waste minimization and recycling would continue to be implemented wherever possible.

3.12.2.2.2 Kamokalā Ridge

Hazardous Materials

Under Alternative 1, there would be no change to the types or amounts of hazardous materials used and stored at Kamokalā Ridge. Transportation and storage of ordnance at this site would continue in accordance with applicable federal laws and site-specific SOPs (see Table 3.12-1).

Hazardous Waste

Operations at this site would continue to result in zero hazardous waste.

Solid Waste

There would be no change to the types or amounts of solid waste produced at this site. All non-hazardous, non-recyclable waste would continue to be disposed of at the Kekaha landfill. Green waste would continue to be used as compost, and waste minimization and recycling would continue to be implemented wherever possible.

3.12.2.2.3 Mānā Water Well

Hazardous Materials

Under Alternative 1, there would be no change to the types or amounts of hazardous materials used and stored at Mānā Water Well. The sodium fluoride stored at this site will continue to be stored with appropriate SDS sheets and within the appropriate secondary containment device.

Hazardous Waste

Operations at this site would continue to result in zero hazardous waste.

Solid Waste

There would be no change to the types or amounts of solid waste produced at this site. All non-hazardous, non-recyclable waste would continue to be disposed of at the Kekaha landfill. Green waste would continue to be used as compost, and waste minimization and recycling would continue to be implemented wherever possible.

3.12.2.2.4 Mākaha Ridge

Hazardous Materials

Under Alternative 1, there would be no change to the types or amounts of hazardous materials used and stored at Mākaha Ridge. Fuels, oil, and pesticides at Mākaha Ridge would continue to be used and stored in accordance with applicable SOPs (see Table 3.12-1). Small amounts of spent aerosols and solvents would continue to be disposed of or recycled per the PMRF Hazardous Waste Management Plan.

Hazardous Waste

Operations at this site would continue to result in zero hazardous waste. The potential for ACBM would also continue to be present.

Universal waste produced at this site, such as spent oil and aerosol/solvent containers, would continue to be handled and managed in accordance with applicable federal regulations and SOPs (see Table 3.12-1).

Solid Waste

There would be no change to the types or amounts of solid waste produced at this site. All non-hazardous, non-recyclable waste would continue to be disposed of at the Kekaha landfill. Green waste would continue to be used as compost, and waste minimization and recycling would continue to be implemented wherever possible.

3.12.2.2.5 Miloliʻi Ridge

*Hazardous Ma*terials

Under Alternative 1, there would be no change to the types or amounts of hazardous materials used at Miloliʻi Ridge. Lead-acid batteries would continue to be used at this site.

Hazardous Waste

There would be no change to the types or amounts of hazardous waste produced at this site. Small amounts of hazardous waste would continue to be created approximately every 5 years due to the replacement of the lead-acid batteries that are used to power solar panels at the site. All batteries would continue to disposed of and recycled locally in accordance with the PMRF Waste Management Program.

Solid Waste

There would be no change to the types or amounts of solid waste produced at this site. All non-hazardous, non-recyclable waste would continue to be disposed of at the Kekaha landfill. Green waste would continue to be used as compost, and waste minimization and recycling would continue to be implemented wherever possible.

3.12.2.2.6 KPGO

Hazardous Materials

Under Alternative 1, there would be no change to the types or amounts of hazardous materials used or stored on Navy- and NASA-use lands at KPGO. Fuels, oil, LBP, and small amounts of spent aerosols and solvents, and pesticides at KPGO would continue to be used and stored in accordance with applicable SOPs (see Table 3.12-1).

Hazardous Waste

Operations at this site would continue to result in zero hazardous waste. The potential for ACBM and LBP would also continue to be present; however, no structures potentially containing ACBMs or LBP would be demolished. Any hazardous waste identified during the normal course of operations would continue to be disposed of per the NASA Environmental Management Plan and PMRF Hazardous Waste Management Plan under the KPGO-specific EPA waste identification number.

Universal waste produced at this site, such as spent oil and aerosol/solvent containers, and pesticides would continue to be handled and managed in accordance with applicable federal regulations and SOPs (see Table 3.12-1).

Solid Waste

There would be no change to the types or amounts of solid waste produced at this site. All non-hazardous, non-recyclable waste would continue to be disposed of at the Kekaha landfill. Green waste would continue to be used as compost, and waste minimization and recycling would continue to be implemented wherever possible.

3.12.2.2.7 Effect Summary

As described above, Alternative 1 would continue to result in potential minor, long-term, adverse effects to hazardous materials and waste management in the ROI. Hazardous materials, such as missile components, ordnance, fuels, oils, pesticides, “cabinet-scale” aerosols, and other small quantity cleaning agents and lubricants would continue to be utilized and managed under site-specific management plans and BMPs. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible. The ongoing implementation of current mitigation measures (see Table 3.1-4) and SOPs (see Table 3.12-1) would continue to occur, and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, there would be no increase in the use or generation of hazardous materials or wastes, or an increased risk of a spill or unintentional release that exceed the capabilities of current

management plans and BMPs. **Therefore, effects of Alternative 1 to hazardous materials and waste management would be adverse but would not be significant.**

3.12.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.12.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 2, there would be no change to existing conditions resulting from the transfer of ownership of leasehold lands to the Navy or NASA. All site-specific SOPs and Instructions in Table 3.12-1 would be implemented under fee simple acquisition of the land, and so guidelines that ensure the management of hazardous materials and waste would be identical to those described above for Alternative 1. Therefore, effects to the management of hazardous materials and waste on leasehold and easement lands under Alternative 2 would be the same as Alternative 1.

3.12.2.3.2 Effect Summary

Alternative 2 would continue to result in potential minor, long-term, adverse effects to hazardous materials and waste management in the ROI. Hazardous materials, such as missile components, ordnance, fuels, oils, pesticides, "cabinet-scale" aerosols, and other small quantity cleaning agents and lubricants would continue to be utilized and managed under site-specific management plans and BMPs. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible. Ongoing implementation of current mitigation measures (see Table 3.1-4), and SOPs (see Table 3.12-1) would occur, and there would be no change to current operations or activities on the former leasehold and easement lands under Alternative 2, regardless of land acquisition mechanism. As a result, there would be no increase in the use or generation of hazardous materials or wastes, or an increased risk of a spill or unintentional release that exceed the capabilities of current management plans and BMPs. **Therefore, effects of Alternative 2 to hazardous materials and waste management would be adverse but would not be significant.**

3.12.2.4 No Action Alternative

3.12.2.4.1 Main Base

Hazardous Materials

Under the No Action Alternative, the Navy would no longer maintain use of Tract E-1 (TMK: 1-2-002-025) and the easement lands adjacent to Main Base. Without the ability to activate restrictive easements for the required safety buffers, testing activities at this site could cease or be greatly reduced, which could reduce the amount of hazardous materials used and stored at this site. The amount of propellants, fuels, and lubricants used for launch operations could decrease, as could the possibility of soil contamination from an unintentional release of fuels, lubricants, or propellants. Fuel and any "cabinet-scale" aerosols and solvents used at the site would be disposed of, recycled, or transported to other appropriate holding sites in accordance with the SPCC Plan and appropriate SOPs. All existing infrastructure on the leasehold portions could be removed or remain in place (per the lease requirements). All the details regarding the relocation of hazardous materials on Tract E-1 (TMK: 1-2-

002-025) and management of the PFAS site are presently unknown and are subject to negotiations between the Navy and the State.

Hazardous Waste

Under the No Action Alternative, the amount of hazardous and universal waste could decrease because waste would no longer be generated by operations at this site. Unused fuels, ACBM, and small mercury-containing items could be removed from Tract E-1 (TMK: 1-2-002-025) (per the lease requirements); all removal would be managed in accordance with federal regulations and applicable SOPs (see Table 3.12-1) and would be subject to negotiations between the Navy and the State. Small amounts of universal waste, such as spent aerosols and solvents, would be disposed of or recycled per the PMRF Hazardous Waste Management Plan.

The presence of emerging contaminants found during the removal process could require soil sampling and analysis to determine if any cleanup is required. Additionally, the Navy would follow Navy regulations to determine how and when cleanup and restoration activities (to the extent practicable) would be for any existing hazardous materials that would be classified as hazardous waste in coordination with DOH. If no emerging contaminants are found, then the soil could be disposed of as solid waste. The Navy would adhere to federal and Miche

Solid Waste

Under the No Action Alternative, solid waste would no longer be generated at this site, resulting in a decrease to the amounts of solid waste that is disposed of at the Kekaha landfill. Pollution prevention and waste minimization programs would no longer be implemented at this site, and green waste would no longer be utilized as compost.

3.12.2.4.2 Kamokalā Ridge

Hazardous Materials

Under the No Action Alternative, the Navy would no longer maintain use of leasehold and easement lands at Kamokalā Ridge for the storage of hazardous materials. Without the ability to enforce the restrictive easements that make up a portion of the safety buffer (ESQD arc), the Kamokalā Magazines could no longer be used for ordnance storage. All ordnance would be removed from the Kamokalā Magazines and transported to another appropriate location in accordance with the appropriate PMRF Instructions and SOPs. All existing infrastructure holding or pertaining to hazardous material management at this site could be removed or remain in place (per the lease requirements). All the details regarding the relocation of hazardous materials at this site are presently unknown and are subject to negotiations between the Navy and the State.

Hazardous Waste

There is no hazardous waste produced at this site; therefore, this alternative would have no effect on the generation or disposal of hazardous waste. If any emerging contaminants are found during the removal process, cleanup and restoration activities could be similar to what is described above in Section 3.12.2.4.1, *Main Base*. All the details regarding removal activities at this site are presently unknown and are subject to negotiations between the Navy and the State.

Solid Waste

Under the No Action Alternative, solid waste would no longer be generated at this site, resulting in a decrease to the amounts of solid waste that is disposed of at the Kekaha landfill. Pollution prevention and waste minimization programs would no longer be implemented at this site, and green waste would no longer be utilized as compost.

3.12.2.4.3 Mānā Water Well

Hazardous Materials

Under the No Action Alternative, the Mānā Water Well could no longer be used as the main source of potable water for PMRF. Use and maintenance of the Mānā Water Well would be negotiated by the Navy and the State per the lease requirements. The small amount of hazardous materials used at this site for water disinfection could be removed or remain in place (per the lease requirements).

Hazardous Waste

There is no hazardous waste produced at this site; therefore, this alternative would have no effect on the generation or disposal of hazardous waste.

Solid Waste

Under the No Action Alternative, solid waste would no longer be generated at this site, resulting in a decrease to the amount of solid waste that is disposed of at the Kekaha landfill. Pollution prevention and waste minimization programs would no longer be implemented at this site, and green waste would no longer be utilized as compost.

3.12.2.4.4 Mākaha Ridge

Hazardous Materials

Under the No Action Alternative, the Navy would no longer maintain use of leasehold and easement lands at Mākaha Ridge. Fuel stored at this site could be removed and transported to another appropriate holding facility, and "cabinet-scale" hazardous materials used at the site could be disposed of or removed. Pesticides would no longer be applied at this location. All the details regarding removal activities at this site are presently unknown and are subject to negotiations between the Navy and the State.

Hazardous Waste

Under the No Action Alternative, universal waste would no longer be generated at this site. Any used oil or aerosol/solvent containers could be relocated to another appropriate location. All transportation and removal activities would be carried out in accordance with the applicable and appropriate SOPs. All the details regarding removal activities at this site are presently unknown and are subject to negotiations between the Navy and the State. Following lease expiration, facilities at this site could be removed or remain in place depending on negotiations. If ACBM or any other emerging contaminants are found during demolition or a potential soil contamination removal process, cleanup and restoration activities would be similar to what is described above in Section 3.12.2.4.1, *Main Base*.

Solid Waste

Under the No Action Alternative, solid waste would no longer be generated at this site, resulting in a decrease to the amount of solid waste that is disposed of at the Kekaha landfill. Pollution prevention and waste minimization programs would no longer be implemented at this site, and green waste would no longer be utilized as compost.

3.12.2.4.5 Miloli'i Ridge

Hazardous Materials

Under the No Action Alternative, the Navy would no longer maintain leasehold lands for use of the frequency shift reflectors. Existing infrastructure at this site could be removed or remain in place (per the lease requirements). The only hazardous materials used at this site are lead-acid batteries; these would be removed and recycled or relocated. All the details regarding removal activities at this site are presently unknown and are subject to negotiations between the Navy and the State.

Hazardous Waste

Lead-acid batteries utilized at this site could be removed and recycled or relocated to another appropriate location (per lease requirements). If any emerging contaminants are found during the removal process, cleanup and restoration activities would be similar to what is described above in Section 3.12.2.4.1, *Main Base*.

Solid Waste

Under the No Action Alternative, the minimal amount of solid waste that is produced at this site would no longer be generated, resulting in a minor decrease to the amount of solid waste that is disposed of at the Kekaha Landfill. Pollution prevention and waste minimization programs would no longer be implemented at this site, and green waste would no longer be utilized as compost.

3.12.2.4.6 KPGO

Hazardous Materials

Under the No Action Alternative, all existing infrastructure on the leasehold portions could be removed or remain in place (per the lease requirements). Fuel and oil stored at this site would be removed and transported to another appropriate holding facility, and "cabinet-scale" hazardous materials used at the site would be disposed of or removed. All the details regarding removal activities at this site are presently unknown and are subject to negotiations between the Navy, NASA, and the State.

Hazardous Waste

Under the No Action Alternative, small amounts of hazardous waste would no longer be produced at this site. The removal of any buildings could result in the presence of emerging contaminants or ACBMs and LBP. If any of these materials are found during the removal process, cleanup and restoration activities could be similar to what is described above in Section 3.12.2.4.1, *Main Base*. All the details regarding removal activities at this site are presently unknown and are subject to negotiations between the Navy, NASA, and the State. Universal waste, including used oil and spent aerosol/solvent containers would no longer be generated, although a large majority of this waste is typically recycled. Operations

that require the use of oil would cease, and there would be a reduction in the amount of oil that is taken to Main Base for recycling. NASA has requested that the State of Hawai'i DLNR remove the State of Hawai'i drums containing refuse and paint, and so it is expected that the State would dispose of the drums according to federal and State regulations.

Solid Waste

Under the No Action Alternative, solid waste would no longer be generated at this site, resulting in a decrease to the amounts of solid waste that is disposed of at the Kekaha landfill. Pollution prevention and waste minimization programs would no longer be implemented at this site, and green waste would no longer be utilized as compost.

3.12.2.4.7 Effect Summary

The No Action Alternative could result in potential minor, short-term, adverse effects to the management of hazardous materials and waste in the ROI. The transportation of hazardous materials such as missile components, ordnance, fuels, oils, pesticides, "cabinet-scale" aerosols and other small quantity cleaning agents, lubricants, and chemicals from leasehold land to fee simple land or another appropriate holding facility could increase the risk of a spill or release of a hazardous material. However, the ongoing implementation of current mitigation measures (see Table 3.14-1), adherence to SOPs and BMPs (see Table 3.12-1) and management under site-specific management plans would significantly reduce these potential risks. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible.

The No Action Alternative could also result in potential minor, long-term, beneficial effects to the management of hazardous materials and waste as hazardous materials would no longer be stored or used on leaseholds or easement lands. While the amount of waste produced on leasehold and easement lands is not significant, there could also be a small decrease in the amount of hazardous waste (including universal waste) and solid waste that is produced. As a result, there is the potential that there could be a small decrease in the amount of solid waste disposed of at the Kekaha landfill coming from leasehold and easement lands. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.13 Visual Resources

Visual resources on Kaua'i include both natural features typical to the Pacific Islands and human-built features. When viewed together as a landscape, these elements combine to create a sense of place characterized by scenic views of tropical beaches, native forests, and mountain ridgelines. Natural views from coastal areas on Kaua'i include shorelines, seascapes, and cliffs. Notable human-built and maintained features that contribute to the visual environment include historic and cultural features, unique structures, agricultural areas, parks and landscaping, and suburban-to-rural development.

3.13.1 Affected Environment

3.13.1.1 Region of Influence

The ROI for visual resources includes each leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO.

3.13.1.2 Regulatory Setting

Aesthetics and views of proposed projects at PMRF and the NASA leasehold areas are mainly guided by the Kauaʻi County General Plan (County of Kauaʻi, 2018) or the West Kauaʻi Community Plan (County of Kauaʻi, 2020). Both plans include policies to preserve scenic views of ocean, coastline/beach areas, mountains, and other elevated landforms. Under NEPA, federal agencies should consider visual effects of proposed projects on scenic resources, historic properties, and scenic experiences of the public who view the landscape.

3.13.1.3 Predictable Environmental Trends

This section supports analysis for the BLNR as may be necessary under HEPA.

Table 3.13-1 summarizes the predictable environmental trends for visual resources.

Table 3.13-1 Predictable Environmental Trends for Visual Resources

Predictable Trend	Influence on Resource
Rising global temperatures (air/ocean)	• No reasonably close causal relationship to visual resources identified.
Change in precipitation patterns	• No reasonably close causal relationship to visual resources identified.
Increased frequency and/or intensity of extreme weather events	• Visual resources may be damaged or destroyed during extreme weather events.
Rising sea levels and associated storm surge	• Rising sea levels and storm surge could damage coastal visual resources.
Ocean acidification	• No reasonably close causal relationship to visual resources identified.

3.13.1.4 Existing Conditions

3.13.1.4.1 Main Base

The leaseholds and easement areas in this location are relatively flat and consist primarily of agricultural and other undeveloped, partially vegetated lands.

The ridges that run east of these areas are the dominant view from Main Base. The Pacific Ocean and coastlines can be viewed from higher elevation vantage points. Kaumualiʻi Highway (Highway 50) is the main paved roadway in this area. Typical views from the highway include mixed vegetation and agricultural areas along both sides of the road, with the mountains in the distance to the east, if traveling northbound on Kaumualiʻi Highway toward Barking Sands Beach and Polihale State Park. The facilities on these leaseholds and fee simple lands are visible to the west for some stretches when traveling northbound on Kaumualiʻi Highway. Figures 3.11-1 through 3.11-3 show the roadways within leasehold and easement lands at Main Base.



Easements at Main Base on Mānā Plain



Coastal Easements at Main Base – Polihale

3.13.1.4.2 Kamokalā Ridge

The ordnance storage facility and paved access roads are the primary human-made structures in the area. Vegetation of various heights is adjacent to both sides of the access roads. Obscured views of the Pacific Ocean and coastlines occur from certain vantage points along the roadway. Due to its higher elevation and the relatively dense vegetation in this area, the ordnance storage facility is not visible from Main Base, Kaumualiʻi Highway, or other public roads west of the Kamokalā Ridge leasehold area. Figure 3.11-4 shows the roads at Kamokalā Ridge.



Easements at Kamokalā Ridge

3.13.1.4.3 Mānā Water Well

The well facility and paved access roads are the primary human-made structures in the area. Vegetation of various heights is adjacent to both sides of the access roads. Obscured views of the Pacific Ocean and coastlines occur from certain vantage points along the roadway. Figure 3.11-4 shows the roads accessing the Mānā Water Well.



Vegetation along the road near Mānā Water Well

3.13.1.4.4 Mākaha Ridge

The Mākaha Ridge area is located on the cliffs of the Nā Pali Coast State Wilderness Park, approximately 1 mile south of Miloli'i Ridge (see Figure 3.11-5). Mākaha Ridge is accessed via the Mākaha Ridge Road, which can be accessed by the public up to a gate outside of the radar site. Mākaha Ridge Road has forest vegetation lining both sides of the road, obstructing a view of any vista. Most of these structures are on the top of the ridgeline and are in the line of sight of Main Base. The radar facilities are only partially visible from the segment of the Mākaha Ridge Road near the radar site gate. Figure 3.11-5 shows Mākaha Ridge Road.



Vegetation at Mākaha Ridge



Cliffs at Mākaha Ridge

3.13.1.4.5 Miloliʻi Ridge

The Miloliʻi Ridge leasehold area is approximately 8 miles north of Main Base. Views of the Pacific Ocean and coastlines are not available due to dense vegetation coverage at this site. The facilities at Miloliʻi Ridge are not visible from public vantage points because of its secluded location. Figure 3.11-5 shows Miloliʻi Ridge Road.



Vegetation at Miloliʻi Ridge

3.13.1.4.6 KPGO

KPGO is located within Kōkeʻe State Park at an elevation of approximately 3,600 feet above sea level near Waimea Canyon. The observatory encompasses five sites with various facilities set within a forested area. The topography west and east of KPGO declines rapidly, and visibility is often restricted by vegetation and changes in topography. Formal public lookouts within Kōkeʻe State Park include the Waimea Canyon Lookout, Puʻu Hinahina Lookout, Kalalau Lookout, and Puʻu O Kila Lookout (DON, 1998, 2008). Figure 3.11-6 shows the roads at KPGO and the surrounding public outlooks. Details on the five KPGO sites and public outlooks are outlined below.

Site A. This site, a former MK-74 radar site, now includes several buildings used for storing excess and spare communication power, telemetry radar, and maintenance supplies, with a mobile telemetry antenna parked outside. The presence of communication ducts with active fiber and electrical lines running along the road leading to Site A blends minimally with the visual landscape due to the natural screening by vegetation (NASA, 2024g).

Site B. The Kōkeʻe Power Plant at Site B consists of several buildings and infrastructure elements, including diesel generators, hazardous material storage, and storage for power plant supplies and water. The power plant provides reliable power to various sites, contributing to the operational requirements of the Navy and NASA (NASA, 2024g).

Site C. Site C houses critical communication infrastructure, including a 200-foot free-standing communication antenna tower and a 150-foot guyed antenna tower. The communication antennas and related structures are essential for range operations and safety. The visual effect of this infrastructure is mitigated by the strategic placement of both towers and the natural screening provided by the surrounding vegetation (NASA, 2024g).

Site D. Site D is dedicated to telemetry and radar operations, with multiple towers and buildings supporting the high accuracy tracking of missiles during flight on the range. The visual effect of these installations is moderated by their design and the natural topography of the area, which helps to obscure the towers and buildings from most vantage points (NASA, 2024g).



NASA's KPGO Site E

Site E. Site E does not host PMRF equipment but is supported by utilities provided by PMRF, including power, phone, and network connections via buried cables (NASA, 2024g). NASA facilities at this site include two main buildings which house equipment and administrative offices, two antennas mounted on tracking gears footed in concrete, several outbuildings, and shelters for equipment storage.

Waimea Canyon. Waimea Canyon is the main visual feature of Waimea Canyon State Park and a major visitor attraction. Its cliffs and deep valleys have earned it the nickname "Grand Canyon of the Pacific." The Canyon offers views of Kauaʻi's natural history, including the upland watershed, erosion-carved walls, canyon floor, and coastal region. Different habitats are visible at various elevations, with many plant and animal species frequently observed. Waterfalls and streams are present in the canyon's valleys, with Waipoʻo Falls being a key feature despite its varying flow (R.M. Towill Corporation, 2014).

Waimea Canyon Lookout is the most visited site in the park, offering 360-degree views of the Canyon, Alakaʻi Plateau, Mt. Waiʻaleʻale, Peʻapeʻa summit, Niʻihau, and Kauaʻi's south and west coasts. Visitors include group tours, individual day visitors, naturalists, campers, and hikers, with bus tours frequenting the site, especially when cruise ships are in port. The location provides views from the Alakaʻi Plateau and Mt. Waiʻaleʻale to the canyon floor and lowland regions, illustrating the differences between lowland shrublands and high elevation wet forests (R.M. Towill Corporation, 2014).



Waimea Canyon (County of Kauaʻi, 2020)

Puʻu Hinahina. Puʻu Hinahina is a popular lookout in the parks, providing distant views of Waimea Canyon, Alakaʻi Plateau, Mt. Waiʻaleʻale, and Kauaʻi's south shore. On clear days, it is possible to observe rainfall on the windward side of mountain ranges and moisture gradients when viewing the Alakaʻi (R.M. Towill Corporation, 2014).

Kalalau and Puʻu O Kila. Kalalau Valley and Puʻu O Kila Lookouts offer views of the Nā Pali Coast with its green, ridged cliffs. Stone terrace remnants can be seen among the red rocks on the valley slopes. Frequent rainfall feeds many waterfalls on the valley walls, with Davis Falls being notable and visible from Kalalau Lookout. Marine and forest birds are often seen flying among the vegetation. The valley's lush greenery and wet conditions contrast sharply with the dry landscape of Waimea Canyon, showcasing the parks' diverse habitats and weather conditions (R.M. Towill Corporation, 2014).

3.13.2 Environmental Consequences

3.13.2.1 Approach to Analysis

The effects to visual resources include changes from the Proposed Action that impact or change natural views, notable human-built features, and other landscapes. Effects would be significant if major changes to the existing viewsheds, the overall landscape, or developed areas could occur.

3.13.2.2 Alternative 1: Succeeding Current Real Estate Agreements

3.13.2.2.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 1, there would be no effect and no change in views in the vicinity of the leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, or KPGO. Public viewpoints toward the area would be of the same character and levels of obstruction with no changes to the current facilities and activities. The facilities, radar sites, antennas, and towers where present would remain. Scenic views of ocean, coastline/beach areas, mountains, and other elevated landforms would remain unchanged.

3.13.2.2.2 Effect Summary

As described above, Alternative 1 could result in continued long-term, minor, adverse effects to visual resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the continued presence of Navy- and NASA-use infrastructure. Many of these buildings are not generally visible to the public, and there would be no change to the existing scenic viewpoints. As a result, there would be no change to visual resources under Alternative 1. **Therefore, effects of Alternative 1 to visual resources would be adverse but would not be significant.**

3.13.2.3 Alternative 2: Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds

3.13.2.3.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO

Under Alternative 2, the continued use of existing infrastructure would result in no change in views in the vicinity of the leasehold and easement lands or at the Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO. The facilities are already integrated into the landscape. Public viewpoints toward the area would be of the same character and levels of obstruction with no changes to the current facilities and activities.

3.13.2.3.2 Effect Summary

As described above, Alternative 2 could result in continued long-term, minor, adverse effects to visual resources on former leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the continued presence of Navy- and NASA-use infrastructure. Many of these buildings are not generally visible to the public, and there would be no change to the existing scenic viewpoints. As a result, there would be no change to visual resources under Alternative 2. **Therefore, effects of Alternative 2 to visual resources would be adverse but would not be significant.**

3.13.2.4 No Action Alternative

3.13.2.4.1 Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge

The No Action Alternative would revert the ownership, management, development, and maintenance of the leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, and Miloliʻi Ridge back to the State of Hawaiʻi. If the Navy were to remove all or a portion of human-built features such as radar sites, antennas, towers, buildings, and other physical structures, there could be a potential for the areas to be returned to a more natural state. Any visual obstructions of scenic landscapes could be gone. Therefore, this could potentially be a minor beneficial effect to visual resources. If the facilities remained, the viewsheds could be consistent to the current conditions. There could be no change in the character or quality of visual resources. No specific public vantage points of significance have been identified that could be affected by the presence or absences of Navy-related structural elements. It is unknown what future visual effects could result from DLNR management of the lands.

3.13.2.4.2 KPGO

Under the No Action Alternative, portions of or all existing infrastructure may be removed or remain in place. The removal of structures may restore the natural landscape in some areas, while remaining structures could become eyesores if not properly managed. The KPGO facilities are not generally visible to the public and should the structures remain, there could be no significant adverse effects to the viewshed. In the short term, the removal of existing infrastructure could result in short-term, non-existent to minor, adverse visual effects from demolition activities and the presence of equipment and debris. The long-term visual effects could depend on how the land is managed after the termination of the lease. Proper removal and restoration efforts could minimize adverse visual effects and potentially enhance the natural aesthetics of the area. The removal of KPGO facilities could restore the lush, forested landscape, further enhancing the natural aesthetic of the area resulting in long-term, moderate, beneficial effects on visual resources.

3.13.2.4.3 Effect Summary

As described above, the No Action Alternative could result in long-term, beneficial effects to visual resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the removal of facilities and infrastructure. As the continued presence of Navy- and NASA-use infrastructure could be considered a potential long-term, minor adverse effect to visual resources, the removal of these buildings could be a minor, long-term beneficial impact. Depending on the level of facility removal and restoration to a more natural state, the effects could be most beneficial if all facilities were to be removed. However, many of these buildings are not generally visible to the public, and there would be no change to the existing scenic viewpoints. As a result, there would be no significant change to visual quality, scenic viewpoints, and visual resources under the No Action Alternative. **Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.**

3.14 Summary of Potential Environmental Effects

A summary of the potential effects associated with each of the action alternatives is presented in Table 3.14-1.

Table 3.14-1 Summary of Potential Environmental Effects

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
Archaeological and Architectural Resources	Alternative 1 would not result in effects to archaeological and architectural resources because all activities with the potential to affect them are subject to review under Section 106 of the NHPA prior to approval, as well as all existing consultations, agreements, and conservation measures. Regulatory protections remain unchanged under Alternative 1. **Therefore, effects are not significant as Alternative 1 includes neither new activities that would affect archaeological and architectural resources, nor would it alter existing protections.**	Alternative 2 would not result in effects to archaeological and architectural resources because all activities with the potential to affect them are subject to review under Section 106 of the NHPA prior to approval, as well as all existing consultations, agreements, and conservation measures. Regulatory protections remain unchanged under Alternative 2. **Therefore, effects are not significant as Alternative 2 includes neither new activities that would affect archaeological and architectural resources, nor would it alter existing regulatory protections for any future actions with the potential to affect these resources.**	The No Action Alternative may result in effects to archaeological and architectural resources on leaseholds and easements at Main Base, Kamokalā Ridge, and KPGO due to the change from federal protections under the Navy's and NASA's historic preservation programs to State protections.
Cultural Practices	Alternative 1 would not result in adverse effects to cultural practices or wahi pana on leaseholds and easements at Main Base[63] and Kamokalā Ridge and would have no effects at Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO. The Navy and NASA acknowledge that for some Native Hawaiians, the	Alternative 2 would not result in adverse effects to cultural practices or wahi pana on leaseholds and easements at Main Base and Kamokalā Ridge and would have no effects at Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO. The Navy and NASA acknowledge that for some Native Hawaiians, the acquisition of ceded lands by the U.S. Government could be perceived as a long-term,	The No Action Alternative could result in short-term, minor to moderate adverse effects to access during periods of potential demolition and/or removal activities in areas of former leaseholds and easements at Main Base and Kamokalā Ridge. No effects would be expected at Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, and KPGO. Additionally, the Navy and NASA acknowledge that for some Native

[62] Under the No Action Alternative, details of future Navy, NASA, and State actions related to transferring possession of the Project Area would be subject to negotiations and are presently unknown. Because additional future analyses, consultation, documentation, and environmental reviews may be required for those actions, any discussion of their effects would be speculative and are not included in this analysis.

[63] Note that "Main Base" is a common naming convention for Navy fee simple, leasehold, and easement lands on the Mānā Plain. This EIS only analyzes potential effects from the Proposed Action on the leasehold and easement lands in the Project Area.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	continued possession of ceded lands[64] by the U.S. Government could be perceived as a long-term, moderate, adverse effect. Moderate restrictions on access to leasehold and easement lands where cultural practices and associated resources occur would continue to be managed by the Navy and NASA to accommodate requests for access to locations under their jurisdiction for cultural practices and wahi pana. There would be no change to ongoing implementation of current management practices (Table ES-2), or BMPs (Section 2.5). In addition, Enhanced Engagement-2 (Table ES-3), would improve access for Cultural Practices in the Project Area. **Therefore, the potential effects of Alternative 1 to cultural practices could be adverse but not significant.**	moderate, adverse effect. Moderate restrictions on access to leasehold and easement lands where cultural practices and associated resources occur would continue to be managed by the Navy and NASA to accommodate requests for access to locations under their jurisdiction for cultural practices and wahi pana. There would be no change to ongoing implementation of current management practices (Table ES-2), or BMPs (Section 2.5). In addition, Enhanced Engagement-2 (Table ES-3) would improve access for Cultural Practices in the Project Area. **Therefore, the potential effects of Alternative 2 to cultural practices could be adverse but not significant. If actions are determined to have potential adverse effects, they would be subject to regulatory oversight to avoid, minimize, or mitigate the effects consistent with federal regulations.**	Hawaiians, returning ceded lands into the State's possession could be perceived as a long-term beneficial effect. The potential benefit of the areas reverting to the State's possession would be determined by future land use designations and activities determined by the State, not as a part of this EIS as they are not Navy nor NASA actions.
Biological Resources	Alternative 1 could result in the continued potential for long-term, minor, adverse effects to biological resources on leaseholds and easements at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge, and KPGO.	Alternative 2 could result in the continued potential for long-term, minor, adverse effects to biological resources on leaseholds and easements at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge, and KPGO.	The No Action Alternative could result in potential long-term, moderate, adverse effects to biological resources on leaseholds and easements at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloliʻi Ridge and KPGO. Long-term

[64] The term "ceded lands" is used to refer to the government lands of the Kingdom of Hawaiʻi and the Crown lands that were property of the Hawaiian monarch, which the Republic of Hawaii transferred or "ceded" to the United States government in the Joint Resolution of Annexation approved by President William McKinley on July 7, 1898 (30 Stat. 750). Upon statehood in 1959, the federal government returned to the State of Hawaiʻi all ceded lands not set aside for its own use in Section 5(f) of the Admission Act. The use of the term "ceded land" is consistent with usage by other State agencies (e.g., https://www.oha.org/about/abouthistory/).

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	Potential effects to general vegetation, general wildlife, special status species, and critical habitat would continue to occur, similar to current conditions. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would continue under Alternative 1. Alternative 1 includes the ongoing implementation of PMRF INRMP and NASA's SENSE Environmental Management Plan, implementation of REPI projects, and current mitigation measures (Table ES-2). In addition, Enhanced Engagement-3 (Table ES-3) would increase public transparency of natural resource management activities at PMRF and KPGO. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. State, federal, and military regulations, including SOPs and BMPs, would continue to be implemented, and there would be no change to biological resources. Alternative 1 would have no effects to listed species that have not been previously analyzed. As a result, there would be no anticipated change to populations of special status species, no further restrictions of wildlife corridors, no further degradation of general habitat or critical habitat, and	Potential effects to general vegetation, general wildlife, special status species, and critical habitat would continue to occur, similar to current conditions. Long-term protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would continue under Alternative 2. Alternative 2 includes the ongoing implementation of PMRF INRMP and NASA's SENSE Environmental Management Plan, implementation of REPI projects, and current mitigation measures (Table ES-2). In addition, Enhanced Engagement-3 (Table ES-3) would increase public transparency of natural resource management activities at PMRF and KPGO. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 2. State, federal, and military regulations, including SOPs and BMPs, would continue to be implemented, and there would be no change to biological resources. Alternative 2 would have no effects to listed species that have not been previously analyzed. There would be no anticipated change to populations of special status species, no further restrictions of wildlife corridors, no further degradation of general habitat or critical habitat, and	protection of special status species and their habitats as well as management and control of invasive species by the Navy and NASA would not continue and the DLNR would assume such responsibilities. The Navy and NASA would no longer conduct regularly scheduled surveys and monitoring efforts of special status species, invasive species control, or native plant restoration efforts. Additionally, the No Action Alternative would result in the loss of conservation and habitat management programs, efforts, and funding from the Navy and NASA. Due to the loss of vegetation and wildlife management programs, conservation efforts, funding by the Navy and NASA, and potential loss of REPI projects, the responsibility of the management of these important biological resources would fall solely on the State. The population of special status species could remain constant due to mandatory requirements by federal agencies. As a result of the loss of conservation management resources and funding currently provided by Navy and NASA, there could be restrictions of wildlife corridors reducing, disturbing, or altering behavior, survival, or reproduction ability. There also could be degradation of general habitat and an increase in invasive species prevalence.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	no increase of invasive species prevalence. **Therefore, the effects of Alternative 1 to biological resources would be adverse but would not be significant**.	no increase of invasive species prevalence. **Therefore, the effects of Alternative 2 to biological resources would be adverse but would not be significant.**	
Land Use and Access	Alternative 1 would result in beneficial effects to land use from fair market value lease and easement payments to the State. These payments could be used in support of the State's public trust obligations. The Navy and NASA acknowledge that some Native Hawaiians who feel a sense of loss and injustice from continued control of ceded lands by the U.S. Government could perceive moderate, adverse effects from Alternative 1. Land use by the Navy and NASA would continue to be consistent with State laws and regulations and County zoning ordinances. Alternative 1 would not result in any change or pose new restrictions on access to State lands within the ROI. In addition, implementation of BMPs (Table ES-2) would continue to occur, and there would be no change to current activities on the leasehold and easement lands under Alternative 1. In addition, Enhanced Engagement-6 (Table ES-3) would help to minimize encroachment or accidental trespass. As a result, land use would be consistent with public trust requirements, consistent with	Alternative 2 would result in short-term, beneficial effects to land use through the purchase of currently leased lands and long-term beneficial effects from fair market value payments for the new easements, but also moderate adverse effects from the removal of these lands from the public land trust. Any income received by the State from the purchase could be used in support of the State's public trust obligations. The Navy and NASA acknowledge that some Native Hawaiians and other members of the public who feel a sense of loss and injustice from the sale of ceded lands by the State could perceive moderate adverse effects from Alternative 2. There would be no adverse effects related to consistency with regulatory standards because use of the former leaseholds would continue to be in accordance with federal laws and regulations, and use of the easements would continue to be consistent with federal and State laws and regulations and County zoning ordinances. Alternative 2 would not result in any new access restrictions on access to	The No Action Alternative could result in potential short-term, minor, adverse effects and long-term beneficial effects to land use and access. The No Action Alternative would have no effect on the public trust obligation because the State would continue to be responsible for fulfilling that requirement. The State lands would be subject to State land use regulations and County of Kaua'i zoning restrictions. Short-term restrictions to access during demolition and removal of facilities could occur, but in the long term, restricted access to KPGO lands, and the occasional access restrictions due to PMRF activities would cease. Additionally, the return of the lands within the ROI lands to State control from the U.S. Government could be perceived as a beneficial effect by some Native Hawaiians. As a result, no new restrictions on access to State lands would result from the No Action Alternative.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	regulatory requirements, and would not create changes or new restrictions to land use or access to State land. **Therefore, the effects of Alternative 1 to land use and access would be adverse but would not be significant.**	State lands within the Project Area. In addition, implementation of BMPs (Table ES-2) would continue to occur, and there would be no change to current use of the leasehold and easement lands under Alternative 2. In addition, Enhanced Engagement-6 (Table ES-3) would help to minimize encroachment or accidental trespass. In summary, land use would continue to be consistent with the State's exercise of its public trust obligations, consistent with regulatory standards, and would not create changes or new restrictions to land use or access to State land. **Therefore, the effects of Alternative 2 to land use and access would be adverse but would not be significant.**	
Socioeconomics	Alternative 1 would have moderate, long-term, beneficial effects to socioeconomics. Since lease payments to DLNR would be at fair market value, they would be higher than under current conditions and benefit the State and the ROI economically depending on how the payments are distributed. Furthermore, continued operation of PMRF would continue to benefit the ROI economically by providing employment (approximately 900 personnel) and expenditures of approximately $150 million annually in salaries, contract goods, and services. Continued long-term, moderate, beneficial effects on socioeconomics	Alternative 2 would result in continued long-term, beneficial effects to socioeconomics that would likely be significant. The socioeconomic effects for Alternative 2 would be dependent on the terms of the real estate agreement. As there are no details available on the size of the payments, it is not possible to precisely determine the significance of the socioeconomic effects. However, the amount would be greater than under existing conditions and, therefore, would benefit the State and the ROI. Furthermore, continued operation of PMRF and KPGO would benefit the ROI economically by continuing employment, contract	The significance of the adverse socioeconomic effects for the No Action Alternative would depend on the number and timing of jobs eliminated at PMRF and KPGO as well as the size of spending reductions associated with these operational changes. All jobs at KPGO would be lost under this alternative. As many of the employees at PMRF are contractors, they might be able to find employment at other locations on Kaua'i. As a result, the potential reductions to Navy and NASA operations under the No Action Alternative would result in the loss of jobs at KPGO as well as other jobs associated with the potential loss of

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	would result from local jobs and income from employment at KPGO. Under Alternative 1, current job levels and spending at PMRF would be unchanged and therefore would not affect job opportunities and associated spending in West Kaua'i or islandwide. Under Alternative 1, there would be a major increase in value of lease payments to DLNR as compared to current conditions which could be considered beneficial. Additionally, there would be no change to areas within the Project Area used for recreational and tourism activities. Finally, the development and continuation of PMRF Kaua'i would establish regular communication channels to strengthen relationships with the Native Hawaiian community and other interested stakeholders as described in Enhanced Engagement-4 (Table ES-3). **Therefore, the effects of Alternative 1 to socioeconomics would not be adverse or significant.**	spending, and community program support. Under Alternative 2, current job levels and spending at PMRF and KPGO would be unchanged and therefore would not affect job opportunities and associated spending in West Kaua'i or islandwide. As a result, there would be a substantial increase in value of real estate agreements and lease payments to DLNR as compared to current conditions which could be considered beneficial. Additionally, there would be no change to areas within the Project Area used for recreational and tourism activities. Finally, the development and continuation of PMRF Kaua'i would establish regular communication channels to strengthen relationships with the Native Hawaiian community and other interested stakeholders as described in Enhanced Engagement-4 (Table ES-3). **Therefore, the effects of Alternative 2 to socioeconomics would not be adverse or significant.**	activities associated with leaseholds and easement areas. Additionally, the disruption of PMRF-supported access to sites within the ROI used for recreational and tourism activities may be lost and/or limited for a period of time until the State decides to grant access to these areas. The activities that could be eliminated at PMRF and the associated number of jobs that could be lost are not known at this time; however, the potential reduction in spending and employment could result in a significant loss to the local community.
Water Resources	Alternative 1 would not cause any effect to the groundwater, surface water, floodplains, or wetlands on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, or KPGO. The Navy would continue to work with ADC (a State agency) and KAA (a tenant agricultural cooperative) via ADC to monitor water quality,	Alternative 2 would not cause any effect to the groundwater, surface water, floodplains, or wetlands on leaseholds and easements at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloli'i Ridge, or KPGO. The Navy would continue to work with KAA and ADC to monitor water quality, manage agricultural ditches, and help prevent localized	On leasehold and easement lands at Main Base, the No Action Alternative could result in potential minor to moderate, long-term, adverse effects to groundwater, surface water, floodplains, and wetlands. The potential loss of operation and maintenance of the Mānā Water Well could change the groundwater quality and access to groundwater at Main Base.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	manage agricultural ditches, and help prevent flooding during large rain events on the Mānā Plain. The Mānā Water Well would continue to be utilized by PMRF as a source of drinking water and would continue to undergo regular inspections and comply with all necessary water quality sampling and standards. The Navy would continue to pay operation and maintenance costs for the Kawaiʻele Pump Station, located on the south end of the Main Base leaseholds, to manage groundwater levels for agricultural purposes and localized flood protection of low-lying areas on the Mānā Plain. At Mākaha Ridge, the Navy would also continue to implement management strategies to minimize soil erosion to improve surface water quality downstream of the Ridge. The ongoing implementation of current mitigation measures (Table ES-2), SOPs, and BMPs (Table 3.7-2) would continue to occur. In addition, Enhanced Engagement-5 (Table ES-3) would improve collaboration between stakeholders (Navy-DLNR-DHHL-KAA-ADC-Kauaʻi County) that manage water resources in West Kauaʻi and Enhanced Engagement-7 would continue the establishment of success criteria for erosion management on Mākaha Ridge. There would be no change to current activities on the leasehold and easement lands under Alternative 1. As	flooding during large rain events on the Mānā Plain. The Mānā Water Well would continue to be utilized by PMRF as a source of drinking water and would continue to undergo regular inspections and comply with all necessary water quality sampling and standards. The Navy would continue to pay operation and maintenance costs for the Kawaiʻele Pump Station to be used to manage groundwater levels for agricultural purposes and localized flood protection on the low-lying areas of the Mānā Plain. At Mākaha Ridge, the Navy would also continue to implement management strategies to minimize soil erosion to improve surface water quality downstream of the Ridge. The ongoing implementation of current mitigation measures (Table ES-2), SOPs, and BMPs (Table 3.7-2) would continue to occur. In addition, Enhanced Engagement-5 (Table ES-3) would improve collaboration between stakeholders (Navy-DLNR-DHHL-KAA-ADC-Kauaʻi County) that manage water resources in West Kauaʻi and Enhanced Engagement-7 would continue the establishment of success criteria for erosion management on Mākaha Ridge. There would be no change to current activities on the leasehold and easement lands under Alternative 2. As a result, Alternative 2 would not degrade water quality, affect beneficial	The Navy could no longer pay operation and maintenance costs for the Kawaiʻele Pump Station which is used to alleviate flooding on the Mānā Plain during and after large rain events to help control surface water levels on the Mānā Plain. Should the State choose to not continue to operate the Kawaiʻele Pump Station during or after significant storm events, increased surface water levels could lead to increased localized flooding on the low-lying areas of the Mānā Plain, which could decrease the amount of available land used for viable agricultural purposes on the Mānā Plain. The loss of operation of the Kawaiʻele Pump Station could also increase water levels in wetland areas adjacent to Main Base, which could change the location and size of the available wetland habitat. Therefore, there could be a change and effect to groundwater, surface water, wetlands, and floodplains at leasehold and easement lands at Main Base due to potential increased levels of surface and groundwater from the potential cessation of operations at Kawaiʻele Pump Station during and after significant storm events. At Kamokalā, there would be no effects to groundwater, surface water, wetlands, or floodplains as a result of the No Action Alternative. The No Action Alternative would not degrade water quality, affect beneficial uses of water

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	a result, Alternative 1 would not degrade water quality, affect beneficial uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. **Therefore, effects of Alternative 1 to water resources would not be adverse or significant.**	uses of water resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. **Therefore, effects of Alternative 2 to water resources would not be adverse or significant.**	resources, contaminate a drinking water source, create noncompliance with the CWA, alter floodplains, or increase hazards of flooding. At the Mānā Water Well, the No Action Alternative could result in potential short- and long-term, moderate adverse effects to groundwater. The Navy would no longer maintain and operate the Mānā Water Well or pump groundwater from the well. The subsequent impact would be loss of access to this groundwater at Main Base and therefore increased demand from Kaua'i County Water Department wells or other wells in the area. The Mānā Water Well and associated parts would no longer continue to be inspected regularly by PMRF personnel including no longer performing regular maintenance on the distribution equipment, as well as monitoring, water testing and analysis, and water disinfection. If the State does not maintain the well or provide Navy access to the water, there could be a potential change to the quality, quantity, and accessibility of groundwater resources as a result of the implementation of the No Action Alternative. Therefore, a potential moderate, short-and long-term, adverse effect to groundwater could occur. There would be no effects to surface water, wetlands, or

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
			floodplains at Mānā Water Well under the No Action Alternative. At Mākaha Ridge, the No Action Alternative could result in potential short- and long-term, minor to moderate, adverse effects to surface water. There could be a change to surface water quality as the increase in dust and debris during potential demolition and removal of existing infrastructure could result in a decrease in downstream water quality; however, these effects would be short term and minimized by the use of appropriate construction BMPs, such as silt socks and dust control. The Navy could no longer support conservation actions for erosion control at this site, which could potentially lead to increased erosion and a decrease in surface water quality in the area. There would be no effects to groundwater, wetlands, or floodplains at Mākaha Ridge under the No Action Alternative. At Miloliʻi Ridge and KPGO, the No Action Alternative could result in potential short-term, minor, adverse effects to surface water as the increase in dust and debris during potential demolition and removal of existing infrastructure could result in a decrease in downstream water quality. These potential effects would be short term and minimized by the use of appropriate construction BMPs, such as silt socks

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
			and dust control. There would be no effects to groundwater, floodplains, or wetlands at Miloliʻi Ridge and KPGO under the No Action Alternative.
Utilities	Alternative 1 would not result in any changes to utility infrastructure or ongoing use of water and electricity that is used to support current operations. Under this alternative, wastewater would continue to be managed pursuant to existing environmental management plans. Potable water from the Mānā Water Well would continue to undergo regular disinfection and testing. Electricity would continue to be conserved as much as possible. Alternative 1 would not result in any change to utilities. As a result, there would be no exceedance of capacity or an unreasonable demand on a utility, loss or reduction of utility capacity such that demand exceeds capacity, and no resulting noncompliance with a permit or regulation. **Therefore, effects of Alternative 1 to utilities would not be adverse or significant.**	Alternative 2 would not result in any changes to utility infrastructure or ongoing use of water and electricity that is used to support current operations. Under this alternative, wastewater would continue to be managed pursuant to existing environmental management plans. Potable water from the Mānā Water Well would continue to undergo regular disinfection and testing. Electricity would continue to be conserved as much as possible. Alternative 2 would not result in any change to utilities. As a result, there would be no exceedance of capacity or an unreasonable demand on a utility, loss or reduction of utility capacity such that demand exceeds capacity, and no resulting noncompliance with a permit or regulation. **Therefore, effects of Alternative 2 to utilities would not be adverse or significant.**	On leasehold and easement lands at Main Base and Mānā Water Well, the No Action Alternative could result in moderate, adverse, short-term to long-term effects to potable water, because there could be a reduction of potable water capacity for PMRF and increased demand on the Kauaʻi County Water Department. The No Action Alternative could result in adverse, short-term to long-term effects to electrical utility and communications services because there could be a temporary reduction in available service capacity. However, these effects may be less than significant because alternate sources of electrical and communication services may be obtained to offset the loss of capacity. No effects to wastewater utilities would be anticipated because the wastewater infrastructure at Main Base has sufficient service capacity. There is no wastewater service at the Mānā Water Well and, therefore, no impacts to wastewater would occur there. At Kamokalā Ridge, the No Action Alternative could result in short-term to long-term, moderate, adverse effects to the electric utility system and the non-potable waterlines that support the fire

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
			hydrants at the missile magazine area because there could be a reduction in service capacity. At Mākaha Ridge, the No Action Alternative could result in short-term to long-term, minor, adverse effects to electric and communication utilities because utility capacity may be reduced. If alternative sources of electrical services are obtained, the effect could be less than significant. No effects to wastewater utilities would be anticipated as the septic systems may remain in place and could still meet capacity needs for wastewater service. At KPGO, the No Action Alternative could result in short- and long-term, moderate, adverse effects to utilities because there may be a reduction in available electrical services at KPGO and the campsites in the area. However, alternative utility resources could be obtained to offset the loss of capacity and would not put unreasonable demand or exceed capacity of these utilities.
Public Health and Safety	Alternative 1 would result in long-term, minor, potential adverse effects to public health and safety from the ongoing use and storage of fuels and oils, missile assembly, ordnance storage and movement, and radar operations on leasehold and easement lands at Main Base, Kamokalā Ridge, Mākaha Ridge, and KPGO. There would be no effects at	Alternative 2 would result in minor, long-term, adverse effects to public health and safety from the ongoing use and storage of small amounts of hazardous materials, storage of fuels and oils, missile assembly, ordnance storage and movement, and radar operations at Main Base, Kamokalā Ridge, Mākaha Ridge, Miloli‘i Ridge, and	The No Action Alternative could result in potential minor to moderate, short-term adverse effects to public health and safety on leasehold and easement lands at Main Base, Kamokalā Ridge, and KPGO as hazardous materials such as fuel, oil, and ordnance would no longer be stored or used on leasehold or easement land and would need to be

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	Mānā Water Well or Miloliʻi Ridge. Alternative 1 would also result in minor, short- and long-term beneficial effects to public health and safety as NASA would continue to collect critical weather data. The ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.9-1) would occur under Alternative 1. In addition, Enhanced Engagement-6 (Table ES-3) would increase public health and safety by improving closure protocol and public notification during launch activities and minimize accidental trespass from adjacent land. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, applicable regulations and policies designed to prioritize public health and safety would continue to be implemented so that there would be no change to imminent or chronic human health and safety risks or increased wildfire risk within the ROI. **Therefore, effects of Alternative 1 on public health and safety would be adverse but would not be significant.**	KPGO. There would be no effects at Mānā Water Well or Miloliʻi Ridge. Effects to public health and safety under Alternative 2 would be identical to those described for Alternative 1 as they are not changed by land acquisition method. The ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.9-1) would occur under Alternative 2. In addition, Enhanced Engagement-6 (Table ES-3) would increase public health and safety by improving closure protocol and public notification during launch activities and minimize accidental trespass from adjacent land. There would be no change to current operations or activities on the leasehold and easement lands under Alternative 2. As a result, applicable regulations and policies designed to prioritize public health and safety would continue to be implemented so that there would be no change to imminent or chronic human health and safety risks or increased wildfire risk within the ROI. **Therefore, effects of Alternative 2 on public health and safety would be adverse but would not be significant.**	transported to another appropriate holding site. The removal and transportation of ordnance from both Kamokalā Magazines and the missile assembly building on Tract E-1 (TMK: 1-2-002-025) to fee simple land or another appropriate holding site could temporarily increase the risk to public health and safety during transport; however, this could be greatly reduced by BMPs, and the possibility of unintentional detonation is extremely unlikely. There would be no effects at the Mānā Water Well. Without access to the telemetry and missile tracking infrastructure on Mākaha Ridge, missile launches could be substantially decreased. Radar operations and associated hazards with EMR could also decrease on leasehold and easement lands at Main Base, Mākaha Ridge, and KPGO. NASA could no longer collect geodetic data at this site, so early warning data on global (and Hawaiian) sea level change, earthquakes, volcano deformation, flooding patterns, and glacier dynamics could be impacted. The Navy would no longer manage wildfire risk, assess daily fire danger, or reduce natural fuels (such as dry grasses) on the leasehold and easement lands. As details regarding the State's potential management of these lands are not known, the potential risk to public health and safety cannot be quantified.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
Air Quality and Greenhouse Gases	Alternative 1 could result in potential long-term, minor, adverse impacts to air quality and GHGs in the ROI. The ongoing implementation of current mitigation measures (Table ES-2) and no change to current operations or activities on the leasehold and easement lands under Alternative 1 mitigate these potential effects. As a result, there are no changes to ambient air quality conditions and no exceedances of federal or State ambient air quality standards that would occur from the continuation of these air emissions under Alternative 1. **Therefore, effects of Alternative 1 to air quality and GHGs would be adverse but would not be significant.**	Alternative 2 could result in potential long-term, minor, adverse impacts to air quality and GHGs in the ROI. The ongoing implementation of current mitigation measures (Table ES-2) and no change to current operations or activities on the leasehold and easement lands under Alternative 2 mitigate these potential impacts. As a result, there are no changes to ambient air quality conditions and no exceedances of federal or State ambient air quality standards that would occur from the continuation of these air emissions under Alternative 2. **Therefore, effects of Alternative 2 to air quality and GHGs would be adverse but would not be significant.**	The No Action Alternative would result in potential short-term, minor, adverse effects, as well as minor, long-term, beneficial effects to air quality and GHGs. Per the lease agreements, any structures or infrastructure could be removed or could remain in place. Short-term, adverse effects could occur during demolition activities associated with the decommissioning of any facilities. Emissions of criteria pollutants and GHGs would be directly produced from: • Operation of heavy equipment; • Operation of construction generator sets; • Heavy duty diesel vehicles hauling construction materials and debris to and from the ROI; • Dust generated during demolition and hauling activities; • Workers commuting daily to and from the ROI and personal vehicles; and • Ground disturbance. All such emissions would be temporary in nature and produced only when activities are occurring. Additionally, the discontinuation of operations would result in minor, long-term, beneficial effects to air quality. As details of the potential reduction of operations are not known, the level of reduction cannot be quantified.

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
			However, any reduction in operations would result in a reduction in all air-emitting activities associated with these activities and long-term air quality effects would be slightly reduced compared to existing levels.
Transportation	Alternative 1 would not result in adverse effects to the transportation network within the ROI. Alternative 1 would not result in a significant change in traffic volumes accessing the facilities and on the existing roadway network in the ROI. Site personnel access to the facilities would continue. The ongoing implementation of current mitigation measures (Table ES-2) would be maintained and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, there would be minimal, if any, effects on the roadway and intersection LOS. **Therefore, the effects of Alternative 1 to transportation would not be adverse or significant.**	Alternative 2 would not result in adverse effects to the transportation network within the ROI. Alternative 2 would not result in a significant change in traffic volumes accessing the facilities and on the existing roadway network in the ROI. Site personnel access to the facilities would continue. Any State- or County-owned road that would become a federal road would be maintained according to all applicable local, State, and federal regulations pertaining to road maintenance. There would be no change to the maintenance and use of the remainder of the roads situated on leasehold and easement lands. The ongoing implementation of current mitigation measures (Table ES-2) would be maintained and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 2, regardless of the land tenure mechanisms. As a result, there would be minimal, if any, effects on the roadway and intersection LOS. **Therefore, effects of Alternative 2 to**	The No Action Alternative could result in minor, short-term, adverse effects to transportation, but would not result in any long-term adverse effects to transportation in the ROI. Under the No Action Alternative, the ownership, management, and maintenance of Navy- and NASA-managed roadways and access ROWs would revert to the State of Hawai'i. Per the lease agreements, any structures or infrastructure could be removed or could remain in place. Potential demolition activities could result in the temporary closure of roads and a temporary increase in traffic volumes on the roadways within the ROI. The road closures and any additional vehicles added into the roadway network for the demolition work would be short term and should not affect the roadway and intersection LOS in the long term. To address any potential effects resulting from the potential demolition activities, additional evaluation would be conducted with more detailed information of demolition activities to develop traffic control plans and/or traffic management plans to detail how

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
		transportation would not be adverse or significant.	the traffic and roadways will be managed during the work. The roadways and access easements currently support a minor volume of vehicular traffic. The State may decide to re-route or provide alternative access methods to maintain public and military access to the fee simple properties. If a re-route or alternative methods are implemented, the existing traffic patterns and volumes would adjust accordingly. As a result, this change would not affect the roadway or intersection LOS due to the minor volume of vehicles that would be affected.
Hazardous Materials and Waste	Alternative 1 would continue to result in potential minor, long-term, adverse effects to hazardous materials and waste management in the ROI. Hazardous materials, such as missile components, ordnance, fuels, oils, pesticides, "cabinet-scale" aerosols, and other small quantity cleaning agents and lubricants would continue to be utilized and managed under site-specific management plans and BMPs. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible. The	Alternative 2 would continue to result in potential minor, long-term, adverse effects to hazardous materials and waste management in the ROI. Hazardous materials, such as missile components, ordnance, fuels, oils, pesticides, "cabinet-scale" aerosols, and other small quantity cleaning agents and lubricants would continue to be utilized and managed under site-specific management plans and BMPs. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever	The No Action Alternative could result in potential minor, short-term, adverse effects to the management of hazardous materials and waste in the ROI. The transportation of hazardous materials such as missile components, ordnance, fuels, oils, pesticides, "cabinet-scale" aerosols and other small quantity cleaning agents, lubricants and chemicals from leasehold land to fee simple land or another appropriate holding facility could increase the risk of a spill or release of a hazardous material. However, the ongoing implementation of current mitigation measures (Table ES-2), adherence to SOPs and BMPs (Table 3.12-1), and management under site-specific management plans would significantly

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.12-1) would continue to occur, and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 1. As a result, there would be no increase in the use or generation of hazardous materials or wastes, or an increased risk of a spill or unintentional release that exceed the capabilities of current management plans and BMPs. **Therefore, effects of Alternative 1 to hazardous materials and waste management would be adverse but would not be significant.**	possible. Ongoing implementation of current mitigation measures (Table ES-2) and SOPs (Table 3.12-1) would occur, and there would be no change to current operations or activities on the leasehold and easement lands under Alternative 2, regardless of land acquisition mechanism. As a result, there would be no increase in the use or generation of hazardous materials or wastes, or an increased risk of a spill or unintentional release that exceed the capabilities of current management plans and BMPs. **Therefore, effects of Alternative 2 to hazardous materials and waste management would be adverse but would not be significant.**	reduce these potential risks. Fuel and oil would continue to be stored with secondary containment devices. Production and disposal of hazardous waste (including universal waste) and solid waste would be similar to current conditions; all waste would continue to be recycled whenever possible. The No Action Alternative could also result in potential minor, long-term, beneficial effects to the management of hazardous materials and waste as hazardous materials would no longer be stored or used on leaseholds or easement lands. While the amount of waste produced on leasehold and easement lands is not significant, there could also be a small decrease in the amount of hazardous waste (including universal waste) and solid waste that is produced. As a result, there is the potential that there could be a small decrease in the amount of solid waste disposed of at the Kekaha landfill coming from leasehold and easement lands.
Visual Resources	Alternative 1 could result in continued long-term, minor, adverse effects to visual resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the continued presence of Navy- and NASA-use infrastructure. Many of these buildings are not generally visible to the public, and there would be no change to	Alternative 2 could result in continued long-term, minor, adverse effects to visual resources on former leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the continued presence of Navy- and NASA-use infrastructure. Many of these buildings are not generally visible to the public, and there would be no	The No Action Alternative could result in long-term beneficial effects to visual resources on leasehold and easement lands at Main Base, Kamokalā Ridge, Mānā Water Well, Mākaha Ridge, Miloliʻi Ridge, and KPGO due to the removal of facilities and infrastructure. As the continued presence of Navy- and NASA-use infrastructure could be considered a potential long-term, minor,

Resource	*Alternative 1 (Succeeding Current Real Estate Agreements)*	*Alternative 2 (Fee Simple Acquisition of Current Real Estate Agreements for Leaseholds)*	*Alternative 3 (No Action)*[62]
	the existing scenic viewpoints. As a result, there would be no change to visual resources under Alternative 1. **Therefore, effects of Alternative 1 to visual resources would be adverse but would not be significant.**	change to the existing scenic viewpoints. As a result, there would be no change to visual resources under Alternative 2. **Therefore, effects of Alternative 2 to visual resources would be adverse but would not be significant.**	adverse effect to visual resources, the removal of these buildings could be a minor, long-term beneficial impact. Depending on the level of facility removal and restoration to a more natural state, the effects could be most beneficial if all facilities were to be removed. However, many of these buildings are not generally visible to the public, and there would be no change to the existing scenic viewpoints. As a result, there would be no significant change to visual quality, scenic viewpoints, and visual resources under the No Action Alternative.

Key: ADC = Agribusiness Development Corporation; BMP = Best Management Practice; CWA = Clean Water Act; DLNR = Department of Land and Natural Resources; EMR = Electromagnetic Radiation; GHG = greenhouse gas; INRMP = Integrated Natural Resources Management Plan; KAA = Kekaha Agricultural Association; KPGO = Kōkeʻe Park Geophysical Observatory; LOS = Level of Service; NASA = National Aeronautics and Space Administration; NHPA = National Historic Preservation Act; PMRF = Pacific Missile Range Facility; REPI = Readiness and Environmental Protection Integration; ROI = Region of Influence; ROW = right-of-way; SENSE = Space Exploration Network Services and Evolution; SLUD = State Land Use District; SOP = Standard Operating Procedure; TMK = Tax Map Key; U.S. = United States.

This page intentionally left blank.

4 Cumulative Effects

This section supports analysis for the BLNR as may be necessary under HEPA, including for BLNR to evaluate the cumulative effects (HAR section 11-200.1-24(l)) and determine whether these effects are significant (HAR section 11-200.1-13(b)(8)). This chapter (1) defines cumulative effects; (2) describes past, present, and reasonably foreseeable actions relevant to cumulative effects; and (3) analyzes the cumulative effects potentially resulting from the incremental interaction of the Proposed Action with the other actions.

4.1 Introduction to Analysis

The approach taken in the cumulative effects analyses follows the objectives of HEPA regulations. Cumulative impact in HEPA is defined as "the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (HAR section 11-200.1-2). HEPA states that an EIS should include "…specific reference to related actions, public and private, existent or planned in the region shall also be included for purposes of examining the possible overall cumulative impacts of such actions" (HAR section 11-200.1-24(i)), and "the interrelationships and cumulative environmental impacts of the Proposed Action and other related actions shall be discussed in the draft EIS" (HAR section 11-200.1-24(l)).

To determine the scope of environmental effects analyses, agencies shall consider cumulative actions which, when viewed with other proposed actions, have cumulatively significant effects and should therefore be discussed in the same effect analysis document.

Cumulative effects are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to a proposed action would be expected to have greater potential for a relationship than those more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative effects. To identify cumulative effects, the analysis needs to address the following three fundamental questions.

- Does a relationship exist such that affected resource areas of the proposed action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
- If one or more of the affected resource areas of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by effects of the other action?
- If such a relationship exists, does an assessment reveal any potentially significant effects not identified when the proposed action is considered alone?

4.1.1 Identify Appropriate Level of Analysis for Each Resource

The cumulative effects analysis focused on meaningful effects from past, present, and reasonably foreseeable actions.

4.1.2 Scope and Area of Cumulative Effects Analysis

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur. For purposes of this analysis, past and reasonably foreseeable projects are those within 5 years of the preparation of this EIS (i.e., 2019 through 2029). The geographic extent for the cumulative effects analysis includes the same ROI as the resources.

For the purposes of this analysis, public documents prepared by federal, State, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions include notices of intent for EISs and EAs, management plans, land use plans, and other planning-related studies.

4.1.3 Describe Current Resource Conditions and Trends

The combined effects of all other actions, including the current aggregate effects of past and present actions were characterized and summarized. The incremental effects of the Proposed Action were then "added to" the combined effects of all other actions to describe the cumulative effects that would result if the Proposed Action were implemented. The analysis in each resource section indicates the effects of both alternatives are not materially different from each other; therefore, the cumulative effects discussions below apply to both action alternatives.

4.1.4 Analyze Potential Cumulative Effects

The affected environment sections of each resource section describe current resource conditions and trends and discuss how past and present human activities influence each resource. The current aggregate effects of past and present actions are reflected in the baseline information presented in that chapter. This information is used in the cumulative effects analysis to understand how past and present actions are currently affecting each resource and to provide the context for the cumulative effects analysis.

4.1.5 Past, Present, and Reasonably Foreseeable Future Actions

Table 4.1-1 summarizes past, present, and reasonably foreseeable actions and the timeframes of their implementation. In addition, a list of past actions that have occurred at PMRF and for which prior NEPA analysis was conducted is included in Tables 1-5 and 3.1-4. Figure 4-1 shows the location of the past, present, and reasonably foreseeable future projects listed in Table 4.1-1.

Table 4.1-1 Cumulative Action Evaluation

#	Project	Project Description	Project Timeframe		
			Past	Present	Future
1	Photovoltaic and Battery Energy Storage Systems	Renewable energy project consisting of combined utility-scale photovoltaic array on 87 acres and 94 acres, and overhead or underground electrical transmission lines located within the installation boundary on Navy fee simple lands at PMRF. The project improved power quality and energy resiliency in support of PMRF. The solar array system can generate up to 44 megawatts of direct current electrical power and feeds electricity into the KIUC electrical grid for public and military users. The environmental effects are primarily associated with terrestrial resources[65].	X	X	X
2	Kawaiʻele Pump Station Operation and Maintenance	To ensure PMRF is able to safely conduct its missions with compatible neighbors, the Navy has leased land adjacent to PMRF in order to operate the Kawaiʻele Pump. Pumping at this station supports agricultural purposes by controlling water levels in the ditch system across the plains. The Navy contracted ADC to operate and maintain this station. Future maintenance and upgrades to the pumps are anticipated at the Kawaiʻele Pump Station which may include a categorical exclusion or EA document.	X	X	X
3	Hawaii-California Training and Testing (HCTT) and Hawaii-Southern California Training and Testing (HSTT)	At-sea military readiness activities were analyzed in the 2025 HCTT Final EIS/OEIS and were previously covered in the 2018 HSTT Final EIS/OEIS and the 2022 Point Mugu Sea Range Final EIS/OEIS. Military readiness activities analyzed included training and RDT&E activities that are generally consistent with and representative of activities the Navy has been conducting in the Study Area for decades.[66]	X	X	X
4	PMRF Land-Based Training and Testing	The Navy prepared an EA to evaluate the potential effects of conducting land-based training and testing activities at launch areas and other locations under the authority of PMRF. The Study Area consists of the land component of PMRF at Barking Sands (fee simple and leasehold land at Main Base), beginning at the high tide line and extending inland to the installation boundary, Mākaha Ridge (tracking sensors), and Kaʻula Island (an offshore islet where inert gunnery and bombing exercises occur).	X	X	X
5	KAA Open Floodable Space Project	The State of Hawaiʻi ADC's land on the Mānā Plain in West Kauaʻi is drained by a ditch system managed by the KAA that traverses PMRF and discharges into the			X

[65] 2017 Final EA for Photovoltaic and Battery Energy Storage Systems at PMRF (https://www.pmrf-kpgo-eis.com/media/5osmzhcf/2017-ea-for-photovoltaic-and-battery-energy-storage-systems-pmrf.pdf).

[66] Existing activities for the underwater ranges located in the submerged lands have been analyzed in previous NEPA such as the 2018 HSTT Final EIS/OEIS, which included notifications to appropriate State agencies. Proposed modernization of infrastructure at PMRF is analyzed in the 2025 HCTT Final EIS/OEIS. The 2025 HCTT Final EIS/OEIS supersedes the 2018 HSTT Final EIS/OEIS.

#	Project	Project Description	Project Timeframe		
			Past	Present	Future
		Pacific Ocean. PMRF and KAA are partnering in an initiative supported by the DoD's REPI program to: mitigate the effect sea level rise has on agricultural land on the Mānā Plain by creating an OFS, which will reduce the amount and improve the quality of stormwater runoff discharged from agricultural drainage ditches into the nearshore environment at PMRF; reduce the threat erosion to PMRF infrastructure; and promote the regeneration of historic wetland habitat for endemic and endangered Hawaiian waterbirds.			
6	Waimea 400 Master Plan[1]	In 2019, the County of Kaua'i purchased a 417-acre property in West Kaua'i between Waimea and Kekaha referred to as "Waimea 400." With extensive input from the community, they developed an adaptive conceptual master plan for the property that can be adjusted over time based on the potential impacts of sea level rise, and groundwater intrusion. Permanent structures are located at higher elevations and areas not anticipated to be impacted by potential sea level rise exposure areas. The project included an initial survey that received over 700 responses identifying the community's desired uses for the site including affordable housing, a long-awaited sports complex, community gardens, agriculture, and walking paths. The plan also envisions continuing the relationship with the schools and community in applying traditional ecological knowledge in the adaptive management of the site and becoming the learning grounds for incubator and innovative agriculture, wetland restoration, affordable and transitional housing, and community-based recreational spaces. The program design and planning are being led by the County of Kaua'i Department of Public Works and Kaua'i County Housing Agency, with involvement from other County agencies and input from community stakeholders[67].			X
7	DLNR – Visitor Center at Polihale[1]	Polihale State Park re-opened for day-use in 2020 and overnight camping in 2022 and underwent a Master Planning process in 2023. The preliminary concepts from the Draft Master Plan include addition of a welcome hale, parking area, and restrooms; creating a dune and endangered species preservation area; creating a cultural preservation area; removing, replacing, or renovating problematic facilities; restoration of lo'i (traditional Hawaiian taro patch)			X

[67] Additional details available in the Waimea 400 EISPN published in the July 23, 2025, edition of Office of Planning and Sustainable Development-Environmental Review Program's The Environmental Notice, https://files.hawaii.gov/dbedt/erp/Doc_Library/2025-07-23-KA-EISPN-Waimea-400.pdf.

#	Project	Project Description	Project Timeframe		
			Past	Present	Future
		and wetlands; designating beach access points; and potential expansion of State Park boundary to increase access.			
8	Ongoing Agricultural Activities Conducted by KAA and ADC[1]	The KAA is a farmer's cooperative made up of the existing ADC land tenants. The KAA has an agreement with ADC to maintain and manage the common areas and infrastructure of the Kekaha Agricultural Lands in West Kaua'i. Farmers, ranchers, and agribusiness companies are currently working on these lands. These activities are expected to continue in the future, and ADC has recently advertised for tenants of commercial land licenses in available areas in Kekaha (Hawai'i Farm Bureau, 2023).	X	X	X

Note: [1]Indicates nonfederal projects.

Key: ADC = Agribusiness Development Corporation; DLNR = Department of Land and Natural Resources; DoD = Department of Defense; EA = Environmental Assessment; EIS = Environmental Impact Statement; HCTT = Hawaii-California Training and Testing; HSTT = Hawaii-Southern California Training and Testing; KAA = Kekaha Agricultural Association; KIUC = Kaua'i Island Utility Cooperative; OEIS = Overseas Environmental Impact Statement; OFS = Open Floodable Space; PMRF = Pacific Missile Range Facility; RDT&E = research, development, test, and evaluation; REPI = Readiness and Environmental Protection Integration; USACE = United States Army Corps of Engineers.

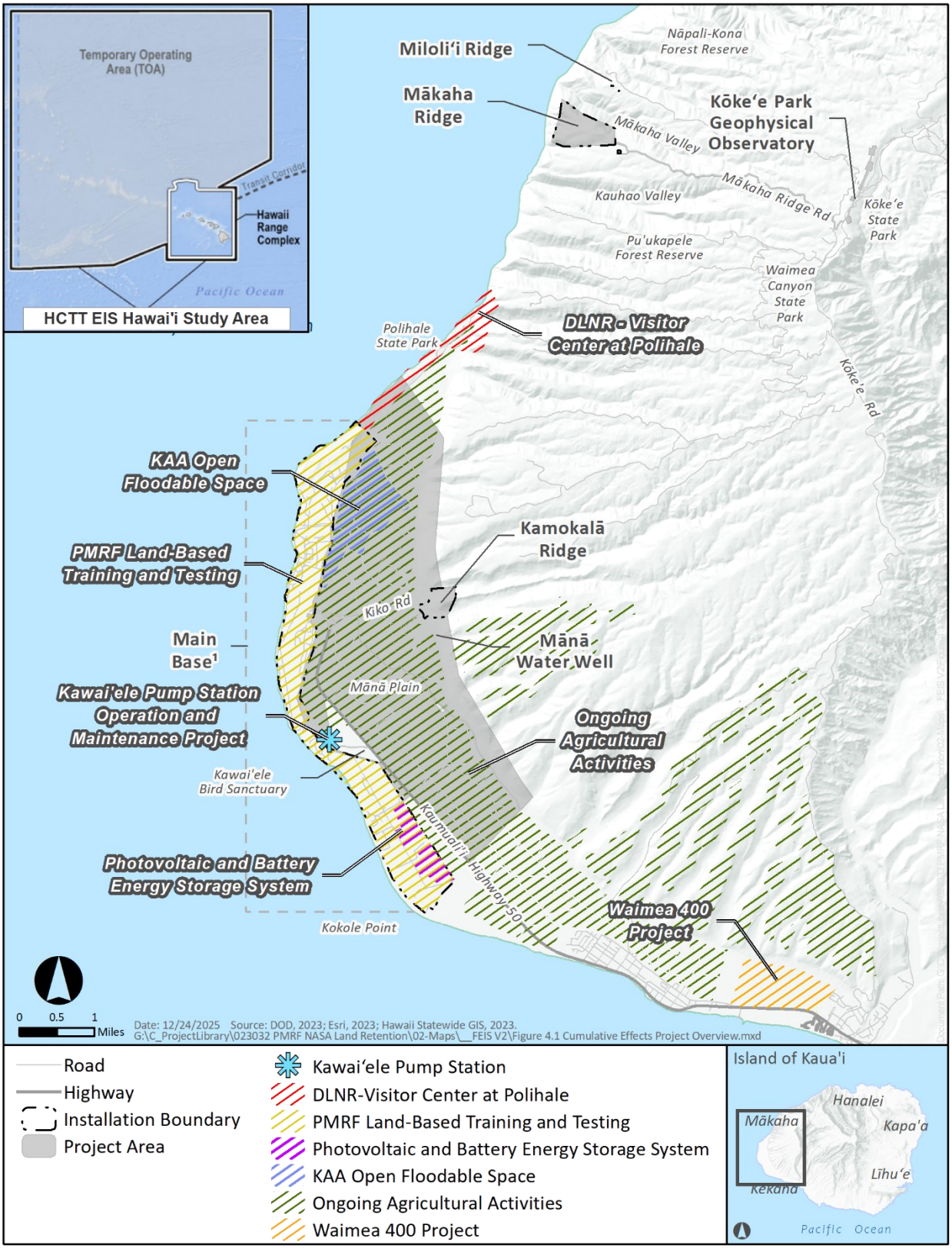


Figure 4-1 Proximate Project Areas

4.2 Cumulative Effects Analysis

Cumulative effects were assessed using quantifiable data where feasible; however, for many of the resources included for analysis, quantifiable data are not available, and a qualitative analysis was undertaken. In addition, where the analysis of potential environmental effects of future actions has not yet been completed, assumptions regarding cumulative effects related to this EIS were made where possible. The analytical methodology presented in Chapter 3, *Affected Environment and Environmental Consequences*, which was used to determine potential effects on the various resources analyzed in this document, was also considered to determine cumulative effects.

4.2.1 Archaeological and Architectural Resources

Development-related actions from land clearing, construction, and subsequent operations and maintenance activities from past and present actions (listed in Table 4.1-1) have the potential to result in effects to archaeological and architectural resources within the ROI. Future projects described in Table 4.1-1, such as the DLNR Visitor Center at Polihale, propose creation of a cultural preservation area that could protect archaeological resources in the ROI.

All projects with a federal nexus are required to comply with Section 106 of the NHPA to determine if they have effects to federally listed historic properties and to then avoid, minimize, or resolve any adverse effects. As part of the Section 106 process, federal agencies are required to afford the ACHP, SHPO, NHOs, other interested parties, and the public an opportunity to comment on undertakings with the potential to affect historic properties, as applicable. The Navy's intent is to meet responsibilities pursuant to Section 106 of the NHPA for Navy undertaking(s) in accordance with the PA among CNRH, the ACHP, and the Hawai'i SHPO regarding Navy Undertakings in Hawai'i. The CNRH PA is the Section 106 Program Alternative which provides an established framework for professional standards, reviews, post-review discoveries, emergencies, and reporting as well as a process for input from NHOs and consulting parties.

Nonfederal actions in the ROI would comply with State and local requirements including HRS Chapter 6E. The Proposed Action would not cause any new effects nor incrementally increase existing effects to cultural resources. Because all prior and future actions would be required to resolve their effects under NHPA and HRS regulations, when these actions are added to the Proposed Action, there would be no cumulative effects to archaeological and architectural resources in the ROI.

4.2.2 Cultural Practices

Cultural practices and access to locations where cultural practices occur in the ROI have been impacted by past, present, and reasonably foreseeable actions described in Table 4.1-1. Future projects described in Table 4.1-1, such as the DLNR Visitor Center at Polihale, propose creation of a cultural preservation area and restoration of lo'i (traditional Hawaiian taro patch) and wetlands that could protect and enhance cultural practices in the ROI. The EISPN prepared for the Waimea 400 project identified that cultural knowledge has been integrated into the planning process and impacts to cultural practices and resources would be minimized.

Cultural practices in the ROI include the veneration of iwi kūpuna and ancestors, traditional cultural practices at the shoreline, and a location at Kaunalewa with spiritual qualities. Cultural practices at the shoreline include fishing and gathering marine resources such as shells, mollusks, seaweed, and salt;

lāʻau lapaʻau (traditional Hawaiian medicine) uses of the one (sand); camping; and surfing. Those actions with a federal nexus and with an HRS Chapter 343 requirement would be analyzed and potential effects to cultural practices mitigated. The EIS identified only temporary effects to cultural practices at Nohili Dune and Polihale from the Proposed Action that are similar to current effects. The Proposed Action would not result in any new or additional effects to cultural practices, nor would the reasonably foreseeable actions listed in Table 4.1-1 have any significant direct or indirect disruption of cultural practices, or disturbance of or restriction of access to resources necessary for the exercise of cultural practices. Through ongoing coordination with NHOs and lineal descendants, and compliance with applicable State protections for traditional and customary Native Hawaiian practices, the Proposed Action when added to past, present, and reasonably foreseeable actions would not result in cumulative effects to cultural practices in the ROI.

4.2.3 Biological Resources

Development-related effects from land clearing, construction, and subsequent operations and maintenance activities from past, present, and reasonably foreseeable actions listed in Table 4.1-1 have resulted in some adverse effects to biological resources in the ROI. Future projects described in Table 4.1-1, such as the DLNR Visitor Center at Polihale, propose creation of an endangered species preservation area that could protect sensitive biological resources in the ROI.

For those activities with a federal nexus, the ESA requires a biological assessment and consultation with the USFWS regarding any effects on species. Management strategies outlined in the 2023 PMRF INRMP and any minimization and mitigation measures identified in the actions' NEPA analyses and Biological Opinions from section 7 consultations result in no significant effects to biological resources. Past and present actions taken by NASA have been similarly addressed in its Environmental Management Plan at KPGO. Projects with State requirements would be required to mitigate for any adverse effects pursuant to Title 13, HAR Chapter 124. Cumulatively, while individual plants and wildlife species may be affected by a project within the ROI, overall effects to populations, habitats, and ecosystem functions would not be significantly affected through compliance with federal and State environmental laws and regulations. The Proposed Action would not itself result in any new or additional effects to biological resources. Because all prior and future actions would be required to mitigate for their effects under NEPA, ESA, and State regulations, when these actions are added to the Proposed Action, there would be no cumulative effects to biological resources in the ROI.

4.2.4 Land Use and Access

Past and present Navy and NASA uses of the State-owned land in the ROI listed in Table 4.1-1 are consistent with applicable laws. Recreational hunting, fishing, biking, hiking, and camping are the primary recreational use of lands in the ROI and expected to continue in the future. Use of agricultural lands managed by ADC and KAA is consistent with the Agricultural District. Future projects described in Table 4.1-1, such as the DLNR Visitor Center at Polihale, propose creation of beach access points and expansion of the State Park boundary that could increase access and recreation in the ROI.

Cumulatively, past, present, and reasonably foreseeable actions are consistent with existing and planned land uses, and effects to access are not expected to change. The Proposed Action would not result in any new or additional effects to land use or access. For any future actions, the Navy and NASA will comply with all applicable State laws, including submitting any Conservation District Use

Applications, as appropriate. Because all prior and future actions would comply with existing land use requirements, when these actions are added to the Proposed Action, there would be no cumulative effects to land use and access in the ROI.

4.2.5 Socioeconomics

As described in Section 3.6, *Socioeconomics*, military activity at PMRF has been an important contributor to the State's economy for decades, providing approximately 900 jobs and expenditures of $150 million annually in salaries, contract goods, and services. Additionally, various federal, State, and local agencies and groups contribute to the local economy by traveling to PMRF for training.

In addition to the above, it is anticipated that any real estate agreement payment would reflect current market value. Although unknown at this time, this payment would represent a sizable increase over existing agreements and would therefore provide a beneficial socioeconomic effect.

The Proposed Action would have a new and additional beneficial effect to socioeconomics resources. The past, present, and reasonably foreseeable actions in the ROI listed in Table 4.1-1 would either have no adverse socioeconomic effect, or, in the case of the affordable housing projects under the Waimea 400 Master Plan, result in a net socioeconomic benefit. The activities covered under the 2025 PMRF Land-Based Training and Testing Final EA are not expected to cause a measurable change in the socioeconomic characteristics of the area (DON, 2024a, 2025). As a result, the Proposed Action, when combined with all reasonably foreseeable actions, would result in no cumulative adverse effects, and minor to moderate beneficial economic effects in the ROI.

4.2.6 Water Resources

Effects to water resources from past and present, and reasonably foreseeable actions in the ROI listed in Table 4.1-1 have and will result in short-term effects to water quality from land disturbing activities during project construction. Development projects are required to comply with federal NPDES standards (when over an acre in size) and State regulations protecting water resources during construction events. Other projects, such as the operation and maintenance of the Kawai'ele Pump Station and KAA Floodable Space project have favorably managed water resources in the ROI.

The Proposed Action would not result in any new or additional effects to water resources. Of the two proposed Navy actions listed in Table 4.1-1, the HCTT project is predominantly at-sea-focused and not in the cumulative area of analysis, and the activities analyzed in 2025 PMRF Land-Based Training and Testing Final EA would have minor to no effects to surface water, groundwater, wetlands, or floodplains. The Waimea 400 Master Plan includes plans for affordable housing projects, and those projects would specifically address management of water resources to include increasing recharge and minimizing erosion. As a result, the Proposed Action when combined with all reasonably foreseeable actions, would result in no cumulative effects to water resources in the ROI.

4.2.7 Utilities

Utility systems in the ROI include potable water, wastewater, electric, and communications systems. Past, present, and reasonably foreseeable actions identified in Table 4.1-1 have and will generate additional demand for utilities; there is sufficient utility capacity for all projects. Because the Proposed

Action would not result in any new or additional effects to utilities, and there is sufficient capacity for all reasonably foreseeable actions, there would be no cumulative effects to utilities in the ROI.

4.2.8 Public Health and Safety

The Proposed Action would not change existing conditions related to public health and safety. As such, there is no new or additional adverse effect from the Proposed Action. For the PMRF Land-Based Training and Testing project, no adverse effects to public health and safety are anticipated. There are no known public health and safety concerns with the past, present, or future nonfederal projects in the ROI. Additionally, there are no known health and safety concerns with the nonfederal projects, so there would be no cumulative effects to public health and safety in the ROI.

4.2.9 Air Quality and Greenhouse Gases

Past and present actions in the ROI identified in Table 4.1-1 have resulted in generation of emissions from project development and operations. All construction projects are either complete or of short and temporary duration and would be required to comply with federal and State laws and regulations both for construction and operation for emissions.

Both Navy and nonfederal projects would not result in exceedances of either the NAAQS, permit limits, or health-based guidance levels in areas to which the general public would have access. As such, and because the Proposed Action would not result in any new or additional effects to air emissions, there would be no significant cumulative effects to air emissions.

With regard to HEPA's requirement to analyze GHGs, Alternatives 1 and 2 do not contribute to any additional GHGs. Therefore, when added to the effects from past, present, and reasonably foreseeable actions, these alternatives would not result in cumulative contributions to GHGs in the ROI.

4.2.10 Transportation

Of the past, present, and reasonably foreseeable actions listed in Table 4.1-1, only the DLNR-Visitor Center at Polihale would contribute to increases in traffic on roadways in the ROI. There is no evidence indicating that this project would cause traffic levels to exceed existing LOS. The Waimea 400 Master Plan would generate more vehicular traffic on the roadways in the ROI as described in the EISPN prepared for the project (https://www.pmrf-kpgo-eis.com/media/eirhsabr/2024-05-08-ka-eispn-pmrf-and-kokee-park-geophysical-observatory-real-estate-action.pdf). The remaining projects, both Navy and nonfederal, would not increase the population or otherwise add traffic to ROI roadways. The Proposed Action would not result in any new or additional effects to transportation. Because all prior and future actions would not significantly add population and traffic to existing roadways within the ROI, when these actions are added to the Proposed Action, there would be no cumulative effects to transportation in the ROI.

4.2.11 Hazardous Materials and Waste

Past, present, and reasonably foreseeable actions identified in Table 4.1-1 conducted by the Navy in the ROI would follow existing federal and State regulations and all protocols to manage, reduce, and dispose of hazardous materials and waste. HCTT is largely an at-sea-focused action with no anticipated effect on the State lands. All State projects are presumed to manage their hazardous material and waste in

accordance with State regulations. The Proposed Action would not change or result in any new or additional effects to the hazardous material or waste stored, used, and disposed of on State lands, because all prior and future actions would comply with existing federal and State requirements, and when these actions are added to the Proposed Action, there would be no cumulative effects to hazardous materials and waste in the ROI.

4.2.12 Visual Resources

Past, present, and reasonably foreseeable actions in the ROI listed in Table 4.1-1 have resulted in temporary changes in the viewshed from Navy operational and training activities, and long-term changes in the viewshed could result from the DLNR-Visitor Center at Polihale. Development of the DLNR-Visitor Center would be permitted and constructed in compliance with the County of Kaua‘i building code and effects to visual resources would be minimized or mitigated through the HRS Chapter 343 process. The Proposed Action would not result in any new or additional effects to visual resources. Because all prior and future actions would not further contribute to visual resources effects, when these actions are added to the Proposed Action, there would be no cumulative effects to visual resources in the ROI.

This page intentionally left blank.

5 Existing and Continuing Mitigation Measures and Proposed Enhanced Engagement

In addition to the BMPs (Chapter 2, Section 2.5, *Best Management Practices*) and Community Coordination (Chapter 2, Section 1.7.5, *Ongoing Community Coordination*), this chapter describes actions the Navy and NASA are currently taking to mitigate, avoid, and minimize effects from the Proposed Action and existing mitigation measures that would continue to be implemented under the action alternatives. The Navy and NASA propose to implement Enhanced Engagement that aims to provide additional protections for the ʻāina. These enhancements were developed in response to feedback received from the public during the scoping and public comment periods. Comments indicated that increased communication with the public and regulatory agencies regarding several ongoing programs could improve mutual understanding and cooperation. Additionally, comments also pointed to programs that moving forward could bridge the gap between the military and the community. This Enhanced Engagement is meant to be this bridge.

Under the No Action Alternative and pursuant to the existing real estate agreements, any return of State property would involve complex negotiations with the State of Hawaiʻi for the transfer of various environmental and cultural responsibilities now performed by Navy and NASA back to the State. Mitigation measures for the No Action Alternative would occur at a later time; therefore, these measures are not discussed herein.

5.1 Existing and Continuing Mitigation Measures

HEPA (HAR section 11-200.1-24) states that:

> The EIS shall consider mitigation measures proposed to avoid, minimize, rectify, or reduce impacts, including provision for compensation for losses of cultural; community, historical, archaeological, and fish and wildlife resources, including the acquisition of land, waters, and interests therein. Description of any mitigation measures included in the action plan to reduce significant, unavoidable, adverse impacts to insignificant levels, and the basis for considering these levels acceptable shall be included. Where a particular mitigation measure has been chosen from among several alternatives, the measures shall be discussed and reasons given for the choice made. The EIS includes, where possible, specific reference to the timing of each step proposed to be taken in any mitigation process, what performance bonds, if any, may be posted, and what other provisions are proposed to ensure that the mitigation measures will in fact be taken in the event the action is implemented.

The Proposed Action under the action alternatives would not result in significant adverse impacts for which mitigation measures are required. As such, specific mitigation measures for the action are not included herein.

The Proposed Action and action alternatives would incorporate previously approved mitigation measures from prior NEPA and HEPA Proposed Actions. Table 3.1-4 provides a relevant list (by resource and location) of effects to resources from ongoing activities as well as mitigation measures for those effects from previous environmental documents that have been identified to have activities that occur in the Proposed Action location.

5.2 Proposed Enhanced Engagement

The Navy and NASA are committed to continued long-term resource protection of the ʻāina. As such, the Navy and NASA are including Enhanced Engagement that proposes protections for the ʻāina and was developed in response to public comment to supplement Alternatives 1 and 2. These enhancements are presented below in Table 5.2-1.

Table 5.2-1 PMRF and KPGO Proposed Enhanced Engagement

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
Enhanced Engagement-1	Archaeological and Architectural Resources	In addition to continuing existing historic preservation compliance, increase access to information about archaeological and architectural resources. Ensure stakeholders have access to the ICRMP, subject to the confidentiality restrictions placed on the dissemination of information about archaeological sites and certain NHO resources. Provide educational materials about these resources to schools and libraries, and post on the PMRF Kaua'i (https://pmrfkauai.com/), PMRF (https://cnrh.cnic.navy.mil/Installations/PMRF-Barking-Sands/), and EIS websites (https://www.PMRF-KPGO-EIS.com).	Navy management of leasehold lands.	Integrated with ongoing activities and historic preservation program.	See SOPs from ICRMP in Table 2-7.	PMRF staff will contact stakeholders from ICRMP via phone calls and email.	See SOPs from ICRMP in Table 2-7.
Enhanced Engagement-2	Cultural Practices, Land Use and Access, Socioeconomics (Recreation)	Streamline access through development of a PMRF Access Management Plan that balances public access and PMRF's mission requirements. As part of the development of this Access Management Plan, the PMRF staff will meet with stakeholders to address improved process for	Access for Cultural Practices, Land Use and Access, and Socioeconomics (Recreation) in the Project Area.	Integrated with PMRF's responses to current access requests.	The Plan would also include community surveys which would serve as a feedback process to	PMRF staff will contact stakeholders from ICRMP, NHOs, and from ongoing community coordination (Section 1.7.5)	Navy publication of the Access Management Plan on the PMRF website (https://cnrh.cnic.navy.mil/Installations/PM

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
		access, including requests to use Kiko Road to access the Kekaha Game Management Area through the Mānā Tunnels hunter check-in station. After BLNR makes its decision and real estate agreements are issued, the Navy and NASA will develop their respective access management plans in consultation with DLNR, OHA, NHOs, and other stakeholders.			gauge whether the access program for cultural practitioners is sufficient to meet community needs and interests in accessing significant cultural sites within the PMRF footprint (both federal and State lands).	via phone calls and email.	RF-Barking-Sands/). Update annually.
Enhanced Engagement-3	Biological Resources	Provide the public with annual wildlife summaries, including status updates and data reports and research studies. This could increase public transparency of natural resource management activities at PMRF and KPGO.	Natural resource management activities on the leasehold/ easement and fee simple parcels.	Quarterly updates provided on the ʻOhana Kilo Hōkū and PMRF Kauaʻi websites (https://pmrfkauai.com/) and newsletters.	See 2023 PMRF INRMP (Appendix K), also see Table 2-7.	PMRF staff will contact Sikes Act Partners including DOFAW from 2023 PMRF INRMP (Appendix K) via phone calls and email.	Projects from 2023 PMRF INRMP (Appendix K), pending funding and mission capability.

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
Enhanced Engagement-4	Socioeconomics	Development and continuation of PMRF Kaua'i to establish regular communication channels to strengthen relationships with the community, and other interested stakeholders. PMRF has a strong relationship with stakeholders and the community and is viewed as a good neighbor and community partner, and the Navy highly values the support of its host community. It is critical that these relationships are maintained and enhanced, stakeholders and the community are kept informed of the actions being proposed at PMRF, and the Navy continues to be viewed as a good neighbor and strong community partner. PMRF Kaua'i will provide a means of providing a proactive method for two-way communication, promoting greater dialogue, working collaboratively toward common goals, and developing solutions. PMRF Kaua'i will include: • PMRF Kaua'i Newsletter • Open House Events • Wide Area Gatherings	The leasehold/ easement/fee simple parcels.	Ongoing.	N/A	Continue distributions of the Quarterly Newsletters and website updates to inform and communicate with stakeholders, including the public and regulatory agencies. Newsletter notifications will be distributed via email.	Consistent delivery of quarterly newsletters and website updates (https://pmrfkauai.com/).

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
		• Base Tours • Within Range magazine – wider distribution • PMRF Kaua'i Website (https://pmrfkauai.com/), including: ▪ Announcements ▪ Information about NEPA/HEPA analysis related to PMRF ▪ Calendar of events ▪ Historical, cultural, natural resources, REPI, and other resiliency protection efforts ▪ Marine resource mitigation and protective measures ▪ Marine research and monitoring projects at PMRF ▪ Pollution prevention actions (e.g., no plastic discharged at sea), cleanup events ▪ Tenants at PMRF (e.g., MDA) with hyperlinks to agency websites ▪ Partnerships with federal and State agencies,					

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
		nongovernmental organizations, etc.					
Enhanced Engagement-5	Management of Water Resources	Establish a Navy-DLNR-DHHL-KAA-ADC-Kaua'i County Working Group to collaboratively manage water resources in West Kaua'i.	Water resources in the leasehold easement/fee simple parcels.	Quarterly working group meetings.	To be developed as part of the working group.	PMRF staff will coordinate via phone calls and email with contacts at DLNR, DHHL, KAA, ADC, and Kaua'i County.	Navy to publish written meeting minutes including action items quarterly on the PMRF Kaua'i website (https://pmrfkauai.com/).
Enhanced Engagement-6	Public Health and Safety	Improve closure protocol and public notification of the activation of restrictive easements during launch activities at fee simple lands at Main Base and consider adding non-barbed wire fencing and signage on leasehold and easement lands to minimize encroachment and accidental or intentional trespass from adjacent land.	Main Base and Easement-1 GHA.	Notification on the 'Ohana Kilo Hōkū and PMRF Kaua'i websites (https://pmrfkauai.com/) and newsletter; radio broadcasts to inform public of closures.	N/A	PMRF staff will coordinate with neighboring land owners via phone calls and email.	Navy to publish new protocol on PMRF website (https://cnrh.cnic.navy.mil/Installations/PMRF-Barking-Sands/), including quarterly updates.
Enhanced Engagement-7	Water Resources, Biological Resources	Establish success criteria for ongoing erosion control management actions at Mākaha Ridge for habitat restoration and improved downslope water quality.	Water resources in the leasehold easement/fee simple parcels.	Integrated into current PMRF INRMP management actions and facility	Control erosion	PMRF staff will coordinate with DLNR staff at OCCL, Land Division, and DOFAW, as well	Quantify success of native plant outplanting through sapling

Enhanced Engagement	*Resource*	*Description of Proposed Enhanced Engagement*	*Applicability in the Project Area*	*Frequency of Implementation*	*Site-Specific Conservation Goals*	*How and With Whom Engagement Will be Conducted*	*Goals*
				maintenance at Mākaha Ridge.		as other stakeholders identified via phone calls and email.	percent survival rate, tracking number of ungulates removed, and subsequent vegetation recruitment in the area.
Enhanced Engagement-8	Biological Resources	Establish success criteria for ongoing invasive species management actions at KPGO for habitat restoration.	Biological resources in the leasehold easement/fee simple parcels.	Integrated into current PMRF INRMP management actions and facility maintenance at KPGO.	Habitat restoration	NASA and PMRF staff will coordinate with DLNR staff at OCCL, Land Division, and DOFAW, as well as other stakeholders identified via phone calls and email.	Quantify success of invasive species removal and habitat restoration through special status and native flora percent survival rate and subsequent vegetation recruitment in the area.

Key: ADC = Agribusiness Development Corporation; BLNR = Board of Land and Natural Resources; DHHL = Department of Hawaiian Home Lands; DLNR = Department of Land and Natural Resources; DOFAW = Division of Forestry and Wildlife; EIS = Environmental Impact Statement; GHA = Ground Hazard Area; ICRMP = Integrated Cultural Resources Management Plan; INRMP = Integrated Natural Resources Management Plan; KAA = Kekaha Agricultural Association; KPGO = Kōkeʻe Park Geophysical Observatory; MDA=Missile Defense Agency; N/A = Not Applicable; NASA = National Aeronautics and Space Administration; NHO = Native Hawaiian Organization; OCCL = Office of Conservation and Coastal Lands; OHA = Office of Hawaiian Affairs; PMRF = Pacific Missile Range Facility; REPI = Readiness and Environmental Protection Integration; SOP = Standard Operating Procedure.

6 Other Required Considerations

NEPA and HEPA require discussion, to the extent practicable, of how the Proposed Action interacts with other environmental reviews, laws, and EOs.

Section 6.1 discusses the possible conflicts between the Proposed Action and the objectives of federal, regional, State, and local land use plans, policies, and controls (laws, regulations, and permits), as applicable. A list of permits and approvals from federal, State, and County agencies necessary for implementation of the Proposed Action, as required pursuant to HAR section 11-200.1-24(k), is presented in Section 6.1.4.

Sections 6.2 and 6.3 contain a list of any unresolved issues and unavoidable adverse effects.

Section 6.4 identifies the irreversible and irretrievable commitment of resources associated with the Proposed Action; and Section 6.5 discusses the trade-off between short-term use of the environment and the maintenance and enhancement of long-term productivity.

6.1 Consistency with Government Plans and Policies

HAR section 11-200.1-24(j) requires discussion of how the Proposed Action may conform or conflict with objectives and specific terms of approved or proposed land use and resource plans, policies, and controls, if any, for the affected area. Appendix E includes a table that identifies how the Project conforms with the objectives of or complies with all federal, State, local, and regional laws; policies; and controls, as applicable.

This section identifies the principal State land use plans, policies, and controls that are applicable to the Proposed Action, and how the Proposed Action may conform or conflict with their objectives.

6.1.1 Land Use Laws

A discussion of the Proposed Action's consistency with relevant federal, State, and County land use laws is included in Section 3.5, *Land Use and Access*.

6.1.2 Hawai'i State Plan and Hawai'i State Functional Plans

The Hawai'i State Plan, codified at HRS Chapter 226, establishes a set of themes, goals, objectives, and policies that are meant to guide the future long-range development of the State. The Hawai'i State Plan also provides a basis for determining priorities, allocating limited resources, and improving the coordination between State and County plans, policies, programs, projects, and regulatory activities. These goals seek to promote a strong economy, a desired physical environment, and nourished community life.

The Statewide Planning System identified in HRS Chapter 226 also requires State Functional Plans, which implement State and County actions. There are 13 Functional Plans used to assist with establishing the policies, statewide guidelines, and priorities within a specific field of activity when such an activity or program is proposed, administered, or funded by any State agency. Due to the nature of the leasehold and easement lands that fall under the Proposed Action, multiple functional plans may be applicable, including the Agriculture Functional Plan, the Conservation Lands State Functional Plan, the Historic

Preservation State Functional Plan, and the Recreation State Functional Plan. All of these functional plans were developed in 1991.

The State Plan (HRS section 226-65) also initiated the Hawai‘i 2050 Sustainability Plan to serve as long-range planning to achieve sustainability and climate adaptation goals, principles, and policies. Published in 2008, the plan reinforces the goals and objectives of the State Plan (above) in terms of economic, physical, and community sustainability with the objectives of promoting these sectors through renewable energy, water conservation, and increased food security, among others; an approach fully supported by the Proposed Action.

6.1.2.1 Hawai‘i State Plan

6.1.2.1.1 Section 226-4 State Goals

(1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai‘i's present and future generations.

(2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

(3) Physical, social, and economic well-being, for individuals and families in Hawai‘i, that nourishes a sense of community responsibility, of caring, and of participation in community life.

Discussion: The Proposed Action promotes the sustainable and diverse growth of the economy by providing up to 900 jobs at PMRF and through its contribution of approximately $150 million annually in salaries, contract goods, and services to the local economy (Navy Region Hawaii Public Affairs, 2024). Detailed support of the economy can be found in Section 3.6, *Socioeconomics*. The Proposed Action supports a stable natural system for the social, physical, and economic well-being of community through its biological monitoring, cultural resources support, and recreational activities throughout the Project Area. Detailed discussion can be found in Section 3.2, *Archaeological and Architectural Resources*; Section 3.3, *Cultural Practices*; Section 3.4, *Biological Resources*; Section 3.5, *Land Use and Access*; and Section 3.9, *Public Health and Safety*.

6.1.2.1.2 Section 226-6 Objectives and Policies for the Economy–in General

(a)(1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai‘i's people, while at the same time stimulating the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.

(b)(13) Foster greater cooperation and coordination between the government and private sectors in developing Hawai‘i's employment and economic growth opportunities.

(b)(18) Encourage businesses that have favorable financial multiplier effects within Hawai‘i's economy, particularly with respect to emerging industries in science and technology.

(b)(19) Promote and protect intangible resources in Hawai‘i, such as scenic beauty and the aloha spirit, which are vital to a healthy economy.

Discussion: The Proposed Action helps support the goals of increasing the economics activities, capitalizing on defense and technology, by being the largest high-tech and third largest overall employer on Kaua‘i providing employment of approximately 900 personnel and expenditures of approximately $150 million annually in salaries, contract goods, and services to the local communities and State. The PMRF INRMP, PMRF ICRMP, and REPI programs help promote and protect the resources of Hawai‘i. Detailed discussion can be found in Section 3.3, *Cultural Practices*; Section 3.4, *Biological Resources*; and Section 3.6, *Socioeconomics*.

6.1.2.1.3 Section 226-9 Objective and Policies for the Economy–Federal Expenditures

(b)(1) Encourage the sustained flow of federal expenditures in Hawai‘i that generates long-term government civilian employment;

(b)(2) Promote Hawai‘i's supportive role in national defense, in a manner consistent with Hawai‘i's social, environmental, and cultural goals by building upon dual-use and defense applications to develop thriving ocean engineering, aerospace research and development, and related dual-use technology sectors in Hawai‘i's economy;

(b)(5) Promote federal use of local commodities, services, and facilities available in Hawai‘i.

Discussion: The Proposed Action meets the goals of encouraging federal employment promotion and development, national defense development and the use of local services and facilities as described in HRS section 226-9 and discussed above. Detailed discussion can be found in Section 3.6, *Socioeconomics*.

6.1.2.1.4 Section 226-10 Objective and Policies for the Economy–Potential Growth and Innovative Activities

(b)(1) Facilitate investment and employment growth in economic activities that have the potential to expand and diversify Hawai‘i's economy, including but not limited to diversified agriculture, aquaculture, renewable energy development, creative media, health care, and science and technology-based sectors;

(b)(14) Encourage the development and implementation of joint federal and State initiatives to attract federal programs and projects that will support Hawai‘i's social, economic, physical, and environmental objectives;

(b)(15) Increase research and development of businesses and services in the telecommunications and information industries.

Discussion: As detailed above, the Proposed Action supports the goals of increasing economic activities and programs to support the State’s development of specialized business industries. Detailed discussion can be found in Section 3.6, *Socioeconomics*.

6.1.2.1.5 Section 226-12 Objectives and Policies for the Physical Environment–Scenic, Natural Beauty, and Historic Resources

(b)(1) Promote the preservation and restoration of significant natural and historic resources.

(b)(4) Protect those special areas, structures, and elements that are an integral and functional part of Hawai‘i's ethnic and cultural heritage.

Discussion: The Proposed Action supports the goal of protecting and preserving natural and historic resources as part of Hawai'i's ethnic and cultural heritage through the implementation of ICRMP and continued coordination with cultural practitioners. Detailed discussion can be found in Section 3.2, *Archaeological and Archaeological Resources* and Section 3.3, *Cultural Practices*.

6.1.2.1.6 Section 226-13 Objective and Policies for the Physical Environment–Land, Air, and Water Quality

(b)(2) Promote the proper management of Hawai'i's land and water resources.

Discussion: The Proposed Action recognizes the importance of proper management of water and land resources to the public and supports this through the development and implementation of BMPs, SOPs, and management strategies to ensure land and water resources are protected. Detailed discussion can be found in Section 3.7, *Water Resources*; Section 3.10, *Air Quality and Greenhouse Gases*; and Section 3.12, *Hazardous Materials and Waste*.

6.1.3 Kaua'i County General Plan, West Kaua'i Community Plan, Kaua'i Island Plan

The Kaua'i County General Plan underwent a comprehensive update in 2018 and serves as the County's guiding policy framework for sustainable growth, land use, and other development issues. The plan is designed to enhance and improve the natural environment of Kaua'i. The Project Area falls within the Waimea-Kekaha Planning District and land uses include agriculture, natural preserve, and parks and recreation. The following goals are identified in the Kaua'i General Plan:

> Goal #1 Sustainable Island: Sustainability means growing responsibly to meet the needs of current and future generations without depleting important resources.
>
> Goal #2 A Unique and Beautiful Place: Kaua'i's people share responsibility, or kuleana, to care for and protect treasured resources, traditions, and qualities of the natural, built, and human environment.
>
> Goal #3 A Healthy and Resilient People: We seek to increase the resilience and vitality of Kaua'i's communities and promote better health outcomes through improving the natural, built, and social environment.

Discussion: PMRF, located in West Kaua'i, is one of the foremost aerospace test sites in the United States. PMRF leverages Kaua'i's location in the center of the Pacific Ocean for the benefit of aerospace and space launch testing. Historically, PMRF has been the driving force behind the establishment of technology-based businesses on Kaua'i. PMRF's continued vitality contributes significantly to Kaua'i's high technology industry and provides opportunities for supportive businesses and entrepreneurs (County of Kaua'i, 2018). The Proposed Action also supports the goals of the Kaua'i's County General Plan through the development of community activities and policies for protecting the natural resources of the County. Detailed discussions can be found in Section 3.3, *Cultural Practices*; Section 3.4, *Biological Resources*; and Section 3.6, *Socioeconomics*.

Land uses at PMRF are consistent with the 2020 West Kaua'i Community Plan and include the following three general areas: Hanapēpē (Port Allen, which is outside of the ROI), Kekaha, and Waimea uplands (County of Kaua'i, 2020). The Proposed Action is consistent with the applicable policies regarding

heritage resources, resiliency, and shared spaces in the West Kauaʻi Community Plan. As stated in the West Kauaʻi Community Plan, Part IV: Other Communities and Significant Areas:

> Over the decades, PMRF has increased its connection with Kekaha and the West Kauaʻi Community, such as development of the Junior Professional Program for high school students, restoration of the Kawaiʻele Bird Sanctuary, establishment of protocols for the care and internment of inadvertently uncovered iwi, and support and partnership with local businesses and nonprofits (County of Kauaʻi, 2020).

A separate Kauaʻi Island Plan, last updated in 2004 and produced by the State of Hawaiʻi DHHL, covers lands owned by the DHHL, which includes 15,061 acres adjacent to the Project Area in Waimea (DHHL, 2004) (Figure 6-1).

Discussion: PMRF is located in the coastal plain below the DHHL Mānā Plain property, just north of State of Hawaiʻi DHHL Kekaha tracts, and adjacent to DHHL Waimea land. The Proposed Action is consistent with land use plans for these areas.

6.1.4 List of Current and Potentially Required Permits, Consultations, Reviews, and Approvals

A list of all permits, licenses, authorizations, and approvals from federal, State, and County agencies necessary for implementation of the activities that would continue to occur under the Proposed Action is in Table 6-1 (HAR section 11-200.1-24(k)). The Navy and NASA prepared this EIS with input from the public and local, State, and federal agencies. The anticipated permits, consultations, reviews, and approvals required for implementation of the Proposed Action will depend on the features of the selected alternative. The list of anticipated permits and approvals for the Proposed Action are listed in Table 6-2. Input on other processes that may be necessary will be requested from government agencies and other participants as part of this environmental review process.

The EIS lists all permits, consultations, reviews, and approvals necessary to implement the Proposed Action, including those overarching requirements listed in Table 6-1. Because the Proposed Action is an administrative real estate action, the associated permits and approvals are related to land use arrangements and resource management.

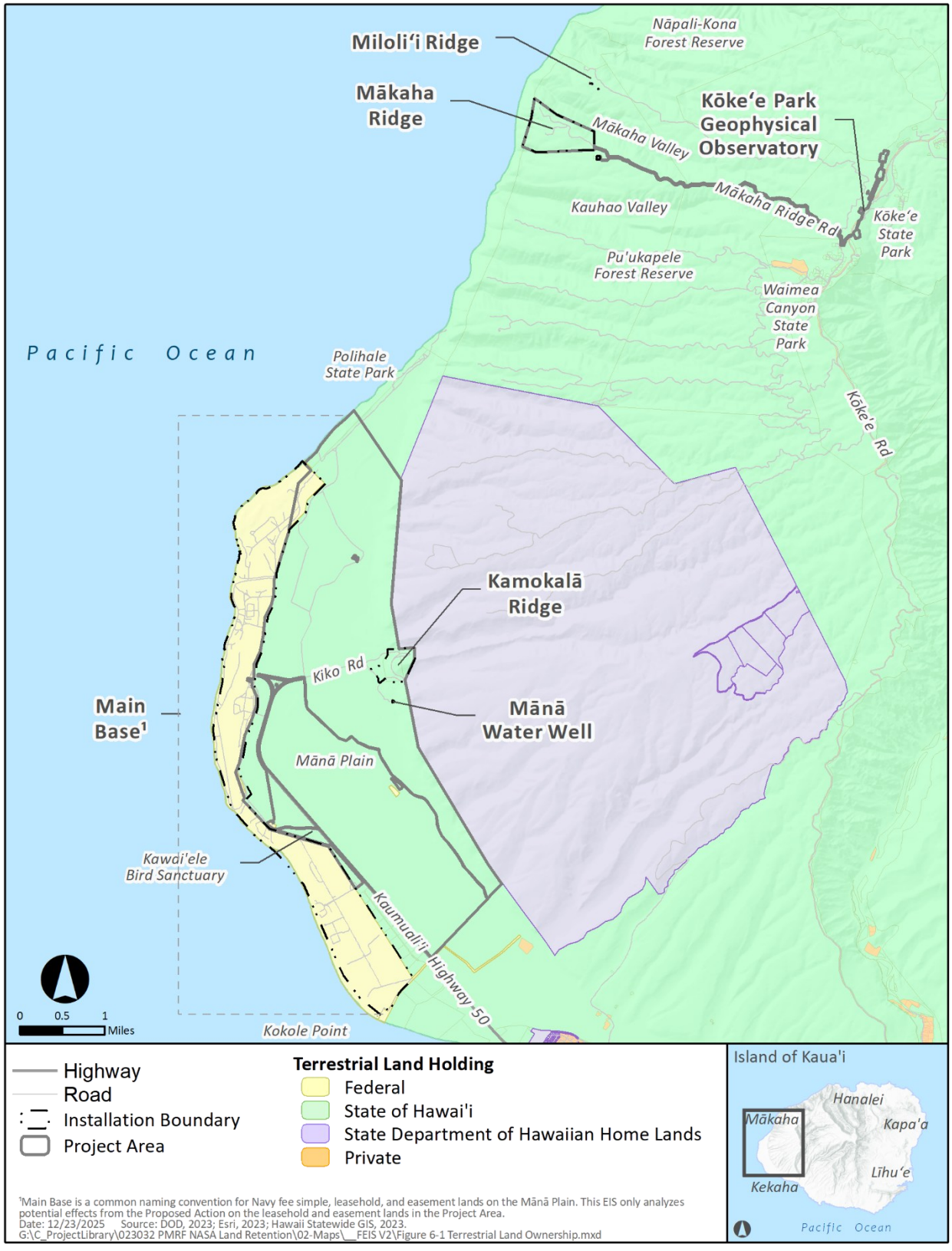


Figure 6-1 Terrestrial Land Holdings

Table 6-1 Current Permits for Activities in the Project Area

Best Management Practice	*Description of Best Management Practices and Management Strategies*	*Applicability in the Project Area*	*Responsible Entity*	*Status*
Noncovered Source Permit No. 0119-01-N (Kōkeʻe Power Plant)	Subject to standard conditions, special conditions, annual fee requirements, annual emissions reporting requirements. Required to submit annual fee, annual emissions report, monitoring report, excess emissions, and continuous monitoring system performance report.	Kōkeʻe – diesel engine generator	DOH, Clean Air Branch	Prior Renewal: 12/10/2015 Current Status: Administratively Extended[1]
Noncovered Source Permit No. 0120-01-N (Mākaha Ridge Diesel Engine Generators)	Subject to standard conditions, special conditions, annual fee requirements, annual emissions reporting requirements. Required to submit annual fee, annual emissions report, monitoring report, excess emissions, and continuous monitoring system performance report.	Mākaha Ridge – two 600 kW, two 320 kW, two 725 kW, four 455 kW diesel engine generators	DOH, Clean Air Branch	Prior Extension: 01/15/2020 Current Status: Administratively Extended[1]

Note: [1]Indicates that while updated versions of these permits are currently under review by DOH, the Navy is lawfully operating under existing permits through an administrative extension.
Key: DOH = Hawaiʻi Department of Health; kW = kilowatt.

Table 6-2 Potential Required Permits, Consultations, Reviews, and Approvals for the Proposed Action

Potential Required Permits and Approvals	*Regulatory Agency*
Approval of request for new real estate agreements (HRS Chapter 171)[1]	BLNR[1]
NHPA (54 U.S.C. section 100101)	ACHP and the Hawaiʻi SHPO
CWA (33 U.S.C. section 1344)	EPA and DOH
CZMA, Subpart C (16 U.S.C. section 1451, et seq.)[2]	Hawaiʻi Office of Planning and Sustainable Development
Hawaiʻi Historic Preservation Review HRS section 6E-8 and HAR Chapter 13-275	DLNR, SHPD

Notes: [1]Indicates approvals necessitating HRS Chapter 343 environmental review.
[2]CZMA Consistency Determination and publication in The Environmental Notice is included in Appendix E.

Key: ACHP = Advisory Council on Historic Preservation; BLNR = Board of Land and Natural Resources; CWA = Clean Water Act; CZMA = Coastal Zone Management Act; DLNR = Department of Land and Natural Resources; DOH = Hawaiʻi Department of Health; EPA = U.S. Environmental Protection Agency; HAR = Hawaiʻi Administrative Rules; HRS = Hawaiʻi Revised Statutes; NHPA = National Historic Preservation Act; SHPD = State Historic Preservation Division; SHPO = State Historic Preservation Officer; U.S.C. = United States Code.

6.2 Unresolved Issues

HEPA requires an EIS to state unresolved issues and how such issues will be resolved prior to the commencement of a proposed action, or what overriding reasons there are for proceeding without resolving the issues (HAR section 11-200.1-24(q)). This section includes issues that would be resolved following the EIS process.

Land Retention Estate(s) and Method(s): After completion of the EIS, and BLNR's issuance of a decision of acceptance or non-acceptance, the Navy and NASA would issue Records of Decision. Upon acceptance, the Navy, NASA, and BLNR would then enter into required negotiations to determine the appropriate land retention estate(s) and method(s) based on the selected alternatives as described in Section 2.3, Alternatives Carried Forward for Detailed Analysis.

Lease Performance and Surrender Conditions: Should the State not issue succeeding real estate agreements, and following the expiration of the current real estate agreements, the Navy and NASA may proceed with actions such as infrastructure removal and/or site remediation as negotiated with the State. These actions would be subject to additional negotiations with the State and further environmental analysis. Appendix C includes a copy of the leases and easements. The lease compliance conditions are not part of the Proposed Action but would be triggered by expiration of the current lease for the State-owned land not retained. Negotiation of the current lease compliance conditions with the State cannot commence until this EIS process is complete; therefore, the parameters for the current lease compliance actions within the State-owned land not retained would be defined and determined after completion of this EIS.

Lease performance and compliance conditions are unknown but are assumed to be the same as current real estate agreements for the purpose of this EIS. Assumptions have been made as described in Section 2.3, but the lease compliance conditions may require further evaluation to determine if additional NEPA compliance is required.

6.3 Unavoidable Adverse Effects

Chapter 3 describes all the anticipated effects from ongoing activities and the Proposed Action and alternatives. Table 3.14-1 summarizes the effects to resources described in Chapter 3. Table 3.1-4 summarizes the environmental effects from ongoing activities on the leasehold and easement lands to include mitigation identified in previous NEPA and HEPA analysis that is now part of PMRF and KPGO existing operations.

Pursuant to HAR section 11-200.1-24(o), this section identifies the following:

- those effects with unavoidable adverse effects (i.e., effects for which new mitigation is identified in this EIS),
- whether any other interests or governmental policies may offset the adverse effects of the Proposed Action, and
- the rationale for proceeding with the Proposed Action notwithstanding unavoidable effects.

Because the Proposed Action has no significant adverse effects it may proceed.

6.4 Irreversible or Irretrievable Commitments of Resources

NEPA and HEPA require evaluation of irreversible and irretrievable commitment of resources should the Proposed Action be implemented. HAR section 11-200.1-24(n) states:

> The draft EIS shall include in a separate and distinct section a description of all irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented. Identification of unavoidable impacts and the extent to which the action makes use of non-renewable resources during the phases of the action, or irreversibly curtails the range of potential uses of the environment, shall also be included. The possibility of environmental accidents resulting from any phase of the action shall also be considered.

Section 6.1, *Consistency with Government Plans and Policies* demonstrates the Proposed Action's consistency with State and local plans, policies, and controls and compliance with federal laws and regulations is included in Section 1.6 and Appendix E.

Since Alternative 1 would result in the acquisition of new real estate agreements, there would be no irreversible or irretrievable commitment of resources except the federal use of State lands. Subsequent real estate agreements would preserve the status quo, resulting in State lands remaining under Navy and NASA management for another extended period.

Alternative 2 would result in the federal acquisition of State lands. Under this alternative, these lands would be under Navy and NASA management similar to current conditions and would irreversibly curtail the range of potential uses of these lands by the State.

6.5 Relationship Between Short-Term Use of the Environment and Long-Term Productivity

As stated in HAR section 11-200.1-24(m), the "Draft EIS shall include in a separate and distinct section a description of the relationship between local short-term uses of humanity's environment and the maintenance and enhancement of long-term productivity. The extent to which the proposed action involves trade-offs among short-term and long-term gains and losses shall be discussed. The discussion shall include the extent to which the proposed action forecloses future options, narrows the range of beneficial uses of the environment, or poses long-term risks to health or safety. In this context, short-term and long-term do not necessarily refer to any fixed time period but shall be viewed in terms of the environmentally significant consequences of the proposed action." NEPA requires a discussion of trade-offs among short-term uses of the environment and the maintenance and enhancement of long-term productivity (42 U.S.C. section 4321 et seq.).

The analysis of the Proposed Action describes minor, adverse, and beneficial effects for short- and long-term uses of the environment (Chapter 3). On the State-owned land, Navy and NASA would continue to implement existing management and mitigation measures that avoid and minimize adverse effects, including existing management measures for *Biological Resources* (Section 3.4), *Archaeological and Architectural Resources* (Section 3.2), and *Cultural Resources* (Sections 3.3).

The Proposed Action is an administrative real estate action that would enable the continuation of ongoing activities on State-owned land. It does not include construction, modernization, or changes in ongoing activities. As discussed in Section 2.3, Alternatives Carried Forward for Detailed Analysis, there would be no difference in ongoing activities on the State-owned land under any action alternative. After

completion of the EIS, the Navy and NASA may proceed with the Proposed Action and would negotiate the appropriate land retention estate(s) and method(s) based on the selected alternative. Retention of the State-owned land through leasehold and easement lands would not narrow the range of beneficial uses by the State of Hawai‘i.

Alternative 2, which proposes to transfer State ownership of 684 acres to the federal government, could preclude future use by the State and therefore narrow the range of beneficial uses by the State of Hawai‘i. As such, land to which the U.S. Government has fee simple title is regulated under federal law. Thus, the Navy and NASA could consider, but are not required to adhere to, State and local regulations for federal land.

The Proposed Action envisions that land retention would promote long-term productivity at PMRF by supporting the Navy and NASA’s missions, notwithstanding the effects discussed in Section 6.3, *Unavoidable Adverse Effects*. Continued use of the State-owned land is paramount to the Navy’s and NASA’s missions; the restrictive use easements provide the areas necessary for safety buffers for operational activities at Main Base and the leaseholds support infrastructure critical for Navy and NASA to fulfill their missions. Loss of key features and facilities within the State-owned land would severely affect the opportunity for the Navy to conduct activities in Kaua‘i and eliminate a critical part of NASA’s geodetic network.

7 List of Preparers

Below is a list of contributors to the preparation of this EIS.

7.1 Government Contributors: Department of the Navy

Julie Chen	NAVFAC Pacific, NEPA Planner – Navy EIS Deputy Project Manager, MS, Environmental Science, MA, Political Science, 3 years
Tara del Fierro	NAVFAC Hawaii, Archaeologist, MA Anthropology, 10 years
Kerry Kylene Ling	NAVFAC Hawaii, NEPA Project Manager – Navy EIS Project Manager, BS, Physics, 20 years
William Manley	Navy Region Hawaii, Environmental Director and Action Proponent Representative, BA History, MA Organizational Leadership, 40 years
Brooke McFarland	NAVFAC Hawaii, Natural Resources Manager, MS Marine Biology, 20 years
Parris Smith	NAVFAC Hawaii, Realty Specialist, BS Business Management, 20 years
Brian Whitehouse	PACFLT, Environmental Planner, BS/MBA, Business Management, 40 years
Gordon Willson-Naranjo	NAVFAC Hawaii, Environmental Protection Specialist, BS Biology, 18 years

7.2 Government Contributors: NASA

Jeff Dorman	NASA Goddard Space Flight Center, Space Geodesy Network Operations Manager, DOPAA, MA, Geography & Earth Sciences, 30 years
Darlene Eltringham	NASA Headquarters, Real Property Accountable Officer, DOPAA, BS, Real Estate & Economic Development, 26 years
Kristy Hopewell	NASA Headquarters, Chief, Real Estate Branch, DOPAA, BS, Business Administration, 20 years
Amy Keith	NASA Headquarters, National Environmental Policy Act Projects Manager, DOPAA, HEPA/NEPA Compliance, BS Electrical Engineering, MS, Environmental Engineering, 38 years
Stephen Merkowitz	NASA Goddard Space Flight Center – Space Geodesy Program Project Manager, DOPAA, Ph.D., Physics, 24 years
Shari Miller	NASA Goddard Space Flight Center, Center NEPA Manager – NASA EIS Project Manager, DOPAA, HEPA/NEPA Compliance, BS, Chemistry & Biology, 30 years
Irene Romero	NASA Goddard Space Flight Center, Center Cultural Resources Manager – NASA EIS Deputy PM, DOPAA, NHPA/Hawaiian Chapter 6E Compliance, BS, Architecture & Planning, Engineering, 15 years

7.3 Navy Consultant Contributors

Stella Acuna	Cardno GS-AECOM Pacific Joint Venture, Senior Reviewer – HEPA/NEPA Compliance, BA, Environmental Design and Planning, 30 years
Kit Adsetts	Cardno GS-AECOM Pacific Joint Venture, Director of Quality – Program QA Director, BS, Environmental Engineering, 27 years

Peer Amble	Cardno GS-AECOM Pacific Joint Venture, Sr Project Manager – DOPAA, HEPA/NEPA Compliance, BA, Physical Geography, 34 years
Kaumakamanōkalanipō Anae	International Archaeology, LLC, Cultural Practitioner and Field Supervisor – Cultural Impact Assessment, MA, Applied Archaeology / BA, Anthropology, Hawaiian Studies, 16 years
Benjamin Barna	Cardno GS-AECOM Pacific Joint Venture, Sr. Archaeologist – Archaeological and Historic Resources, Cultural Practices, Ph.D., Anthropology / MA, Anthropology / BA, Archaeology and U.S. History, 19 years
Benjamin Berridge	Cardno GS-AECOM Pacific Joint Venture, Principal – QA/QC, BA, Environmental Studies, 15 years
Alex Bethke	Cardno GS-AECOM Pacific Joint Venture, Sr. Cultural Resources Project Manager – Archaeological and Historic Resources, Architectural Resources, MA, History (Public History) / BA, History and Political Science, 18 years
Raul Castillo	Cardno GS-AECOM Pacific Joint Venture, Air Quality Analyst – Air Quality, MA, Urban and Regional Planning / BA, Business Administration, 6 years
Christine Chaplin	Cardno GS-AECOM Pacific Joint Venture, Sr GIS Analyst – Geographic Information Systems Analyst, BS, Natural Resources & Environmental Management, 18 years
Jackie Clark	Cardno GS-AECOM Pacific Joint Venture, Public Involvement Specialist – References, BS, Business Administration, 18 years
Angelica Demers	Cardno GS-AECOM Pacific Joint Venture, Biologist – Public Health and Safety, Hazardous Materials and Waste, Water Resources, BS, Natural Resource Management / AS, Aquarium Science, 9 years
Carolyn Dunmire	Cardno GS-AECOM Pacific Joint Venture, Socioeconomic Analyst – Socioeconomics, MS, Engineering-Economic Systems / BS, Chemical Engineering, 35 years
Tania Fragomeno	Cardno GS-AECOM Pacific Joint Venture, Public Involvement Manager – Public Outreach, BA, Psychology, 22 years
Bill Halperin	Cardno GS-AECOM Pacific Joint Venture, President – Sr QA/QC, PhD/MA/BA, Geography, 43 years
Vickie Harris	Cardno GS-AECOM Pacific Joint Venture, Application Developer – Website, BS, Computer Studies / AS, Computer Technology, 17 years
Jess Hawkins	Cardno GS-AECOM Pacific Joint Venture, Biologist – Biological Resources, Water Resources, BS, Environmental Science / BS, Biology, 20 years
Hannah Hubanks	Cardno GS-AECOM Pacific Joint Venture, Environmental Scientist – Peer Reviewer of Biological Resources and Water Resources, MS, Natural Resources and Environmental Management / BS, Zoology, 13 years
Claudia Laughlin	Cardno GS-AECOM Pacific Joint Venture, Graphic Designer – EIS and Public Involvement Graphics, 34 years
Michele Lefebvre	Cardno GS-AECOM Pacific Joint Venture, Sr Project Manager – EIS Project Manager, DOPAA, HEPA/NEPA Compliance, Ph.D., Biology / BA, Biology, 19 years (including HEPA)

Jenny Miller	Cardno GS-AECOM Pacific Joint Venture, Sr Program Manager – Sr QA/QC, Sr NEPA Reviewer, MA, Planning and Development / BA, Political Science, 21 years
Alex Morrison	International Archaeology, LLC, Project Manager/Sr Archaeologist – Archaeological Inventory Survey, Cultural Impact Analysis, Ph.D., Anthropology, 23 years
Abigail Mouch	Cardno GS-AECOM Pacific Joint Venture, Biologist – EIS Deputy Project Manager, MS, Ecology and Evolutionary Biology / BS, Ecology, 9 years
Daniel Ortega	Cardno GS-AECOM Pacific Joint Venture, Environmental Scientist/Planner – Land Use and Access, MS, Biology / BS, Biological Science, 1 Year
Chris Stoll	Cardno GS-AECOM Pacific Joint Venture, Sr Planner/GIS Manager – Transportation, MA, Urban and Regional Planning and GIS Certificate, 23 years
Traci Warholic	Cardno GS-AECOM Pacific Joint Venture, Environmental Planner – Public Meeting Support, MS, Natural and Environmental Resource Management / BS, Biology, 11 years
Heidi Wellborn	Cardno GS-AECOM Pacific Joint Venture, Environmental Planner – Utilities, Visual Resources, BS, Natural Resources Management and Policy, 19 years
Steve Wenderoth	Cardno GS-AECOM Pacific Joint Venture, Senior Regulatory Advisor – Sr QA/QC, Sr NEPA Reviewer, JD, Juris Doctorate, Cum Laude / BA, Government, 36 years
Kim Wilson	Cardno GS-AECOM Pacific Joint Venture, Document Production Manager – Technical Editor, Document Production, 43 years
Jefferson Young	Cardno GS-AECOM Pacific Joint Venture, Transportation Engineer – Transportation, ME, Transportation / BS, Civil and Environmental Engineering, 7 years

7.4 NASA Consultant Contributors

Efrain Arroyo	DAWSON, MA, Anthropology / BA, Anthropology/Archaeology, 6 years
Samantha Bartleson	DAWSON, MS, Geoenvironmental Sciences / BS, Geoenvironmental Sciences, 3 years
Caroline Garcia	DAWSON, BS, Environmental Sustainability Sciences, 3 years
Alexandra Hutchisson	DAWSON, MA, Political Sciences / BS, Agricultural Journalism and Communications, 17 years
Johna Hutira	DAWSON, BA, Anthropology, 45 years
Natalie Lott	DAWSON, BS, Integrated Science and Technology, 3 years
Hannah Patel	DAWSON, BS, Biological Sciences, 7 years
Elizabeth Schultz	DAWSON, BS, Biological Sciences, 2 years
Karen Stackpole	DAWSON, MS, Environmental Science and Education / BS, Biology / AS, Agriculture, 28 years
Draper Suttles	DAWSON, BS, Biosystems Engineering, 7 years
Michelle Bare	HDR, BS, General Studies, 34 years

Timothy Didlake	HDR, BS, Earth Sciences, 16 years
Carolyn Hein	HDR, BS, Environmental Science, 5 years
Dylan Wake	HDR, BS, Environmental Science, 1 year
Chris Coughlin	Peraton Inc., NASA Kōkeʻe Park Geophysical Observatory - Station Manager, DOPAA, BS Electronics Engineering, 17 years