Final

Ground Based Strategic Deterrent Test Program
Environmental Assessment / Overseas Environmental Assessment

April 2021

Volume I

U.S. Air Force Nuclear Weapons Center
Kirtland Air Force Base, New Mexico

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Privacy Advisory

This EA/OEA is provided for public comment in accordance with the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality (CEQ) NEPA Regulations (40 CFR §§ 1500-1508), and 32 CFR § 989, Environmental Impact Analysis Process (EIAP).

The EIAP provides an opportunity for public input on Air Force decision-making, allows the public to offer inputs on alternative ways for the Air Force to accomplish what it is proposing, and solicits comments on the Air Force's analysis of environmental effects.

Public commenting allows the Air Force to make better, informed decisions. Letters or other written or oral comments provided may be published in the EA/OEA. As required by law, comments provided will be addressed in the EA/OEA and made available to the public. Providing personal information is voluntary. Any personal information provided will be used only to identify your desire to make a statement during the public comment portion of any public meetings or hearings or to fulfill requests for copies of the EA/OEA or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of EA/OEA; however, only the names of the individuals making comments and specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the EA/OEA.

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Acronyms and Abbreviations

30 CES/CEIEA	30th Space Wing, Installation Management Flight, Environmental Conservation
30 SW	30th Space Wing
AADT	Annual Average Daily Traffic
ACAM	Air Conformity Applicability Model
ACM	Asbestos-Containing Material
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFPAM	Air Force Pamphlet
AFSPC	Air Force Space Command
APE	Area of Potential Effects
AQCR	Air Quality Control Region
ARSTRAT	Army Forces Strategic Command
ARTCC	Air Route Traffic Control Center
BASH	Bird/Wildlife Air Strike Hazard
BCC	Birds of Conservation Concern
Be	Beryllium
BMP	Best Management Practice
BOA	Broad Ocean Area
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBECS	Commercial Buildings Energy Consumption Survey
CBRE	Chemical, Biological, Radiological, and Explosives
CCC	California Coastal Commission
CCR	California Code of Regulations
CCWA	Central Coast Water Authority
Cd	Cadmium
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CNEL	Community Noise Equivalent Level
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Equivalent
CPUC	California Public Utilities Commission
Cr	Chromium
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DAPTF	Declining Amphibian Populations Task Force
dB	Decibel(s)
DEP	Document of Environmental Protection
DESR	Defense Explosives Safety Regulation
DLA	Defense Logistics Agency
DNL	Day-Night Level
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOE	Department of Energy
DOT	Department of Transportation
DPG	Dugway Proving Ground
DPM	Diesel Particulate Matter
DPU	Division of Public Utilities
DU	Depleted Uranium
DWMRC	Division of Waste Management and Radiation Control
DWR	Department of Water Resources

EA	Environmental Assessment
EA/OEA	Environmental Assessment/ Overseas Environmental Assessment
eDASH	an Air Force Sharepoint electronic dashboard tool
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIA	Energy Information Administration
EIAP	Environmental Impact Analysis Process
EISA	Energy Independence and Security Act
EO	Executive Order
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
EUL	Enhanced Use Lease
FAA	Federal Aviation Administration
FDE	Force Development Evaluation
FONSI	Finding of No Significant Impact
FR	Federal Register
ft^2	Square Feet
ft^3	Cubic Feet
FTS	Flight Termination System
FTU	Formal Training Unit
FY	Fiscal Year
g	Gram(s)
GBSD	Ground Based Strategic Deterrent
GHG	Greenhouse Gas
gpd	gallons per day
GVWR	Gross Vehicle Weight Rating
HAFB	Hill Air Force Base
HAP	Hazardous Air Pollutants
HAPC	Habitat Areas of Particular Concern
HCl	Hydrogen Chloride
HMMP	Hazardous Materials Management Plan
HVAC	Heating, Ventilation, and Air Conditioning
HWMP	Hazardous Waste Management Plan
I-	Interstate Highway
ICAO	International Civil Aviation Organization
ICBM	Intercontinental Ballistic Missile
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
KMISS	Kwajalein Missile Impact Scoring System
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt Hour
LBP	Lead Based Paint
LCU	Landing Craft Utility
LF	Launch Facility
LLNL	Lawrence Livermore National Laboratory
LOA	Letter of Authorization
LOS	Level of Service
MAF	Missile Alert Facility
MBTA	Migratory Bird Treaty Act
mcf	Million Cubic Feet
MEC	Munitions and Explosives of Concern
MGS	Missile Guidance Set
mi	Mile(s)
MIF	Mission Integration Facility
mmBtu/hr	Million British Thermal Units per Hour
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
mph	Miles per Hour
MS4	Municipal Separate Storm Sewer System
MSA	Munitions Storage Area
MSGP	Multi-Sector General Permit

MSRS	ManTech SRS Technologies Inc
MW	Megawatt(s)
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NDSD	North Davis Sewer District
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
nm	Nautical Mile(s)
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NO_x	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTM	Notice to Mariners
HWSF	Hazardous Waste Storage Facility
O_3	Ozone
OAQPS	Office of Air Quality Planning and Standards
OEA	Overseas Environmental Assessment
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
Pb	Lead
PBACM	Post-Boost Altitude Control Module
PBPS	Post Boost Propulsion System
PBV	Post-Boost Vehicle
PCB	Polychlorinated Biphenyl
PFMC	Pacific Fisheries Management Council
PG&E	Pacific Gas and Electric
PK PLTF	Peacekeeper Proof Load Test Facility
PM	Particulate Matter Pollution
PM_{10}	Particulate Matter Less than or Equal to 10 Microns
$PM_{2.5}$	Particulate Matter Less than or Equal to 2.5 Microns
PNNL	Pacific Northwest National Laboratory
ppb	Parts per Billion
ppm	Parts Per Million
PRS	Payload Re-entry System
PSC	Public Service Commission of Utah
PSD	Prevention of Significant Deterioration
PSRE	Propulsion System Rocket Engine
PSS	Physical Security System
PSSTF	Physical Security System Test Facility
PV	Photovoltaic
QRP	Qualified Recycling Program
RCC	Range Commanders Council
RMI	Republic of the Marshall Islands
ROI	Region of Influence
RS	Reentry System
RSL	Regional Screening Level
RSLP	Rocket System Launch Program
RTS	Ronald Reagan Ballistic Missile Defense Test Site
RV	Reentry Vehicle
SBCAPCD	Santa Barbara County Air Pollution Control District
SDZ	Surface Danger Zone
SHPO	State Historic Preservation Officer

SIP	State Implementation Plan
SLC	Space Launch Complex
SMAC	Software Mission Assurance Center
SMIC	Strategic Missile Integration Center
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
SR-	State Route
SSC	Species of Special Concern
SW	Space Wing
SWI	Space Wing Instruction
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TACC	Training and Collaboration Center
TAZ	Traffic Analysis Zone
TCLP	Toxicity Characteristic Leaching Procedure
TIF	Temporary Integration Facility
TP	Test Pad
tpy	Tons Per Year
TT	Thrust Termination
U	Uranium
U.S.	United States
UCAR	University Corporation for Atmospheric Research
UDOT	Utah Department of Transportation
UDWR	Utah Department of Wildlife Resources
UES	USAKA Environmental Standards
UFC	Unified Facilities Criteria
ULA	United Launch Alliance
UOSH	Utah Occupational Safety and Health
UPDES	Utah Pollutant Discharge Elimination System
US-	U.S. Highway
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USAFGSC	United States Air Force Global Strike Command
USAG-KA	United States Army Garrison – Kwajalein Atoll
USAKA	United States Army Kwajalein Atoll
USAPHC	United States Army Public Health Center
USASMDC	United States Army Space and Missile Defense Command
USASSDC/TBE	United States Army Space and Strategic Defense Command and Teledyne Brown Engineering
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXO	Unexploded Ordnance
VAFB	Vandenberg Air Force Base
VOC	Volatile Organic Compound
WAP	Waste Analysis Plan
WFRC	Wasatch Front Regional Council
WPRFMC	Western Pacific Regional Fishery Management Council
WSC	Water Systems Consulting, Inc.
WWTP	Wastewater Treatment Plant
yd^3	Cubic Yard(s)
$\mu g/m^3$	Microgram per cubic meter

1.0 Purpose of and Need for the Proposed Action

1.1 Introduction

The United States (U.S.) Air Force (USAF) prepared this Environmental Assessment/Overseas Environmental Assessment (EA/OEA) to analyze implementation of the Ground Based Strategic Deterrent (GBSD) Test Program. GBSD represents the modernization of the U.S. land-based nuclear arsenal, eventually replacing the aging Minuteman III intercontinental ballistic missile (ICBM) system. Before USAF can make future decisions to transition the Minuteman III weapon system from active status to the GBSD weapon system, developmental and operational program testing of the new system must occur. Test program-related actions would occur primarily at Hill Air Force Base (HAFB) in Utah and at Vandenberg Air Force Base (VAFB) in California. Such tests would include conducting missile launches from VAFB with flights over the Pacific Ocean in the Western Test Range. Testing flights would terminate at the Kwajalein Atoll in the Republic of the Marshall Islands (RMI). The USAF also must begin planning for the development of training for our Airmen on the new GBSD system, which would include establishing a GBSD Schoolhouse at VAFB. The Schoolhouse would include classrooms and other support facilities for the GBSD Formal Training Unit (FTU). Additional test support activities would occur at U.S. Army Dugway Proving Ground (DPG) in Utah.

Following review of the proposed GBSD Test Program, USAF determined that an EA/OEA is required to assess the potential environmental effects from the facility construction, operations, and flight test activities that would occur. This analysis includes the assessment of environmental impacts in the RMI, which operates under a Compact of Free Association with the United States and follows regulatory provisions of the National Environmental Policy Act (NEPA). Supported by the U.S. Army Space and Missile Defense Command (USASMDC), this EA/OEA was prepared in accordance with the following regulations, statutes, and standards:

- NEPA of 1969
- Executive Order (EO) 12114 (Environmental Effects Abroad of Major Federal Actions)
- The President's Council on Environmental Quality (CEQ) regulations for implementing NEPA[1] (40 Code of Federal Regulations [CFR] Parts 1500-1508)
- Department of Defense (DoD) regulations for implementing EO 12114 (32 CFR Part 187, Environmental Effects Abroad of Major Department of Defense Actions)

[1] This EA/OEA follows the CEQ rules in effect prior to the September 2020 revised rules, as the EA/OEA was initiated before the new CEQ regulations went into effect.

- USAF regulations for implementing NEPA (32 CFR Part 989, Environmental Impact Analysis Process)
- Air Force Instruction (AFI) 32-7091, Environmental Management Outside the United States
- U.S. Army regulations for implementing NEPA (32 CFR Part 651, Environmental Analysis of Army Actions)
- Environmental Standards and Procedures for United States Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands, 16th Edition (USASMDC/ ARSTRAT 2021a), and hereafter referred to as the USAKA Environmental Standards (UES).

1.2 Background

The Minuteman III weapon system is the enduring land-based leg of the U.S. nuclear triad, which includes USAF bombers and U.S. Navy Ohio-class submarines. The Minuteman III first became operational in the early 1970s but is based on 1960s technology and materials when prior Minuteman I and II systems were first deployed. While certain components and subsystems have been upgraded over the years, most of the fundamental infrastructure in use today is the original equipment supporting more than 50 years of continuous operation. As an aging platform, the Minuteman III requires major investments to maintain its reliability and effectiveness.

The Minuteman III weapon system remains the only land-based ICBM in America's nuclear arsenal. Currently, the Minuteman III force consists of 400 missiles dispersed within 450 underground Launch Facilities (LFs) (also referred to as missile silos) located within the three Missile Wings based at F.E. Warren Air Force Base (AFB) in Wyoming, Malmstrom AFB in Montana, and Minot AFB in North Dakota. USAF is currently implementing multiple life extension programs to maintain the Minuteman III inventory through the end of its useful life, around 2036. To sustain the current force to 2036, the USAF must continue to conduct Minuteman III flight tests on a regular basis to ensure the safety, accuracy, and reliability of the Minuteman III weapon system.

The GBSD program consists of the modernization of the land-based leg of the U.S. nuclear triad, eventually replacing the aging Minuteman III weapon system. For the GBSD acquisition effort, the USAF is developing and delivering an integrated GBSD weapon system, including launch, and command and control segments. The new weapon system will meet the combatant commander's current requirements, while having the adaptability to affordably address changing technology and emerging threats through 2075. The GBSD represents the most cost-effective ICBM replacement strategy, leveraging existing Minuteman III infrastructure, while also

implementing mature, modern technologies and more efficient operations, maintenance, and security concepts.

1.3 Purpose of the Proposed Action

The Proposed Action would implement booster development, flight testing of the proposed GBSD weapon system, and GBSD FTU training. The purpose of this testing is to assess attainment of technical design parameters; verify and validate system performance capabilities (baseline requirements); and determine whether the system is operationally effective, suitable, survivable, and safe for its intended use in support of the U.S. nuclear triad. This type of testing is required as part of DoD and USAF weapon system acquisition processes (DoD 2012, 2020a, 2020b; USAF 2017), and the information generated is essential to decision makers. The purpose of the GBSD FTU/Schoolhouse is to train our Airmen on the entirely new weapon system.

1.4 Need for the Proposed Action

Developed using 1960s technology and materials, the Minuteman III weapon system has exceeded its designed life expectancy. While the system remains an active, viable deterrent for the United States, many components are becoming obsolete and unsupportable, resulting in continual upgrades to maintain system reliability and performance. It is in the best interest of national security to replace the Minuteman III weapon system with a technologically and environmentally mature design before age, diminishing manufacturing sources, and material shortages make Minuteman III sustainability difficult, putting the nation at risk. In order to maintain a consistent fleet of 400 ICBMs on alert, the multi-year fielding of the GBSD will require that the USAF replace the Minuteman III missiles and warheads and GBSD missiles and warheads on a one-for-one sequencing.

However, before the USAF can initiate the one-for-replacement of the Minuteman III missiles with the new GBSD missiles and warheads, successful developmental and operational testing under the GBSD Test Program must first occur. Such developmental and operational testing is needed to ensure the GBSD weapon system can function and achieve operational status to replace the Minuteman III and support the nuclear triad. Without the GBSD Test Program, the scheduled one-for-one replacement of the Minuteman III missiles by the new GBSD missiles and warheads, which is vital to the long-term defense and security of the United States and its allies, could be impaired or delayed.

Similar to the requirement to develop and test the GBSD missiles themselves far in advance of consideration of their operational fielding, the early planning and initiation of training on this new weapon system is vital to its success. Accordingly, there is a need to analyze the GBSD FTU/Schoolhouse so that it can be constructed and begin training our Airmen in time to support

the fielding of GBSD. If this planning is forced to wait for future operational GBSD fielding decisions, the training would not be available in time.

Conducting the proposed GBSD Test Program at HAFB, VAFB, and DPG represents the most cost-effective ICBM test strategy, as it leverages existing Minuteman III infrastructure. Establishing a flight test range for ICBMs anywhere other than VAFB would constitute treaty violations between the United States and other nations.

1.5 Scope of the Environmental Assessment/Overseas Environmental Assessment

This EA/OEA assesses the reasonably foreseeable activities and operations that would occur during implementation of the proposed GBSD Test Program. It includes analysis of associated facility construction and modifications and test operations, which would occur at HAFB, VAFB, and DPG. At VAFB, GBSD test missiles would be launched from modified LFs and possibly an existing test pad (TP). On each missile, test reentry vehicles (RVs) would be used as payloads, which would impact at predetermined locations downrange.

This EA/OEA also contains analysis of the GBSD Schoolhouse, including the classroom and other support facilities required in support of the FTU. The proposed location for the GBSD Schoolhouse is VAFB. As host to the current Minuteman III Schoolhouse and FTU, VAFB is the ideal location for the proposed GBSD Schoolhouse. The rationale for VAFB as the sole alternative location considered for the GBSD Schoolhouse is explained in **Section 2.3**. In accordance with the CEQ and USAF regulations for implementing NEPA (40 CFR § 1502.14[d] and 32 CFR § 989.8[d], respectively), this EA/OEA also reviews the No Action Alternative that serves as the baseline from which to compare the Proposed Action. Under the No Action Alternative, Minuteman III flight tests conducted from VAFB and supported by HAFB would continue to be conducted to 2030 or until decisions are made to remove the Minuteman III weapon system from active status. Also under the No Action Alternative, operation of the Minuteman III Schoolhouse at VAFB would continue until such decisions on the Minuteman III system are made.

Because the proposed GBSD Test Program would overlap several years of Minuteman III flight testing, the Proposed Action analyzed in this EA/OEA takes into consideration the actions, resulting impacts (i.e., direct, indirect, and cumulative) that would occur from conducting both GBSD and Minuteman III test programs in parallel, and addresses mitigations being implemented on the GBSD testing activities to reduce impacts to less than significant.

To provide decision makers with sufficient information to plan and make informed decisions on the proposed GBSD Test Program, this EA/OEA evaluates several environmental/resource categories within the affected environment that potentially could be impacted. For this analysis, the following 16 resource areas were considered: air quality, airspace management, biological

resources, cultural resources, environmental justice, geology and soils, hazardous material and waste management, health and safety, infrastructure, land use, coastal zone consistency, noise, socioeconomics, transportation, visual resources, and water resources. Because the environmental issues associated with the proposed GBSD Test Program vary at each location affected, the environmental/resource categories analyzed at each location also varied. Refer to **Chapters 3.0** and **4.0** for identification of those categories described and analyzed by location.

1.6 Interagency and Intergovernmental Coordination and Consultations

Interagency and intergovernmental coordination is an integral part of EA/OEA preparation. As part of early coordination and consultations, USAF notified and consulted with relevant federal and state agencies on the Proposed Action and alternatives to identify potential environmental issues and regulatory requirements associated with project implementation. The following discussions summarize the agency coordination and consultations that have been completed.

U.S. Fish and Wildlife Service (USFWS) Consultation Under Section 7 of the ESA – VAFB

The USAF, in coordination with the VAFB 30 Space Wing (30 SW) Installation Management Flight, prepared a Biological Assessment to evaluate the effects of proposed GBSD Test Program construction activities at VAFB on species listed under the Endangered Species Act (ESA) and to support consultation with the USFWS under Section 7 of the ESA (USAF 2020b). The USAF initiated formal consultation with USFWS Pacific Southwest Regional Office for potential effects on ESA-listed species on November 16, 2020 (**Appendix A**). The USFWS issued a Biological Opinion for proposed construction at VAFB on April 5, 2021 (**Appendix A**). The USFWS concluded that implementation of the GBSD test program at VAFB may result in incidental take of some ESA-listed species, but is not likely to jeopardize the continued existence of any of the species considered in their Biological Opinion.

Consultation with the National Marine Fisheries Service (NMFS) – VAFB

The USAF has concluded that proposed construction activities at VAFB would have no effect on ESA-listed marine species, their critical habitats, or Essential Fish Habitat (EFH), and that no consultation with NMFS is required for new construction activities at VAFB.

In coordination with the VAFB 30 SW Installation Management Flight, USAF has concluded that the potential effects of all Proposed Action launch activities at VAFB on marine species and habitats are covered under existing programmatic consultations and Letters of Authorization (LOA [NMFS 2019]) under the Marine Mammal Protection Act (MMPA) for ongoing launch activities at VAFB, and that no further consultation with NMFS is needed for Proposed Action launch activities.

Consultations with the California State Historic Preservation Officer (SHPO)

In accordance with Section 106 of the National Historic Preservation Act (NHPA), consultations with the California SHPO, Indian Tribes, and any other identified consulting parties are currently ongoing and led by VAFB. In January 2021, VAFB initiated consultation with the California SHPO on the Area of Potential Effects (APE), determinations of National Register of Historic Places (NRHP) eligibility of historic and archaeological resources, and determinations of effect to historic properties (listed or eligible for listing in the NRHP) from the GBSD Proposed Action (**Appendix B**). VAFB made a determination of adverse effects for the undertaking at three architectural resources and two archaeological sites. Resolution of the adverse effects activities are detailed in the signed May 2021 Memorandum of Agreement (MOA).

Consultations with the Utah State Historic Preservation Officer (SHPO)

Consultations with the Utah SHPO, Indian Tribes, and any other identified consulting parties under Section 106 of the NHPA have been completed at HAFB and are currently underway at DPG. In October 2019, HAFB conducted NHPA Section 106 consultations with the Utah SHPO for implementation of the GBSD Proposed Action at HAFB. HAFB made a determination of No Adverse Effect to historic properties and the Utah SHPO concurred with that determination in correspondence dated October 21, 2019 (**Appendix B**). DPG initiated consultation with the Utah SHPO for GBSD Test Program activities at the post on January 11, 2021. Although site selection is still underway, DPG consulted on three potential sites and anticipated utility corridors. DPG made a determination of No Historic Properties Affected for GBSD construction and activities at DPG. The Utah SHPO concurred with DPG's determination of No Historic Properties Affected on January 15, 2021.

Consultations with Indian Tribes

USAF has conducted and will continue to conduct government-to-government consultation with federally recognized Indian Tribes in accordance with Section 106 of the NHPA and implementing regulations at 36 CFR Part 800 and to comply with Native American Graves Protection and Repatriation Act (NAGPRA) with regards to the GBSD Proposed Action. In accordance with Air Force Manual (AFMAN) 32-7003, consultations have been initiated and are being conducted by the respective installation commanders with support from the installation tribal liaison officer and cultural resource manager.

HAFB' s Section 106 consultation in October 2019 included consultation with 20 Tribes (**Appendix B**). Responses were received from three Tribes. The Northern Arapaho Tribe responded that they determined there were no adverse effects, the Hopi Tribe concurred with a determination of no adverse effect, and the Paiute Indian Tribe of Utah response stated they had no objections. In December 2020, government-to-government consultations with Indian Tribes were initiated at DPG. Letters were sent to Tribes in Utah on December 21, 2020 (**Appendix B**).

VAFB communicates frequently with the Santa Ynez Band of Chumash Indians, the federally recognized Indian Tribe affiliated with managed lands at VAFB. A tribal representative was on-site for archaeological investigations that included excavation beginning in August 2020. On November 5, 2020, representatives of VAFB met with Tribal representatives to provide project information and maps and a preliminary assessment of cultural resources with a potential to be impacted by the Proposed Action. On January 5, 2021, representatives of VAFB participated in a video teleconference with the Tribal Elders' council meeting. A request for consultation under Section 106 was submitted to the Tribe on January 12, 2021. Comments from the Santa Ynez Band of Chumash Indians were received on March 18, 2021 regarding this EA/OEA and Section 106 consultation. VAFB provided a written response to the Tribe's comments on March 23, 2021, and met with Tribal representatives on April 2, 2021. In correspondence dated April 7, 2021, the Tribe responded with its concurrence that the effort to identify the broadest range of cultural resources for NEPA and Section 106 analysis was complete (**Appendix B**).

Coordination with the California Coastal Commission (CCC)

For compliance with Federal Coastal Zone Consistency regulations (15 CFR Part 930) and the California Coastal Management Program, the USAF anticipates that the GBSD Test Program-related actions proposed to occur within the designated coastal zone at VAFB will be consistent with the enforceable policies of the state's certified program and would not adversely affect coastal zone resources. To comply with the program's requirements, USAF submitted a negative determination to the CCC requesting their concurrence (**Appendix A**). On April 1, 2021 the CCC concurred with the negative determination pursuant to Section 15 CFR 930.35(d) of the NOAA implementation regulations (**Appendix A**).

Coordination with the RMI

For all activities within the RMI, including territorial waters of the RMI, the standards and procedures in the UES (USASMDC 2021a) apply. Under the UES, the USAF must coordinate with UES appropriate agencies including the RMI Environmental Protection Authority, U.S. EPA, USFWS, NMFS, and USACE; providing agencies with an opportunity to review and comment on activities potentially affecting the environment (USASMDC 2021a). The USAF began coordination with UES appropriate agencies in July 2020. The GBSD program would develop and finalize a Document of Environmental Protection (DEP) for activities in the RMI. The DEP will be reviewed by the UES appropriate agencies and in place prior to the initial GBSD flight test in 2023. The Minuteman III program will continue to follow the existing Minuteman III ICBM Modification and Fuze Modernization DEP.

U.S. Fish and Wildlife Service (USFWS) Consultation Under the UES – RMI

In accordance with Section 3-4 of the UES, USAF initiated coordination with USFWS on August 25, 2020, for GBSD-related actions at Kwajalein Atoll in the RMI. USAF representatives met with USFWS to (1) provide general information about the proposed GBSD Test Program activities at U.S. Army Garrison-Kwajalein Atoll (USAG-KA), (2) identify USFWS concerns for

biological resources, and (3) discuss the consultation process as specified in the UES. To support consultation with the USFWS, USAF prepared a Biological Assessment to evaluate the effects of proposed activities at USAG-KA on consultation species listed under the UES (USAF 2020d). USAF initiated informal consultation with USFWS Pacific Islands Fish and Wildlife Office for potential effects on UES-consultation species on November 16, 2020 (**Appendix A**). The USFWS issued a Letter of Concurrence on January 7, 2021 (USFWS consultation reference number 01EPIF00-2021-I-0058; **Appendix A**), concurring with the determination that the Proposed Action is not likely to adversely affect sea turtles on land at Kwajalein Atoll islets.

Consultation with the National Marine Fisheries Service (NMFS) – RMI

In accordance Section 3-4 of the UES, USAF initiated coordination with the NMFS Pacific Islands Regional Office on July 30, 2020, for the purpose of (1) providing information about proposed GBSD Test Program activities; (2) to discuss potential effects on ESA-listed marine species, designated critical habitats, and species protected under Section 3-4 of the UES; and (3) to discuss the consultation process as specified in the UES. To support consultation with the NMFS, the USAF prepared a Biological Assessment to evaluate the effects of Proposed Action activities at USAG-KA on species listed under the UES (USAF 2020d). USAF initiated formal consultation with the NMFS Pacific Islands Regional Office for potential effects on the UES-consultation species on November 16, 2020 (**Appendix A**). The NMFS issued a Biological Opinion on March 15, 2021 (NMFS File Number PIRO-2020-03355; **Appendix A**). The NMFS concluded that implementation of the GBSD test program at USAG-KA may result in incidental take of some UES-consultation corals, mollusks, and fish, but is not likely to jeopardize the continued existence of any of the species considered in their Biological Opinion.

1.7 Public Notification and Review

In accordance with the CEQ and USAF regulations for implementing NEPA, USAF is soliciting comments on this Draft EA/OEA from interested and affected parties. When providing input on the EA/OEA, the USAF requests that comments be substantive in nature. Generally, substantive comments are regarded as those specific comments that challenge the analysis, methodologies, or information in the EA/OEA as being factually inaccurate or analytically inadequate; that identify impacts not analyzed or developed and evaluate reasonable alternatives or feasible mitigations not considered by the USAF; or that offer specific information that may have a bearing on the decision, such as differences in interpretations of significance, scientific, or technical conclusions, or cause changes or revisions in the proposal. Non-substantive comments, which do not require a specific USAF response, are generally considered to be those comments that are non-specific; express a conclusion, an opinion, agree, or disagree with the proposals; vote for or against the proposal itself, or some aspect of it; state a position for or against a particular alternative; or otherwise state a personal preference or opinion. All substantive comments, either written or verbal, received during the public

comment period, will be given full and equal consideration in the preparation of the Final EA/OEA.

A Notice of Availability (NOA) for the Draft EA/OEA, and the Draft Finding of No Significant Impact (FONSI), was published on February 19, 2022 in local and regional newspapers for HAFB, VAFB, DPG, and USAG-KA (see **Table 1-1**). The NOA invited the public to review and comment on the Draft EA/OEA. The public and agency review period ended on March 22, 2021. The Draft EA/OEA and Draft FONSI were available over the Internet at gbsdtesteaoea.govsupport.us. A list of agencies and organizations that were sent a notice of availability of the document is provided in **Appendix C**. A total of 44 comments were received from agencies and the public. Comment letters from the NMFS, U.S. EPA Region 9, USFWS, and the Santa Barbara Air Pollution Control District are included in **Appendix A**. All comments received were considered in the development of this Final EA/OEA and are a part of the administrative record.

Table 1-1. Newspaper Publications for the Notice of Availability

State or Country	City/Town	Newspaper
California	Lompoc Santa Barbara Santa Maria	*Lompoc Record* *Santa Barbara News-Press* *Santa Maria Times*
Utah	Ogden Ogden Salt Lake City Salt Lake City Tooele	*Hilltop Times* *Standard-Examiner* *Deseret News* *Salt Lake City Tribune* *Tooele Transcript Bulletin*
Republic of the Marshall Islands	Majuro U.S. Army Garrison Kwajalein Atoll	*Marshall Islands Journal* *Kwajalein Hourglass*

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2.0 Description of the Proposed Action and Alternatives

Two alternatives are assessed in this EA/OEA—the Proposed Action and the No Action Alternative. **Section 2.1** provides a description of the No Action Alternative for continued operation and flight testing of the Minuteman III weapon system. **Section 2.2** gives a detailed description of the proposed GBSD Test Program, including facility construction and modifications and flight test activities. The facility siting process that was used and the elimination of potential alternatives are discussed in **Section 2.3**. **Section 2-4** provides a summary comparison of the environmental consequences associated with the Proposed Action and the No Action Alternative.

2.1 No Action Alternative – Continuation of the Minuteman III Test Program

The U.S. Strategic Command regularly conducts flight tests of Minuteman III missiles from VAFB as part of the program's ongoing Force Development Evaluation (FDE) test activities. The Air Force Global Strike Command manages the FDE flight tests, including missile selection from the three Missile Wings, test planning, launch operations, flight performance assessment, and reporting. The primary requirement of the flight tests is to provide an assessment of the weapon system's performance, target accuracy, reliability, and overall effectiveness.

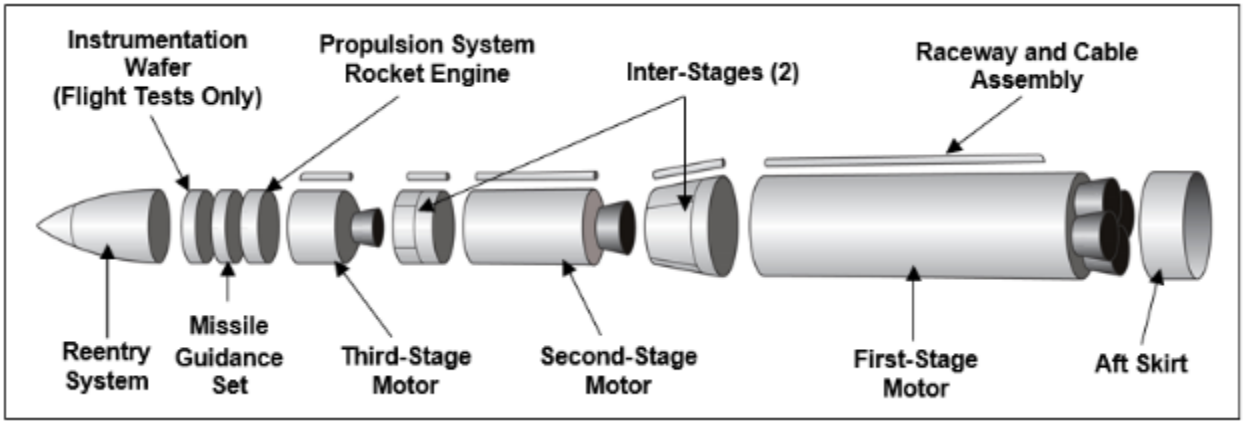
Under the No Action Alternative, ongoing system monitoring, and flight testing of Minuteman III missiles would continue to ensure weapon system safety, accuracy, and reliability for the remaining life of the Minuteman III weapon system, which is expected to occur at least to 2030. These activities would include continued use of the Minuteman III Schoolhouse at VAFB for Airmen training on the weapon system. All USAF installations and facilities currently supporting the Minuteman III test activities would continue their operations in support of maintaining the Minuteman III weapon system. The Minuteman III missile, flight preparation, launch-related activities, and training are described in the following sections.

Although not specifically described herein as part of the No Action Alternative, future life-extension programs for the Minuteman III weapon system would need to occur, along with major investments in all of the parts and sustainment requirements, in order for the Minuteman III to remain operational long term.

2.1.1 Minuteman III Weapon System Description

The Minuteman III weapon system generally is unchanged from the Proposed Action description analyzed in prior environmental documents (USAF 2004, 2006, 2013a, 2020e). The missile consists of five major missile sections: the three-stage solid-propellant booster, the propulsion

system rocket engine (PSRE), the missile guidance set (MGS), instrumentation wafer (flight test configuration only), and the Reentry System (RS). The latter four sections make up what generally is referred to as the post-boost vehicle (PBV). The missile is approximately 59.9 feet long, with a maximum diameter of 5.5 feet, and weighs approximately 79,400 pounds at launch. Further discussions on key components of the Minuteman III missile are provided in the paragraphs that follow. A diagram of the Minuteman III is provided in **Figure 2-1**.



Source: USAF 2004, 2013a, 2020e

Figure 2-1. Minuteman III Missile

Solid Propellant Booster

The solid-propellant booster is composed of the assembled 1st, 2nd, and 3rd stage motors, along with the inter-stages and ordnance systems. Information on the dimensions of each motor, propellant weight, and main chemical components is provided in **Table 2-1**.

Table 2-1. Minuteman III Solid Propellant Rocket Motors

DIMENSIONS			PROPELLANT	
Stage	**Diameter (feet)**	**Length (feet)**	**Weight (~pounds)**	**Main Chemical Components**
1	5.5	18.6	45,700	Ammonium Perchlorate Aluminum Polybutadiene-Acrylic Acid-Acrylonitrile
2	4.3	9.1	13,750	Ammonium Perchlorate Aluminum Polybutadiene-Carboxyl Terminated
3	4.3	5.5	7,300	

Source: USAF 2004

Other ordnance carried on the Minuteman III includes motor igniter assemblies, shroud ejection motor initiator, gas generators, and a Flight Termination System (FTS) destruct package used only for flight tests from VAFB. Should a launch anomaly occur during flight, the destruct devices, in the form of linear explosive assemblies, are used to separate the stages, split the motor casings, and stop forward thrust.

Propulsion System Rocket Engine (PSRE)

Just above the Stage 3 motor on the Minuteman III is the PSRE. It is a liquid propellant rocket unit consisting of two sealed propellant storage assemblies, a helium gas storage tank for pressurizing the propellant, and several small rocket engines. The propellants used are monomethylhydrazine as the fuel, and nitrogen tetroxide as the oxidizer, which form a hypergolic combination. The PSRE is completely assembled and fueled with 13.2 gallons of fuel and oxidizer each at the time of manufacture. Other ordnance materials within the PSRE contain less than 1 ounce of additional explosives.

Missile Guidance Set and MOD 7 Instrumentation Wafer

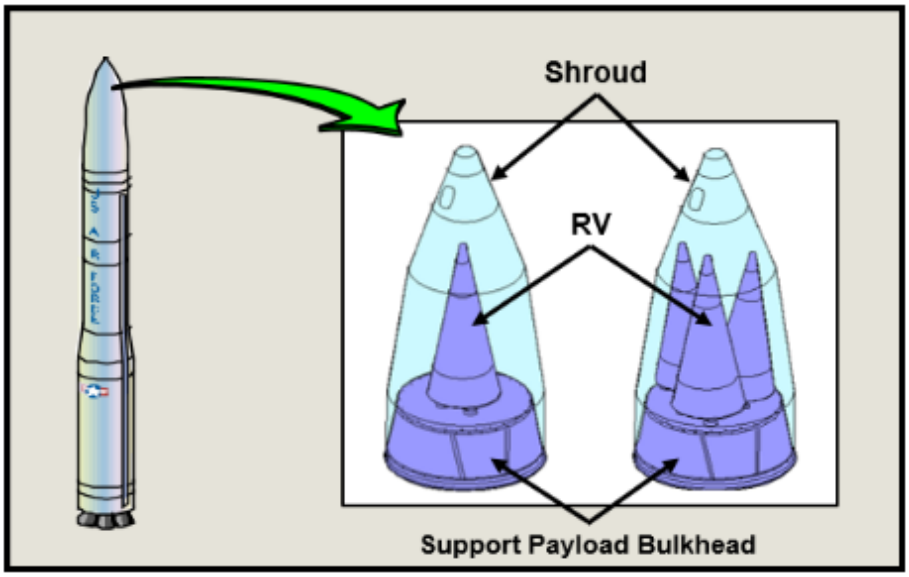
Mounted on top of the PSRE are the electronic MGS and the MOD 7 instrumentation wafer (used only for flight tests). The guidance set is an inertial guidance system that directs the flight of the Minuteman III missile. Components within the instrumentation wafer transmit data to track the missile's flight path and evaluate performance, following launch from VAFB.

Reentry System (RS)

The payload section on top of the Minuteman III missile is referred to as the RS. Inside of the RS, the Support Payload Bulkhead provides a structural support base for one Mark 21 RV or one to three Mark 12A RVs (**Figure 2-2**), and carries the electronics needed to activate and deploy them in flight. A two-piece shroud covers the bulkhead and RVs, protecting them during ascent. The nose cap on top of the shroud contains a small rocket motor containing 6.8 pounds of solid propellant, which is used to eject the shroud from the vehicle while in flight. Other small quantities of ordnance carried onboard the RS include a shroud ejection motor initiator, gas generators, and gas generator initiators, which, when combined, contain less than 1 pound of additional explosives.

In its current configuration, the Minuteman III RS fielded at the Missile Wings employs either the Mark 12A or Mark 21 operational RV. For the Minuteman III flight tests conducted from VAFB, the operational RVs are replaced with one to three test RVs (one Mark 21 or up to three Mark 12A RVs). The test RVs do not contain any fissile materials; however, they do contain varying quantities of hazardous materials, including batteries, high explosives, asbestos, depleted

uranium (DU)[2], and other heavy metals. All test RVs typically include 0.29 to 22 ounces of asbestos; approximately 0.035 to 0.353 ounces each of beryllium (Be), cadmium (Cd), and chromium (Cr); approximately 4.8 ounces of lead (Pb); and less than 187 pounds of DU. In general, only two test RVs per year contain high explosives (USAF 2004, 2013a, 2020e). A Mark 21A RV is currently under development, which is anticipated to include similar materials utilized in the legacy hardware design of the Mk21.



Source: Modified from USAF 2004, 2013a, 2020e

Figure 2-2. Minuteman III Reentry System

Batteries

To provide electrical power to the Minuteman III subsystems, several different types of batteries are carried on board the motors, the RS, and other sections of the missile. These include multiple silver-zinc batteries, a single lithium carbon monofluoride battery, and a single lithium silicon/ iron disulfide (thermal) battery. Approximately 15 batteries are carried on each Minuteman III flight test missile (depending on the RS configuration used), each weighing from 1 to 21 pounds. The individual Mark 12A RVs contain one silver zinc battery (approximately 1.6

[2] Uranium (U) is a silver-colored, radioactive metal that is nearly twice as dense as lead. Small amounts of U occur naturally in soil, water, air, plants, and animals; and contribute to natural background radiation in the environment. Depleted uranium is a byproduct of the enrichment process used to make weapons grade U-235. Depleted uranium retains the natural toxicological properties of U, but has approximately half of its radiological activity. Depleted uranium is a non-fissile material (USAF 2004).

pounds), while the Mark 21 RV contains one silver zinc and one thermal battery (total battery weight of approximately 2.4 pounds).

2.1.2 Hill Air Force Base

Located approximately 20 miles north of Salt Lake City, Utah, HAFB (**Figure 2-3**) is an Air Force Materiel Command base providing logistics management and repair support for the nation's land-based ICBMs. As part of this effort, Minuteman III boosters are disassembled and reassembled at the installation to allow for rocket motor inspections and testing for flight worthiness, motor refurbishment, and motor change-outs and upgrades when required. This includes the typical replacement of four Minuteman III boosters pulled every year from the Missile Wings for flight tests at VAFB, and the supply of other missile components (such as the instrumentation wafer) needed for the tests. HAFB supports a variety of other tests on ICBM hardware and software components in addition to providing training support. These actions are considered routine at HAFB and are dictated by standard operating procedures (USAF 2004).

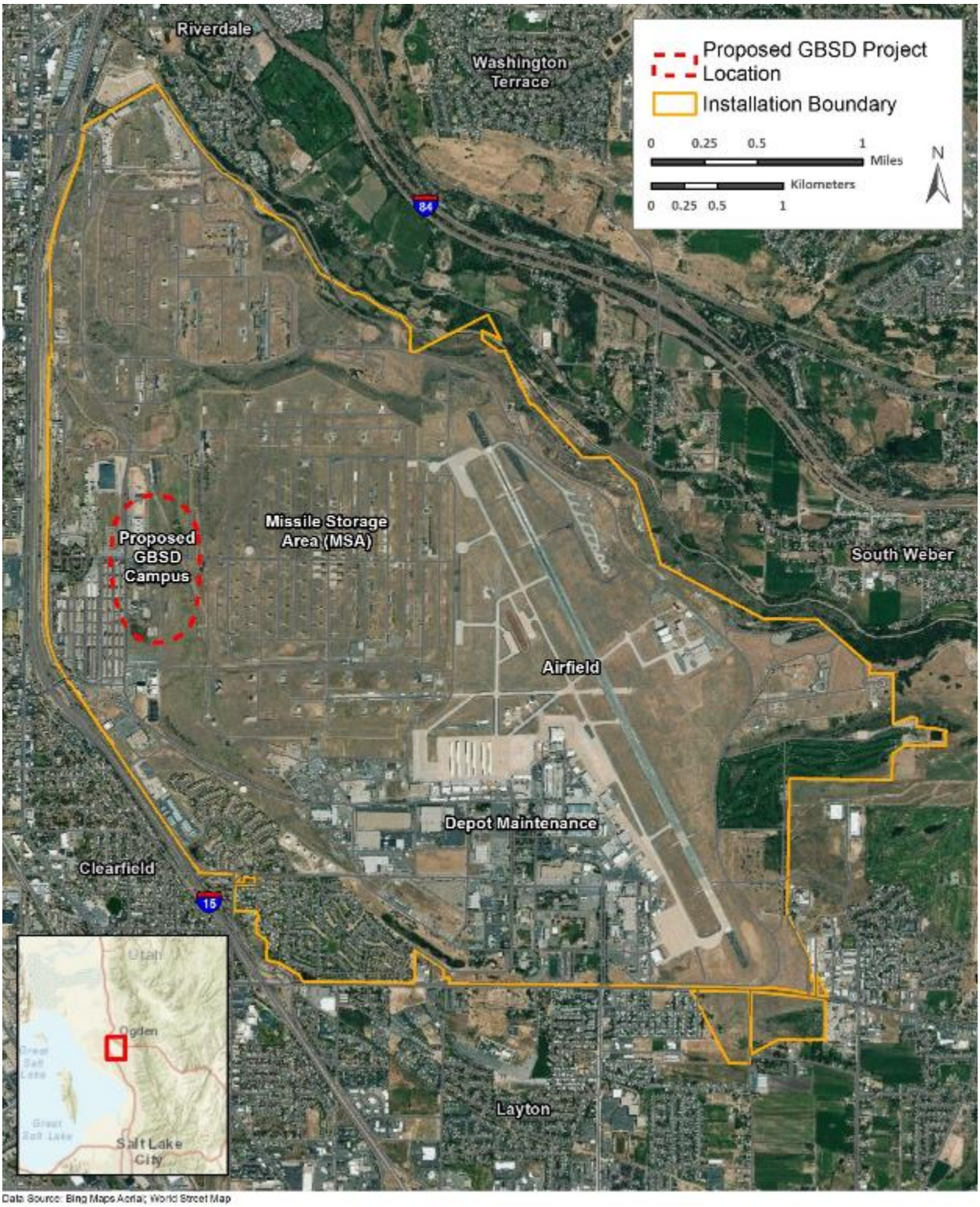


Figure 2-3. Hill Air Force Base, Utah

2.1.3 Vandenberg Air Force Base

VAFB is located on the central coast of California approximately 150 miles northwest of Los Angeles. As a USAF installation, VAFB is the headquarters of the 30 SW, which conducts space and missile test launches and operates the Western Range.[3] The installation hosts a variety of federal agencies and commercial aerospace companies.

In support of the Minuteman III FDE testing, up to four Minuteman III missile launches are conducted every year from existing underground LFs 04, 09, and 10 located near the northern end of the installation (**Figure 2-4**). In some years, a fifth Minuteman III flight test is conducted. For maintenance and reconditioning purposes, the three LFs are used on a rotating basis in the launch cycle; thus, each of the three LFs are used for launches one to two times per year on average. LF-26 has previously supported these launches, but has not been used since 2006. Launch control for all Minuteman III flights is conducted from Missile Alert Facility (MAF) 01A.

For each Minuteman III flight test, USAF randomly selects a Minuteman III missile from one of the three Missile Wings and ships it to VAFB in specially designed missile transporter trailers. Prior to shipping to VAFB, the RS with the operational RV(s) and the PSRE are removed from the booster. The solid-propellant booster; PSRE; MGS and instrument wafer; and RS (minus the operational RVs) are shipped separately to VAFB. To safeguard these components and other ordnance from fire or other mishap, all transportation, handling, and storage of the components is accomplished in accordance with DoD, USAF, and United States Department of Transportation (U.S. DOT) policies and regulations. Personnel supporting the ICBM program are regularly trained on missile handling and maintenance procedures using existing trainer facilities.

Upon arrival at VAFB, the booster is either placed temporarily in a missile storage bunker or taken to the program's Missile Processing Facility, depending on the launch schedule. After being unloaded, the booster undergoes inspections and system checks, and the FTS destruct package is added.

After the booster is lowered into the silo and readied at the LF, the PSRE, MGS, and instrumentation wafer are added. The RS with the test RV(s) is then installed. The test RVs serve to simulate operational RVs to help ensure that the weapon system meets requirements. Test RVs would include variations of the existing Mark 21 and Mark 12A, as well as the MK21A currently under development, as needed for instrumentation and telemetry purposes. The test RVs would not contain any fissile materials, but as described in **Section 2.1.1**, they can contain varying quantities of hazardous materials, including heavy metals, high explosives, and

[3] The Western Range extends from the California coast to Hawaii and the western Pacific, and consists of a vast array of space and missile tracking and data-gathering equipment and facilities. Western Range instrumentation is supplemented by Point Mugu Naval Air Warfare Center in California, the USAG-KA, and U.S. Air Force Maui Optical Site in Hawaii (USAF 2004, 2020e; VAFB 2019a).

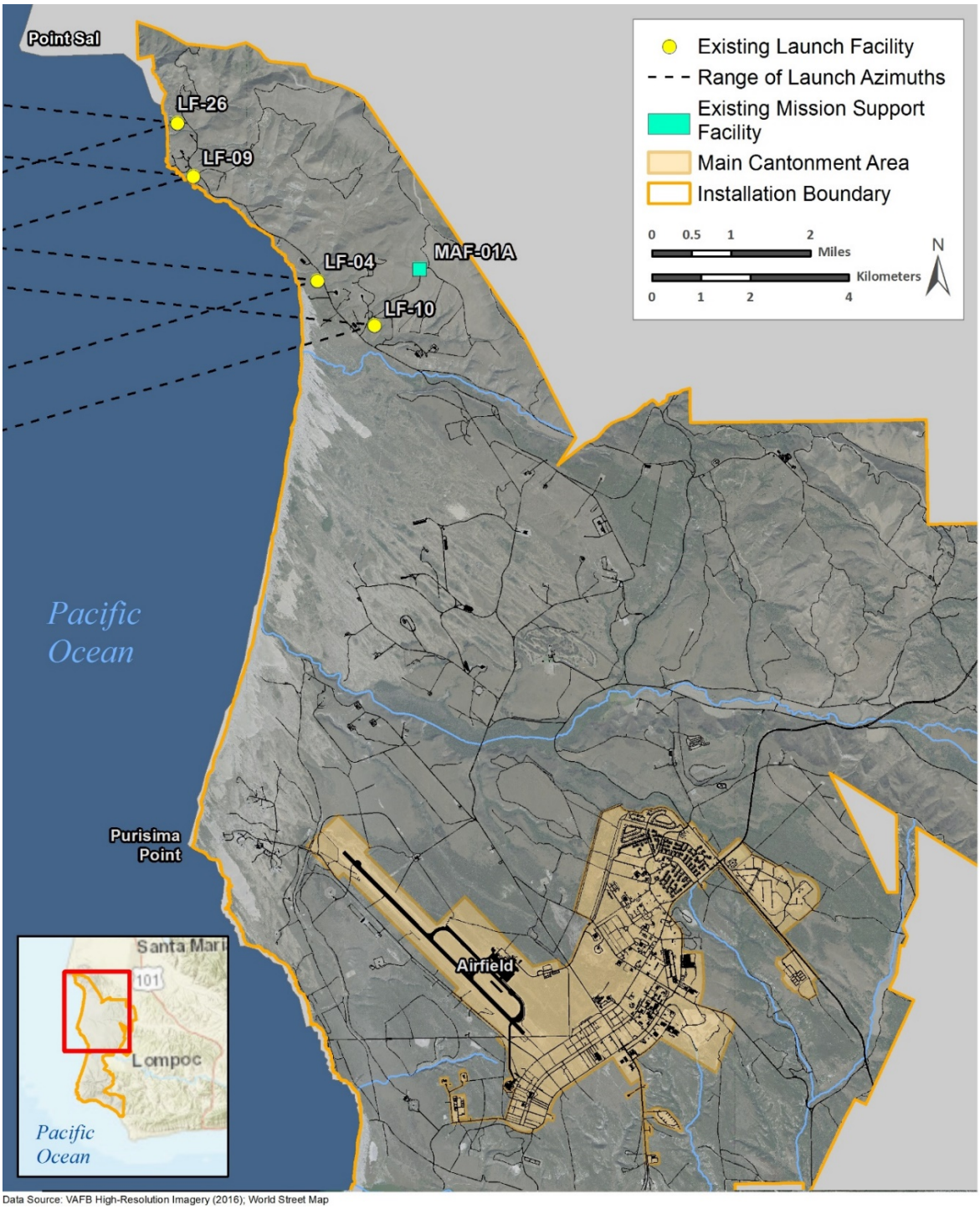


Figure 2-4. Vandenberg Air Force Base (North Base), California

batteries. The types and quantities of these materials would not vary appreciably regardless of the RV ultimately deployed. Such test RVs arrive at the installation preassembled from the Department of Energy (DOE).

For each test flight, USAF personnel conduct a comprehensive safety analysis to determine specific launch and flight hazards for each test. A standard dispersion computer model for both normal and aborted launch scenarios is run by installation safety personnel. As part of the analysis, risks to off-installation areas and non-participating aircraft, sea vessels, and personnel are determined. The results of the analysis then are used to identify the launch hazard area, expended booster stage drop zones, and terminal hazard areas.

A flight termination boundary along the vehicle flight path is also predetermined in case a launch vehicle malfunctions or a flight termination action occurs. The flight termination boundary defines the limits at which command flight termination would be initiated to contain the vehicle and its debris within predetermined hazard and warning areas, thus minimizing the risk to test support personnel and the public. Thrust would be terminated by initiation of the FTS, which splits the motor casing, releasing motor pressure. The PSRE also contains a linear shaped charge which splits the fuel tank when a destruct action is taken. These actions stop the booster's forward thrust, causing the missile to fall along a ballistic trajectory into the ocean.

If an early launch abort were to occur, installation actions would be taken immediately to remove unburned propellant and any other hazardous materials that had fallen on land or off the beach in waters up to 6 feet deep. Any recovery from deeper water would be treated on a case-by-case basis.

As a normal procedure, commercial and private aircraft and watercraft are notified of all the hazard areas several days prior to launch through a Notice to Airmen (NOTAM) and a Notice to Mariners (NTM). Within a day prior to launch, radar and other remote sensors are used to verify that the hazard areas are clear of non-mission-essential aircraft, vessels, and personnel. Depending on which of the Minuteman III LFs is used, range safety procedures may require closure of Point Sal State Beach located just off the north end of the base—typically for less than a day. Commercial train movements through the base are also coordinated and monitored.

As noted earlier, in support of the Minuteman III program, the training of Airmen at the Minuteman III Schoolhouse at VAFB is ongoing. Approximately 1,700 Airmen are trained at the Schoolhouse each year.

These actions are considered routine at VAFB and are dictated by standard operating procedures (USAF 2004, 2006, 2013a, 2020e).

2.1.4 U.S. Army Dugway Proving Ground

Operated by the U.S. Army Test and Evaluation Command, DPG is a major DoD range located in west central Utah, about 80 miles southwest of Salt Lake City. The two cantonment districts on the range are English Village and the Central Mission Operations Complex (**Figure 2-5**). Covering approximately 800,000 acres, DPG is the nation's leading test center for chemical and biological defense, providing testing and support to counter chemical, biological, radiological, and explosives (CBRE) hazards. In addition to its CBRE testing programs, DPG performs an important role in training DoD active and reserve components to ensure combat readiness. These training activities include artillery, air, counterterrorism, and ground combat exercises.

DPG currently is not supporting the Minuteman III program. Discussions on proposed GBSD test-related actions at DPG are provided in **Section 2.2.4**.

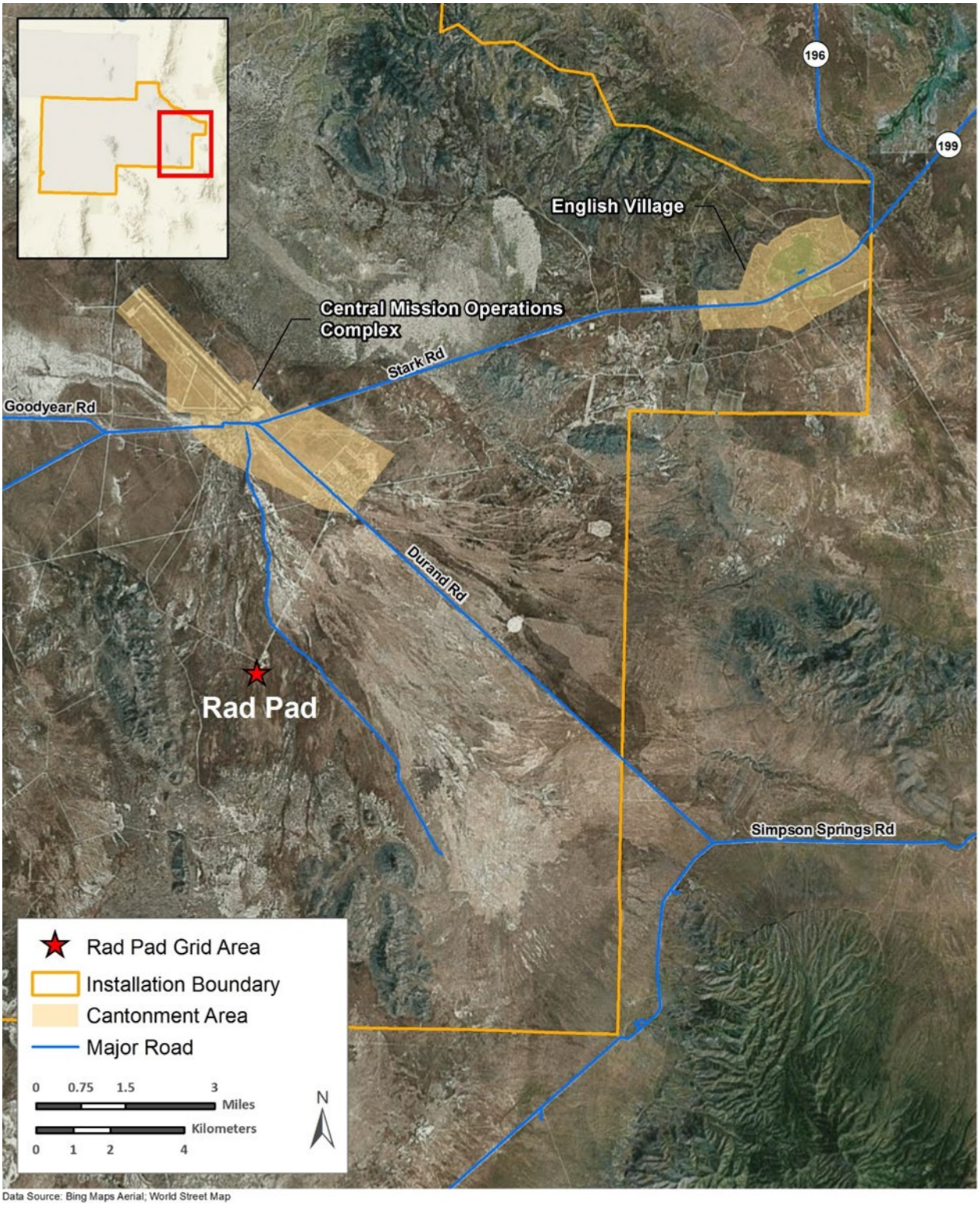


Figure 2-5. U.S. Army Dugway Proving Ground, Utah

2.1.5 Downrange Test and Support

For the Minuteman III flight tests conducted from VAFB, the primary target locations for the test RVs have been within or near USAG-KA located in the RMI. Such Minuteman III testing at USAG-KA generally has been conducted regularly since the late 1980s (Robison et al 2010, USAF 2004).

Between 2006 and 2015, USAF conducted five Minuteman III extended range flight tests towards broad ocean areas (BOAs)[4] approximately 200 nautical miles (nm) southwest of Guam in international waters and southwest of Guam within Exclusive Economic Zone (EEZ) ocean areas of the Republic of Palau. **Figure 2-6** shows representative missile flight paths and the booster stage drop zones for Minuteman III flight test missiles launched from VAFB. Although shown on the figure, no additional Minuteman III extended range flight tests beyond Guam are planned. Use of both target locations has been analyzed previously and the potential impacts identified (USAF 1992, 2004, 2006, 2013a).

During missile flight, and following motor burnout and separation, the spent stage 1 motor will splash down in the Pacific Ocean approximately 95 to 140 nm off the California coast. Following in sequence, the spent stage 2 motor also will splash down approximately 760 to 825 nm off the coast. As the missile travels along a flight path several hundred nautical miles north of the Hawaiian Islands, it will reach an apogee several hundred miles in altitude. Prior to this point, the stage 3 motor will have separated from the PBV. For the ongoing Minuteman III flight tests launched towards USAG-KA, the spent 3rd stage motor will travel on a ballistic course, splashing down in the open ocean approximately 50 to 240 nm northeast of the RMI. The motor thrust termination (TT) port assemblies will impact downrange of the 3rd stage motor debris by approximately 300 to 500 nm in the BOA. Towards the terminal end of each Minuteman III flight test, the PBV and MGS fragments will impact in predetermined BOAs. The one to three test RVs on each flight will continue traveling at hypersonic velocities towards the designated target area at USAG-KA. With the possible exception of the test RVs, the expended rocket motors and other missile hardware are not recovered from the ocean following flight tests. The general locations of splashdown hazard areas in the vicinity of the RMI are shown in **Figure 2-7**. With the exception of the area around USAG-KA, no missile components are expected to impact within territorial seas. Additionally, no missile components are expected to impact within Marine National Monuments or Marine Reserves located offshore of California, the Hawaiian Islands, and elsewhere.

[4] For purposes of this EA/OEA, BOA is defined as any ocean area along the missile's flight path that is outside of territorial seas. Under maritime law, territorial seas generally extend seaward up to 12 nm from a nation's coastline.

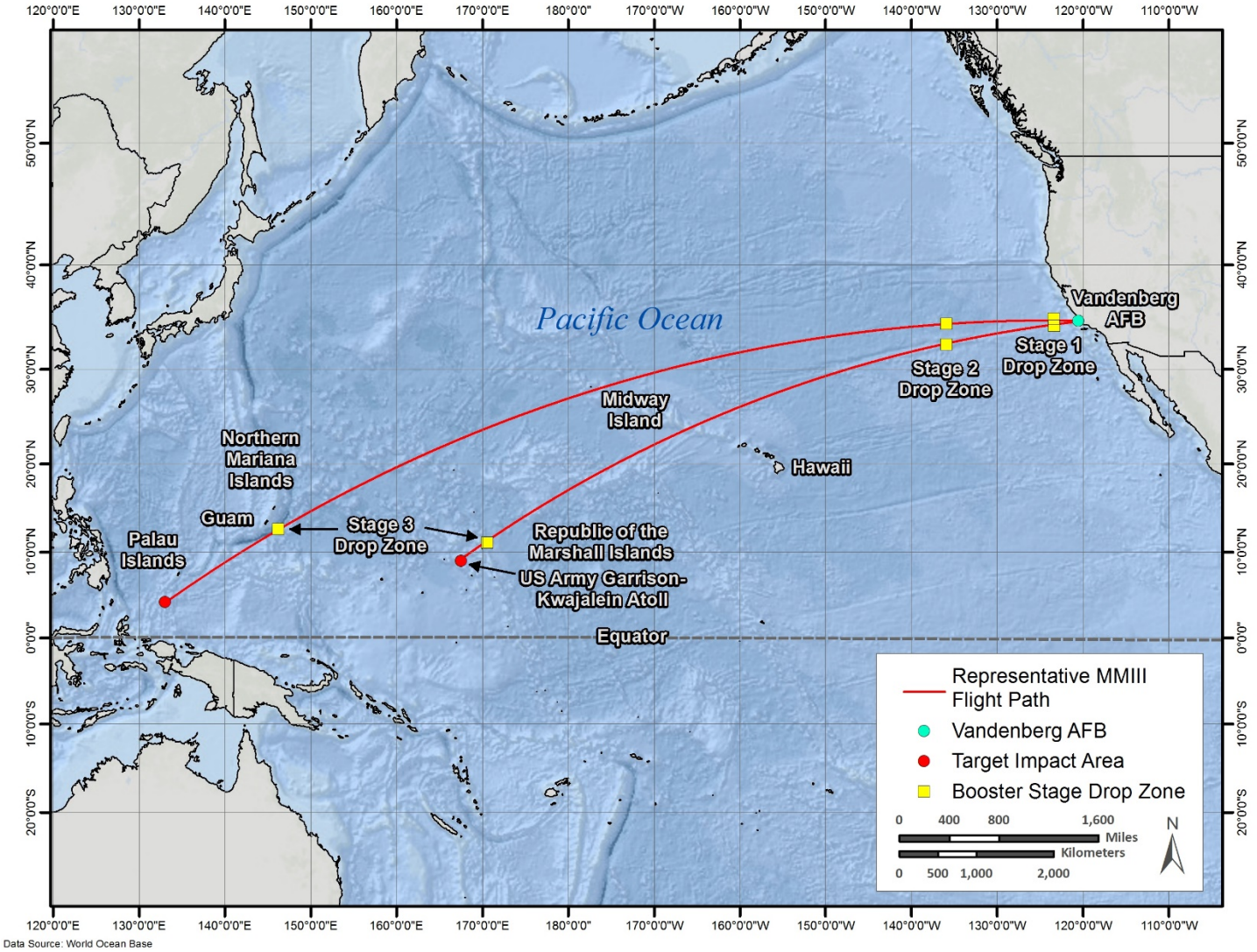


Figure 2-6. Representative Minuteman III Flight Paths and Impact Areas

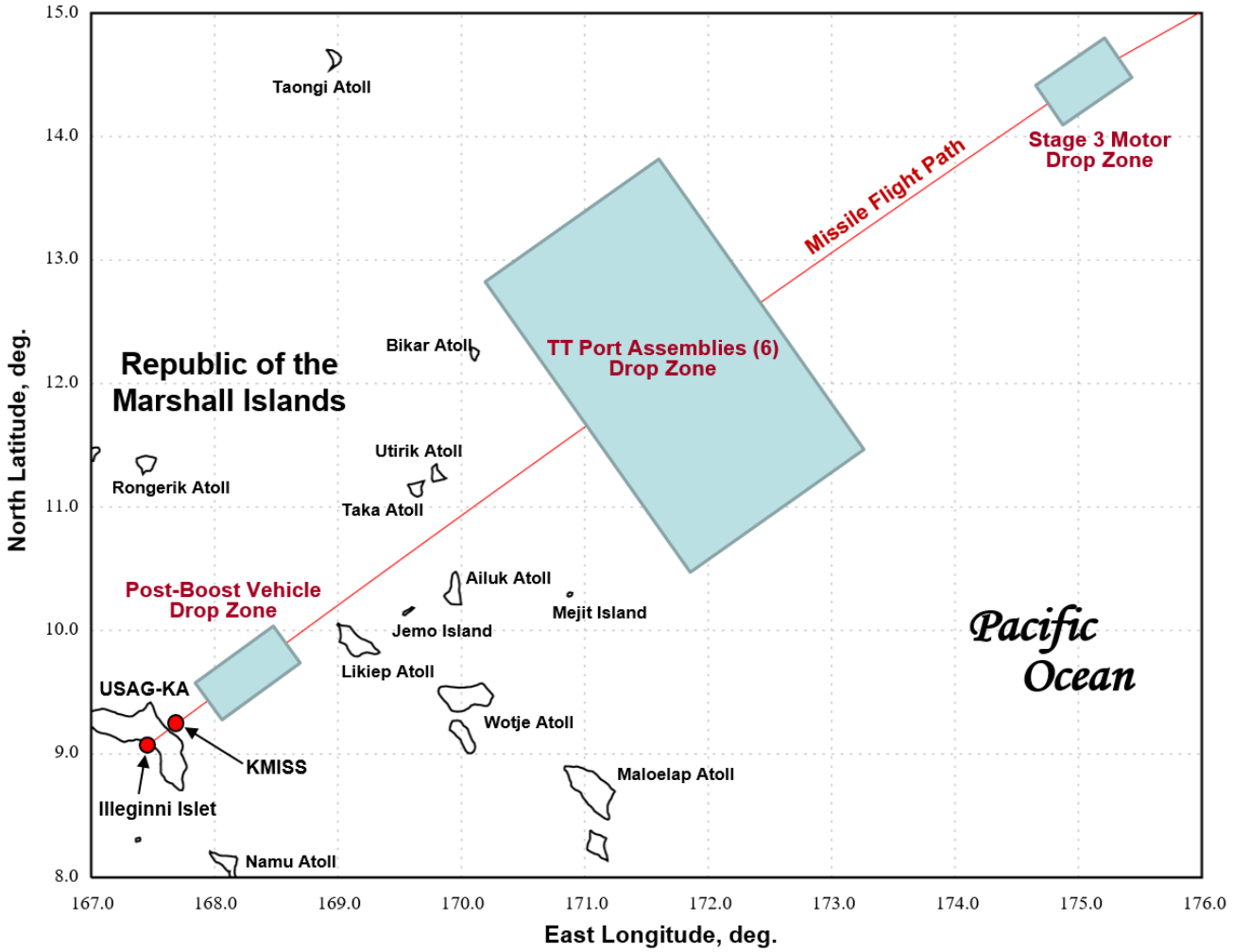


Figure 2-7. Representative Minuteman III Flight Path and Hazard Areas in the Vicinity of the Marshall Islands

2.1.5.1 U.S. Army Garrison-Kwajalein Atoll

Centrally located within the RMI, USAG-KA consists of all or portions of 11 out of 93 coral islets that enclose a large lagoon. Since the late 1950s, the Kwajalein Atoll has served as a primary site for flight testing ICBMs, sea-launched ballistic missiles, and antiballistic missiles. USAG-KA supports the Minuteman III flight tests by providing tracking, sensing, and other technical and logistical support, typical of everyday operations there. An extensive array of missile tracking radars, optical sensors, and meteorological equipment are located on several of the islands. Depending on mission requirements, other auxiliary sea-based, aircraft-based, and satellite-based sensors (optical and radar systems) may be involved in tracking the missile and collecting data. Test support is provided primarily by existing government personnel and contractors based at USAG-KA.

In the past, test RV target locations at the atoll have included land, atoll lagoon, and adjacent ocean areas. Test RV land impacts in the vicinity of Illeginni Islet, located on the west side of Kwajalein Atoll (**Figure 2-8**), have been discontinued for the remaining life of the Minuteman III weapon system. The last land impact at Illeginni Islet occurred in 2012 (USAF 2004, 2020e; USAG-KA 2017).

Currently, for each Minuteman III flight test, the one to three test RVs are normally targeted at the Kwajalein Missile Impact Scoring System (KMISS) ocean area located just east of Kwajalein Atoll, impacting in deep ocean waters at least 3 nm offshore of Gagan Islet (**Figure 2-8**). The KMISS is an existing, deep ocean range that uses fixed underwater sensors to detect and locate surface impacts of missiles and RVs in all weather conditions. For Minuteman III testing, the range is used to score the precision of test RVs.

In preparation for some Minuteman III flight tests, Lawrence Livermore National Laboratory (LLNL) and contractor personnel may deploy in the KMISS ocean waters up to 17 sensor rafts stored at the installation. The rafts measure approximately 9 feet wide and 15 feet long, and contain various sensors, including neutron detectors, cameras, and video equipment (**Figure 2-9**). All of the rafts have hydrophones, which measure the sound from test RV impacts to determine the exact splash-down location. The rafts generally use battery-powered trolling motors for differential thrust navigation and station-keeping to ensure proper positioning for the flight tests (USAF 2010, 2013a; USASMDC/ARSTRAT 2011).

During most tests, the RVs will remain intact until impact in ocean waters. Generally twice a year, however, a single test RV will contain a conventional explosive charge for purposes of conducting a high-fidelity test. During such tests, the exploding RV may detonate upon contact with ocean waters or detonate at some altitude (airburst) over the ocean. During such tests, the resulting debris would impact in a focused area of the KMISS. Upon ocean impact, any debris remaining from the test RVs sinks to the ocean bottom. Because the KMISS waters range in depth from 5,000 to 12,000 feet, there is no recovery of test RV debris (USAF 2020e).

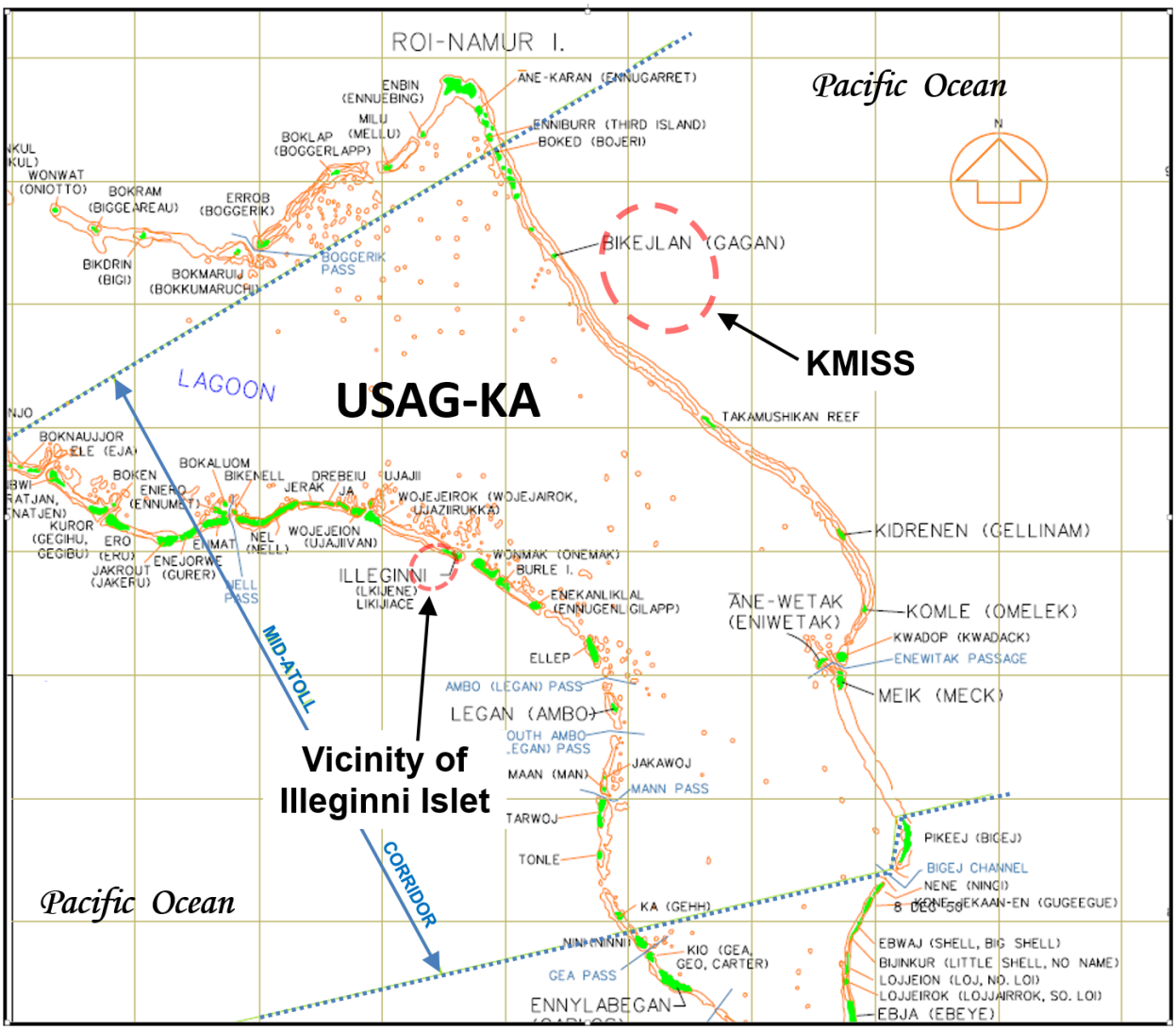
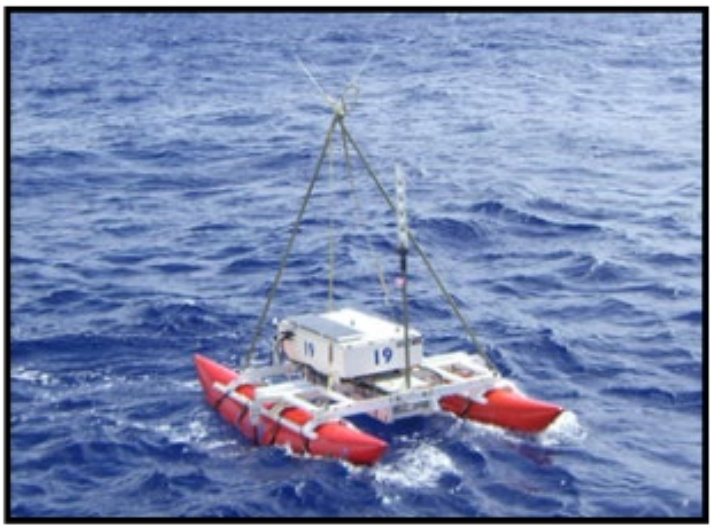


Figure 2-8. U.S. Army Garrison–Kwajalein Atoll



Source: USAF 2010

Figure 2-9. Representative Sensor Raft System

2.2 Proposed Action – GBSD Test Program

The proposed GBSD Test Program involves the development, testing of and training for a new ICBM weapon system that would eventually replace the aging Minuteman III weapon system. Implementation of the test program would include facility construction or modifications at HAFB, VAFB, and DPG. In addition, GBSD flight test activities would be conducted from VAFB and include target impacts at USAG-KA in the RMI. While technically not part of the Test Program, the Proposed Action includes the construction and operation of the GBSD FTU/Schoolhouse at VAFB. As described earlier, such training at VAFB would be needed in time to support the fielding of the new GBSD weapon system when that decision is made.

Because deployment of the new GBSD weapon system cannot occur until it has been adequately tested and proven sufficiently mature for operational use, both GBSD and Minuteman III flight test activities and related operations would overlap at HAFB, VAFB, and USAG-KA. Such testing would overlap for up to 10 years or until decisions are made to remove the Minuteman III weapon system from active status.

To ensure the Minuteman III weapon system's performance, target accuracy, and overall effectiveness during this period, the GBSD Test Program cannot interfere with the Minuteman III test program and associated training. During the approximate 10-year overlapping period, HAFB, VAFB, and USAG-KA would require the necessary facilities and work force to conduct both test programs in parallel. The proximity and overlapping aspects of these two test programs require that the Minuteman III test program be incorporated as part of the Proposed Action analyzed in this EA/OEA. The Minuteman III test program is described in **Section 2.1** and is incorporated into the analysis of the GBSD Weapon System in **Section 4.2** and for cumulative impacts in **Section 4.3**.

2.2.1 GBSD Weapon System Description

The design of the proposed GBSD weapon system is to be sized to fit within existing Minuteman III LFs. The booster would use a solid propellant composition with similar properties to that of the Minuteman III booster. Similar to the Minuteman III flight test missile, the GBSD flight test missile would carry a Post-Boost Altitude Control Module (PBACM) on top of the booster that includes a Post Boost Propulsion System (PBPS) (with liquid hypergolic propellants), and Payload Re-entry System (PRS). For electrical power, the GBSD weapon system also would contain multiple batteries similar to those described in **Section 2.1.1** for Minuteman III. Although the PRS may be of a new design, the test RVs used for flight testing would be the same or similar to those used for Minuteman III flight testing. During Test Flights additional On-Board Test Equipment is installed (the On-Board Test Equipment is the equivalent of the instrumentation wafer in Minuteman III).

Like the Minuteman III weapon system, the GBSD weapon system design also is expected to use other known ordnance, including motor igniter assemblies, shroud ejection motor initiator,

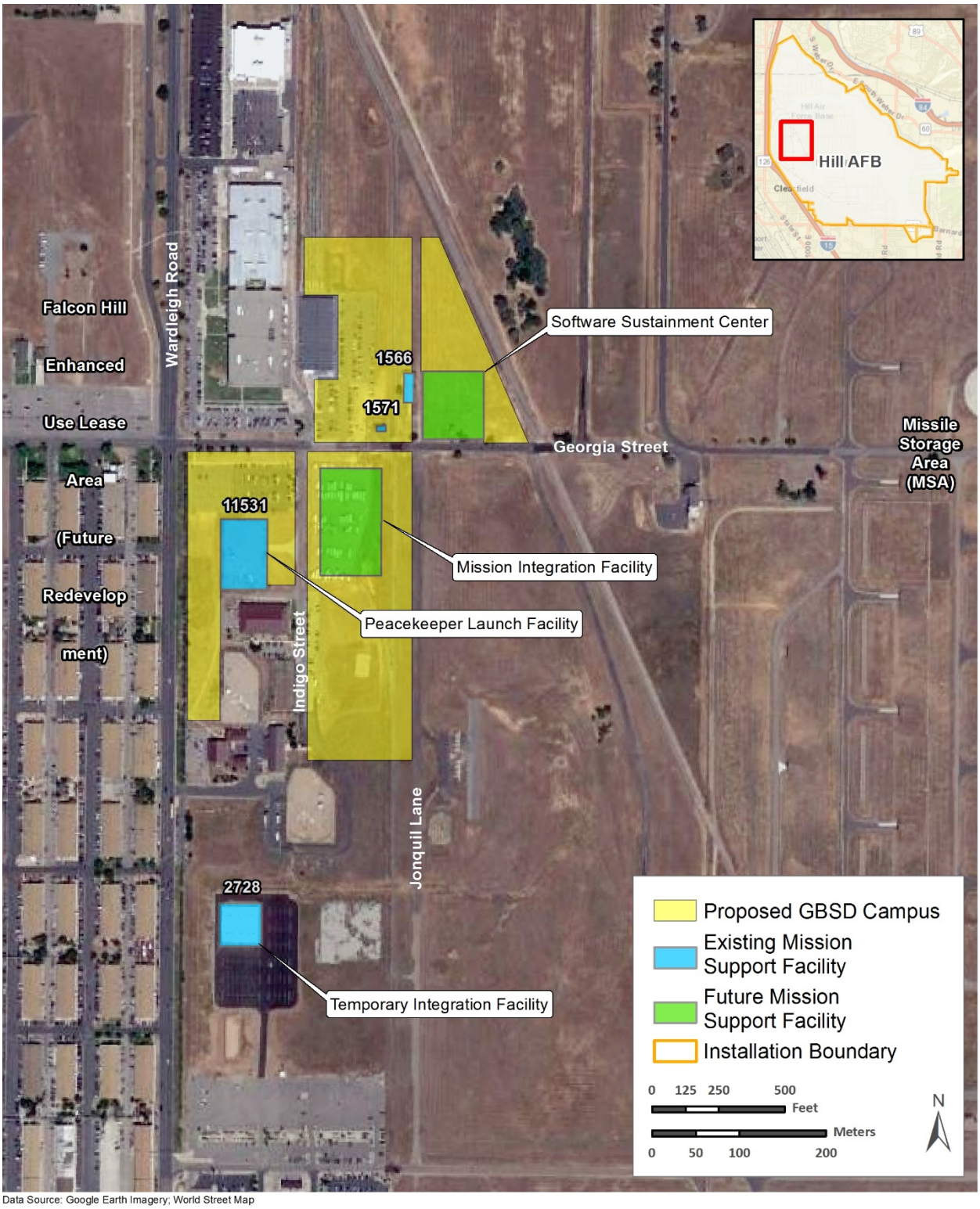
gas generators, and an FTS destruct package. Should a launch anomaly occur during flight, the destruct devices, in the form of linear explosive assemblies, would separate the stages, split the motor casings, and stop forward thrust.

2.2.2 Hill Air Force Base

For the proposed GBSD Test Program campus at HAFB, some existing facilities would be used, along with the construction of several new facilities. The proposed approximate 22.9-acre campus, including new and existing facilities, would be located near the west side of the installation (**Figures 2-3** and **2-10**) beside some of the existing Minuteman III support facilities and adjacent to other properties planned for redevelopment as part of the Falcon Hill Enhanced Use Lease (EUL) (USAF 2008, 2016a).

2.2.2.1 GBSD Facilities and Infrastructure Description

Table 2-2 lists the proposed facilities to be located within the designated GBSD Test Program campus at HAFB. These facilities would consist primarily of office and administrative space; laboratory areas and workrooms; high bays for missile hardware fitting, testing, and assembly; training classrooms; and equipment storage. Included in the campus is the existing Peacekeeper Launch Facility silo (Facility 11531), shown in **Figure 2-10**, which would be refurbished and modified for GBSD missile testing and training purposes. A new Software Sustainment Center and Mission Integration Facility (MIF) is approved for construction within the campus area for the MMIII program. This facility would be used in support of the GBSD Test Program (USAF 2011a, 2018, 2019c, 2019d). Within the proposed campus area, existing paved and gravel parking would be relocated, plus a new 560-stall parking structure would be built. Also, under the Proposed Action, an existing GBSD Temporary Integration Facility (TIF) located south of the campus would eventually be dismantled and the modular building units relocated for other mission use or sold for non-military application.



Data Source: Google Earth Imagery; World Street Map

Figure 2-10. Proposed GBSD Test Program Campus at HAFB, Utah

Table 2-2. List of Facilities and Infrastructure Proposed for the GBSD Test Program at HAFB, Utah		
Proposed GBSD Facility/Function	**Facility/Building/Lot Location**	**Summary of Site Modifications/Construction**
GBSD Launch Facility	Peacekeeper Launch Facility 11531	To use the existing 91-foot deep silo for missile system testing, development, and training of crews, it will need to be transitioned from the Peacekeeper missile system to the GBSD missile system. Renovations and modifications to the facility are expected to include remediation and abatement for any hazardous materials (e.g., asbestos, lead-based paint, cadmium), water infiltration, mold, and corrosion; removal of unusable Peacekeeper equipment; electrical system and heating, ventilation, and air conditioning [HVAC] repairs and upgrades; and GBSD conversion and equipment installation. One approximately 250-kW fixed standby diesel generator with an indoor fuel oil day tank (with a capacity less than 240 gallons), an approximately 4,000-gallon underground fuel oil storage tank, and an approximately 400-gallon diesel exhaust fuel tank, as required, would be installed at the facility within the yellow surveyed aera as outlined in **Figure 2-10**. It is anticipated that the diesel generator would operate approximately 200 hours/year. During construction, an approximate 1-acre temporary laydown area would be established adjacent to the pad, which may require minor clearing and grading. The laydown area will be within the yellow surveyed aera as outlined in **Figure 2-10**. A double-wide office trailer would temporarily be placed on site. Electrical power would be drawn from on-site connections. Potable water would be bottled, and portable latrines would be used.
Temporary Integration Facility (TIF)	Building 2728	The existing one-story, 20,000 square-foot (ft^2) building would be used for GBSD until availability of the new MIF. The modular building units would eventually be dismantled and relocated for other mission use or sold for non-military application. Existing paved areas around the building would remain.
Mission Integration Facility (MIF)	Vacant lots and parking areas along Georgia Street, Jonquil Lane, and Wardleigh Road (26.0 acres)	This previously approved, multistory building (approximately 140,000 ft^2) will be constructed prior to implementing the proposed GBSD Test Program (USAF 2018a). One standby 1.0 megawatt (MW) fixed diesel generator with an 1,800-gallon fuel tank is included with the facility. For GBSD, three 60 kilowatt (kW) fixed diesel generators, each with a 250-gallon fuel tank, would be added. For the program to use portions of the building, expectations are that internal buildouts and modifications (e.g., walls, electrical, raised floors, HVAC) would be needed.

Table 2-2. List of Facilities and Infrastructure Proposed for the GBSD Test Program at HAFB, Utah (Continued)		
Proposed GBSD Facility/Function	**Facility/Building/Lot Location**	**Summary of Site Modifications/Construction**
Software Sustainment Center		This previously approved multistory building with office and laboratory space (approximate 173,000 ft^2) will be constructed prior to implementing the proposed GBSD Test Program (USAF 2011a, 2019c, 2019d). For the program to use portions of the building, expectations are that internal buildouts and modifications (e.g., walls; electrical; raised floors; HVAC) would be needed. For GBSD, a 1.5 MW fixed diesel generator with a 2,000-gallon fuel tank would be added for backup power and placed in a sound suppression enclosure.
Training and Collaboration Center (TACC)		Construct a new approximate 70,000 ft^2, multistory training, and conference facility. An HVAC system for the building would include a boiler. The new building would be no taller than 80 feet.
Parking Structure		Construct a new approximate 560-stall, multi-level parking structure. The new building would be no taller than 80 feet.
Other Parking and Roadways		Prior to new facility construction, less than 1 acre of existing paved parking area would require demolition. Construct approximately 16 acres of new paved roadways, surface parking, and sidewalks. Additionally, portions of Georgia Street and Jonquil Lane adjacent to the building sites would need to be widened and repaved.
Utility Systems		Extend underground electrical, communication, and water/sewer lines to each new building. Install outdoor lighting systems for streets and parking areas.

2.2.2.2 GBSD Site Preparation and Construction

At HAFB, construction and modification of proposed GBSD facilities would begin in fiscal year (FY) 2021 with planned completion of all facilities by FY 2024. Temporary site preparation and construction activities are expected to require up to approximately 200 workers on site. Workers would be expected to have or find housing and related amenities/services in the local communities.

Nearly all of the proposed campus area has been previously disturbed and is either paved or covered with low, maintained vegetation. Asphalt removed through demolition would be recycled, stored, and made available for reuse during future HAFB construction projects, or disposed at an offsite permitted landfill. Uncontaminated waste concrete pavement would be sent to the HAFB construction debris landfill or to an offsite permitted landfill. Site excavation and grading plans would be designed to balance cuts and fills as much as possible, with minimal import or export of earth material. Any imported earth material would be obtained from already permitted sources not containing rubbish, contaminants, or other cultural material. If additional construction laydown area outside of the proposed campus is needed for temporary

storage of equipment and materials, existing paved or previously disturbed land adjacent to the campus would be used.

All utilities (i.e., potable water, sewer, power, natural gas, storm water, and communications) are already available within the project area, so no ground disturbances are expected to occur outside of the campus area. Each new GBSD facility would include HVAC and water heating systems, most likely natural gas fired. Potentially, existing facilities to be used may require system upgrades or other modifications. For GBSD, three 60 kW fixed diesel generators, each with a 250-gallon fuel tank, would be added to the MIF. For GBSD, an additional 1.5 MW fixed diesel generator with a 2,000-gallon fuel tank is proposed for the Software Sustainment Center.

Depending on the types of wastes and excess equipment resulting from renovation of the Peacekeeper Launch Facility, such materials would be appropriately disposed of or recycled at a licensed facility; or transferred to the local Defense Logistics Agency (DLA) Disposition Services for demilitarization, recycling, and disposal. Any resulting hazardous material and waste would be handled, transported, and disposed of in accordance with established HAFB and USAF procedures, and applicable federal and state laws and regulations.

All new GBSD facilities would be designed and constructed in accordance with Unified Facilities Criteria (UFC) and other applicable codes and standards, including local wind load, fire protection, and lightning protection. Construction of the campus would require incorporation of the following sustainable and green engineering design criteria:

- UFC 1-200-02, High Performance and Sustainable Building Requirements
- UFC 3-201-01, Civil Engineering (Chapter 3, Storm Drainage Systems)
- UFC 3-210-10, Low Impact Development (for compliance with stormwater management requirements under Section 438 of the Energy Independence and Security Act [EISA])
- Engineering and Construction Bulletin/ECB 2011-1, High Performance Energy and Sustainable Policy, January 19, 2011
- EO 13834, Efficient Federal Operations
- U.S. Green Council Leadership in Energy and Environmental Design requirements for facilities, including unoccupied facilities.

2.2.2.3 GBSD Operations and Maintenance

Initial operation of the GBSD Test Program campus at HAFB would be expected to begin in FY 2024. Once all facilities are completed and usable, up to approximately 1,660 personnel would work at the campus throughout the approximate 10-year test program. This would include approximately 820 new personnel brought in from outside HAFB. The remaining approximate 840 personnel would relocate from other areas of the installation. All new military personnel,

government civilians, and contractors working at the campus would be expected to have or find housing and related amenities/services in the local communities.

The types and amounts of hazardous materials used and stored during campus operations would be minimal and consist of compressed gases, adhesives, lubricants, and solvents. Additionally, routine building maintenance and cleaning would require use of paints, pesticides, and cleaning products that are used typically on government installations. Solid and hazardous wastes generated at the campus would be collected, temporarily stored (as needed), and disposed or recycled by means of existing installation facilities using established waste management procedures.

No propellants or ordnance would be used within any of the GBSD campus facilities. The GBSD missiles to be used and tested within the GBSD Launch Facility silo and in other campus facilities would be full-scale, inert mockups shipped to HAFB from the manufacturer in Promontory, Utah. These “pathfinder” versions of the GBSD missile would serve to resolve hardware/software integration issues, verify end-to-end system performance, validate missile processing procedures, and support the training of launch crews going to VAFB.

Once the GBSD Test Program is completed, the facilities likely would be used to support future GBSD deployment and sustainment program activities or other missions and programs.

2.2.3 Vandenberg Air Force Base

At VAFB, a combination of new and existing facilities would be used in support of the GBSD Test Program, primarily for missile flight testing, and for FTU-related training. As shown in **Figure 2-11**, existing test launch facilities to be used are located towards the northern end of the installation. Most other new and existing facilities proposed for the program would be located within or near the Main Cantonment Area. Nearly all of the proposed GBSD facilities would be in proximity to existing Minuteman III flight test and system support facilities.

2.2.3.1 GBSD Facilities and Infrastructure Description

Table 2-3 lists all of the new and existing facilities that would support the GBSD Test Program and training at VAFB. Also included are temporary construction laydown (staging) areas and access roads. The new or refurbished GBSD facilities would consist of two LFs; a launch pad; a MAF for launch control; office and administrative space; laboratory areas and workrooms; training facilities; high bays for missile hardware fitting, testing, and integration; and storage for boosters, the PRS, other ordnance, and other equipment. All of the facility and construction areas listed in **Table 2-3** are shown on **Figures 2-11** to **2-14**. Existing facilities would require some level of restoration, reconstruction, or modifications.

Implementation of the GBSD Test Program would require the Minuteman III test program to stop using LF-04 for flight tests beyond the 4th quarter of FY 2021, limiting that program to only two LFs (i.e., LF-09 and LF-10) instead of three (**Figure 2-11**). Losing LF-04, however, would not impact the Minuteman III launch schedule as ongoing launches would rotate between the two remaining LFs in the launch cycle.

Because the GBSD Test Program would acquire existing Buildings 1900 and 8337, current operations by the 2nd Space Launch Squadron, Rocket System Launch Program (RSLP), 30th Logistics Readiness Squadron, and United Launch Alliance (ULA) in those two buildings would require relocation to other facilities at VAFB, including Buildings 1800 1860/1861, and 5500. These mission relocations are also listed in **Table 2-3** and shown on **Figures 2-11** and **2-12**.

Table 2-3. List of Proposed Facilities, Infrastructure, and Construction Laydown Areas Associated with the GBSD Test Program at VAFB, California

Proposed GBSD Facility/Function	Facility/Building/ Lot Location	Summary of Site Modifications/Construction
GBSD Launch and Launch Support Facilities and Infrastructure		
Test Launch Silos (2 sites)	Launch Facility 04 (LF-04) (Facility 1976)	Modifications to the 77-foot deep silo facility may include external repairs to the concrete pad; abutment walls; access hatch; electrical/communication lines and equipment; cable trays; lighting systems; installation of new below-grade structures; repair/replace portions of the above-grade concrete pads and underground LF structure; facility waterproofing and water diversion; refurbish/replace launch tube liner and associated equipment; trenching for utilities and communication lines; add/replace light/camera towers/poles and antennas; and demolish/repave the access road/entry as needed. Any removal of Minuteman III equipment or assets associated with the turnover of the Minuteman III would be managed by the GBSD Program. Two standby 105 kW fixed diesel generators each with a 192-gallon fuel tank would be installed underground at the facility. Two 8-gallon diesel exhaust fuel tanks would be used. It is anticipated that the fixed diesel generators would operate approximately 150 hours/year. Additionally, vegetation fire breaks would need to be maintained on a regular basis around the launch facility. The firebreak would require approximately 46,250 cubic feet (1,715 cubic yards) of shale rock. During construction, an approximate 1.63-acre temporary laydown area would be established adjacent to the pad, which would require minor clearing and grading. A double-wide office trailer would temporarily be placed on site. Electrical power would be drawn from on-site connections. Potable water would be bottled, and portable latrines would be used. Any removal of Minuteman III equipment or assets associated with the turnover of the Minuteman III would be coordinated with the GBSD Program.
	Launch Facility 26 (LF-26) (Facility 1967)	Modifications to the 87-foot deep silo facility may include external repairs to the concrete pad, abutment walls, access hatch, electrical/communication lines and equipment, cable trays, lighting systems; installation of new below-grade structures; repair/replace portions of the above-grade concrete pads and underground LF structure; facility waterproofing and water diversion; trenching for utilities and communication lines; add/replace light/camera towers/poles and antennas; demolish/repave the access road/entry as needed, and repair/replace the perimeter chainlink fence. Within the launch tube and access, refurbish/replace launch tube liner and associated equipment, and replace/repair electrical/communication cabling. There may be additional utility connections within the existing fence line and internal to the facility. Any removal of Minuteman III equipment or assets

Table 2-3. List of Proposed Facilities, Infrastructure, and Construction Laydown Areas Associated with the GBSD Test Program at VAFB, California		
		associated with the turnover of the Minuteman III would be managed by the GBSD Program. Two standby 105 kW fixed diesel generators, each with a 192-gallon fuel tank would be installed underground at the facility. Two 8-gallon diesel exhaust fuel tanks would be used. It is anticipated that the fixed diesel generators would operate approximately 150 hours/year. Also, vegetation fire breaks would need to be established and maintained on a regular basis around the launch facility. During construction, an approximate 2.5-acre temporary laydown area would be established adjacent to the pad, which would require minor clearing and grading. A double-wide office trailer would temporarily be placed on site. Electrical power would be drawn from on-site connections. Potable water would be bottled, and portable latrines would be used.
Test Launch Pad	Test Pad 01 (TP-01) (Facility 1840)	No facility repairs or modifications are planned, except for installing a new 20 to 25-foot tall launch stool. Existing vegetation fire breaks would need to be maintained on a regular basis around the launch facility or reestablished prior to each launch.
Launch Control	Missile Alert Facility D0 (MAF-D0) (Facility 1450)	Modifications to the MAF will include demolition of the existing top-side building and construction of a new top-side facility. Activities may include demilitarizing or remodeling of the underground launch control center. If demilitarized, a new above-grade launch control center may be constructed on site. Just north of these facilities, a new steel/concrete building and garage (up to 4,500 ft^2) may be constructed. Additional activities include trenching for utilities and communication lines; add/replace light/camera towers/poles and antennas; demolish/replace driving surfaces; and modify access road/entry as needed. The MAF is divided into two sections: above ground (LC-A) and below ground (LC-B). For LC-A, there would be one standby 1,500 kW fixed diesel generator with five underground 10,000-gallon fuel tanks. It is anticipated that the LC-A generator would operate approximately 150 hours/year. For LC-B, there would be one standby 250 kW generator with one underground 1,325-gallon fuel tank. It is anticipated that the LC-B generator would operate approximately 150 hours/year. All construction and renovation work would be within the existing fence line. During demolition and construction, an approximate 3.3-acre temporary laydown area would be established adjacent to the site, which would require minor clearing and grading. A double-wide office trailer would temporarily be placed on site. Electrical power would be drawn from on-

Table 2-3. List of Proposed Facilities, Infrastructure, and Construction Laydown Areas Associated with the GBSD Test Program at VAFB, California		
		site connections. Potable water would be bottled, and portable latrines would be used.
Launch Equipment Storage	Building 2002	No substantial modifications are planned.
Other GBSD Test Program Support Facilities and Infrastructure		
GBSD Component Processing Facility	Building 1900	The existing 75,000 ft^2 facility would be renovated to support component processing, maintenance, calibration, assembling, and testing; administration; LF refurbishment; and related support (storage, warehouse, industrial use). Facility modifications and upgrades may include exterior corrosion and roof repairs, door repairs, upgrading mechanical and utility systems (e.g., replacing propane boilers with electric boilers, and HVAC and electrical upgrades), reconfiguring bays to lab and maintenance areas, and installing security systems. There would be one standby 200 kW portable diesel generator with a 60-gallon fuel tank. It is anticipated that the generator would operate approximately 75 hours/year. Paved areas outside the building also would be resurfaced. New explosive safety quantity distances (ESQDs) would be established around the facility.
GBSD Contractor Vehicle/Support Equipment Test and Proof Load Facility	Building 1818 & Peacekeeper Proof Load Test Facility (PK PLTF)	Until the new Consolidated Maintenance Facility is available; testing and proof loading of vehicles and support equipment would need to be conducted at this existing facility. The currently abandoned facility would require refurbishing the existing 300 ft^2 Building 1818 and repairing/configuring the exterior concrete pad and 30-foot deep test pit to accommodate GBSD and other vehicles.
GBSD Temporary Contractor Test Support Facilities	Buildings 8337 and 8339	Within existing Buildings 8339 (17,770 ft^2) and 8337 (60,000 ft^2) internal modifications would include repair/modernize of existing mechanical, electrical, and HVAC systems; convert existing administrative/office space to lab and maintenance test/repair operations; install security systems; and install first and second floor workspace (office) module equipment. In Building 8337, there would be one standby 200 kW portable diesel generator with a 60-gallon fuel tank. In Building 8339, there would be one standby 400 kW portable diesel generator with a 60-gallon fuel tank. It is anticipated that each generator would operate approximate 75 hours/year. Surrounding the buildings, the approximate 5.6 acres of paved parking and open areas would be cleared of several trees. All paved and non-paved areas would be paved over. An approximate 2,500 ft^2 office trailer would be placed temporarily within the parking area outside Building

Table 2-3. List of Proposed Facilities, Infrastructure, and Construction Laydown Areas Associated with the GBSD Test Program at VAFB, California		
		8339. New underground utility connections (electrical, communications, and water) would tie into the trailer. Temporary exterior lighting also would be installed. These facilities would temporarily be used through FY 2026 or until the GBSD Consolidated Maintenance Facility is ready for occupancy. Buildings 8339 and 8337 would then be turned over for other mission use, and all temporary mobile modules and trailer likely would be removed from the site.
Consolidated Maintenance Facility	Vacant lot north of Nevada Ave and west of 13th Street (26.8 acres)	Clear vegetation and construct a new facility with a square footage of approximately 148,400 ft^2. Other construction would include approximately 590,000 ft^2 of paved roadways, parking, and sidewalks; a permanent stormwater retention pond; and extending underground utilities to the site from adjacent areas.
GBSD Depot Maintenance Facilities	Buildings 9320, 9325, 9327, and 9330	No substantial modifications are planned at any of these existing buildings. Such actions may include moving or adding walls, and electrical and HVAC modifications.
GBSD Vehicle Maintenance Facilities	Buildings 7501, 10711, and 10713	Existing Building 7501 (8,000 ft^2) would be remodeled. No substantial modifications are planned for existing Buildings 10711 and 10713. Such actions may include moving or adding walls, and electrical and HVAC modifications.
GBSD Component Operations Facility	Vacant lot east of existing Munitions Storage Area (MSA) (4.7 acres)	Clear vegetation and construct a new approximate 25,000 ft^2 facility within an approximate 4.7-acre area. Other construction would include approximately 504,000 ft^2 of paved roadway, parking, and sidewalks; a perimeter chainlink fence; a permanent stormwater retention pond; and extending underground utilities to the site from 13th Street and the adjacent MSA. During construction, a temporary access road and adjacent laydown areas would be used. New ESQDs would be established around the facility.
		During construction, alternative temporary laydown areas for equipment and materials have been identified: an approximate 4.3-acre area just east of the building site, and two smaller areas just southwest along the MSA fence line that measure 0.8 and 1.8 acres. For the selected laydown area(s), the site would require minor clearing and grading. A double-wide office trailer may need to temporarily be placed on site. Electrical power would be drawn from on-site connections. Potable water would be bottled, and portable latrines would be used. Temporary access to the construction site would be via one of two alternative roads off of 35th Street, one east of the site and one just to the west along the MSA fence line. The western-most laydown area and access road are the preferred alternative.

Table 2-3. List of Proposed Facilities, Infrastructure, and Construction Laydown Areas Associated with the GBSD Test Program at VAFB, California		
GBSD Weapons Maintenance Facility	Building 1544 within the MSA	Existing Building 1544 (8,960 ft^2) would be remodeled. Such actions may include moving or adding walls, and electrical and HVAC modifications.
Additional MSA Parking	Vacant area next to existing MSA Parking (0.5 acres)	With the addition of GBSD operations and facilities at the MSA, additional parking for 20 stalls would be needed. Prior to completing the parking lot, the site also could temporarily be used for construction laydown.
GBSD Vehicle Processing Facility	Vacant lot west of 13th Street (23.1 acres)	This new facility would be located just off the southern most end of the Main Cantonment Area. Within the 23.1-acre parcel, clear sufficient vegetation and construct a new approximate 16,400 ft^2 facility. Other construction would include approximately 40,700 ft^2 of paved access roadway, parking, and sidewalks; a permanent stormwater retention pond; and extending underground utilities (i.e., electric, communications, natural gas, and water) to the site from 13th Street. For wastewater treatment, a septic tank and leach field would be constructed with the parcel. New ESQDs would be established around the new facility. During construction, an approximate 0.5 or 1.5-acre area located just east of 13th Street would be used temporarily for construction laydown. Within either laydown area, up to three construction trailers would be placed on site, which would be enclosed by a perimeter chainlink fence. Following construction, the trailers and fence would be removed.
Storage Igloos	Igloo Storage Area	Up to four existing igloo facilities would be used. Internal modifications may include electrical upgrades and replacement of storage rails. Changes to existing ESQDs are possible.
Temporary Storage	Existing Hot Cargo Pads next to the Igloo Storage Area (Facilities 6809 and 6810)	No modifications are planned at the two pads.
GBSD Schoolhouse (2 location alternatives)	Vacant lots adjacent to California Boulevard and 6th Street (27.5 acres)	Alternative 1, as the preferred location for the new GBSD Schoolhouse, would be co-located with the existing Minuteman III Schoolhouse, which would increase program efficiency during weapon system cross over. The approximate 288,500 ft^2 GBSD Schoolhouse would include classrooms, labs, shops, high bays, unaccompanied housing dormitory and the GBSD FTU. Within the 27.5-acre parcel, sufficient area would be cleared to construct the new facility. Other construction would include approximately 240,000 ft^2 (5.5 acres) of paved roadways, parking, and sidewalks; and extending underground utilities to the site from adjacent areas.

Table 2-3. List of Proposed Facilities, Infrastructure, and Construction Laydown Areas Associated with the GBSD Test Program at VAFB, California		
	Vacant lots between Iceland Avenue and Utah Avenue (14.1 acres)	Alternative 2 is a smaller parcel area that is farther from current personnel support facilities (i.e., dining, gym, BX, medical facilities, etc.). Following clearing of sufficient area, the new facility and related infrastructure (as described for Alternative 1) would be constructed.
Utility Corridor	North Base	Up to approximately 25.2 miles of lines would be installed throughout portions of North Base from the Main Cantonment area north to LF-26. Most of the new lines would be installed in trenches within 5 feet of existing road shoulders on either side of the roadway or within the roadway pavement if sensitive resources are to be avoided. Trenches would be up 1 foot wide and 2 feet deep.
Other Mission Relocations due to the GBSD Test Program		
Vehicle Processing	Building 1800	Because GBSD would acquire Building 1900 for program use (described earlier), current operations would require relocation to other facilities. To use existing Building 1800, the building would be modified with installation of a booster processing rail system, and hoist and gantry system. Other modifications likely would include replacing the HVAC, repairing/replacing the roof, repair of external facility corrosion, and other requirements to make the facility functional and safe for vehicle processing. A new guard shack also would be installed at the front entrance. Because new ESQDs would be established around the facility, having boosters in Building 1800 would require Building 1806 (just to the east) to not be occupied, as the new ESQD arc would encompass that facility.
Vehicle Processing and Training	Buildings 1860/1861	As part of the mission relocation from Building 1900, current operations would require the addition of a 20,000 ft^2 prefabricated metal building on the existing concrete pad at Buildings 1860/1861 for the purpose of vehicle and equipment storage, and training. Electrical power is already accessible at the site. A new waterline connection on the west side of the existing pad would be needed for fire suppression in the new building. Additionally, the existing buildings may require reconfiguration of workspace, repair/replacement of mechanical/HVAC systems and roofs, repair of exterior corrosion and/or damaged facility components (e.g., doors, windows, and siding).
Vehicle Processing and Training (Option)	Building 8401	Building 8401 is an option to using Buildings 1860/1861. No facility modifications or construction activities are required for Building 8401.
Offices	Building 5500	Current office operations in Building 8339 would relocate to Building 5500. Prior to occupying the building, internal modifications to approximately 4,400 ft^2 would include reconfiguring workspace walls and

Table 2-3. List of Proposed Facilities, Infrastructure, and Construction Laydown Areas Associated with the GBSD Test Program at VAFB, California		
		ceilings, renovation of restrooms and janitorial/storage space, and electrical and communication upgrades.
Equipment Storage and Component Processing	Existing ULA possessed facilities	Current operations would be relocated from Building 8337 to accommodate GBSD test support capability. Vehicles and support equipment would be moved to other ULA possessed facilities on VAFB. No facility repairs or upgrades are anticipated.
Other GBSD Temporary Construction Laydown and Office Areas		
Point Sal Road Laydown Area	Adjacent to Point Sal Road just south of LF-10	During GBSD construction, the existing approximate 0.8-acre gravel area would be used temporarily for storing construction equipment, containers, and bulk material. No utilities or other services would be required.
Globe Laydown Area	MAF-01A (Facility 1974)	The facility currently serves as the MAF for the Minuteman III test program. During GBSD construction, two double-wide trailers would temporarily be placed near the MAF for construction contractor use as offices and to store construction-related equipment. The trailers would occupy less than 0.1 acre and be placed adjacent to existing paved parking. On-site power and communication connections would be aboveground. Potable water would be bottled, and portable latrines would be used.
Brioso Laydown Area	MAF-01E (Facility 1987)	The facility previously served as the MAF for the Peacekeeper test program. During GBSD construction, an approximate 1.0-acre area next to the MAF would be used temporarily for storing construction equipment, containers, and bulk material. No utilities or other services would be required.
Igloo Laydown Area	Vacant lot between existing Hot Cargo Pads next to the Igloo Storage Area	Between the two existing pads is an approximate 1.5-acre lot that temporarily would be used for storing construction equipment, containers, and bulk material. No utilities or other services would be required.

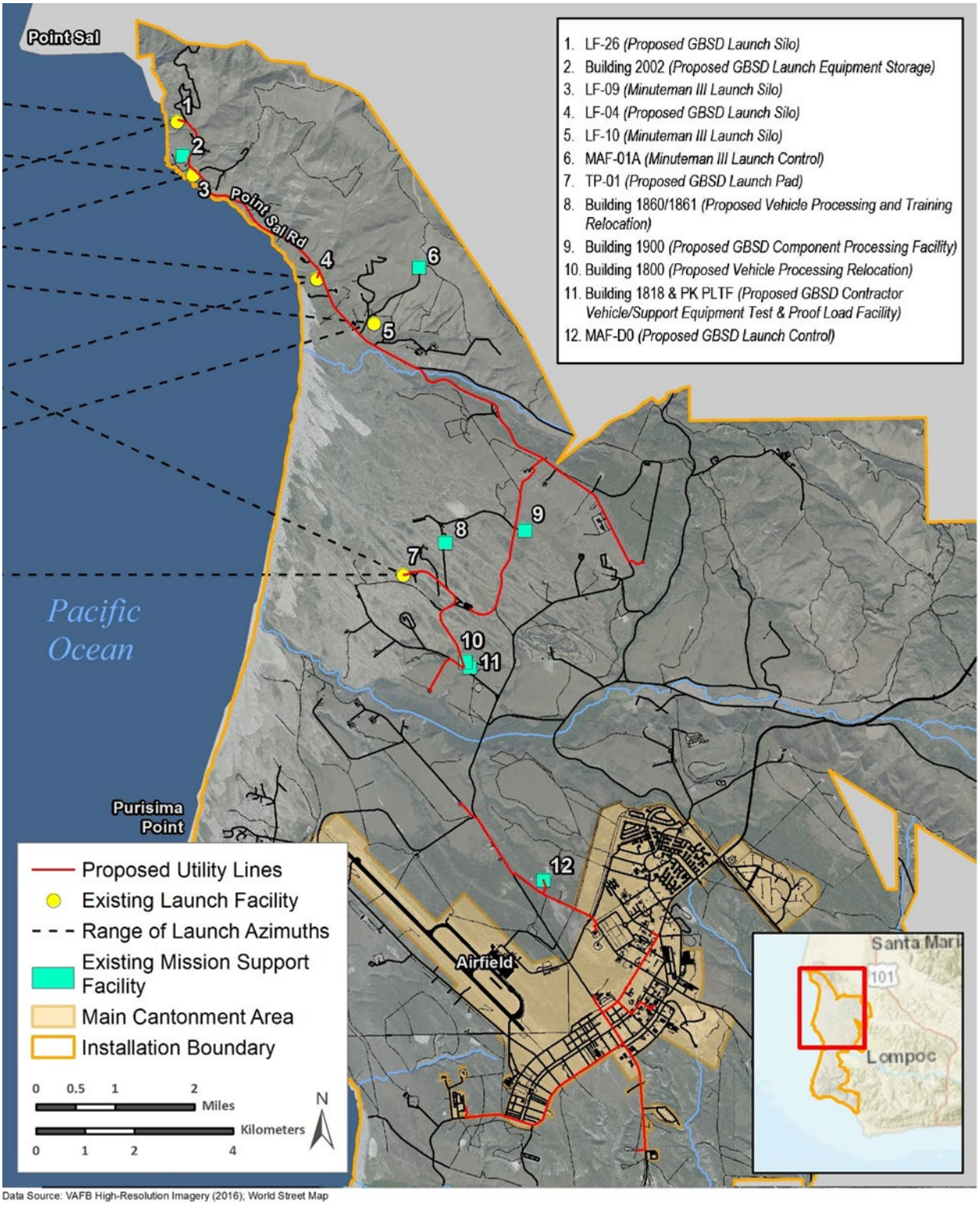
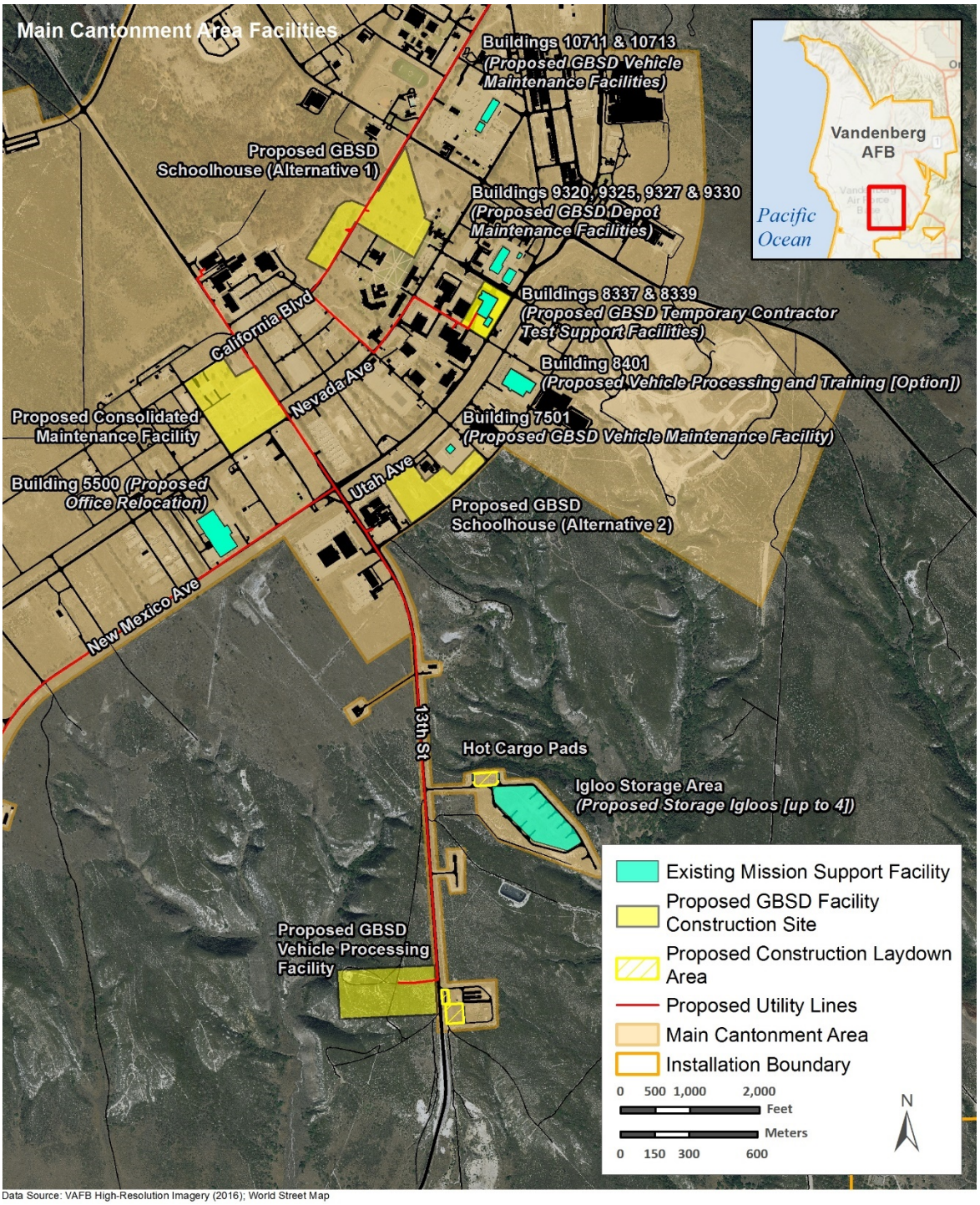


Figure 2-11. Proposed GBSD Test Program and Related Facilities on VAFB North Base



Data Source: VAFB High-Resolution Imagery (2016); World Street Map

Figure 2-12. Proposed GBSD Test Program Facilities and Construction Laydown Areas Within or Near the VAFB Main Cantonment Area

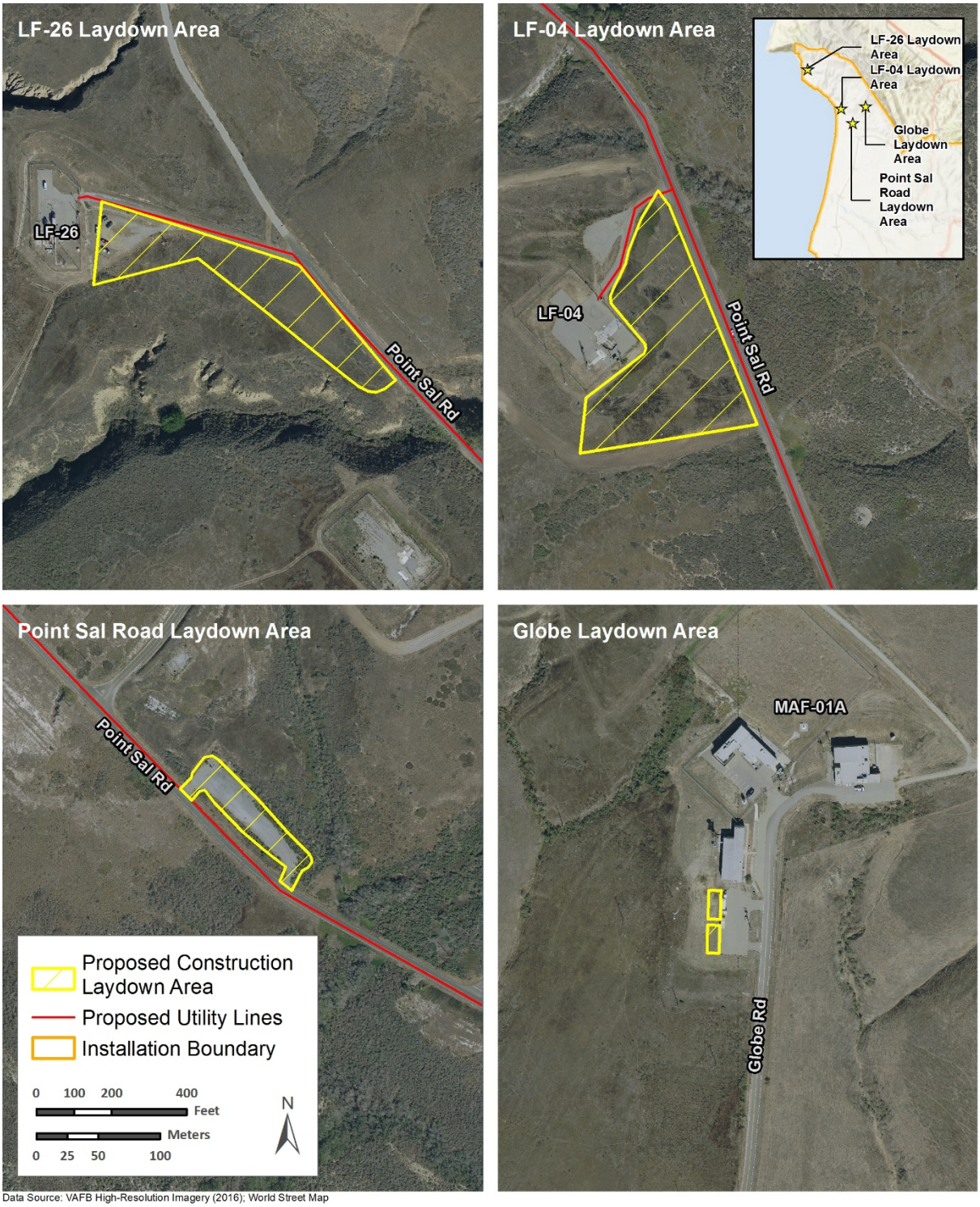
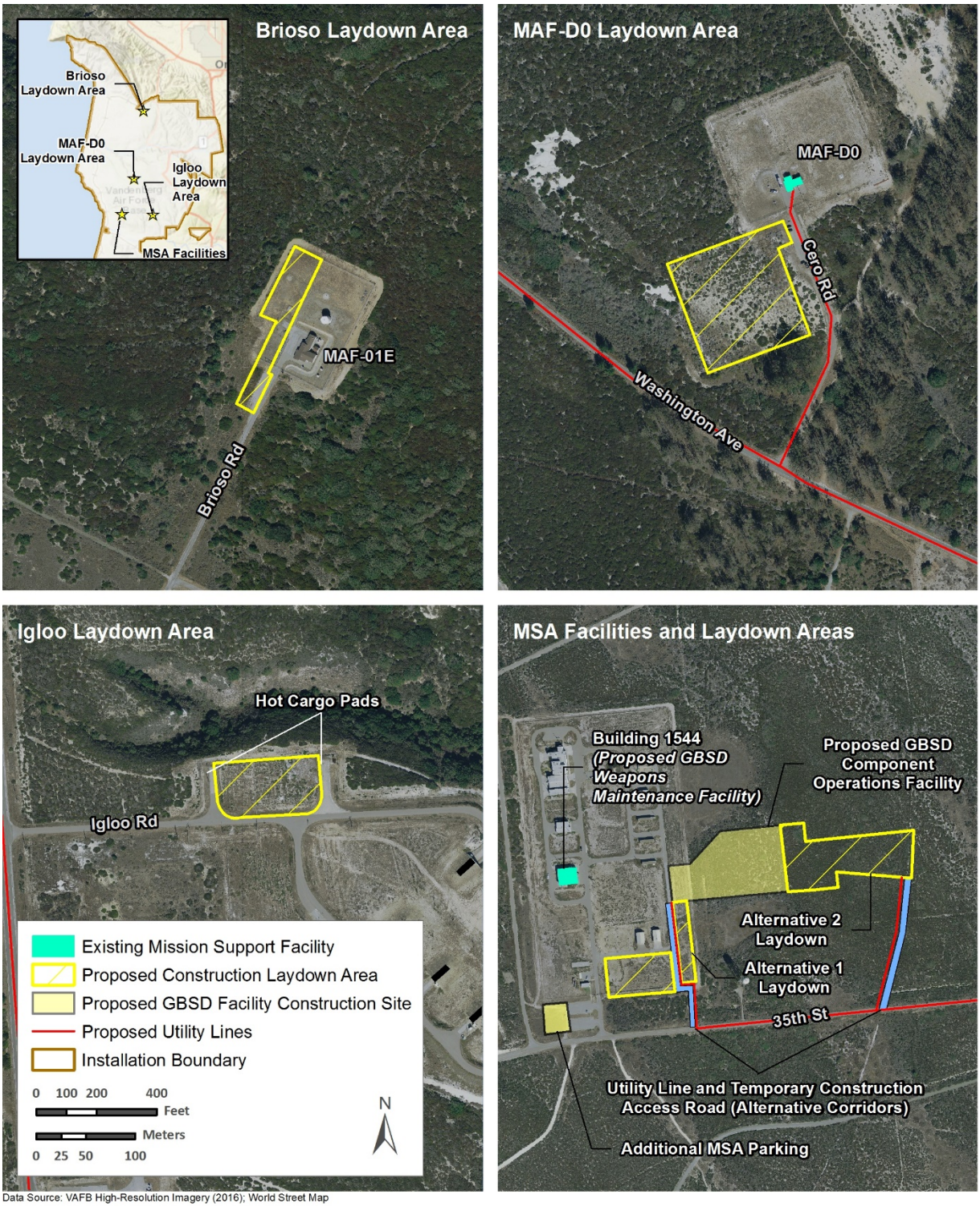


Figure 2-13. Other GBSD Test Program Construction Laydown Areas on VAFB North Base



Data Source: VAFB High-Resolution Imagery (2016); World Street Map

Figure 2-14. Other GBSD Test Program Facilities and Construction Laydown Areas on VAFB North Base and Near the Main Cantonment Area

2.2.3.2 GBSD Site Preparation and Construction

At VAFB, construction and modification of proposed GBSD facilities would begin in FY 2021 with planned completion of all facilities by FY 2025. Temporary site preparation and construction activities are expected to require up to approximately 200 workers on the installation. Workers would be expected to have or find housing and related amenities/services in the local communities.

Only some of the proposed construction areas have been previously disturbed. Some areas are covered with low, maintained vegetation, while others are covered in brush and sparse trees. Prior to construction, facility project areas would be cleared of vegetation, which would be converted to firewood, mulch, or composted. Site excavation and grading plans would be designed to balance cuts and fills as much as possible, with minimal import or export of earth material. Any imported earth material would be obtained from already permitted sources not containing rubbish or contaminants. For any GBSD-related project areas with potential soil or groundwater contamination, or potential presence of munitions and explosives of concern (MEC), appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance. All excavation work would occur within the proposed construction areas shown on **Figures 2-11** to **2-14**. For some new facility building sites, pile driving may be needed in order to create deep, structurally stable foundations. The number and depth of the pile foundations would depend on the depth to stable soils or bedrock.

On VAFB North Base, multiple construction laydown areas would be established temporarily in support of the GBSD Test Program construction effort. These areas would be used to set up temporary construction management offices, and for the temporary storage of construction equipment, containers, and bulk materials. In preparation for some of the laydown areas, clearing and grading would be required. The locations of key laydown areas are shown on **Figures 2-12** to **2-14**. Vegetation at the LF-04 laydown area would be removed and a portion of the area may have 3 inches of soil scraped off and stockpiled to preserve the seedbank of endangered plants. A geomat would be placed on the scraped ground surface and covered with gravel to establish the required surface for the purpose of staging or parking. Upon completion of construction, the gravel and geomat would be removed and the stockpiled soil would be redistributed in this area or planted in accordance with the revegetation plan.

As part of constructing new facilities, utilities (i.e., potable water, sewer, power, natural gas, and communications) would need to be extended from within the proposed project sites or from adjacent areas. Up to approximately 25.2 miles of new conduit for utility lines would be installed underground throughout portions of North Base from the Main Cantonment area north to LF-26 (see **Figures 2-11** and **2-14**). At other locations, existing underground conduits would be used where available. Each new GBSD facility would include HVAC and water heating systems; most likely natural gas fired. Potentially, existing facilities to be used may require mechanical and electrical system upgrades or other modifications. The existing propane boilers at B1900 may be replaced with electric fired units.

Depending on the types of wastes and excess equipment resulting from demolition and refurbishment activities, such materials would be appropriately disposed of or recycled at a licensed facility; or transferred to the local DLA Disposition Services for demilitarization, recycling, and disposal. Any resulting hazardous material and waste, and wastewater, would be handled, transported, and disposed of in accordance with established VAFB and USAF procedures, and applicable federal and state laws and regulations.

Preliminary design analyses estimate a total of approximately 70 acres will be affected. This included 35 acres of ground disturbance that would occur at VAFB as a result of all project-related construction activities, and additionally, a total of approximately 35 acres of new impervious building and pavement areas would be created.

Just as described for HAFB (**Section 2.2.2.2**), all new GBSD facilities at VAFB would be designed and constructed in accordance with UFC and other applicable codes and standards, including stormwater management, sustainable design, local wind load, fire protection, lightning protection, and seismic standards. The VAFB Post-Construction Stormwater Standards also would apply to the design.

Additionally, for wildfire protection, fire breaks would be needed around each of the three proposed GBSD launch sites prior to a launch and potentially maintained on a regular basis. This requires clearing or cutting 15- to 20-foot-wide paths around or near the launch sites, then disking these same areas. At LF-04, fire breaks are already established and maintained on a regular basis. The LF-04 firebreak measures 1,850 feet long, 50 feet wide, and 6 inches deep and would require approximately 46,250 cubic feet (1,715 cubic yards) of shale rock. The shale rock would be obtained from the Titan Gate borrow pit located on VAFB which is approximately 6.5 miles from the LF-04. For LF-26, fire breaks have not been maintained for at least 10 years, so these would need to be reestablished. For TP-01, fire breaks around the pad would need to be maintained on a regular basis or reestablished prior to each GBSD launch. Along the roadways leading up to each launch site, vegetation would be mowed approximately 10 to 15 feet on either side.

2.2.3.3 GBSD Operations and Maintenance

GBSD Test Program operations at VAFB are expected to begin in FY 2021 as facilities become available. Temporary GBSD facilities most likely would be returned to VAFB for other mission use as permanent GBSD facilities become operational. Once all facilities are completed and usable, approximately 260 new personnel would work on site throughout the approximate 10-year test program. All military personnel, government civilians, and contractors working at the installation would be expected to have or find housing and related amenities/services in the local communities.

For the GBSD FTU/Schoolhouse at VAFB, initial training activities would begin ramping up in FY 2028, with all training assets in place by FY 2030. Once fully operational, GBSD training at

VAFB would occur in parallel with the Minuteman III Schoolhouse until such training for the legacy program is no longer needed. For GBSD, approximately 17 new instructor positions would be placed at VAFB through FY 2036 or until the transition from Minuteman III to the GBSD system is complete. Students would be trained in missile operations and maintenance. The long-term average daily student load at the GBSD FTU/Schoolhouse is expected to be approximately 140 students throughout the life of the GBSD program. The 17 new instructors likely would need to find housing in the local communities; however, all or most of the 140 students would be housed at the Schoolhouse facilities on VAFB.

In preparation for each GBSD flight test missile launch, the individual boosters would be shipped most likely as an integrated stack directly to VAFB from an existing rocket motor manufacturer located in Promontory, Utah. The transport of the booster by truck or by rail would follow established routes, similar to that of other large booster systems. The PBACM-like rocket motor, MGS, and PRS components (including shroud and bulkhead) would be shipped separately from the manufacturer. Just as for Minuteman III, the test RVs for GBSD would be shipped to the installation preassembled from DOE. To safeguard these components and other ordnance from fire or other mishap, all transportation, handling, and storage of the components would be accomplished in accordance with DoD, USAF, U.S. DOT, and state DOT policies and regulations. Personnel supporting the transportation of components would be trained on missile and ordnance handling procedures.

Once at VAFB, GBSD missile components would be stored in the appropriate GBSD facilities (i.e., MSA, Maintenance Facility, Processing Facility, and RSLP Storage Igloos) until needed for assembly and integration testing. When ready, the fully integrated booster would be transported to the designated launch site. At the LFs, a transporter erector vehicle would lower the booster into the silo. At TP-01, mobile cranes would be used to transfer the booster to a launch stool. Once completed, the PRS containing one to three test RVs is loaded onto a payload transporter and taken to the launch site for placement on top of the booster.

All GBSD developmental and operational flight tests are expected to be conducted from the LF-04 and LF-26 silos. At any point during the flight test schedule should there be an issue in using the LFs, TP-01 could be used as an option for conducting launches. In parallel with GBSD flight testing, all Minuteman III flight tests would continue to be conducted from LF-09 and LF-10. The proposed flight test schedule for both missile programs is shown in **Table 2-4**.

Table 2-4. Proposed Number of GBSD and Minuteman III Flight Tests from VAFB by Fiscal Year

Test Program	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
GBSD	0	0	0	4	4	5	6	5	4
Minuteman III	4	5	3	4	4	4	3	3	3
Total Flight Tests	4	5	3	8	8	9	9	8	7

The types and amounts of hazardous materials used and stored during flight test operations would be minimal and consist of compressed gases, adhesives, lubricants, and solvents. Because the test RVs would arrive at VAFB fully assembled, there would be no direct handling of the hazardous materials contained in them (e.g., high explosives, asbestos, DU, and other heavy metals). Routine building maintenance and cleaning would require use of paints, pesticides, and cleaning products that are typically used on government installations. Solid and hazardous wastes generated by the program would be collected, temporarily stored (as needed), and disposed or recycled by means of existing installation facilities using established waste management procedures.

GBSD flight tests would be conducted using the same range safety procedures as used for Minuteman III flight tests. USAF personnel would conduct a comprehensive safety analysis to determine specific launch and flight hazards for each test. A standard dispersion computer model for both normal and aborted launch scenarios would be run by installation safety personnel. As part of the analysis, risks to off-installation areas and non-participating aircraft, sea vessels, and personnel would be determined. The results of the analysis then are used to identify the launch hazard area, expended booster stage drop zones, and terminal hazard areas.

Prior to each flight test, NOTAM and NTM notifications would be released. Within a day prior to launch, radar and other remote sensors would be used to verify that the hazard areas are clear of non-mission-essential aircraft, vessels, and personnel. Depending on which launch site is used and the planned launch trajectory, range safety procedures may require closure of Point Sal State Beach located just north of LF-26—typically for less than a day—and the coordination and monitoring of any train traffic passing through the installation. These actions are considered routine at VAFB and are dictated by standard operating procedures (USAF 2004, 2006, 2010, 2013a, 2020e).

If a malfunction were to occur during missile flight, the onboard FTS system (or Autonomous Flight Termination System) would be activated. Thrust would be terminated by initiation of an explosive charge that splits or vents the motor casing, which releases pressure and significantly reduces propellant combustion. This action would stop the booster’s forward thrust, causing the missile to fall along a ballistic trajectory into the ocean. Just as for ongoing Minuteman III flight tests, actions would be taken immediately to remove unburned propellant and any other hazardous materials that had fallen on land or off the beach in waters up to 6 feet deep. Any recovery from deeper water would be treated on a case-by-case basis.

Once the initial GBSD developmental and operational program testing is completed, the facilities likely would be used to support future GBSD deployment and sustainment program activities or other missions and programs. Also as part of GBSD system sustainment, LF-09, LF-10, and MAF-01A likely would be converted for GBSD FDE flight testing following a decision to remove the Minuteman III weapon system from active status. The conversion and use of

these three facilities for GBSD purposes would be analyzed in future environmental documentation separate from this EA/OEA.

2.2.4 U.S. Army Dugway Proving Ground

A related action to the GBSD Test Program is the proposed construction and operation of the GBSD Physical Security System (PSS) Test Facility (PSSTF) at DPG. Serving as a representative GBSD missile LF, the PSSTF would allow for the testing of all security features associated with an operational GBSD missile LF that would later be used throughout the three Missile Wings as part of GBSD deployment.

For the construction and operation of the PSSTF at DPG, three alternative sites were identified, all within a few miles of the Rad Pad Grid Area shown on **Figure 2-5**. The locations of Alternatives 1, 2, and 3 are shown on **Figure 2-15**, with Alternative 3 being the preferred site. Although each alternative is approximately 10 acres in area, only a portion of the selected parcel would be used for the new facility and temporary construction laydown area.

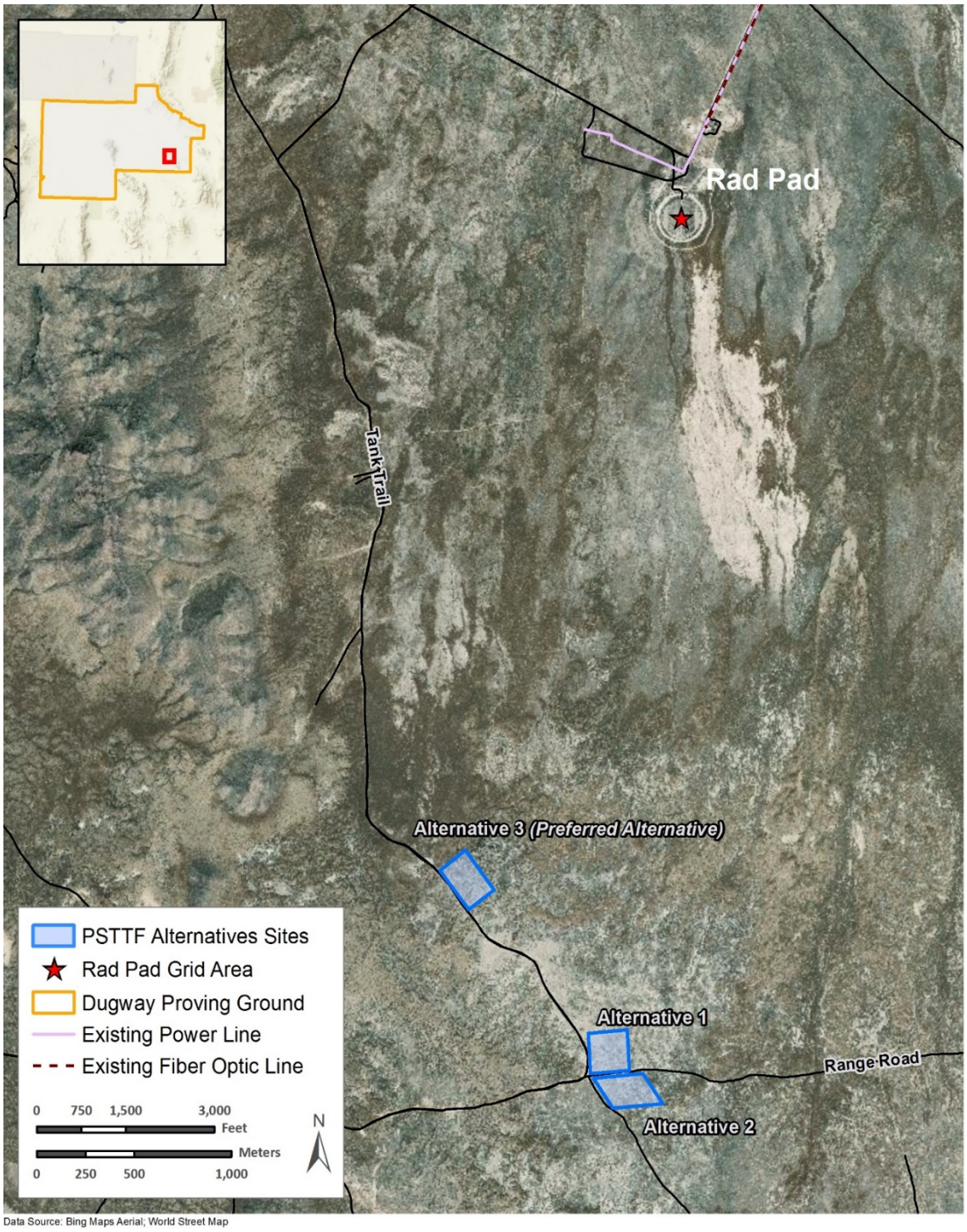


Figure 2-15. Location of PSSTF Alternative Sites near the Rad Pad Grid Area

2.2.4.1 GBSD Facilities and Infrastructure Description

The proposed PSSTF would be a representative GBSD missile LF, built to the same physical specs as an operational LF for all topside and below grade structures down to the lower floors, but without the full underground missile silo. The steel and concrete structure would be furnished with both operational and non-operational equipment that is representative of what would be installed in a fielded LF facility, excluding the missile.

The low-lying facility would be situated on an approximate 1 to 1.5-acre site covered mostly with gravel. Much of the underground facility would be topped with a concrete pad. At most, the underground structure would extend approximately 35 feet in depth. A launch closure door mounted on rails would rest on top of the pad. The site would include several poles for lighting and security systems. Additionally, the site would be surrounded by a minimum 6-foot high chain link fence, surmounted by strands of barbed wire angled outward (**Figure 2-16**).

A gravel access road would extend to the PSSTF from the nearest existing road and gravel-covered parking would be provided outside the fenced facility. Electrical power and fiber optic cable would be extended to the site. For electrical power backup and occasional primary power, a fixed 60 kW generator with an approximate 450-gallon aboveground diesel fuel tank would be installed on site.

As part of testing, a portable or mobile command center trailer or vehicle would be placed approximately 1 mile from the PSSTF for observation and communication purposes.

2.2.4.2 GBSD Site Preparation and Construction

At DPG, construction and staging of the proposed PSSTF would occur sometime between FY 2022 and FY 2025, and last up to 30 months. Temporary site preparation and construction activities are expected to require up to approximately 40 workers on site.

Access from the DPG Main Gate at English Village (**Figure 2-5**) to the three alternative sites shown on **Figure 2-15** would be via approximately 12 miles of paved road plus 8 miles of gravel road. Each of the alternative sites is generally undisturbed. Constructing the PSSTF would require excavation and other ground disturbance within an approximate 25,000 square foot (ft^2) area to a maximum depth of approximately 45 feet. Additional concrete pads would be constructed for equipment storage, and the fixed power generator and fuel tank. With the possible exception of the access driveway and parking area, all ground disturbance activities are expected to occur within the approximate 1 to 1.5-acre site. Additional temporary laydown areas for equipment and materials would be located adjacent to the construction site within the 10-acre parcel. Little or no ground disturbance would be required for the remote command center trailer or vehicle. For any construction areas with potential soil contamination or presence of MEC, appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance.

Both electrical power and fiber optic cable would be extended to the project site from the Rad Pad Grid Area (**Figure 2-16**). The pole-mounted utilities most likely would be installed along the existing roads and trails shown in the figure for approximately 5 miles.

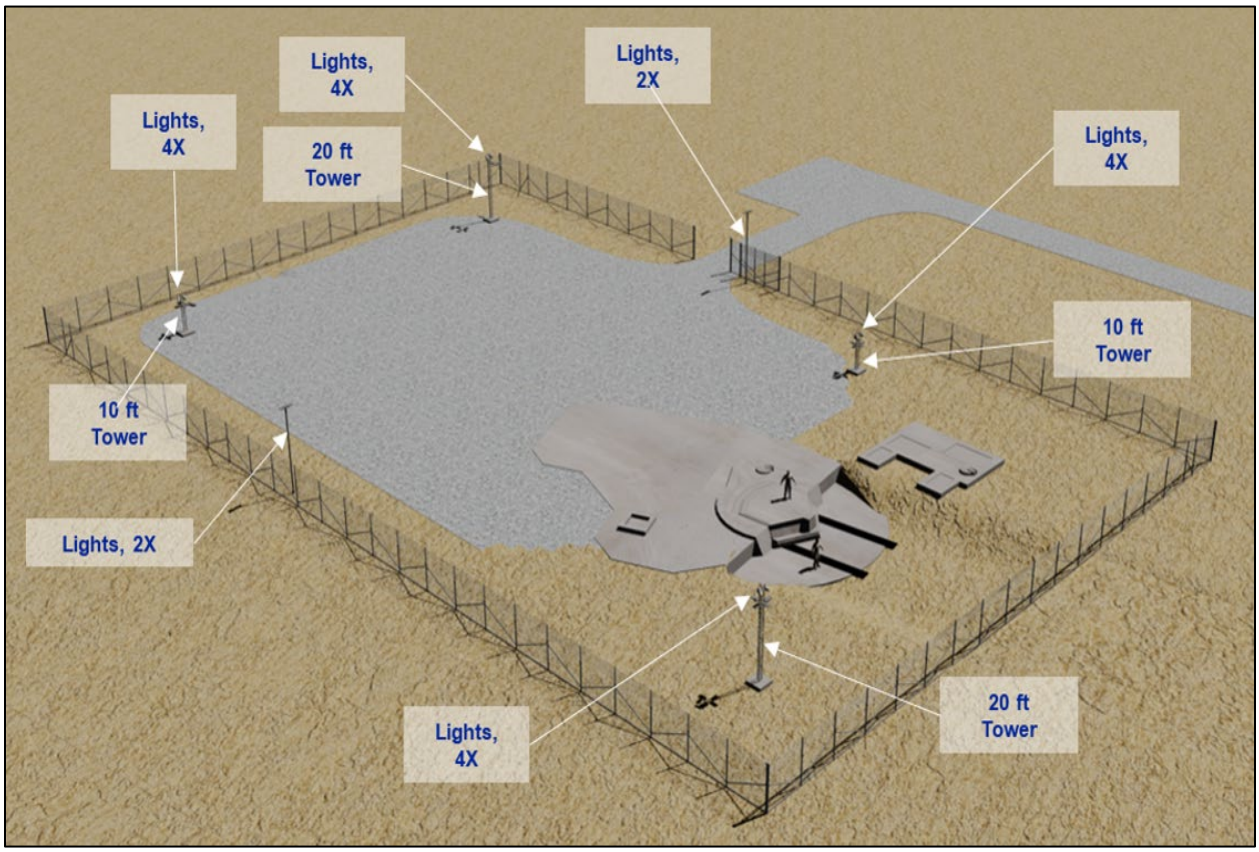


Figure 2-16. Notional Layout of the PSSTF

Because of the remoteness of the PSSTF alternative sites from existing concrete plants outside the range, and the extent of concrete that would be needed for construction, a temporary concrete batch plant would be established near English Village within a previously disturbed area. Such batch plant operations require large cement powder bins, aggregate piles, and water to be stored on site. The proposed batch plant equipment would dispense measured amounts of cement powder, sand, stone aggregate, and water into concrete mix trucks that would then transport and dispense the concrete mix at the project location. Up to several hundred truck trips may be required.

2.2.4.3 GBSD Operations and Maintenance

Proposed testing of security systems at the PSSTF is expected to begin as early as FY 2025 and potentially last through FY 2029. Activities would include testing of delay and denial structures and technologies, alarm systems, situational awareness systems, and communication systems. Live Fire Test and Evaluation activities also are planned to take place at the site, which would involve the occasional use of munitions and explosives (DoD classification 1.1 and 1.3/1.4[5]). For range safety purposes during operations, a surface danger zone (SDZ) would be established around the facility.

During test operations, the number of support personnel on site would range between 15 and 100 depending on the type of activities occurring. Test activities would occur during both day and nighttime hours.

On average, the 60-kW generator would be expected to run approximately 100 hours per month. Potable water at the facility and remote command center would be bottled and on-site portable latrines would be used. The latrines would be periodically serviced by a contractor.

[5] DoD explosive classifications are based on the hazard class and division of the materials, which are defined in 49 CFR § 173.50.

2.2.5 Downrange Test and Support

Under the Proposed Action, Minuteman III flight tests conducted from VAFB would continue using USAG-KA for missile targeting purpose. Support actions at USAG-KA would continue as described in **Section 2.1.5**. Following launch, the Minuteman III spent 1st, 2nd, and 3rd stage motors would impact in deep ocean waters downrange (**Figure 2-6**). The PBV components also would impact in ocean waters farther downrange. RV impacts at USAG-KA would continue to occur east of USAG-KA within the KMISS ocean area.

To comply with GBSD Test Program security classification requirements regarding missile flight paths and downrange testing, only GBSD downrange target locations at USAG-KA are described and analyzed in this EA/OEA. The types of downrange test support activities, however, are expected to be conducted similarly to those described in **Section 2.1.5** for Minuteman III flight tests. GBSD spent booster motors, PBACM components, and test RVs would be expected to impact primarily in ocean waters away from populations and land areas.

To support the GBSD flight tests, an extensive array of missile tracking radars and sensors would be used. Depending on flight paths and mission requirements, sea-based, aircraft-based, and satellite-based sensors (optical and radar systems) could be involved in tracking the missile and collecting data.

2.2.5.1 U.S. Army Garrison-Kwajalein Atoll

For GBSD flight tests conducted at USAG-KA, test RVs are expected to impact in adjacent ocean waters and, in a few instances, on land. Under the GBSD Test Program, up to approximately nine test RV impacts per year would be conducted at USAG-KA starting in FY 2024 and continuing until FY 2029. It is expected that most test RVs would be targeted at the KMISS ocean area just east of Gagan Islet, or within deep ocean waters in the vicinity of Illeginni Islet on the western side of Kwajalein Atoll (**Figure 2-8**). Such testing at the KMISS would be conducted in the same manner as for the ongoing Minuteman III flight tests, while testing in the vicinity of Illeginni Islet would be conducted similarly to what was previously done under the Minuteman III program (USAF 2004, 2020e; USAG-KA 2017).

During GBSD testing, up to two test RVs per year could be over-ocean airbursts, as described in **Section 2.1.5.1**. While most test RVs in the vicinity of Illeginni Islet would impact in ocean waters approximately 2,600 feet offshore, up to three test RVs in total are expected to impact land on the western end of Illeginni Islet. Although there is a risk for test RVs to strike the shallow waters or reef flats adjacent to Illeginni, the USAF previously estimated the probability for such events to be between 10 and 20 percent (USAFGSC and USASMDC/ARSTRAT 2015).

Further descriptions of GBSD test activities in the vicinity of Illeginni Islet are provided below.

2.2.5.1.1 Pre-Test Preparations

Within days of each flight test conducted at Illeginni Islet, portable camera stands, and other data collection equipment would be set up on the western end of Illeginni Islet to record the flight test. Minor clearing of vegetation may be needed as is typically done in preparation for such tests. In addition, up to 17 LLNL sensor rafts with onboard optical and/or acoustical sensors (**Figure 2-9**) would temporarily be placed in ocean waters within approximately 2,600 feet of the islet in waters no less than 10 feet deep. Deployed from a Landing Craft Utility (LCU) or similar vessel, the rafts would maintain position in the water using onboard battery-powered trolling motors. No anchors would be used to maintain raft positions.

2.2.5.1.2 Terminal Flight and Impact Activities

To ensure the safe conduct of the flight tests at USAG-KA, a Mid-Atoll Corridor Impact Area has been established across the atoll (**Figure 2-8**). When a point of impact is to occur in this area, a number of strict precautions are taken to protect personnel. Such precautions may consist of evacuating nonessential personnel and sheltering all other personnel remaining within the Mid-Atoll Corridor. Just as at VAFB, NOTAMs and NTMs are published and circulated in accordance with established procedures to provide warning to personnel, including natives of the Marshall Islands, concerning any potential hazard areas that should be avoided. Visual sweeps of hazard areas are accomplished starting several days prior to each flight test to assist in the clearance of non-critical personnel. Only mission-essential personnel are permitted in hazard areas.

2.2.5.1.3 Post-Test Cleanup and Recovery Operations

Following completion of each flight test at Illeginni Islet, USAG-KA personnel would first secure the area and recover the free-floating sensor rafts. An LCU vessel likely would be used to recover the rafts and transport cleanup/recovery equipment from Kwajalein Islet, located at the most southern end of the atoll, to Illeginni. For land or near-shore RV impacts, no assessment or cleanup activities would occur until: (1) Unexploded Ordnance (UXO) personnel from the range inspect the impact area, and (2) other personnel stabilize fugitive dust and disturbed soil by wetting/washing the site. Personnel working in the impact area would wear proper personal protective equipment, as necessary. Once the site is cleared for safe entry, test support personnel would conduct an impact assessment of the site, and initiate cleanup and recovery operations.

Debris from those test RVs that impact on land would be recovered. Post-test recovery operations on Illeginni Islet would require the manual cleanup and removal of any visible RV debris, including hazardous materials. Excavated material would be screened, and the collected RV debris washed before packaging for shipment back to Kwajalein Islet and the United States. In addition, soil samples taken from Illeginni Islet would be tested to ensure that concentrations of Be and U (as a surrogate for DU) do not exceed established UES standards (USAG-KA 2017, USASMDC 2021a). Craters formed by the RV impacts would be backfilled using a

backhoe/loader and repairs would be made to any structures on the islet, as necessary. Both LLNL and USAG-KA personnel normally would be involved in these operations.

If a test RV were to strike the shallow waters or reef flats adjacent to Illeginni, RV recovery/cleanup operations, within 500 to 1,000 feet of the Illeginni shoreline, would be conducted similarly to land operations when tide conditions and water depth permit. A backhoe would be used to excavate the crater. Excavated material would be screened for debris and the crater most likely back-filled with coral ejected around the rim of the crater. For any RVs that impact in deeper waters, a dive team would be brought in to conduct an underwater search. Using a ship for recovery operations, a remotely operated vehicle would first be used to locate the debris field on the bottom. Divers in scuba gear would then be able to recover the debris manually. In general, RV debris recovery operations would not be attempted in waters deeper than 100 feet.

2.3 GBSD Facility Siting and Alternative Elimination

USAF initially conducted an Analysis of Alternatives in 2014 to assess options for the future land-based nuclear deterrent system. Analysis concluded continued silo-basing in the existing Minuteman III infrastructure with enhanced capabilities was the most cost-effective approach to satisfy nuclear deterrence operations for the foreseeable future. The Under Secretary of Defense for Cost Assessment and Program Evaluation found the analysis to be sufficient to inform future acquisition decisions and concurred with the final recommendations.

For the identification of GBSD facility options and alternatives at HAFB and VAFB, a programmatic approach for testing and eventual deployment was used so as to leverage existing Minuteman III and related ICBM facilities and infrastructure that are not available at any other DoD installations. The continuation of ICBM flight tests from VAFB also would minimize impacts on the National Airspace System. The proposed GBSD activities, however, would not be allowed to negatively affect the Minuteman III mission, test program, and Schoolhouse training. Once USAF identified initial facility requirements, they were presented to the installations for evaluation against available facilities to determine the ability to support. Possible siting options were then coordinated between the installations and the GBSD Test Program to determine the best available options for leadership approval.

Starting in early 2019, representatives from the GBSD Test Program conducted site surveys of existing facilities and available land areas at HAFB and VAFB, which included meetings with installation staff to identify meaningful options for consideration. During this process, USAF focused on finding efficient, cost-effective, and environmentally acceptable options, while also satisfying applicable safety, security, and sustainability requirements. This included application of USAF facility requirements as specified in AFMAN 32-1084 (*Standard Facility Requirements*) (USAF 2020f).

Currently at HAFB, there is no facility with adequate vacant space to centralize GBSD enterprise activities in a controlled, secure environment for conducting essential testing, training, and collaboration activities. Many of the available facilities are substandard, obsolete, and scheduled for demolition under the Falcon Hill EUL program (USAF 2008, 2016a). USAF completed a preliminary analysis of reasonable options for satisfying the GBSD program facility requirements (including repair/modification and new construction), and given the mission and security needs, mostly new construction is the only option that would meet the requirements. The campus location chosen (**Figure 2-10**) also would utilize the prior Peacekeeper Launch Facility silo, which is critical to the mission.

During the initial selection of GBSD facilities at VAFB, surveys and meetings with installation personnel looked at options that utilized only existing facilities (no new build), no reuse of existing facilities (all new build), and a combination of existing and new facilities, which is the plan going forward. A Courses of Action analysis was prepared by USAF (2019a) that looked at individual GBSD Test Program facility requirements and compared them to: (1) potentially usable existing facilities and (2) vacant lots that potentially could be used for new construction. Since then, program planning and design at VAFB has progressed and additional facility requirements have been identified as part of the Proposed Action described in **Section 2.2.3**. Additionally, potential footprint locations for some of the VAFB facilities will be confirmed through geotechnical investigations (e.g., soil borings) in the proposed build areas.

Because the GBSD FTU/Schoolhouse represents a facility that would operate beyond the initial Test Program activities and continue operating throughout the life of the GBSD program, it was particularly important to ensure good siting decisions were made. USAF initially considered basing the GBSD FTU/Schoolhouse at a location other than VAFB. Specifically, the three existing Minuteman III missile wings were considered as possible GBSD FTU locations: F.E. Warren AFB, Malmstrom AFB, and Minot AFB. After careful consideration, VAFB was selected as the sole reasonable alternative for the GBSD FTU/Schoolhouse, primarily because VAFB is the existing location of the Minuteman III Schoolhouse. The proposed co-location of the GBSD FTU/Schoolhouse at VAFB alongside the existing Minuteman III Schoolhouse promotes efficiencies in several critical respects, which are as follows:

- Anticipating that the two school houses would operate for a time in parallel, it is likely that they would share instructors and Military Training Leaders.
- The co-location would permit shared use of vehicles and equipment from the ICBM testing mission at VAFB.
- Co-location of the schoolhouses would avoid lag time in permanent change of station (moving between bases) for Minuteman III instructors and Military Training Leaders, both of which are likely to transition between schoolhouses.

- The co-location of the two schoolhouses would permit the repurposing of some Minuteman III academic spaces should unforecasted training requirements emerge during the transition, or after Final Operating Conditions (the full standup of the GBSD FTU/Schoolhouse).
- Locating the GBSD FTU/Schoolhouse at VAFB would tend to retain the specialized civilian instructors of the Minuteman III Schoolhouse, who may be uninclined to relocate once operation of that schoolhouse stands down in favor of GBSD training.

When it came to selecting a potential location for the proposed PSSTF, three military installations were considered: DPG and Utah Test and Training Range in Utah, and Eglin AFB in Florida. DPG was selected due to its ability to support Live Fire Test and Evaluation activities that were needed to properly evaluate the PSSTF. The other two installations would not be able to meet that requirement. Proximity of DPG to HAFB contributed to its selection, as well as being able to support the GBSD timeline and project schedule. Similar to VAFB, alternative sites for the PSSTF at DPG will eventually be confirmed through geotechnical investigations so as to avoid areas with a shallow groundwater table.

2.4 Comparison of Environmental Consequences of the Proposed Action and the No Action Alternative

The No Action Alternative, for Minuteman III would result in continued environmental consequences from routine operations at HAFB, VAFB, and downrange. There are no Minuteman III activities at DPG. Potential environmental consequences for the GBSD Test Program are summarized in **Table 2-5** and under the analysis for each installation **(Sections 4.2.1, 4.2.2, 4.4.3,** and **4.2.4)**.

Table 2-5. Comparison of Potential Environmental Consequences		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Hill Air Force Base, Utah (HAFB)		
Air Quality	The No Action Alternative would continue to be routine operations at HAFB. Air quality impacts would continue to be insignificant as shown in previous NEPA documentation. HAFB will continue to operate under the current Title V operating permit(s) and complete an annual criteria and Hazardous Air Pollutant Emission Inventory. Under the No Action Alternative, for Minuteman III Modification the USAF 2004 Final EA discusses HAFB's role in the ongoing Minuteman III missile tests.	Construction/Demolition phases are below the general conformity significant indicator levels for pollutants of concern and therefore no significant impacts to air quality are anticipated. Additionally, construction-related emissions would be short-term, temporary, and would be confined to the construction site area. Exhaust emissions from construction equipment and vehicles would be minimized through implementation of BMPs by the construction contractors, including proper operation and maintenance of equipment. The inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soils by 50 percent from uncontrolled levels. Construction dust would be reduced by implementation of fugitive dust control measures as listed in **Section 4.2.1.1.3** (Mitigation Measures). The Mitigation Measures are considered part of the Proposed Action. An air quality permit must be in place prior to construction.
Climate Change		The magnitude of climate change beyond the next few decades will depend primarily on the amount of GHGs (especially carbon dioxide [CO2]) emitted globally. The potential effects of GHG emissions generated by the Proposed Action are by nature global. Given the global nature of climate change and the current state of science, it is not useful at this time to attempt to link the emissions qualified for local actions to any specific climatological change or resulting environmental impact. Therefore, the quantitative analysis of CO2e emissions in this EA/OEA is for disclosing the local net effects of the proposed actions and for its potential usefulness in making reasoned choices among alternatives.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Hill Air Force Base, Utah (HAFB) Continued		
Cultural Resources	Under the No Action Alternative, Minuteman III test-related activities conducted at HAFB would continue to 2030, or until decisions are made to remove the Minuteman III weapon system from active status. Thus, no impacts on archaeological or architectural resources would continue to be expected under the No Action Alternative. The present use of buildings within the Ogden Air Materiel Historic District for Minuteman III test program support would continue.	Under the Proposed Action, no adverse effects on archaeological resources are anticipated. The only archaeological resource within the APE is the NRHP-eligible railway, which has been abandoned in place. Under the Proposed Action, no adverse effects on architectural resources are anticipated. None of the existing buildings being used for the GBSD Test Program, including the Peacekeeper LF 11531 (Kitterman 2019), are listed or eligible for listing in the NRHP. The proposed campus, however, is located in the Ogden Air Materiel Historic District, which includes seven individually eligible buildings. HAFB began NHPA consultation in support of the GBSD Test Program in October 2019 and identified that the proposed work would continue to support the ICBM mission for which the National Register District and individually eligible buildings are significant. HAFB determined that the proposed GBSD campus would have no adverse effect to historic properties and the SHPO concurred with the determination on October 21, 2019 (HAFB 2019, Utah SHPO 2019) (see **Appendix B**). There are no flight test launches associated with HAFB. Under the Proposed Action, no adverse effects on archaeological or architectural resources are anticipated during operations and maintenance.
Hazardous Material and Waste	Routine operations at HAFB for Minuteman III flight tests result in the same environmental consequences as outlined in existing NEPA documents and standard operating procedures. Therefore, no negative environmental consequences would continue as a result of implementation of the No Action Alternative. Under the No Action Alternative, the 2004 Final EA for Minuteman III Modification (USAF 2004) discusses HAFB's role in the ongoing Minuteman III missile tests.	All hazardous material and waste associated with GBSD operations and maintenance would be managed by HAFB's Hazardous Materials Management Plan and Hazardous Waste Management Plan in accordance with installation regulations and policies. All label directions and safety data sheets would be followed to ensure proper handling and disposal of hazardous material and waste. Safety data sheets would be kept current at all construction and demolition sites on HAFB. The hazardous material and waste used or generated as a result of operations and maintenance for GBSD facilities are not anticipated to introduce unmitigable human health or environmental risks to HAFB.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Hill Air Force Base, Utah (HAFB) Continued		
Health and Safety	Under the No Action Alternative, no significant impacts on health and safety would continue to be expected at HAFB. Minuteman III test-related activities conducted at HAFB would continue to 2030, or until decisions are made to remove the Minuteman III weapon system from active status. The supporting actions conducted on and off HAFB, including the transport of Minuteman III missile components over public roadways, would continue to be considered routine and are dictated by standard operating procedures.	Long-term, minor, adverse impacts are anticipated at HAFB over the approximate 10-year period during which the ongoing Minuteman III test program and the proposed GBSD Test Program campus activities would be conducted in parallel. HAFB currently supports a variety of other tests and training on ICBM hardware and software components. These actions are considered routine and are dictated by standard operating procedures.
Infrastructure	Under the No Action Alternative, Minuteman III test-related activities conducted at HAFB would continue to 2030, or until decisions are made to remove the Minuteman III weapon system from active status. The supporting actions conducted at HAFB would continue to be considered routine and are dictated by standard operating procedures.	No adverse impacts are anticipated. Long-term, negligible, beneficial impacts on the HAFB electrical power system, natural gas, potable water, and wastewater management would be expected from the flight test activities conducted during operation of the GBSD Test Program. Long-term, negligible, adverse impacts on stormwater drainage at HAFB would be expected from the flight test activities conducted during operation of the GBSD Test Program. Operation of the proposed campus would increase impervious surfaces at HAFB by 15 acres, which could increase stormwater runoff. Long-term, negligible, adverse impacts would be expected on solid waste management at HAFB from the flight test activities conducted during operation of the GBSD Test Program. Operation of the GBSD Test Program would increase the quantity of solid waste generated at HAFB due to the 820 new personnel. The existing HAFB solid waste management contract would be amended to accommodate collection and disposal of solid waste generated at the GBSD Test Program Campus.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Hill Air Force Base, Utah (HAFB) Continued		
Noise	No changes to the existing conditions with respect to noise levels would occur. The No Action Alternative would continue to result in the same environmental consequences that result from routine operations at HAFB for Minuteman III flight tests and are regulated under existing NEPA documentation. Under the No Action Alternative, for Minuteman III Modification the USAF 2004 Final EA discusses HAFB's role in the ongoing Minuteman III missile tests.	Noise from construction will be localized and temporary. No significant impacts to workers during operation and maintenance activities are anticipated. Personnel associated with the operation and maintenance of the GBSD complex are anticipated to be exposed to a noise level less than 70 dB for less than 24 hours No significant impacts to workers during operation and maintenance activities are not anticipated.
Socioeconomics/ Environmental Justice	The affected environment would continue to be influenced by ambient environmental conditions and other ongoing development projects. The Regulatory Framework, is current, and would not change.	Implementation of the Proposed Action would not result in significant or high and adverse short-term environmental justice impacts in the defined Region of Influence. A housing shortfall would cause negligible impacts over a 10-year period. This EA/OEA has identified no effects that would result in disproportionately high or adverse effects on minority or low-income populations in the area. he activities would also be conducted in a manner that would not exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination because of their race, color, national origin, or socioeconomic status.
Transportation/ Traffic	The supporting actions conducted at HAFB are considered routine and are dictated by standard operating procedures. The No Action Alternative would continue to not result in any construction activities, additional personnel, or trips. There would continue to be no transportation or traffic impacts under the No Action Alternative.	Short-term, negligible, adverse impacts on transportation/traffic at and near HAFB would occur during site preparation and construction. Long-term, minor, adverse impacts on transportation/traffic at and near HAFB would occur under the Proposed Action. The GBSD Test Program campus at HAFB is expected to be operational by 2024. The WFRC 2019-2050 Regional Transportation Plan includes improvements for roads leading to the Roy and West Gates by 2030 and for roads leading to the South Gate in Phase 2 (by 2040). The minor adverse impacts on traffic from the Proposed Action could be reduced with these planned transportation improvements.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Hill Air Force Base, Utah (HAFB) Continued		
Water	The existing HAFB water quality compliance documents and management plans for stormwater and wastewater would remain unchanged and in-effect. No negative environmental consequences would continue from implementation of the No Action Alternative. Under the No Action Alternative, for Minuteman III Modification the USAF 2004 Final EA discusses HAFB's role in the ongoing Minuteman III missile tests.	The proposed construction for GBSD facilities would not be anticipated to redirect, dam, drain, or withdraw from any of HAFB's surface water or groundwater bodies. No water resources would be impacted by operations and maintenance actions for the Proposed Action.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Vandenberg Air Force Base, California (VAFB)		
Air Quality	Under the No Action Alternative, no change to the existing conditions with respect to air quality have occurred since the preparation of the 2013 Final EA. The total direct and indirect emissions associated with conducting the Minuteman III flight tests estimations would continue to exceed *de minimis* levels.	Construction-related emissions would be short-term, temporary, and would be confined to the construction site area. An air quality permit must be in place prior to construction. The increase launches do not exceed the general conformity significant indicator levels for pollutants of concern. Additionally, based on the historical data for the exhaust emissions of four Minuteman III launches, the exhaust emissions from 61 individual and single flight tests are below the general conformity significant indicator levels for pollutants of concern. Additionally, the implementation of the Mitigation Measures listed in **Section 4.2.2.1.4** would reduce the emission of CO from operations and maintenance.
Airspace	Minuteman III flight tests would continue to be conducted in accordance with established Federal Aviation Administration, U.S. DoD, and USAF navigation and airspace safety policies and procedures. Close coordination with the Los Angeles Air Route Traffic Control Center by the launch operations manager, the ability for VAFB to schedule restricted airspace over the installation and ocean range, and existing range safety and notification requirements minimize potential impacts on the use of airspace by general aviation during launches would continue.	No impacts on airspace are expected at VAFB. The environmental consequences of ongoing Minuteman III testing on airspace at VAFB are not expected to be different under the Proposed Action than under the No Action Alternative. Close coordination with the Los Angeles ARTCC by the launch operations manager, the ability for VAFB to schedule restricted airspace over the installation and ocean range, and existing range safety and notification requirements would minimize potential impacts on the use of airspace by general aviation during launches.
Biological Resources	Under the No Action Alternative, Minuteman III activities would continue to have minor short-term impacts to some biological resources including vegetation, wildlife, and threatened and endangered species and would have no impacts to environmentally sensitive habitats at VAFB. There would continue to be minimal short-term impacts to vegetation surrounding launch facilities due to launch emissions and heat. Exposure to short-term noise from launches and helicopter overflights (if conducted) would have the potential to cause temporary behavioral disturbance in	**Site Preparation and Construction.** Under the Proposed Action, site preparation and new construction would have moderate impacts on vegetation and sensitive habitat types at VAFB including vernal pool and Burton Mesa chapparal habitats. New construction may also have impacts on some sensitive wildlife species including the Endangered Species Act (ESA)-listed vernal pool fairy shrimp and California red-legged frog. A number of monitoring, avoidance, and mitigation measures would be in place to reduce the impacts of proposed facility construction on vegetation, wildlife, and sensitive habitats at VAFB. With

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Vandenberg Air Force Base, California (VAFB) Continued		
Biological Resources (Continued)	hauled out pinnipeds, protected bird species, and other wildlife but would not change the distribution or abundance of any wildlife species. The USAF has consulted with the USFWS on the effects of ongoing Minuteman III launch activities, on threatened and endangered species. The USAF would continue to implement mitigation measures and monitoring requirements detailed in the Programmatic Biological Opinion for VAFB (USFWS 2015 and 2018). Ongoing launch operations may cause minor, short-term effects on some threatened or endangered species but would not jeopardize the continued existence of these species. Elevated noise levels due to ongoing Minuteman III launch activities at VAFB would continue to have the potential to disturb hauled out pinnipeds protected under the MMPA. The USAF has consulted with the NMFS and obtained a programmatic take by Level B harassment permit for seals and sea lions (NMFS 2019, USAF 2020e). The USAF would continue to implement the protective measures detailed in the permit and launch activities would have no more than a negligible impact on hauled out pinnipeds (NMFS 2019, USAF 2020e).	implementation of these measures impacts to biological resources would be less than significant. The USAF has prepared a biological assessment to fully evaluate the effects of proposed construction on ESA-listed species and has determined that the action may adversely affect some ESA-listed species. The USAF has initiated consultation with the USFWS under Section 7 of the ESA to ensure the appropriate measures are in place to protect these species. **Flight Test Activities.** Under the Proposed Action, the impacts of flight test activities would be similar to the impacts of ongoing flight testing under the No Action Alternative. Launch activities would have minor, short-term impact on some rare or special-status vegetation and wildlife including, hauled-out pinnipeds and nesting birds. A number of monitoring and minimization measures would be in place to reduce impacts to special-status species including measures required under the terms of the USFWS Programmatic Biological Opinion (USFWS 2018) and the NMFS Letters of Authorization under the MMPA (NMFS 2019) for pinniped take by harassment for ongoing launch activities at VAFB. Flight test activities would not change the distribution or relative abundance of any vegetation or wildlife species at VAFB and impacts would be less than significant. **Operations and Maintenance.** Daily operations and maintenance of Minuteman III and GBSD facilities would have minimal impacts to biological resources at VAFB. Operation and maintenance of new facilities and existing facilities under the Proposed Action would occur in compliance with the requirements of programmatic operations at VAFB and biological resources would be managed by the installations Natural Resource Management Division under the installations Integrated Natural Resource Management Plan. Mitigation Measures are provided in **Section 4.2.2.2.4**.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Vandenberg Air Force Base, California (VAFB) Continued		
Climate Change		The magnitude of climate change beyond the next few decades will depend primarily on the amount of GHGs (especially carbon dioxide [CO2]) emitted globally. The potential effects of GHG emissions generated by the Proposed Action are by nature global. Given the global nature of climate change and the current state of science, it is not useful at this time to attempt to link the emissions qualified for local actions to any specific climatological change or resulting environmental impact. Therefore, the quantitative analysis of CO2e emissions in this EA/OEA is for disclosing the local net effects of the proposed actions and for its potential usefulness in making reasoned choices among alternatives.
Coastal Zone	Under the No Action Alternative, there would be no new or increased levels of impacts within the coastal zone. Minuteman III test-related activities conducted at VAFB would continue through 2030, or until decisions are made to remove the Minuteman III weapon system from active status. The No Action Alternative would not result in any new construction activities, major facility modifications, vegetation clearing, excavations, or other ground disturbance, as current Minuteman III-related facilities and infrastructure would continue to be used and maintained.	Under the Proposed Action, the combination of the ongoing Minuteman III flight test activities and proposed GBSD Test Program activities would not result in significant impacts on the coastal zone at VAFB. Under the Proposed Action, USAF would continue to comply with Federal Coastal Zone Consistency regulations (15 CFR Part 930) and the California Coastal Management Program.
Cultural Resources	Under the No Action Alternative, Minuteman III test-related activities conducted at VAFB would continue through 2030, or until decisions are made to remove the Minuteman III weapon system from active status. USAF conducts up to four flight tests annually with a fifth test in some years. The No Action Alternative would not result in any construction activities, major facility modifications, excavations, or other ground disturbance, as current Minuteman III-related facilities and infrastructure would continue to be used and maintained.	During site preparation and construction, USAF would develop appropriate avoidance, minimization, or mitigation measures in consultation with the California SHPO and consulting parties that would reduce these adverse effects below a significant impact threshold under NEPA. For architectural resources, all anticipated adverse effects would be reduced below a significant impact threshold through consultation to avoid, minimize, or mitigate the adverse effects under Section 106. Therefore, no significant impacts are anticipated. Under the Proposed Action, no adverse effects on archaeological or architectural resources are anticipated from operations. Mitigation Measures are provided in **Section 4.2.2.5.4**.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Vandenberg Air Force Base, California (VAFB) Continued		
Geology and Soils	Under the No Action Alternative, the 2013 *Final Supplemental Environmental Assessment for Minuteman III Extended Range Flight Testing* and FONSI concluded that no impacts to geology and soil resources would occur as a result of its actions. No geology and soil resources are anticipated to be affected at VAFB for the ongoing Minuteman III program.	The proposed construction would be relatively shallow and is not anticipated to result in contamination, substantial degradation, or loss of value to the soil. During flight test activities no adverse effects on geology and soil resources are anticipated. Flight test activities associated with the GBSD Test Program at VAFB would be conducted similarly to that of the ongoing Minuteman III flight tests.
Hazardous Material and Waste	Under the No Action Alternative, no change to the existing conditions with respect to hazardous material and waste have occurred since the preparation of the 2013 *Final Supplemental Environmental Assessment for Minuteman III Extended Range Flight Testing* and FONSI.	The proposed construction for GBSD facilities at VAFB would increase the use and generation of hazardous material and waste during site preparation and construction, however this would be temporary. Minuteman III pre-test motor inspections, system checks, addition of test reentry vehicles (RVs) and FTS are routine activities that do not exceed VAFB's hazardous waste management plan. Routine post-test refurbishment would follow established standard operating procedures.
Health and Safety	Under the No Action Alternative, no significant impacts on health and safety would be expected at VAFB. Minuteman III test-related activities conducted at VAFB would continue through 2030, or until decisions are made to remove the Minuteman III weapon system from active status.	Pre-test motor inspections, system checks, addition of test RVs and FTS are routine activities that do not exceed VAFB's hazardous waste management plan. Routine post-test refurbishment would follow established standard operating procedures. Short-term, negligible, adverse impacts on health and safety would result from construction and demolition associated with the proposed GBSD Test Program facilities and infrastructure on North Base. Public health and safety for the proposed GBSD flight tests would be ensured through the establishment of launch hazard areas and debris impact corridors; beach and access road closures (as necessary); evacuation of offshore oil rigs (as necessary); and the coordination and monitoring of train traffic passing through the installation.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Vandenberg Air Force Base, California (VAFB) Continued		
Infrastructure	Under the No Action Alternative, Minuteman III flight test program activities conducted at VAFB would continue through 2030, or until decisions are made to remove the Minuteman III weapon system from active status. The supporting actions conducted at VAFB are considered routine and are dictated by standard operating procedures.	Short-term, negligible, adverse impacts on the utility systems (i.e., electrical power, natural gas, potable water, and wastewater management) would be expected during site preparation and construction at VAFB. Because the proposed flight test activities at VAFB would occur no more than nine times per year and each test event would last just a few days, the overall effects on infrastructure from such actions would be minor. No adverse impacts and long-term, negligible, beneficial impacts on the VAFB infrastructure would be expected from the test activities conducted during operations and maintenance for the GBSD Test Program.
Noise	Under the No Action Alternative, Each Minuteman III flight test launch will generate noise levels ranging from 125 dB (unweighted) in the immediate vicinity of the launch site at VAFB, to around 105 dB (unweighted) or lower in some populated areas off base.	Overall impacts from noise during construction would be short-term and is not anticipated to a cause significant noise impacts. Noise exposure from pre-flight activities is minimal. The continuing Minuteman III launch actions combined with the GBSD launch actions, the launches per year would have no significant impact on ambient noise levels.
Socioeconomics/ Environmental Justice	Under the No Action Alternative, the Proposed Action would not occur and there would be no significant impacts on socioeconomics or environmental justice. No changes to the affected environment for socioeconomics or environmental justice have occurred since the preparation of the 2019 Minuteman III Modification Supplemental EA United States Space Command Headquarters Basing and Construction.	Implementation of the Proposed Action would be expected to have a positive socioeconomic impact on the region of influence during the site preparation and construction phase. Based on the increase in population and the possibility that a percentage of the increased population are already living in the area and would not have a negative impact on the housing shortfall, the housing shortfall would cause negligible impacts over a 10-year period.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Vandenberg Air Force Base, California (VAFB) Continued		
Transportation/ Traffic	Under the No Action Alternative, Minuteman III annual flight test activities conducted from VAFB would continue through 2030, or until decisions are made to remove the Minuteman III weapon system from active status. USAF conducts up to four flight tests annually with a fifth test in some years.	Short-term, negligible, adverse impacts on transportation/traffic at and near VAFB would occur during site preparation and construction. Long-term, negligible, adverse impacts on transportation/traffic at and near VAFB would occur during GBSD Test Program activities. Flight test activities would not result in more than negligible adverse impacts on traffic on SR-1 and SR-246. Like the Minuteman III program, all transportation for GBSD would be accomplished in accordance with DoD, USAF, U.S. DOT, and state DOT policies and regulations. VAFB and its contractors would follow federal, state, and local regulations regarding maintaining original site hydrology, and revegetate or leave unpaved areas in a permeable state to allow for maximum surface drainage.
Water	For the No Action Alternative, the 2013 *Final Supplemental Environmental Assessment for Minuteman III Extended Range Flight Testing* and FONSI determined that water quality would not be impacted as a result of Minuteman III flight testing. No impacts to water resources are anticipated at VAFB for the ongoing Minuteman III program.	The proposed construction for GBSD facilities would not be anticipated to redirect, dam, drain, or withdraw from any of VAFB's surface water or groundwater bodies. No water resources would be impacted by pre-test preparation and support for the Proposed Action. No water resources would be impacted by operations and maintenance actions for the Proposed Action. Mitigation Measures are provided in **Section 4.2.2.12.4.**

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
U.S. Army Dugway Proving Ground (DPG)		
Air Quality	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. Under the No Action Alternative, the existing condition of air quality and climate change resources at DPG would not change.	A temporary increase in emissions (i.e., fugitive, volatile organic compounds, CO2e) would occur as a result of site preparation and construction activities. Emission will decrease as construction work is completed. DPG would continue to comply with the current air permit that address the current exceedance of the significant indicator level. Overall the operation of the GBSD PSSTF would not have a significant impact to air quality at DPG. Any additional activities not included in the Proposed Action would be considered a separate undertaking under NEPA. Mitigation Measures are provided in **Section 4.2.3.1.3.**
Biological Resources	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. Under the No Action Alternative, the existing condition of biological resources at DPG would not change.	Construction and operation of the PSSTF under the Proposed Action would not have a significant impact on biological resources under any of the three site alternatives. Construction of the PSSTF would remove vegetation on the site. However, no ESA-listed vegetation occurs in the region of influence and with implementation of avoidance and minimization measures, proposed new construction would not significantly impact vegetation. Operation of the testing facility may have minor impacts on some wildlife species through habitat loss and disturbance from elevated noise levels, but no changes in species distributions or relative abundance at DPG would occur. The potential construction areas include Great Basin vegetated dune habitat which is considered a sensitive habitat at DPG. Construction activities in this area should be limited to the minimum area necessary and laydown areas should be located in disturbed areas or non-native vegetation types rather than in Great Basin vegetated dune habitat to reduce impacts to this habitat type. Since only approximately 1.5 acres would be used for construction, impacts to this sensitive habitat would be less than significant. Mitigation measures are provided in **Section 4.2.3.2.3.**

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
U.S. Army Dugway Proving Ground (DPG) Continued		
Cultural Resources	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. By not implementing the Proposed Action, the potential for environmental impacts associated with the project construction and operations would not occur.	Under the Proposed Action, no significant impacts on archaeological resources are anticipated. The Rad Pad alternative sites are within areas that have been previously surveyed. Under the Proposed Action, no impacts on architectural resources are anticipated. The three alternative sites are previously undeveloped, and the nearest NRHP-eligible resources are at the Rad Pad site. Under the Proposed Action, no adverse effects on archaeological or architectural resources are anticipated from operations. PSSTF-related operations and maintenance activities would be similar in nature to other activities currently conducted at DPG.
Geology and Soils	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. Under the No Action Alternative, the existing condition of geology and soils at DPG would not change.	For any construction areas with potential soil contamination or presence of MEC, appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance. During construction, temporary soil erosion would be expected to occur. With proper BMPs, NPDES constraints, and low-impact development during construction temporary soil erosion should be mitigable. The Proposed Action at DPG is to establish and operate the PSSTF for the foreseeable future. Long-term soil erosion by water or wind is a possibility at any disturbed site; however, the activity proposed will likely increase the disturbance of natural soil stability at the site (live-fire training exercises, etc.).

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
U.S. Army Dugway Proving Ground (DPG) Continued		
Hazardous Material and Waste	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. Under the No Action Alternative, the existing condition of hazardous material and Waste at DPG would not change.	The Proposed Action would have short-term, negligible, adverse impacts on DPG's Hazardous Material and Waste resources during site preparation, construction, operation, and maintenance of the PSSTF. The proposed PSSTF would be built to the same physical specs as an operational LF for all topside and below grade structures down to the lower floors, but without the full underground missile silo.
Health and Safety	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. By not implementing the Proposed Action, the potential for new or increased health and safety risks associated with the project construction and operations would not occur.	Short-term, negligible, adverse impacts on health and safety would result from construction associated with the proposed PSSTF near any of the three Rad Pad alternative sites and the temporary concrete batch plant at DPG. Long-term, negligible, adverse impacts on health and safety would be expected from GBSD program-related actions at any of the three PSSTF alternative sites. Operation of the GBSD PSSTF would include live-fire test and evaluation activities; however, these types of activities are commonly conducted at DPG.
Infrastructure	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. By not implementing the Proposed Action, the increase in infrastructure demands associated with the project construction and operations would not occur.	Short-term, negligible, adverse impacts on the electrical power supply system, stormwater drainage, and solid waste management, could occur during PSSTF site preparation and construction, and installing power line connections from the DPG electrical power system to the selected alternative site. No adverse impacts and long-term, negligible, beneficial impacts on the DPG electrical power supply system would be expected during operations and maintenance of the GBSD PSSTF. Long-term, negligible, adverse impacts on stormwater drainage at DPG would be expected during operation and maintenance of Alternative 1, 2, or 3 at DPG. Long-term, negligible, adverse impacts on the solid waste management system at DPG would be expected during operations and maintenance of Alternatives 1, 2, or 3 at DPG.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
U.S. Army Dugway Proving Ground (DPG) Continued		
Noise	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. Under the No Action Alternative, the existing condition of noise at DPG would not change.	Short-term noise is anticipated to occur during the construction phase of the PSSTF. Short-term effects would be due to noise from the use of construction equipment (i.e., light and heavy equipment) during construction and modification. Test events are anticipated to occur monthly from FY 2025 and potentially last through FY 2029. Overall, elevated noise levels are not expected to impact surrounding buildings, facilities, or ranges on DPG.
Water	Under the No Action Alternative, the GBSD PSSTF would not be constructed and no GBSD test activities would be conducted at DPG. Under the No Action Alternative, the existing condition of water at DPG would not change.	The Proposed Action would have short-term, negligible, adverse impacts on DPG's water resources during site preparation, construction, operation, and maintenance of the PSSTF. DPG has the water management resources accessible to accommodate construction and long-term use of the PSSTF. Established water management practices would be followed including all local, state, federal, and DoD laws, rules, and regulations.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Downrange Test and Support Locations		
United States Army Garrison-Kwajalein Atoll		
Air Quality	Under the No Action Alternative, no change to the existing conditions with respect to air quality have occurred since the preparation of the 2020 Final Supplemental EA for Minuteman III Modification and Fuze Modernization.	Implementation of the Proposed Action within a downrange area would have no significant impact on air quality.
Airspace	Under the No Action Alternative, ongoing flight testing of Minuteman III missiles would continue at USAG-KA, with RVs normally being targeted at the KMISS deep ocean range just east of the atoll.	Under the Proposed Action, negligible adverse impacts on airspace are expected from the combined Minuteman III and GBSD flight tests that would be conducted at USAG-KA.
Biological Resources	Under the No Action Alternative, ongoing Minuteman III testing would continue with reentry RV impacts in the KMISS area. The consequences for biological resources at USAG-KA would remain the same as those concluded in the Minuteman III Modification Supplemental EA. No significant impacts on biological resources would be expected. Marine mammals and other important marine wildlife have the potential to be affected by RV impacts in the deep ocean waters but the potential for harm is extremely low and any effects are expected to be limited to short-term behavioral disturbance with no impacts on local populations. The USAF has consulted or coordinated with the NMFS and the USFWS on the effects of Minuteman III test activities on UES-listed species and would continue to abide by the terms of those consultations. Minuteman III testing would continue with no land or shallow water impacts; therefore, there would be no impacts to terrestrial or nearshore marine species.	Under the Proposed Action, both Minuteman III and GBSD testing would occur at USAG-KA. GBSD testing would be similar to Minuteman III testing in many respects but, for the up to six tests per year, RV impacts may occur either in the deep waters of the KMISS area, on Illeginni Islet, or in the vicinity of Illeginni Islet (i.e., the waters southwest of Illeginni Islet). Of the up to six tests per year, only up to three total tests over the entire test program would impact on land at Illeginni Islet. A number of monitoring, avoidance, and mitigation measures would be in place for the Proposed Action to reduce impacts to biological resources at USAG-KA. **Deep Offshore Waters**. Under the Proposed Action, potential impacts on biological resources in the offshore waters of Kwajalein Atoll may include exposure to elevated noise levels, direct contact from RV components, disturbance from human activity and vessel operation, and exposure to hazardous chemicals. The potential impacts from the GBSD tests expected to be of the same types and magnitude as for Minuteman III tests under the No Action Alternative. The addition of GBSD tests to this area may lead to additional accumulation of marine debris in the KMISS area and would slightly increase the risk to marine wildlife due to the increased number of

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Downrange Test and Support Locations (Continued)		
United States Army Garrison-Kwajalein Atoll (Continued)		
Biological Resources (Continued)		tests per year. However, the impacts of the proposed action on wildlife species in the offshore waters region of influence would still be less than significant. **Illeginni Islet and in Nearshore Waters**. Land RV impacts have been discontinued for the Minuteman III program; therefore, future Minuteman III activities would not contribute to consequences at Illeginni Islet. Proposed GBSD testing would include up to three total tests with RV impact on land at Illeginni Islet through 2029. The Proposed Action has the potential to directly or indirectly affect biological resources through elevated sound pressure levels; direct contact and shock waves; exposure to hazardous materials; disturbance due to human activity or equipment operation; and vessel strike. Impacts to terrestrial vegetation would be minor, while no impacts to marine vegetation are expected. With implementation of mitigation measures, sensitive wildlife species on Illeginni Islet are not likely to be adversely affected and impacts would be less than significant. A substantial number of UES-protected marine wildlife occurs offshore of the Illeginni Islet RV Impact Zone in reef habitats. As with previous Minuteman III RV testing on Illeginni Islet, the USAF has evaluated the impacts of activities based on the worst-case scenario of a shoreline impact which might introduce debris and shock waved into nearshore habitats. The USAF has determined that some invertebrate species might be impacted by test activities at Illeginni Islet but that the Proposed Action is not likely to change the distribution, relative abundance, or recovery ability of any species at Kwajalein Atoll. Therefore, impacts would be less than significant to protected invertebrates and other wildlife in the region of influence. Since the USAF has concluded that the Proposed Action may adversely affect seven coral species, three mollusk species, and one fish species listed as consultation species under the UES, the USAF consulted with NMFS for the effects of the proposed activities at Kwajalein Atoll. The USAF has also consulted with the USFWS for potential effects on nesting sea turtles at Illeginni Islet. Mitigation measures are provided in **Section 4.2.4.1.1.**

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Downrange Test and Support Locations (Continued)		
United States Army Garrison-Kwajalein Atoll (Continued)		
Cultural Resources	Under the No Action Alternative, ongoing flight testing of Minuteman III missiles would continue at USAG-KA, with RVs normally being targeted at the KMISS deep ocean range just east of the atoll. As such, no impacts on archaeological or architectural resources would be expected.	Under the Proposed Action, little or no adverse impacts on archaeological or architectural resources would be expected at USAG-KA. At Illeginni Islet, there are no substantive archaeological resources. Use of established standards and procedures for the preservation and protection of cultural resources at USAG-KA would continue throughout the Minuteman III and GBSD flight test programs.
Hazardous Material and Waste	Under the No Action Alternative, no change to the existing conditions with respect to Hazardous Material and Waste have occurred since the preparation of the 2019 Minuteman III Supplemental EA.	No additional hazardous material management plans for flight test or impact activities would be required as a result of the Proposed Action.
Health and Safety	Under the No Action Alternative, no significant impacts on health and safety would be expected at USAG-KA. Ongoing flight testing of Minuteman III missiles would continue at USAG-KA, with RVs normally being targeted at the KMISS deep ocean range just east of the atoll.	Under the Proposed Action, no significant impacts on health and safety would be expected at USAG-KA.
Noise	Under the No Action Alternative, no change to the existing conditions with respect to noise have occurred since the preparation of the 2019 Draft EA.	No significant impacts to ambient noise levels are anticipated from the flight test segment of the Proposed Action. In general, noise levels associated with post-test operations would be similar to those generated during pre-test preparation. Thus, no significant impacts to ambient noise levels are expected.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Downrange Test and Support Locations (Continued)		
Broad Ocean Area (BOA)		
Air Quality	No change to the existing conditions with respect to air quality have occurred since the preparation of the 2013 Final Supplemental EA for Minuteman III Modification and Fuze Modernization.	No exceedances of air quality standards are expected, and no new permanent stationary sources of emissions or changes to air emission permits are required.
Airspace	Under the No Action Alternative, ongoing flight testing of Minuteman III missiles would continue over the BOA of the Northern Pacific region along similar flight paths.	Under the Proposed Action, long-term, negligible, adverse impacts on airspace are expected within the BOA of the Pacific region.
Biological Resources	Under the No Action Alternative, Minuteman III activities would continue to have no significant impact on biological resources in the BOA. Within the BOA, the No Action Alternative is expected to have no discernible effect on biological diversity in pelagic or benthic habitats of the BOA. Special status marine wildlife are extremely unlikely to be affected by elevated sound pressures or direct contact by falling Minuteman III components in the BOA and no ESA-listed species are likely to be adversely affected by the No Action Alternative. The No Action Alternative would continue to have no impact on environmentally sensitive habitats including designated critical habitat and essential fish habitat.	Under the Proposed Action, Minuteman III activities in the BOA would continue to have no significant impact on biological resources as described for the No Action Alternative. The potential BOA location for GBSD testing are not presented in the EA/OEA; however, based on test activities of Minuteman III and other missile systems the types of impacts for biological resources in the BOA are expected to be similar. For biological resources, the significance of potential impacts would depend on the biological resources present at proposed BOA locations. However, biological resources could be exposed to elevated sound pressure levels from sonic booms or component splashdown, direct contact from vehicle components, and exposure to hazardous chemicals. Environmental analyses for a number of other missile system flight tests within open ocean areas of the Pacific Ocean have been conducted, including for Minuteman III. Generally, environmental analyses for Minuteman III and other missile systems have concluded that there would be no significant impacts to biological resources in the BOA. Furthermore, these analyses have indicated that adverse effects to special status species and/or sensitive habitats in the BOA are unlikely for these types of flight tests. A location specific analysis of GBSD flight test impacts to biological resources in the BOA will be conducted in the classified annex to this EA/OEA.

Table 2-5. Comparison of Potential Environmental Consequences (Continued)		
Locations and Resources Affected	**No Action Alternative**	**Proposed Action**
Downrange Test and Support Locations (Continued)		
Broad Ocean Area (BOA) Continued		
Health and Safety	Under the No Action Alternative, no significant impacts on health and safety would be expected under the No Action Alternative. Existing shipping/receiving, storage, and docking facilities on Guam are used for storing sensor rafts and staging the Navy Mobile Instrumentation System observation ship or a similar vessel in preparation for Minuteman III ICBM and RV flight test missions in the BOA.	Under the Proposed Action, no significant impacts on health and safety would be expected within the BOA of the Pacific region.

2.5 Mitigation Measures

Mitigation measures are designed to avoid, minimize, rectify, reduce, or compensate for potential adverse effects to various environmental resources during implementation of the Proposed Action. These measures are listed in **Chapter 4** and would become an attachment to the FONSI.

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3.0 Affected Environment

This chapter describes existing environmental conditions for each of the Proposed Action locations identified and described in **Chapter 2.0**. The ongoing Minuteman III flight tests and related operations were taken into consideration in describing the Affected Environment.

3.1 Hill Air Force Base

HAFB is in Northern Utah and is bordered by the Wasatch Mountains on the east and overlooks the Great Salt Lake to the west. It is located in Davis and Weber Counties about 30 miles north of Salt Lake City and comprises 6,600 acres. It is south of the city of Ogden, and near the towns of Layton, Clearfield, Riverdale, Roy, and Sunset. HAFB is an Air Force Materiel Command base, and it is the home of several operational and support missions (see **Figure 2-3**).

Rationale for Environmental Resources Analyzed

In compliance with NEPA, CEQ, and USAF environmental impact analysis process (EIAP) regulations and guidelines, this EA/OEA focuses only on those environmental resources considered potentially subject to impacts from the Proposed Action. Air quality, climate change, infrastructure, noise, and transportation/traffic are the environmental resource areas of concern requiring discussion for HAFB.

The remaining environmental resources were not analyzed further because negligible impacts to these resources are anticipated as a result of implementing the Proposed Action. This section explains why airspace, biological resources, cultural, hazardous material and waste, health and safety, socioeconomics/environmental justice, land use, visual aesthetics and water were dismissed from detailed analysis in this EA/OEA.

The proposed activities are well within the limits of current operations and permits at HAFB. Thus, there would be no effects on airspace and land use resources. Any new construction would not alter the current landscape of the project area; therefore, no impacts to visual aesthetics resources would be expected.

The Proposed Action does not require any ground-disturbing activities within any non-surveyed areas (i.e., biological or cultural resources surveys). Based on previous documents and maps this area appears to have been previously disturbed due to its flat topography, sparse vegetation, and proximity to buildings and roads (see maps throughout **Section 3.1**). The proposed construction in this area would be relatively shallow and is not anticipated to result in contamination, substantial degradation, or loss of value to the soil; therefore, no impacts to biological resources would be expected. Biological resources at HAFB are currently managed under the installation's Integrated Natural Resources Management Plan (INRMP) as well as Integrated Pest Management Plan, Wildland Fire Management Plan, Stormwater Management

Plan (SWMP), and Bird/Wildlife Aircraft Strike Hazard (BASH) Plan (HAFB 2016b). Natural resource management at HAFB has included extensive habitat and vegetation mapping as well as comprehensive species inventories (HAFB 2016). Vegetation within the region of influence (ROI) consists primarily of developed areas with maintained grasses and landscaped trees and shrubs (HAFB 2016). A portion of the ROI includes degraded sage habitat; predominantly covered in grasses, forbs, and sparse shrubs (USAF 2016b, HAFB 2016b). No ESA threatened, endangered, or candidate species are known to occur on HAFB (HAFB 2016). HAFB has compiled a list of Species of Concern for the base (Table 5.4.2 in HAFB 2016) which includes Utah State Species of Concern and Birds of Conservation Concern (BCC) and manages for these species. Where project work must occur during the migratory bird nesting season and in suitable habitat, the USAF would coordinate with HAFB natural resource management to minimize the risk to nesting birds in the project area. The Proposed Action would have minimal to no adverse impact on biological resources at HAFB.

The only archaeological resource within the APE is the NRHP-eligible railway, which has been abandoned in place. The Proposed Action would not impact the railway. HAFB entered into a MOA with the Utah SHPO in 2014 to mitigate adverse effects to the railway at that time, as well as all future activities affecting the railway (HAFB 2014a). No other archaeological sites have been located within the APE for the proposed GBSD Test Program campus. For Architectural resources, none of the existing buildings being used for the GBSD Test Program, including the Peacekeeper LF 11531 (Kitterman 2019), are listed or eligible for listing in the NRHP. The construction would take place in areas where previous ground disturbance has occurred and there is a low likelihood of subsurface archaeology. HAFB would follow its Unanticipated Discovery of Archaeological Resources Protocol in the event that cultural material is found. There are no flight test launches associated with HAFB.

Development associated with the GBSD Test Program campus at HAFB would provide revenue to local equipment suppliers and construction workers during the construction phase. This is a beneficial impact for the surrounding community. If the contractor(s) is sourced from outside of the defined ROI, sufficient local lodging accommodations exist to accommodate these workers throughout the proposed construction stages; this is estimated as a maximum of 200 workers for the most personnel-intensive phase of construction, which would last for approximately 2 years. Implementation of the Proposed Action would not result in significant or high and adverse short-term environmental justice impacts in the defined ROI. Potential environmental justice impacts evaluated in this EA/OEA would occur primarily on site; off-base minority, low-income, and youth populations would not be affected. The approximate 840 new personnel would relocate to the GBSD Test Program campus from other areas of the installation. The new individuals could move into the area in discrete unknown intervals within the 10-year period. All new military personnel, government civilians, and contractors working at the campus would be expected to have or find housing and related amenities/services in the local communities. Personnel who are community-based could already be living in the area, which may not add to the housing demand. Based on the increase in population and the possibility that a percentage

of the increased population are already living in the area and would not have a negative impact on the housing shortfall, the housing shortfall would cause negligible impacts over a 10-year period. This EA/OEA has identified no effects that would result in disproportionately high or adverse effects on minority or low-income populations in the area. The activities would also be conducted in a manner that would not exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination because of their race, color, national origin, or socioeconomic status.

The proposed construction for GBSD facilities would not be anticipated to redirect, dam, drain, or withdraw from any of HAFB's surface water or groundwater bodies. Ground disturbing activities may cause soil erosion by wind and water, locally increasing the turbidity of stormwater. Best building and management practices would be in effect during the proposed construction to mitigate site soil erosion, so this effect would be minimal and temporary. HAFB and its contractors would follow the established stormwater management plan and the Hazardous Materials Management Process to ensure there would be no changes to water quality during site preparation and construction. No water resources at HAFB would be used or affected by pre-test preparation and support of the Proposed Action, however HAFB would adhere to all established permits, standard operating procedures, and regulations to maintain water quality health.

3.1.1 Air Quality – HAFB

3.1.1.1 Applicable Regulations

Refer to **Appendix E, Section E.1.1**.

3.1.1.2 Region of Influence

The ROI is within Davis and Weber Counties. The Air Quality Control Region (AQCR) for Utah is code 219.

3.1.1.3 Affected Environment

Existing Emissions

Counties. Air quality in the vicinity of HAFB (Davis and Weber Counties) is impacted by vehicular, refinery, aircraft, and other on- and off-base industrial emissions. The nonattainment/maintenance status for each county in Utah by year for all criterial pollutants indicate that in 2019 Davis County (whole) was in nonattainment for ozone (O_3) and $PM_{2.5}$. In 2019 Weber County (partial) was in nonattainment for O3 and particulate matter less than 2.5 microns in diameter (PM2.5). (USEPA 2019c) See **Table 3-1** for emissions for Davis and Weber Counties during calendar year 2017 (the most recent year of data).

Table 3-1. Summary of Criteria Air Pollutant Emissions (tons/year) for Davis and Weber Counties, Utah									
Pollutant	**CO**	**VOC**	**NO_x**	**O_3**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**HAPs**	**CO_2e**
Davis County Emissions	29,930	11,777	6,503	N/A	3,399	927	164	121.4	N/A
Weber County Emissions	25,328	10,776	4,577	N/A	4,399	996	34.6	49.5	N/A
Total	**55,258**	**22,553**	**11,080**	**N/A**	**7,798**	**1,923**	**198.6**	**170.9**	**N/A**

Source: Utah Department of Environmental Quality 2020.

Note: CO = carbon monoxide, VOC = volatile organic compound, NO_x = oxides of nitrogen, PM_{10} = particulate matter less than 10 microns in diameter, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, SO_2 = sulfur dioxide, HAP = hazardous air pollutant

Installation. HAFB is considered a major source (i.e., a stationary source or group of stationary sources that emit or have the potential to emit 10 tons per year or more of a HAP or 25 tons per year or more of a combination of HAPs) and as such requires submittal of an annual inventory of emission estimates for particulate matter less than 10 microns in diameter (PM_{10}), $PM_{2.5}$, sulfur oxides (SO_x), nitrogen oxides (NO_x), CO, volatile organic compounds (VOCs), and HAP emissions. (HAFB 2019a) The installation operates under a Title V operating permit (No. 1100007003) for emission sources. The installation has extensive industrial facilities for warehousing/distribution, painting, paint stripping, plating, parts, and wastewater treatment. HAFB is a prevention of significant deterioration (PSD) source for NOx and CO, as the potential to emit emissions of each pollutant is greater than 250 tpy.

In addition, HAFB manages and maintains other systems such as conventional air munitions, solid propellants, landing gear and training devices. Criteria and HAPs were estimated for the Main Base of HAFB for calendar year 2018. See **Table 3-2** for the emissions from point and fugitive sources for HAFB during calendar year 2019 (most recent year of data) (HAFB 2019a).

Table 3-2. Summary of Criteria Air Pollutant Emissions (tons/year) for HAFB, Utah									
Pollutant	**CO**	**VOC**	**NO_x**	**O_3**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**HAPs**	**CO_2e**
HAFB Emissions	105	107	109	N/A	15.8	10.4	0.87	45.4	111,000
Total	**105**	**107**	**109**	**N/A**	**15.8**	**10.4**	**0.87**	**45.4**	**111,000**
Percentage Contribution of HAFB – Davis County	0.35%	0.91%	1.68%	N/A	0.46%	1.12%	0.53%	37.4%	N/A
Percentage Contribution of HAFB – Weber County	0.41%	0.99%	2.38%	N/A	0.36%	1.04%	2.51%	91.7%	N/A

Source: HAFB 2020; Utah Department of Environmental Quality 2020

3.1.2 Climate Change – HAFB

Existing Conditions for Climate Change

Due to its topographical, geographical, and climatic diversity, Utah is divided into seven different unique climate divisions. It is important to understand the climatic complexities of each division to determine how climate change will affect the health of various Utah communities. (Spencer et al. 2012)

Davis and Weber counties lie within both the Northern Mountains and North Central climate divisions. (Spencer et al. 2012) These areas are characterized as Humid Continental with no real dry season and warm-to-hot summers. Winters are severe with cold temperatures and abundant snowfall. Annual precipitation amounts can range from 10 to more than 55 inches (Gillies and Ramsey 2009). **Table 3-3** summarizes the climate averages for both Davis and Weber counties.

Table 3-3. Climate Averages for Davis and Weber Counites, Utah

	Davis County, Utah	Weber County, Utah
Rainfall	21.0 inches	21.5 inches
Snowfall	45.4 inches	50.8 inches
Precipitation	83.6 days	84.5 days
Sunny	226 days	226 days
Average July High	90.6°F	90.4°F
Average January High	22.0°F	17.8°F
Comfort Index (Higher =better)	7.2	7
Ultraviolet (UV) Index	4.5	4.5
Elevation	4,580 feet	5,602 feet

Source: Sperling's Best Places (Data retrieved from national data sources)

Greenhouse Gases

Approximately 85 percent of Utah's total GHG emissions result from the consumption of fossil fuels. Non-fossil fuel sources contribute the remaining 15 percent of Utah's total GHG emissions. The Utah electric utility sector produces about 60 percent of the state's total CO_2 emissions. (Utah Department of Natural Resources 2000)

According to a recent 2019 DoD report, HAFB is currently, and has the potential to be impacted by recurrent flooding, drought, desertification, and wildfires due to the effects of a changing climate (DoD 2019).

3.1.3 Hazardous Material and Waste – HAFB

3.1.3.1 Applicable Regulations

Refer to **Appendix E, Section E.1.2**.

3.1.3.2 Region of Influence

The ROI for HAFB is limited to HAFB's existing facilities which handle, collect, store, and ship hazardous material and waste.

3.1.3.3 Affected Environment

Across HAFB there are multiple hazardous material distribution service centers, and hazardous waste collection sites that use eDASH and EESOH-MIS. This enables HAFB to have a standardized system of ordering, tracking, distributing, and final collection of hazardous material and waste across its large campus. The most recent safety data sheets are available in EESOH-MIS for all hazardous substances. HAFB offers educational courses to communicate its EMS to base personnel and contractors.

The Hazardous Waste Storage Facility (HWSF) is also known at HAFB as Buildings 898 and 888 (UDEQ 2010). Building 898 was built in 1983 and is 4,000 ft^2); it is used to store hazardous waste and other materials. Building 888 was built in 1996, is 12,800 ft^2, constructed of concrete blocks and has secondary containment. Building 888 is the primary receiving and storage area for the HWSF (UDEQ 2010). The HWSF accepts listed and characteristic (ignitable, corrosive, reactive, or toxic) waste under a Resource Conservation and Recovery Act (RCRA) Part B permit. Its personnel are trained appropriately to identify and handle hazardous material and waste.

Industrial activities at HAFB generate hazardous waste. According to the 2008 EA for Falcon Hill EUL, typical HAFB hazardous wastes include:

- Hazardous materials that can no longer be used
- Hazardous material spills and residues
- Wastes generated through vehicle maintenance activities
- Wastes created from various types of aircraft testing
- Still bottoms from solvent recovery processes
- Shotblast residues
- Paint wastes
- ICBM maintenance
- Other maintenance

Once hazardous waste is generated and moved to the HWSF, it is allowed to accumulate for up to one year before it is required to be properly disposed at permitted offsite facilities.

The Minuteman III weapons system operations at HAFB are conducted within the Missile Assembly Maintenance and Storage Area. Additional existing support facilities are located near the west side of HAFB, adjacent to the Falcon Hill EUL area (USAF 2008, 2016b). These include the Peacekeeper LF and the TIF. The Peacekeeper LF is an existing missile silo that is inactive and is proposed to be turned over to the GBSD program for future use. The TIF is an existing one-story, 20,000 ft^2 building used for Minuteman III software integration and updates. A new Software Mission Assurance Center (SMAC) and MIF are already planned and approved for construction, which would partly be used in support of the GBSD Test Program (USAF 2011a, 2018a, 2019d, 2019e).

HAFB has been on the NPL list for CERCLA Superfund cleanup since 1987. The USEPA refers to these sites as Operable Units (OU) and all OU at HAFB are currently at various stages of cleanup. The nearest OU under treatment to the Falcon Hill EUL area where proposed GBSD facilities will be erected are OU 9 and OU 10. OU 9 is a trichloroethene (TCE) groundwater plume, and OU 10 has three chlorinated solvent plumes (tetrachloroethene [PCE], shallow TCE, and deep TCE). OU 9 is located over 2,000 feet to the northwest of the proposed location for the SMAC and MIF. OU 9 has some soil contamination, however it is located proximate to the 1100 Area and not in the preferred locations described in this EA/OEA. OU 10 is located less than 2,000 feet to the southwest of the proposed location for the SMAC and MIF. The extent of contamination for OU 10 is confined to groundwater, not soil or air. The Proposed Action for constructing GBSD facilities and revamping current Minuteman III facilities at HAFB are not in a location that would expose chlorinated solvents to workers digging in the vicinity.

The 2008 EA and 2016 SEA for the Falcon Hill EUL Area did not identify any hazards relating to asbestos, lead based paint (LBP), or munitions. Based on its proximity to the Falcon Hill EUL, it is unlikely that this Proposed Action would result in encounters with any of these hazardous substances; however, all federal, state, and USAF regulations with regards to asbestos, LBP, or munitions will be followed by HAFB personnel or contractors.

HAFB Fire Department is tasked with responding to any emergency hazardous material releases on the campus, however HAFB holds coordination agreements for mutual aid for fire protection and hazardous materials incident response with local fire departments and medical facilities (UDEQ 2010). Hazardous material releases are also required to be reported to the appropriate authorities such as state, local, or other agencies as necessary via written report within 72-hours of an incident (UDEQ 2010).

3.1.4 Health and Safety – HAFB

3.1.4.1 Applicable Regulations

Refer to **Appendix E, Section E.1.3**.

3.1.4.2 Region of Influence

The ROI for health and safety at HAFB is limited to ongoing Minuteman III program support areas, the proposed GBSD Test Program Campus, and the U.S. transportation network used in support of ICBM transport operations. The health and safety ROI includes military personnel, contractors, and the general public.

3.1.4.3 Affected Environment

All contractors performing construction and demolition activities at HAFB are responsible for following federal Occupational Safety and Health Administration (OSHA) (29 CFR) and state of Utah safety regulations, and are required to conduct construction and demolition activities in a manner that does not increase risk to workers.

Health and safety at HAFB is managed under the directorate of the Ogden Air Logistics Safety Office. The 75th Civil Engineer Group provides the installation with airport rescue firefighting, structural fire protection, fire prevention, public education, and other emergency response services. The 75th Medical Group's Family Health Clinic and Flight Medicine Clinic are the primary military medical facilities at HAFB. Several other clinics and hospitals, which are devoted to the public, are off-installation in the city of Ogden. These facilities include Davis Hospital and Medical Center, Ogden Regional Medical Center and McKay-Dee Hospital (My Base Guide 2018a).

Interstate highways are the preferred route for the transportation of Minuteman III missile components, although depending on the destination, some state and local routes may be used. The health and safety of travel on U.S. transportation corridors is under the jurisdiction of each state's Highway Patrol and DOT, and the U.S. DOT. USAF coordinates with each state's DOT when the transport of hazardous missile components is planned to occur. USAF has an excellent safety record of transporting missile rocket motors. During the height of the Minuteman Program, from the early 1960s to 1990, over 11,000 Minuteman missile movements involving over 12,400 individual Minuteman rocket motors occurred by air, rail, or road. Since 1962, only three accidents have been associated with these movements, all of them transport truck rollover scenarios. In each of these cases, all USAF property was safely recovered and no damage to the environment or human health occurred (USAF 2004).

As noted in **Section E.1.3**, safety managers at HAFB use federal, DoD, and USAF regulations, directives, instructions, and procedures for the storage, handling and movement of Minuteman III missile components, including motor stages and related explosive materials.

3.1.5 Infrastructure – HAFB

Infrastructure consists of the systems and associated structures, and the utilities that provide public services to enable a population in a specified area to function. The infrastructure and utilities addressed in this analysis include electrical power, natural gas, potable water management, wastewater, stormwater drainage, and solid waste management.

3.1.5.1 Applicable Regulations

Refer to **Appendix E, Section E.1.4**.

3.1.5.2 Region of Influence

The ROI for the analysis of infrastructure and utilities at HAFB includes the proposed GBSD Test Program campus where demolition and construction activities would occur. The analysis also considers the utility services and systems, supporting infrastructure, and supplies at HAFB that could be affected by the Proposed Action.

3.1.5.3 Affected Environment

Electrical Power

HAFB purchases its electrical power from Rocky Mountain Power, a private utility company and subsidiary of PacifiCorp. As part of PacifiCorp, Rocky Mountain Power has a net generating capacity of approximately 10,632 MW from fossil fuel, hydroelectric, wind-powered, and geothermal facilities, and purchases additional energy as necessary (PacifiCorp 2020). Rocky Mountain Power provides 69 MW at 100 percent capacity to HAFB, but the installation's current demand is approximately 45 MW, which equates to a headroom capacity of 24 MW. Supplementary power sources available at HAFB include the Colorado River Storage Project, which is a Bureau of Reclamation project that generates hydroelectric power from long-term storage of Upper Colorado River Basin water, and on-site generation from gas turbines and solar photovoltaic (PV) arrays. Currently, 27 percent of HAFB's energy is generated from renewable sources on the installation itself. The primary source of alternative fuel is from the steam plant southeast of the installation. The other renewable energy source is the 220 kilowatt solar PV array in the southern portion of the installation (HAFB 2016a).

Transmission of commercial electrical power onto the installation occurs at three entry points: two kV lines and one 138 kV line. The power is then distributed through five substations on the installation (HAFB 2016a). The area of the proposed GBSD Test Program campus is serviced by both overhead and underground distribution lines.

Natural Gas

Natural gas is the primary fuel for space heating, industrial steam production, domestic water heating, and process applications at HAFB. Gas is transported and provided by Questar Corporation (part of Dominion Energy) through three main entry points (high pressure feeder

lines) that provide distribution to various portions of the installation, along with seven additional entry points that service specific areas. On-installation distribution capacity is 18,000 dekatherms per day, while current demand is 12,000 dekatherms per day, which equates to a headroom capacity of 6,000 dekatherms (HAFB 2016a). One dekatherm is equal to 10 therms or 1 million British thermal units.

The installation natural gas distribution system includes gas mains ranging in size from 1 to 8 inches. Natural gas mains are accessible along some streets within the proposed GBSD Test Program campus.

Potable Water

Approximately 85 percent of the water consumed at HAFB is pumped from on-installation wells. The remaining 15 percent is purchased from the Weber Basin Water District (HAFB 2016a). Potable water treatment is performed by the water district (USAF 2008). Groundwater supplies are present in three main aquifers, including an unnamed deep, unconfined aquifer along the mountain front, the Sunset Aquifer, and the Delta Aquifer. There are five potable water production wells currently operating at HAFB, including one well near the intersection of Georgia Street and Jonquil Lane, next to Building 1571 and within the proposed GBSD Test Program campus (**Figure 2-10**). The active wells provide water for domestic water consumption and non-potable applications (HAFB 2016a).

The combined water supply available to HAFB is approximately 9.46 million gallons per day (gpd). Current average demand is approximately 2.66 million gpd, while peak demand is 6.85 million gpd. The result is a headroom capacity of approximately 6.8 million gallons during average demand and 2.6 million gallons during peak demand (HAFB 2016a).

The on-installation water distribution system, which is privatized and operated by American Water Operations and Maintenance, Inc., consists of water storage reservoirs and tanks, underground water mains, services lines, and several booster pumps (AFCEC 2014, HAFB 2016a). Underground water mains are located along several streets within the proposed GBSD Test Program campus, as well as within other portions of the project area. Water service lines also cross through the project area.

Wastewater Management

HAFB generates wastewater from domestic and industrial sources and uses separate wastewater collection systems for the sanitary sewer wastewater and process discharge water. Similar to the water distribution system, the sanitary sewer wastewater collection system is privatized with American Water Operations and Maintenance, Inc. (AFCEC 2014).

The installation sanitary sewer wastewater collection system consists of approximately 18 lift stations and extensive sanitary sewer mains ranging in size from 6 to 15 inches, including several gravity flow mains that cross through the proposed GBSD Test Program campus. The

wastewater generated is collected and conveyed off-installation near the South Gate to the North Davis Sewer District (NDSD) Wastewater Treatment Plant (WWTP) for treatment. Although the capacity and headroom of the system is difficult to determine due to the large load that the WWTP receives, the treatment capacity of the WWTP is 34 million gpd on average and 65 million gpd during peak demand (HAFB 2016a). The line that connects HAFB to the NDSD system has a 900-gallons-per-minute capacity, which equates to approximately 1.3 million gpd (USAF 2008). The on-installation wastewater collection system was designed for an average daily flow of 699,384 gpd and a maximum daily flow of 836,452 gpd. On average, the installation discharges approximately 824,000 gpd to the WWTP, but during peak demand approximately 1,000,000 gpd are discharged to the WWTP (HAFB 2016a).

Stormwater Drainage

The HAFB stormwater system collects surface water runoff from the impervious areas of the entire installation. HAFB is subject to municipal stormwater regulations as administered by the Utah Division of Water Quality. Stormwater discharges at the installation are regulated under Phase II Stormwater Regulations of the Multi-Sector General Permit (MSGP) for stormwater discharges associated with industrial activities (UTR000444) and the General Utah Pollutant Discharge Elimination System (UPDES) Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4) (UTR090000). This permit requires the continued implementation of a SWMP with the intent to reduce the discharge of pollutants from the storm drain system and satisfy the appropriate water quality requirements of the Utah Water Quality Act (HAFB 2016b). Utah was granted primacy in the National Pollutant Discharge Elimination System (NPDES) program by the USEPA in 1987, and Utah's program is known as UPDES.

HAFB has implemented two methods to manage stormwater based on the level of development of an area. In the less developed areas of the installation, runoff is allowed to infiltrate into the ground through surface ditches or overland flow, discharging to large unoccupied areas. In the developed areas of the installation, runoff is collected in the storm drainage system (collection boxes, storm drainage/collection pipes and mains) that transport the stormwater to 14 on-installation detention/retention ponds. Stormwater from the detention ponds is discharged via approved outfalls or percolates and evaporates, while stormwater from the retention ponds percolates and evaporates (HAFB 2016b). The outfalls consist of gates that can be manually operated when necessary to control the rate of release of stormwater or contain spills. The ponds require routine maintenance including sediment removal (HAFB 2016, 2014b). Gravity mains cross through the proposed GBSD Test Program campus and there are several stormwater inlets within and adjacent to the project area (HAFB 2016a).

Solid Waste Management

All non-recyclable municipal solid waste (refuse) generated at HAFB is disposed of by a contractor at the Wasatch Integrated Waste Management District Davis Landfill, which is approximately 1 mile east of the installation (HAFB 2018b). In 2017, the remaining capacity the Davis Landfill was approximately 8.9 million cubic yards, which is expected to last until around

2044 (WIWMD 2017). The installation's Qualified Recycling Program (QRP) office coordinates the recycling scrap metal, used oil, scrap lead-acid batteries, and other permitted recyclable commodities through direct sales. Recyclable materials not sold through QRP are recycled by DLA Disposition Services and other organizations on the installation. The general refuse contractor separates out recyclable materials (e.g., paper/cardboard, plastic containers, and aluminum cans) from municipal solid waste and transports the materials to Rocky Mountain Recycling or Recycled Earth for recycle processing. The contractor also collects and transports recyclable materials that are collected throughout the installation and at the installation recycling center. Military family housing at HAFB is privatized; therefore, municipal solid waste generated there is not managed by the installation (HAFB 2018b).

Non-hazardous construction and demolition debris is collected for recycling or disposal. Waste asphalt can be recycled to support specific projects on the installation or disposed at an offsite permitted landfill. Construction and demolition debris, including uncontaminated concrete, can be disposed of at the HAFB landfill. The installation owns and operates an approximately 26-acre Class IVb permitted solid waste landfill located in the northern portion of the installation, which is restricted to receiving only construction and demolition debris (non-hazardous asphalt, concrete, wood, and soil debris) generated at the installation. Contractors typically have requirements to recycle reusable or recyclable material of all types, including construction and demolition debris diversion (HAFB 2018b). In 2019, HAFB received a Class IVb solid waste permit renewal for the existing approximately 26 acres along with a proposed lateral expansion of approximately 6.8 acres. The lateral expansion would be adding to the existing permitted asphalt cell facility and will primarily be used for staging reusable soil, crushed concrete, and broken asphalt (DWMRC 2019).

In FY 2019, HAFB generated approximately 8,800 tons of nonhazardous municipal solid waste, of which 4,300 tons was disposed of at the Wasatch Integrated Waste Davis Landfill and 4,504 tons were reused or recycled. Also in FY 2019, the installation generated 46,787 tons of construction and demolition debris, of which 26,392 tons were disposed of at the HAFB landfill and 20,395 tons were recycled or reused (Bowen 2020).

3.1.6 Noise – HAFB

3.1.6.1 Applicable Regulations

Refer to **Appendix E, Section E.1.5**.

3.1.6.2 Region of Influence

The ROI for noise is the areas closest to the project site that would experience elevated noise from implementation of the Proposed Action.

3.1.6.3 Affected Environment

Standard ambient background noise at HAFB is associated with the airfield and vehicle traffic. HAFB operates one of the busiest airfields in the USAF with approximately 45,000 operations annually. Engine noise from the testing and flight of aircraft is present throughout the day however noise is not persistent. HAFB arrival and departure procedures are coordinated with the Federal Aviation Administration (FAA) and are managed alongside Salt Lake International Airport arrival and departure procedures. To the maximum extent possible, USAF pilots avoid flying over densely populated areas, schools, churches, and public buildings (HAFB 2018a).

3.1.7 Transportation/Traffic – HAFB

Transportation/traffic addresses impacts on roadway networks consisting of streets, highways, and intersections; the operation and flow of vehicular traffic within roadway networks and at installation access control points (i.e., gates); the availability of vehicle parking; and traffic safety from a proposed action.

3.1.7.1 Applicable Regulations

Refer to **Appendix E, Section E.1.6**.

3.1.7.2 Region of Influence

At HAFB, the transportation/traffic ROI consists of the on-installation roadways, parking areas, and access control points leading to the proposed GBSD Test Program campus. The off-installation roadways leading to HAFB that could be affected by the Proposed Action are also part of the ROI. The main roadways leading to HAFB are SR-97 (5600 South), SR-103 (650 North/M Street), SR-232 (Hill Field Road), and SR-193 (700 South). All of these roads are under the jurisdiction of UDOT. **Figure 3-1** shows the major roadways and installation gates within the ROI for HAFB.

3.1.7.3 Affected Environment

On-installation Roadways and Gates

There are 103 miles of roads on HAFB, consisting of 18 miles of primary, 77 miles of secondary, and 8 miles of unpaved access roads. The on-installation streets are classified as arterials, collectors, and local streets. The collectors, which carry the majority of traffic are Southgate Avenue, Wardleigh Road, 6th Street, Balmer Street, and Foulois Road. There are several large parking areas on base, including those within the project area (HAFB 2016a).

Vehicular access to HAFB is currently controlled through three principal access control points: the Roy, West, and South Gates. These gates are described as follows:

- The Roy Gate provides access to the north end of the installation. It is located at the east end of SR-97 (5600 South) in Roy City and connects to Cottonwood Street on base. The Roy Gate is open Monday through Friday from 0400 to 2000, and is closed on weekends and federal holidays. It is the only gate for commercial vehicle access and inspection (open 24-hours-per-day, 7-days-per-week for this purpose).
- The West Gate provides access to the west side of the installation and is closest to the proposed GBSD Test Program campus. It is located on the east end of SR-103 (650 North/M Street) in Clearfield City and connects to M Avenue on base. It is open 24-hours-per-day, 7-days-per-week.
- The South Gate provides access to the south end of the installation. This gate is the main entry point for passenger vehicles and includes the visitor center. It is located at the north end of SR-232 (Hill Field Road) in Layton City and connects to Southgate Avenue on base. It is open 24-hours-per-day, 7-days-per-week. (HAFB 2016a, HAFB 2019b).
- HAFB also has two secondary access control points that are currently closed: the East Gate and the Truck Gate. The East Gate is located on the east side of the installation connecting 6th Street on base to North Fairfield Road off base. The Truck Gate is located on the southwest side of the installation near the residential area. These gates are only open for special events or other gate closures during construction (HAFB 2016a, HAFB 2019b).

Figure 3-1. Major Roads and Gates at HAFB

Off-installation Roadways

Regionally, HAFB is located near the junction of Interstate I-15 and I-84, with I-15 running north and south adjacent to the western boundary. These are the main interstate routes serving the region including the cities of Ogden, Layton, Clearfield, Riverdale, Roy, and Sunset. U.S. Highway (US-) 89 is roughly 2 miles east of HAFB.

The SR-97 (5600 South) interchange with I-15 provides direct access to the installation at the Roy Gate. SR-97 is a five-lane road (two lanes in each direction plus a center turn lane) at the interchange and access to HAFB. The speed limit is 35 miles per hour (mph) near the gate. UDOT conducted a traffic study and concept report on the I-15/5600 South Interchange in 2016 (UDOT 2016b). The study concluded that the existing interchange does not have the capacity to serve both the I-15 northbound off-ramp traffic and the traffic exiting HAFB during the evening peak traffic period. UDOT is currently in the process of preparing an EA to evaluate long term solutions to accommodate future (2050) traffic demand assuming development of the Falcon Hill EUL and a minor increase of employment on the installation. The Wasatch Front Regional Council (WFRC) is the metropolitan planning organization responsible for long range transportation planning for the metropolitan areas in Weber, Davis, and Salt Lake Counties. Improvements to the I-15/5600 South Interchange are included in the WFRC 2019-2050 Regional Transportation Plan in Phase 1 (2019–2030) (UDOT 2016b, WFRC 2019).

SR-103 (650 North/M Street) branches off from SR-126 (Main Street) in Clearfield on the west side and extends to the HAFB West Gate. Its interchange with I-15 provides direct access to the installation at the West Gate. It widens from one through lane in each direction on the west to three through lanes in each direction on the east, with numerous turning lanes. The speed limit is 30 mph. UDOT conducted a traffic study to identify improvements at the I-15/650 North Interchange in 2016. Improvements were constructed to accommodate peak hour traffic through 2024 at a level of service (LOS)[6] D or better, which is UDOT's goal for urban areas. Improvements included additional turning lanes for traffic exiting the HAFB West Gate. Further interchange improvements are included in the WFRC 2019-2050 Regional Transportation Plan in Phase 1 (2019–2030) (UDOT 2016c, WFRC 2019).

SR-232 (Hill Field Road) is a north-south road that runs from Main Street (SR-126) in Layton City on the south to the HAFB South Gate on the north. The Hill Field Road and I-15 interchange is approximately 2.3 miles south of the South Gate. SR-232 is intersected by two arterials that also have an interchange with I-15: SR-193 (700 South) and SR-108 (Antelope Drive). North of SR-193, SR-232 has two through lanes in each direction, numerous turn lanes

[6] The public roadway analysis uses the term LOS, which is a measure of the vehicle-carrying capacity and performance of a street, freeway, or intersection. When the capacity of a road is exceeded, the result is congestion, delay, and a poor LOS. LOS is represented by a letter "grade" ranging from A for excellent conditions (free-flowing traffic and little delay) to F for failure conditions (extremely congested, stop-and-go traffic and excessive delay).

and a speed limit of 25 mph. South of SR-193, SR-232 is five lanes (two lanes in each direction plus a center turn lane) with a speed limit of 40 to 45 mph. The WFRC 2019-2050 Regional Transportation Plan includes operational improvements to SR-232 from I-15 to SR-193 in Phase 2 (2031–2040). Operational improvements improve the flow without adding additional lanes. Examples include intersection improvements such turn lanes and signal synchronization (WFRC 2019).

SR-193 (700 South) runs east and west, and passes directly south of the South Gate. The 700 South interchange with I-15 is 1.6 miles west of the South Gate, and the interchange with US-89 is 3.4 miles east of the South Gate. SR-193 is five lanes (two lanes in each direction plus a center turn lane) with a speed limit of 50 to 55 mph. (UDOT 2017b, UDOT 2019). The WFRC 2019-2050 Regional Transportation Plan includes capacity improvements for SR-193 and its interchange with I-15. The plan is to widen SR-193 from a five lane section to a seven-lane section (three lanes in each direction plus a center turn lane) from I-15 past the HAFB South Gate to Fort Lane. Operational improvements would be made from Fort Lane to US-89. Both of these roadway projects are needed in Phase 2 (2031-2040). Improvements to the interchange with I-15 are planned for Phase 1 (2019-2030) (WFRC 2019).

Traffic Counts

UDOT collects annual average daily traffic (AADT) counts on state routes. Counts on state routes approaching HAFB gates are shown in **Table 3-4**. The counts include traffic moving in both directions (UDOT 2016a, 2017a).

Table 3-4. AADT in the Vicinity of HAFB

Route	Location	2017 AADT[1]	2016 AADT	2015 AADT
SR-97	Approach to Roy Gate, Main Street to HAFB boundary (MP 5.095 – MP 5.347)	35,300	34,000	33,000
SR-103	Approach to West Gate, Main Street to HAFB (MP 0.000 – MP 0.225)	17,800	17,000	16,000
SR-232	Approach to South Gate from south, North of SR-193 (MP 2.263 – MP 2.402)	9,000[2]	24,000	23,000
SR-232	Approach to South Gate from south, South of SR-193 (MP 1.268 – MP 2.263)	25,400	25,000	23,000
SR-193	Approach to South Gate from east and west (MP 4.971 to MP 6.190)	33,700	33,000	31,000

Sources: UDOT 2016a, 2017a

Notes:

MP = Milepost, SR = State Route

[1] Annual average daily traffic (AADT) is rounded to nearest hundred

[2] Data error likely

3.2 Vandenberg Air Force Base

VAFB is located in Santa Barbara County on the central coast of California, about 50 miles northwest of the City of Santa Barbara (**Figure 2-4**). Covering more than 99,400 acres, it is the third largest USAF installation. A primary mission for the base is to conduct and support space and missile launches. Located along the Pacific coast, VAFB is the only facility in the United States from which unmanned government and commercial satellites can be launched into polar orbit, and where land-based ICBMs can be launched to verify weapon system performance.

Rationale for Environmental Resources Analyzed

As it relates to the VAFB section of this EA/OEA, air quality/climate change, biological resources, coastal zone, cultural resources, infrastructure, noise, and socioeconomics/environmental justice, transportation/traffic and water are the areas of concern requiring discussion.

Other resource areas were not analyzed further because no significant impacts to these resources are anticipated as a result of implementing the Proposed Action. The Proposed Action is well within the limits of current operations and permits at the Base. Thus, there would be no effects on land use resources. Any new construction would not alter the current landscape of the project area, therefore no impacts to visual aesthetics would be expected.

There are no construction-related activities currently planned for the Minuteman III program, and those construction-related actions associated with the proposed GBSD Test Program would not affect airspace usage, management, or safety at the installation. All new GBSD facilities and facility modifications would be constructed in accordance with FAA regulations in 14 CFR Part 77, *Safe, Efficient Use, and Preservation of Navigable Airspace*, so as not to create any obstructions to air navigation, or adversely affect navigational and communication facilities and equipment. Long-term, negligible, adverse impacts on airspace at VAFB and downrange over the Pacific region would occur under the Proposed Action. Based on previous and ongoing launches from VAFB, all flight tests would continue to be conducted in accordance with established FAA, DoD, and USAF navigation and airspace safety policies and procedures. Close coordination with the Los Angeles Air Route Traffic Control Center (ARTCC) by the launch operations manager, the ability for VAFB to schedule restricted airspace over the installation and ocean range, and existing range safety and notification requirements would minimize potential impacts on the use of airspace by general aviation during launches. Prior to each flight test mission, a Notice to Airmen (NOTAM) would be published to divert commercial and private aircraft from any hazard areas along the missile flight path. The launches would be infrequent, short-term events, after which the airspace is returned to the control of the Los Angeles ARTCC. Apart from additional flight tests required by the GBSD program, no additional impacts to airspace would be anticipated. Therefore, airspace is not carried forward as a resource area requiring further analysis.

Construction work for LF-04 and LF-26 would occur in previous disturbed areas; therefore, construction actions (connecting utilities and underground access ways) would not be expected to result in significant impacts to geology and soils. The Main Cantonment of VAFB appears to have been previously disturbed due to its flat topography, sparse vegetation, and a few buildings and roads. The proposed construction in this area would be relatively shallow and is not anticipated to result in contamination, substantial degradation, or loss of value to the soil. VAFB is in a seismic hazard zone, so all ground disturbing activities would be completed based on current DoD technical guidance and engineering standards for seismic evaluation and strengthening of new and existing buildings. All applicable federal, state, and local building requirements for seismic safety would be met during site preparation and construction. No geology and soil resources would be affected during GBSD Test Program operations. No additional maintenance would be required to geology and soil resources post-construction.

3.2.1 Air Quality – VAFB

3.2.1.1 Applicable Regulations

See **Appendix E, Section E.2.1**.

3.2.1.2 Region of Influence

For the project ROI, VAFB is located in the South Central Coast Intrastate AQCR (AQCR 032) (40 CFR 81.166) within the Santa Barbara County Air Pollution Control District (SBCAPCD).

3.2.1.3 Affected Environment

Existing Emissions for Santa Barbara County

Emissions of criteria air pollutants are inventoried by state Air Resources Board by stationary, area-wide, mobile, and natural sources. See **Table 3-5** and **3-6** for Santa Barbara County emissions for calendar year 2019 (the most recent year of data).

Table 3-5. Estimated Annual Average Emissions – Santa Barbara County, California (Tons per Year[1])

Source Type	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	VOC	CO_2e	HAPs
Stationary	1,759	828	77	128	75	1,035	192,678	187
Area	2,862	1,196	106	4,206	902	5,636	N/A	445
On-Road	9,354	2,408	17	258	124	1,284	1,837,357	349
Nonroad	6,217	855	0	64	55	665	200,739	22
Total	**20,245**	**5,287**	**200**	**4,656**	**1,155**	**8,619**	2,230,774	1,208

Source: USEPA 2020a

Notes: CO = carbon monoxide, NO_x = oxides of nitrogen, SO_x = oxides of sulfur, PM_{10} = particulate matter less than 10 microns in diameter, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, VOC = volatile organic compound

[1] Emissions are based on ton/day x 365 days per year; rounded to nearest tenth.

Table 3-6. Estimated Ozone Precursor[1] for Santa Barbara County, California		
CO	**NOx**	**VOC[2]**
51,613	42,210	35,369

Source: California EPA Air Resources Board, 2019

Notes:

CO = carbon monoxide, NOx = oxides of nitrogen, VOC = volatile organic compound

[1] Ozone precursors are associated with gas formation from NOx, CO, and VOCs. (UCAR 2020)

[2] Reported as Reactive Organic Gas (ROG)

Existing Emissions at VAFB

Emissions sources on VAFB include both point and area sources. The sources are divided into 20 subcategories. On-base mobile sources of air emissions include various aircraft, missile and spacecraft launches, and numerous government and personal motor vehicles. **Table 3-7** summarizes overall emissions for VAFB (based on most recent year of data).

Table 3-7. Criteria Pollutant and HAP Emissions Attributable to VAFB (Tons per Year)									
Source	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**SO_x**	**NO_x**	**CO**	**Lead**	**HAP**	**CO_2e**
VAFB Stationary & Mobile	39.90	6.86	-	3.51	82.74	212.73	0.0	0.71	11,456
Santa Barbara County	8,619	4,656	-	200	5,287	20,245	0.0	1,208	2,230,774
VAFB Emission % of Santa Barbara County Emissions	0.5%	0.2%	-	1.8%	1.6%	1.1%	0.0	006%	0.51%

Source: VAFB 2018b

Notes:

PM_{10} = particulate matter less than 10 microns in diameter, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, SO_x = oxides of sulfur, NO_x = oxides of nitrogen, CO = carbon monoxide, VOC = volatile organic compound

[1] Reactive organic compound (ROC) equals Volatile Organic Compound

[2] A dash indicates that the pollutant is not measured at this location.

3.2.2 Biological Resources – VAFB

Biological resources are defined as native or naturalized vegetation and wildlife and the habitats in which they occur. Within this EA/OEA, biological resources are divided into five major categories: (1) terrestrial vegetation, (2), terrestrial wildlife, (3) marine resources, (4) threatened and endangered species (i.e., those listed or proposed for listing under the ESA), and (5) environmentally sensitive habitats. Environmentally sensitive habitats are those areas designated by USFWS or NMFS as critical habitat for ESA listed species or other sensitive habitats such as wetlands, habitats limited in distribution, or important seasonal use areas for

wildlife (e.g., breeding areas, feeding areas, or migration routes). In this EA/OEA, special status species refers to those species listed by federal or state agencies including those afforded protection under the regulations listed in **Appendix E**.

3.2.2.1 Applicable Regulations

Refer to **Appendix E, Section E.2.2**.

3.2.2.2 Region of Influence

The ROI for biological resources at VAFB includes the areas subject to effects of the Proposed Action as described in **Chapter 2** including:

- the locations of existing facilities proposed for renovation or modification;
- the areas proposed for new construction;
- the locations of LFs, test pads, and launch azimuths used for Minuteman III testing and/or proposed for GBSD testing; and
- areas of VAFB and nearshore waters in the vicinity of these sites which would be subject to effects of the Proposed Action including elevated noise levels and indirect habitat modification.

Because there would be minimal to no effects on biological resources due to renovation, modification, or use of existing facilities, these sites are not described or analyzed in detail in the biological resource sections. The remaining portions of the ROI are generally divided into new construction areas and testing areas due to the differing types and magnitude of potential effects.

3.2.2.3 Affected Environment

This section summarizes existing information on plant and animal species and habitat types in the ROI with special emphasis on the presence of any special-status species. and in proportion to the magnitude of potential effects.

VAFB includes a variety of terrestrial habitats from sea level to 2,100-foot elevation. Located in a dry subtropical climate zone, VAFB includes pine forest, oak forest, woodland, riparian, wetland, maritime chaparral, coastal scrub, coastal strand, salt marsh, freshwater marsh, and grassland habitats (USAF 2011b). Proposed new construction, repurposing of existing facilities, and test activities (including launches) would all take place in terrestrial areas. A biological resources survey of all proposed new construction areas, including proposed utility lines and buffer areas around these sites, was conducted in 2020 (MSRS 2020).

The Proposed Action would have minimal to no impact on marine biological resources in the ROI. With implementation of BMPs to prevent sedimentation, increased turbidity, and pollution

(**Section 4.2.2.2.4**), no impacts to marine species or habitats in nearshore waters are expected. Special status marine wildlife may occur in nearshore waters such as some ESA-listed salmonids, sea turtles, the black abalone (*Haliotis cracherodii*), pinnipeds, and potentially other marine mammals (see USAF 2011b for a complete list). However, the Proposed Action activities at VAFB would not affect these species and they are not analyzed further. Southern sea otters (*Enhydra lutris nereis*) which rest at the surface, may be exposed to elevated noise levels from test activities, and are discussed in the *Threatened and Endangered Species* subsection.

Biological resources at VAFB are currently managed under the installation's INRMP (USAF 2011b) which includes a Wildland Fire Management Plan, BASH Plan, Fish and Wildlife Management Plan, Wetlands and Riparian Habitats Management Plan, Coastal and Riparian Habitats Management Plan, Threatened and Endangered Species Management Plan, and Integrated Pest Management Plan.

Terrestrial Vegetation

A wide variety of vegetation types occur on VAFB as described in detail in the GBSD Test Program Biological Survey Report (MSRS 2020) and the VAFB INRMP (USAF 2011b). Proposed new construction areas within the VAFB main cantonment area consist of highly disturbed urban and industrial areas dominated by landscaped and maintained vegetation. Many introduced species occur in this portion of the ROI including iceplant (*Carpobrotus* spp.), veldt grass (*Ehrharta calycina*), bromes (*Bromus* spp.), onionweed (*Asphodelus fistulosus*), and Blue gum eucalyptus (*Eucalyptus globulus*) (MSRS 2020). The proposed GBSD Vehicle Processing Facility and Component Operations Facility, as well as some proposed utility and infrastructure locations, are outside the main cantonment and include more sensitive habitats such as maritime chaparral and vernal pool habitats (MSRS 2020)

Vernal pools and maritime chaparral are described further in the *Environmentally Sensitive Habitats* subsection.

The proposed utility corridor is primarily in disturbed and maintained vegetation. Several vegetation types occur within or near the proposed utility corridor including non-native grasses and forbs, central coastal scrub, iceplant, non-native trees, native and non-native herb, maritime chaparral, central dune scrub, and coast live oak woodland as described in the GBSD Test Program Biological Survey Report (MSRS 2020). Drainages crossing the utility corridor are either largely unvegetated ephemeral drainages or erosional washes, or contain central coast arroyo willow riparian forest and scrub habitat (MSRS 2020).

Rare and special status plant species in the ROI for proposed new construction include two ESA-listed species and 13 species listed on the California Natural Diversity Database as special species (**Table 3-8**; MSRS 2020).

Table 3-8. Special Status Plant Species in the Vandenberg Air Force Base Region of Influence

Common Name	Scientific Name	Federal Listing Status	State Listing Status	California Rare Plant Rank[1]	Occurrence[2] and Habitat
La Purisima manzanita	*Arctostaphylos purissima*	-	-	1B.1	Observed; maritime chaparral
Sand mesa manzanita	*Arctostaphylos rudis*	-	-	1B.2	Observed; maritime chaparral
Ocean bluff milk-vetch	*Astragalus nuttallii* var. *nuttallii*	-	-	4.2	Observed; central dune scrub
Santa Barbara ceanothus	*Ceanothus impressus* var. *impressus*	-	-	1B.2	Observed; maritime chaparral
Lompoc ceanothus	*Ceanothus cuneatus* var. *fascicularis*	-	-	4.2	Potential; maritime chaparral
Coastal goosefoot	*Chenopodium littoreum*	-	-	1B.2	Potential; central dune scrub
Gaviota tarplant	*Deinandra increscens* ssp. *villosa*	FE	SE	1B.1	Documented; disturbed habitats north of Shuman Creek
Dune larkspur	*Delphinium parryi* ssp. *blochmaniae*	-	-	1B.2	Potential; coastal bluffs and north of Shuman creek
Blochman's dudleya	*Dudleya blochmaniae* ssp. *blochmaniae*	-	-	1B.1	Potential; coastal bluffs and rocky outcrops
Lompoc yerba santa	*Eriodictyon capitatum*	FE	SR	1B.2	Observed, single stand northwest of 35th Street
Island wallflower	*Erysimum insulare*	-	-	1B.3	Observed; central dune scrub
Kellogg's horkelia	*Horkelia cuneata* var. *sericea*	-	-	1B.1	Observed; coastal scrub, maritime chaparral, and central dune scrub
Crisp monardella	*Monardella undulata* ssp. *crispa*	-	-	1B.2	Observed; central dune scrub
California spineflower	*Mucronea californica*	-	-	4.2	Observed; central dune scrub
Black-flowered figwort	*Scrophularia atrata*	-	-	1B.2	Observed; coastal scrub, maritime chaparral, central dune scrub, and riparian

Sources: MSRS 2020, USFWS 2020, State of California 2019a.

Abbreviations: FE = U.S. ESA Endangered, SE = State of California Endangered, SR = State of California Rare Species, "-" = not listed.

[1] California Natural Diversity Database Rare Plant Rank: 1B.1 = Rare and seriously threatened in California, 1B.2 = Rare and moderately threatened in California, 1B.3 = Rare and not very threatened in California, 4.2 = Limited distribution and moderately threatened in California

[2] Occurrence Notes: observed = observed during 2020 surveys of the ROI, documented = observed during previous surveys of the ROI, potential = species has the potential to occur in the ROI.

Vegetation immediately surrounding the existing launch pads and test pad proposed for GBSD use is regularly maintained as firebreak and is considered disturbed vegetation (MSRS 2020, USAF 2011b). Vegetation types near the existing launch pads include iceplant and non-native grasses and forbs (MSRS 2020). The area around TP-01 includes central dune scrub and central coastal scrub habitats (MSRS 2020, USAF 2011b).

Major threats to native vegetative communities in the ROI include invasive nonnative species, wildfire, and human development (USAF 2011b). Invasive plant species such as iceplants (Family Aizoaceae), veldt grass (*Ehrharta calycina*), European beachgrass (*Ammophila arenaria*), and pampas grass (*Cortaderia selloana*) threaten dune and chaparral plant communities on VAFB (USAF 2011b). While several vegetation types at VAFB are fire-adapted, including chaparral, unnatural fire intensity or interval may lead to invasion by exotic plant species (USAF 2011b).

Terrestrial and Freshwater Wildlife

The variety of habitats at VAFB provide for a wide diversity of terrestrial and freshwater animal species. Comprehensive lists of these species can be found in Appendix A and B of the GBSD Biological Survey Report (MSRS 2020) and Appendix A of the VAFB INRMP (USAF 2011b) and are incorporated here by reference. This section focuses on important, rare, and special status wildlife species in the ROI as well as on species which may be sensitive to the effects of the Proposed Action.

Terrestrial and Freshwater Invertebrates. Terrestrial invertebrates found in the ROI for proposed new construction include species common on VAFB and in the region such as painted meadow grasshoppers (*Chimarocephala pacifica*), black-tailed bumble bees (*Bombus melanopygus*), and several species of butterfly (MSRS 2020).

Within the ROI, rare and special status invertebrates include one ESA-listed species and three species designated as special species on the California Natural Diversity Database (**Table 3-9**; MSRS 2020). Vernal pool fairy shrimp (*Branchinecta lynchi*) occur in many vernal pools on VAFB (USAF 2011b). Vernal pool fairy shrimp are listed under the ESA and discussed further in the *Threatened and Endangered Species* subsection.

Blue butterflies (*Euphilotes* undescribed sp.) occur in coastal scrub habitats where they are closely dependent on their host plant, seacliff buckwheat (*Eriogonum parvifolium*). Until 2020, the blue butterfly found on VAFB was thought to be the federally endangered El Segundo blue butterfly (*Euphilotes battoides allyni*) (MSRS 2020). However, recent genetic evidence has indicated that blue butterfly populations on VAFB are genetically distinct from the El Segundo blue butterfly and likely represents a unique species (MSRS 2020, Dupuis et al. 2020). In the ROI, the blue butterfly has been documented on the western end of Rhea Road where its host plant seacliff buckwheat occurs (MSRS 2020).

Table 3-9. Special Status Terrestrial and Freshwater Wildlife Species Known to or with the Potential to Occur in the New Construction ROI at VAFB.					
Species Name	**Scientific Name**	**Federal Listing Status**	**State Listing Status**	**California State Rank[1]**	**Occurrence[2] and Habitat**
Invertebrates					
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT	-	S3	Documented; vernal pools
California fairy shrimp	*Linderiella occidentalis*	-	-	S2S3	Documented; vernal pools
Monarch butterfly	*Danaus plexippus*	-	-	S2S3	Documented; non-native trees
Blue butterfly	*Euphilotes* sp. (undescribed)	-	-	-	Documented; central dune scrub
Obscure bumble bee	*Bombus caliginosus*	-	-	S1S2	Potential; central dune scrub
Fishes					
Arroyo chub	*Gila orcutti*	-	SSC	S2	Potential; streams and lakes
Amphibians					
California red-legged frog	*Rana draytonii*	FT	SSC	S2S3	Observed; perennial ponds and streams
Western spadefoot	*Spea hammondii*	-[3]	SSC	S3	Documented; grassland and vernal pools
Reptiles					
California legless lizard	*Anniella pulchra*	-	SSC	S3	Observed; coastal scrub and chaparral
Blainville's (coast) horned lizard	*Phrynosoma blainvillii*	-	SSC	S3S4	Documented; scrub, chaparral, and grasslands
Two-striped garter snake	*Thamnophis hammondii*	-	SSC	S3S4	Observed; riparian
Birds[3]					
Rufous-crowned sparrow	*Aimophila ruficeps*	BCC	SSC	S3	Potential; rocky outcrops
Grasshopper sparrow	*Ammodramus savannarum*	BCC	SSC	S3	Observed; grassland, open scrub
Bell's sparrow	*Artemisiospiza belli (Amphispiza belli belli)*	BCC	-	-	Observed, open chaparral

Table 3-9. Special Status Terrestrial and Freshwater Wildlife Species Known to or with the Potential to Occur in the New Construction ROI at VAFB. (Continued)

Species Name	Scientific Name	Federal Listing Status	State Listing Status	California State Rank[1]	Occurrence[2] and Habitat
Western burrowing owl	*Athene cunicularia hypugea*	BCC	SSC	S3	Documented; non-native grasses and forbs, iceplant-herb (non-breeding)
Oak titmouse	*Baeolophus inornatus*	BCC	-	S4	Potential; oak woodlands, chaparral
Ferruginous hawk	*Buteo regalis*	BCC	-	S3S4	Documented, open grassland, shrublands, riparian (winter migrant)
Nuttall's woodpecker	*Dryobates nuttallii*	BCC	-	-	Observed; oak and riparian woodlands
Peregrine falcon	*Falco peregrinus anatum*	BCC	-	S3S4	Documented; coastal rocky outcrops
Loggerhead shrike	*Lanius ludovicianus*	BCC	SSC	S4	Observed, semi-open habitat with posts or trees
Allen's hummingbird	*Selasphorus sasin*	BCC	-	-	Potential; open or partially wooded areas, riparian
Lawrence's goldfinch	*Spinus lawrencei*	BCC	-	S3S4	Observed; scrub, riparian
Mammals					
Pallid bat	*Antrozous pallidus*	-	SSC	S3	Rocky outcrops, arid caves, man-made structures
Townsend's big-eared bat	*Corynorhinus townsendii*	-	SSC	S4	Rocky outcrops, man-made structures
Western mastiffbat	*Eumops perotis californicus*	-	SSC	S3S4	Caves, abandoned structures, trees
American badger	*Taxidea taxus*	-	SSC	S3	Observed, open grassland

Sources: MSRS 2020, USAF 2011b, USFWS 2020, State of California 2019b, Moyle et al. 2015, Thomson et al. 2016, USFWS 2008a, Bolster 1998.

Abbreviations: BCC = Birds of Conservation Concern, FT = U.S. ESA Threatened, MBTA = Migratory Bird Treaty Act, SSC = State of California Species of Special Concern, "-" = not listed.

[1] California Natural Diversity Database State Rank: S1 = Critically imperiled in in California, S2 = Imperiled in California, S3 = Vulnerable in California, S4 = Apparently secure (uncommon but not rare) in California

[2] Occurrence Notes: observed = observed during 2020 surveys of the ROI, documented = observed during previous surveys of the ROI, potential = species has the potential to occur in the ROI.

[3] The western spadefoot is currently under review for listing under the ESA. In 2015, the USFWS found that a 2012 petition to list the species under the ESA presented evidence that listing may be warranted (80 FR 37568 [July 1, 2015]); however, no additional findings have been made for this species.

[4] Birds listed in this table are those BCC or California SSC species observed during surveys of the new construction portion of the ROI or that are likely to nest there. For a complete list of special status bird species with the potential to occur in the ROI, see Appendix A of MSRS 2020 and Appendix A of USAF 2011b.

Freshwater Fishes. Freshwater habitats on VAFB include rivers, creeks, a lake, and small ponds (USAF 2011b). No freshwater habitats that support fish occur within the proposed new construction areas. The proposed utility line corridor crosses a small number of freshwater streams such as Shuman Creek and freshwater wildlife at VAFB are described briefly in this section. Freshwater fish species at VAFB include several game fish such as red-ear sunfish (*Lepomis microlophus*) and largemouth bass (*Micropterus salmoides*) as well as four special status fish species (**Table 3-9**; USAF 2011b). Three of these species, Southern California steelhead (*Oncorhynchus mykiss irideus*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), and Tidewater goby (*Eucyclogobius newberryi*), are listed under the ESA. The known distribution of these ESA-listed fish on VAFB is more than 1 mile from any proposed construction site; therefore, these species would not be impacted by the Proposed Action and are not discussed further. The Arroyo chub is listed as a Species of Special Concern (SSC) by the State of California (Moyle et al. 2015) and occurs in freshwater streams and lakes of VAFB year-round, including Shuman Creek (USAF 2011b). This species is introduced at VAFB and although these populations are outside the Arroyo chub's native distribution, they are important for the species due to habitat degradation within its native range (Moyle et al. 2015).

Amphibians. Freshwater and adjacent terrestrial habitats on VAFB provide habitat for 10 amphibian species including ensatina salamanders (*Ensatina eschscholtzii*), arboreal salamanders (*Aneides lugubris*), and Baja California treefrogs (*Pseudacris hypochodriaca*; USAF 2011b). Two special status amphibians occur in the VAFB ROI, the California red-legged frog (*Rana draytonii*) and the Western spadefoot (*Spea hammondii*; **Table 3-9**; USAF 2011b). The ESA-listed California red-legged frog occurs in permanent streams and ponds and is discussed further in the *Threatened and Endangered Species* subsection. Western spadefoots, a California SSC, breed in vernal pools (seasonal pools formed by winter rains) in late winter through March and occur in adjacent upland sandy habitats during the dry season (USAF 2011b). The Western spadefoot was petitioned for listing under the ESA in 2012 and the status of the species is currently under review by the USFWS (80 FR 37568 [July 1, 2015]).

Terrestrial Reptiles. Seventeen reptile species have been observed on VAFB including the relatively common terrestrial garter snake (*Thamnophis elegans*), gopher snake (*Pituophis catenifer*), California kingsnake (*Lampropeltis californiae*), western rattlesnake (*Crotalus oreganus*), western fence lizard (*Sceloporus occidentalis*), Southern alligator lizard (*Elgaria multicarinata*), and western skink (*Plestriodon skitonianus*; USAF 2011b). Two special status reptiles have the potential to occur in the VAFB ROI for new construction (**Table 3-9**), both are listed as species of special concern by the State of California. The burrowing California legless lizard (*Anniella pulchra*) is found in scrub and chaparral habitats where soils are loose and there is a layer of leaf litter (USAF 2011b). Blainville's horned lizards (*Phrynosoma blainvillii*) are also found in scrub and chaparral habitats as well as in grasslands (USAF 2011b).

Birds. At least 315 species of birds have been documented on VAFB and in nearshore environments, 115 of these species have been known to breed on the installation (USAF

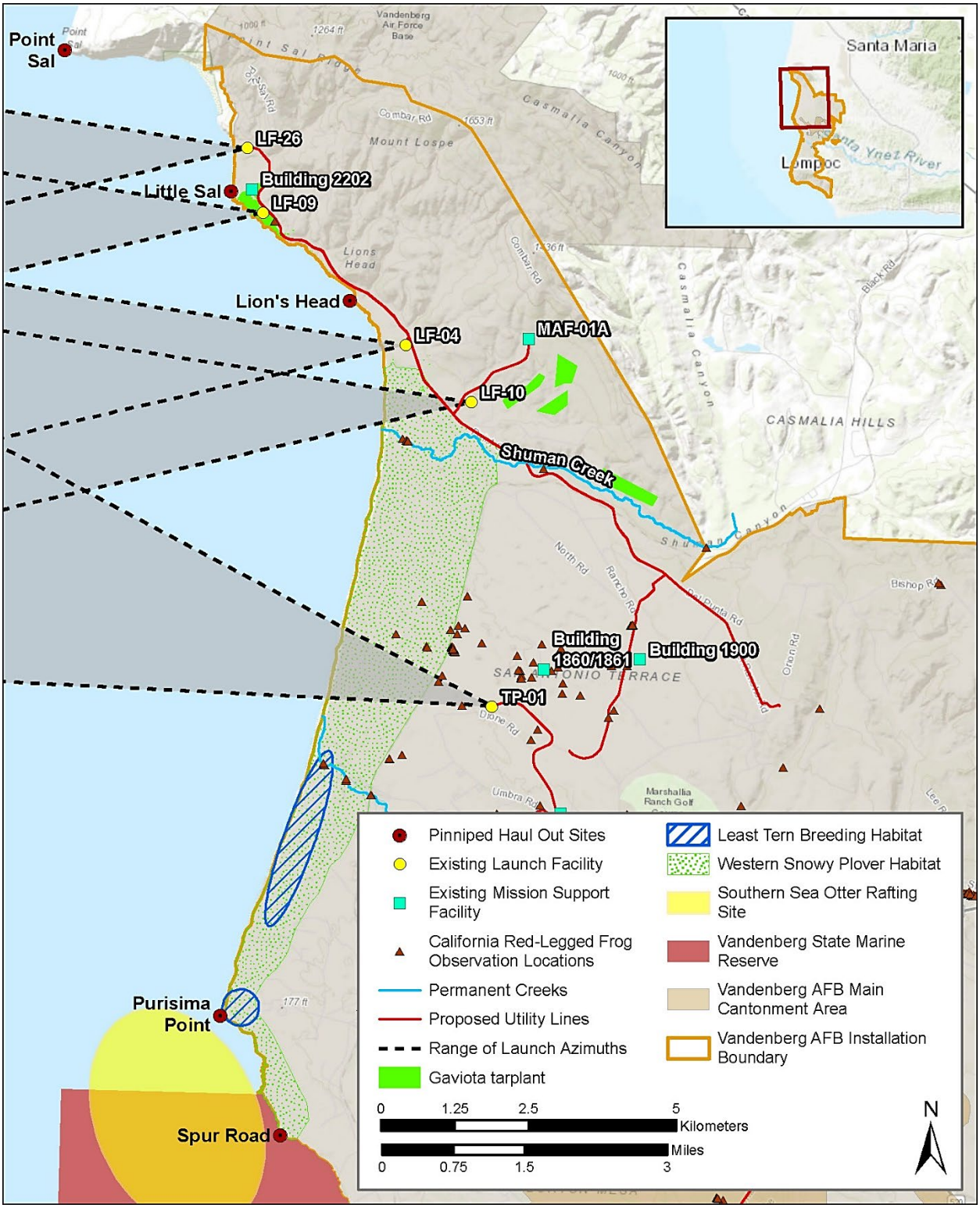
2011b). These species include a diversity of seabirds, shorebirds, waterfowl, marshbirds, landfowl, raptors, owls, woodpeckers, hummingbirds, and passerines (perching birds including songbirds; USAF 2011b). A complete list of bird species known to occur on VAFB can be found in the VAFB INRMP Fish and Wildlife Management Plan (USAF 2011b). All native migratory bird species present in the ROI are protected under the MBTA.

During surveys of the proposed new construction portion of the ROI, a number of special status bird species were observed (MSRS 2020) including seven species listed as BCC species or State of California SSC (**Table 3-9**). Many of these special status bird species have the potential to nest in the new construction ROI (MSRS 2020).

Several special status bird species also occur in the proposed testing ROI which includes launch corridors and areas that would be exposed elevated noise levels from launches. Many seabirds and shorebirds occur along the coast and in nearshore waters including some BCC species (i.e., ashy storm-petrel, black oystercatcher, long-billed curlew, and black skimmer) and State of California SSC (i.e., common loon, ashy storm-petrel, and black skimmer) (USAF 2011b). Three ESA-listed bird species occur in the testing ROI; Western snowy plovers (*Charadrius nivosus*), California least terns (*Sterna antillarum browni*), and marbled murrelets (*Brachyramphus marmoratus*), and are discussed further in the *Threatened and Endangered Species* subsection.

Mammals in Terrestrial Habitats. At least 53 species of mammals occur on VAFB and in adjacent nearshore waters (USAF 2011b). Typical terrestrial mammal species in the ROI include Virginia opossum (*Didelphis virginiana*), desert cottontail (*Sylvilagus audubonii*), brush rabbit (*Sylvilagus bachmani*), California ground squirrel (*Spermophilus beecheyi*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), badger (*Taxidea taxus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), mule deer (*Odocoileus hemionus*), deer mouse (*Peromyscus maniculatus*), agile kangaroo rats (*Dipodomys agilis*), and dusky-footed woodrats (*Neotoma fuscipes*) among others (MSRS 2020, USAF 2011b). Several bat species occur on VAFB, including three special status bat species (**Table 3-9**; USAF 2011b), all of which have the potential to occur ROI. American badgers have been observed in the ROI (MSRS 2020) and are considered an SSC by the State of California.

Four marine mammal species are known to haul out or breed on VAFB beaches and rocky outcrops; northern fur seals (*Callorhinus ursinus*), northern elephant seals (*Mirounga angustirostris*), Pacific harbor seals (*Phoca vitulina ruchardii*), and California sea lions (*Zalophus californianus*; USAF 2011b). All of these pinnipeds are protected under the MMPA. Northern fur seals and California sea lions haul out on VAFB seasonally but do not breed there. California sea lions haul out seasonally at Point Sal (**Figure 3-2**) and South Rocky Point (USAF 2011b).



Sources: VAFB 2019b, USAF 2018b, USAF 2011b, Esri World Topographic Base Map

Figure 3-2. Protected Species and Sensitive Habitats in and near the Proposed Testing ROI at VAFB.

Northern elephant seals have been observed hauled out near Rocky Point on South VAFB (USAF 2011b). Since 2017, elephant seals have been documented breeding and pupping on VAFB annually, but only on South VAFB where they would not be exposed to stressors resulting from the Proposed Action.

Pacific harbor seals also breed on VAFB (USAF 2011b). These seals haul out on base year-round at Purisima Point, at the Spur Road haul out site), and from near Vandenberg Harbor north to South Rocky Point (USAF 2011b). The South Rocky Point haul out area is the main harbor seal pupping and breeding site, with peak breeding and pupping from February through May (USAF 2011b). The Point Sal and Purisima Point pinniped haul out sites occur within the ROI for proposed testing activities (**Figure 3-2**).

Threatened and Endangered Species

Nine ESA-listed threatened and endangered species occur in the VAFB ROI (**Table 3-10**). Due to the potential for the proposed new construction to affect ESA-listed species, a Biological Assessment was prepared (USAF 2020b) and includes detailed descriptions of ESA-listed species in the new construction ROI which are incorporated here by reference. Detailed descriptions of these species can also be found in the USFWS Biological Opinion for the Proposed Action (**Appendix A**). ESA-listed species on VAFB are currently managed under the VAFB INRMP Threatened and Endangered Species Management Plan (USAF 2011b).

Listed Plant Species. Two ESA-listed plant species occur in the proposed new construction ROI, Gaviota tarplant (*Deinandra increscens* ssp. *villosa*) and Lompoc yerba santa. (*Eriodictyon capitatum*).

Gaviota tarplant is an annual that occur in coastal grasslands and coastal sage scrub (USFWS 2011) as well as in disturbed habitats along roads on VAFB (USAF 2020e). Gaviota tarplant has the potential to occur within all habitat types with low growing vegetation in the areas of the ROI north of Shuman Creek (MSRS 2020). Historically, stands of this species have been observed along Point Sal Road north of Shuman Creek and the species has been known to occur near LF-09 which is used for Minuteman III testing (**Figure 3-2**). Gaviota tarplant is likely to occur in the proposed utility line construction along Point Sal Road and may occur in the maintained firebreak areas near LF-09.

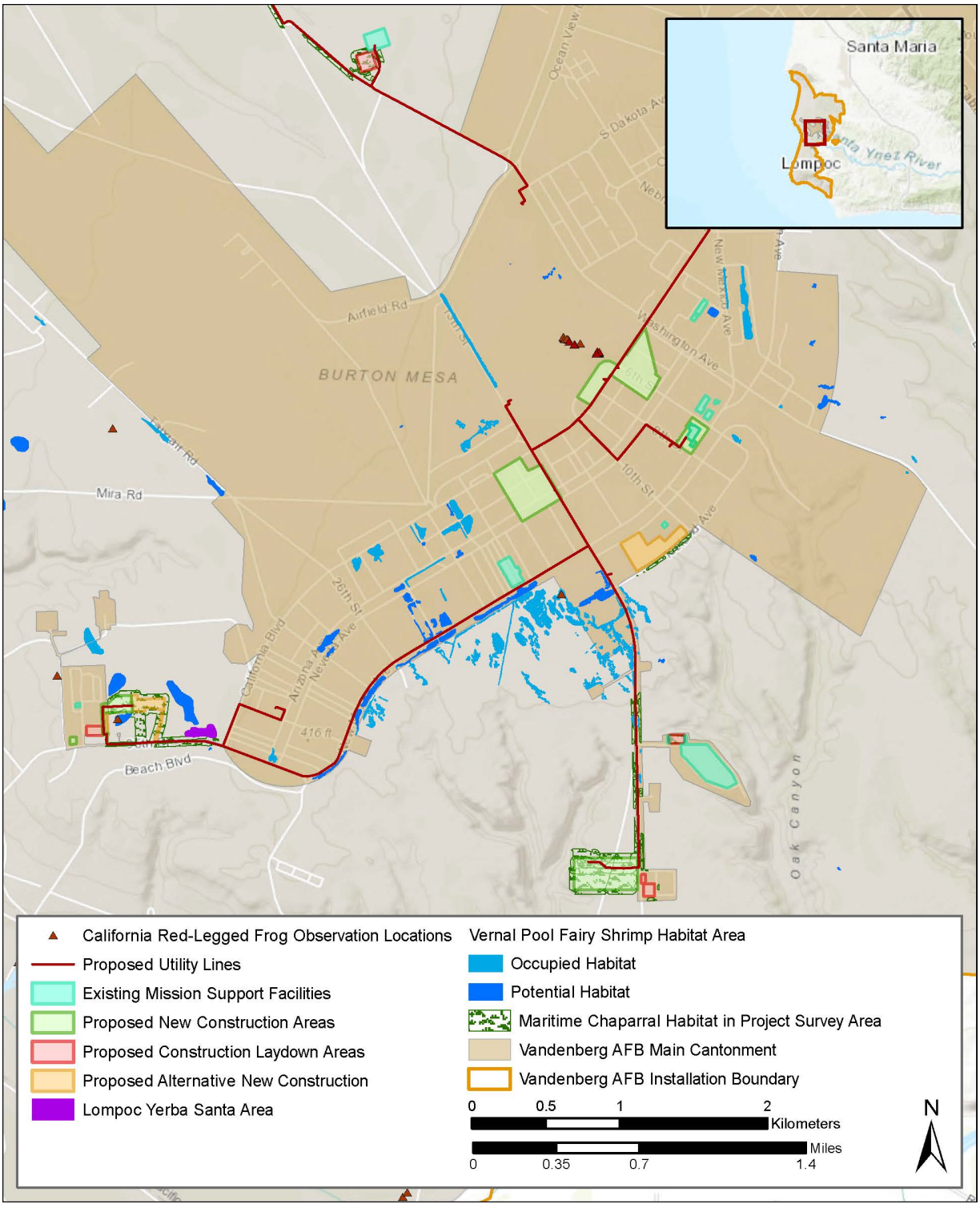
Lompoc yerba santa is an evergreen shrub which may grow up to 16 feet tall and is endemic to Santa Barbara County (MSRS 2020). This plant forms stands in chaparral, coastal scrub, and pine forest habitats on VAFB (MSRS 2020). In the ROI, a single stand of Lompoc yerba santa occurs near the proposed utility line north of 35th Street (**Figure 3-3**).

Table 3-10. Threatened and Endangered Species in the VAFB ROI.				
Species Name	**Scientific Name**	**Federal Listing Status**	**Occurrence in the New Construction ROI**	**Occurrence in the Testing ROI**
Plants				
Gaviota tarplant	*Deinandra increscens ssp. villosa*	E	Within utility line corridor north of Shuman Creek	Near LF-09
Lompoc yerba santa	*Eriodictyon capitatum*	E	Stand north of 35th Street within utility line corridor	-
Invertebrates				
Vernal pool fairy shrimp	*Branchinecta lynchi*	T	Vernal pools near Component Operations Facility, within GBSD Vehicle Processing Facility Site, and within utility line corridor	-
Amphibians				
California red-legged frog	*Rana draytonii*	T	Ponds and streams near Component Operations Facility, GBSD Schoolhouse Alternative 1, and within utility corridor	-
Birds				
Marbled murrelet	*Brachyramphus marmoratus*	T	-	Nearshore Marine, Rare.
Western snowy plover (Pacific Coast DPS)	*Charadrius nivosus nivosus*	T	-	Coastal sandy beaches and dunes.
California least tern	*Sterna antillarum browni*	E	-	Coastal beaches and dunes. Nesting at Purisima Point.
Mammals				
Southern sea otter	*Enhydra lutris nereis*	T	-	Nearshore marine

Sources: USAF 2011b, USFWS 2020, MSRS 2020

Notes:

DPS = Distinct Population Segment, E = ESA Endangered, T = ESA Threatened, LF = Launch Facility



Sources: MSRS 2020, VAFB 2019b, NOAA 2020, Esri World Topographic Base Map

Figure 3-3. Protected Species and Sensitive Habitats in and near the Proposed New Construction ROI at VAFB.

Listed Wildlife Species. ESA-listed terrestrial wildlife species include vernal pool fairy shrimp, California red-legged frogs, and two bird species (**Table 3-10**). Regarding marine species, only species with the potential to be exposed to Proposed Action stressors at VAFB are included in this section. Other ESA-listed marine wildlife may occur offshore of VAFB, such as some sea turtle, marine mammal, and fish species (see USAF 2011b for a complete list); however, the Proposed Action activities at VAFB are not expected to impact these species in this portion of the ROI and they are not discussed in this section. ESA-listed marine resources in the downrange test and support locations (including the post-launch flight corridor and component drop zones) are discussed in **Section 3.4**.

The vernal pool fairy shrimp is a small freshwater crustacean that occurs in vernal pool habitats where offspring survive dry periods as cysts (desiccation-resistant embryos; USFWS 2015). After winter rains fill the ephemeral pools, cysts hatch, grow to maturity, and reproduce (USFWS 2015). This species is sensitive to habitat loss and fragmentation due to development as well as habitat degradation resulting from changes to natural hydrology, increased invasive species, climate change, pollution, erosion, and sedimentation (USFWS 2015). In the ROI, vernal pool fairy shrimp are known to occur or have suitable habitat near the proposed Component Operations Facility, within the GBSD Vehicle Processing Facility construction area, and in ditches along the proposed utility line, especially along 13th Street, New Mexico Avenue, and 35th Street (**Figure 3-3**).

California red-legged frogs occur in nearly all permanent streams and ponds on VAFB as well as in some seasonal wetlands (USAF 2011b). While these frogs breed in waterbodies, juvenile and adult frogs may disperse long distances from breeding sites and have been found up to 400 feet from breeding sites in adjacent dense riparian habitats (USFWS 2015). All aquatic and riparian areas within the range of the species are considered suitable habitat for this species as well as any landscape features that provide cover and moisture (USFWS 2015). Based on USAF surveys for California red-legged frogs on VAFB, and GBSD biological surveys (MSRS 2020), individuals are known to occur near the proposed Component Operations Facility site, the Alternative 1 GBSD Schoolhouse site, and in a number of aquatic habitats along the proposed utility line route (**Figures 3-2** and **3-3**).

Marbled murrelets occur only at-sea in the ROI. These birds are considered rare in nearshore waters off VAFB (USAF 2011b) but have the potential to occur at-sea in the launch corridor.

Western snowy plovers occur on VAFB beaches and dunes year-round with both resident and migrant birds (USAF 2011b). In the ROI, snowy plovers breed from March through September (USAF 2011b) with peak nesting from mid-April to mid-June (USFWS 2007). VAFB is an important wintering area for snowy plovers and in 2004, VAFB supported approximately 22 percent of the California population (USAF 2011b). Western snowy plover habitat occurs near all proposed launch pads and test pads (**Figure 3-2**) and within the proposed launch corridors.

California least terns are found along the Pacific Coast of California where they nest in colonies from mid-April through August (USAF 2011b). The distribution of nesting California least terns in the ROI is limited (**Figure 3-2**). With the exception of two nests on San Antonio Beach in 2002, least terns have only nested at a colony at Purisima Point since 1998 (USAF 2011b). The tern colony at Purisima Point is over 4 miles from TP-01, the closest proposed GBSD launch location.

Southern sea otters occur in nearshore marine habitats of the ROI where they feed primarily on abalones, sea urchins, crabs, and clams (USAF 2011b). Sea otters spend a significant portion of their time at the water surface and are usually found rafting in kelp beds (USAF 2011b). One primary rafting area for the sea otter breeding colonies offshore of VAFB occurs near Purisima Point (**Figure 3-2**).

Environmentally Sensitive Habitats

Vernal Pools and Seasonal Wetlands. Vernal pools are depressions which contain water for only a portion of the year and are ecologically important and sensitive habitats (CDFW 2013). Vernal pools in California fill with water from winter and spring rains but are completely dry during the summer and fall (MSRS 2020, CDFW 2013). On VAFB, these wetlands are dominated by nonpersistent vegetation such as alkali ryegrass (*Leymus triticoides*), Lemmon's canarygrass (*Phalaris lemmonii*), annual beard grass (*Polypogon monspeliensis*), low barley (*Hordeum depressum*), rushes (*Juncus* spp.), and spikerushes (*Eleocharis* spp.; USAF 2011b). These vernal pools and seasonal wetlands provide important habitat for a diversity of wildlife including rare species such as the vernal pool fairy shrimp and western spadefoot (USAF 2011b). The extent of vernal pools on VAFB varies from year to year but have been estimated to cover anywhere from 10 to 114 acres (USAF 2011b). The historical extent of vernal pools in California has been reduced by an estimated 90 percent or more and these habitats continue to be threatened by agriculture and development activities (CDFW 2013).

Within the ROI, vernal pool occurs primarily along 13th Street and New Mexico Avenue, near the proposed Component Operations Facility, and within the proposed GBSD Vehicle Processing Facility construction site (**Figure 3-3**). Wetland surveys were conducted at proposed new construction and utility sites in 2020 to define the extent of vernal pools in the ROI.

Maritime Chaparral. Maritime chaparral vegetation on VAFB consists primarily of medium to tall woody shrubs such as manzanitas (*Arctostaphylos* spp.), Santa Cruz Island oak (*Quercus tomentella*), California lilacs (*Ceanothus* spp.), and chamise (*Adenostoma fasciculatum*) (MSRS 2020, USAF 2011b). Burton Mesa chaparral, a rare type of maritime chaparral, is a regionally declining plant community distinguished by the presence of sand mesa manzanita (*Arctostaphylos rudis*), La Purisima manzanita (*Arctostaphylos purissima*), buckbrush (*Ceanothus cuneatus*), and Santa Barbara ceanothus (*Ceanothus impressus* var. *impressus*) (USAF 2011b). Most of the remaining Burton Mesa chaparral occurs on VAFB where it is managed under the VAFB INRMP (USAF 2011b). Burton Mesa chaparral is composed primarily

of rare plant species, including the ESA-listed Vandenberg monkeyflower (*Diplacus vandenbergensis*) and Lompoc yerba santa; and the State of California listed seaside bird's beak (*Cordylanthus rigidus littoralis*), occur in this habitat type on VAFB (**Table 3-8**) (USAF 2011). The dominant plant species in Burton Mesa chaparral, manzanitas (*Arctostaphylos* spp.), are ranked by the California Department of Fish and Wildlife (CDFW) as critically imperiled and at very high risk of extinction or extirpation.

Burton Mesa chaparral is a regionally declining plant community that has been reduced considerably over the years, and now occupies approximately 13,061 acres (USAF 2011b). Approximately 29.5 acres of maritime chapparal habitat occurs within the proposed GBSD construction areas (**Figure 3-3**), including the GBSD Vehicle Processing Facility and Component Operations Facility sites. The alternative laydown area for the Component Operations Facility occurs on an additional 5 acres of this habitat type.

Critical Habitats. Designated critical habitat for several terrestrial and freshwater ESA-listed species occurs near VAFB including habitat for Vandenberg monkey flower, La Graciosa thistle (*Cirsium loncholepis*), California red-legged frog, and Southern California DPS of steelhead. There is no designated critical habitat on VAFB as VAFB was excluded from critical habitat designations for these species under provisions in the 2004 National Defense Authorization Act. The Proposed Action would have no impact on designated critical habitat for these terrestrial or freshwater species and it is not discussed or analyzed further in this EA/OEA. Even though designated critical habitat for these ESA-listed species does not occur on VAFB, the potential impacts of the Proposed Action on suitable habitat for these species (as described in the *Threatened and Endangered Species* subsection) are evaluated in **Section 4.2.2.2**.

Critical habitat for black abalone, and leatherback turtles (*Dermochelys coriacea*) has been designated in nearshore habitats offshore of VAFB. However, no portion of the Proposed Action would affect the primary constituent elements of the designated critical habitat for these species and these habitats are not discussed further in this EA/OEA.

California Coastal National Monument. Established in 2000 and expanded in 2014, the California Coastal National Monument protects offshore islands, rocks, exposed reefs, and pinnacles owned or controlled by the U.S. Government within 12 nm of the California shoreline (3 CFR 9089 [March 11, 2014]). The California Coastal National Monument comprises approximately 1,000 acres of offshore rocks and islands as well as 7,924 acres onshore (BLM 2019). The monument includes the feeding and nesting habitat for an estimated 200,000 breeding seabirds as well as foraging and breeding habitat for California sea lions, harbor seals, elephant seals, and southern sea otters (3 CFR 9089 [March 11, 2014]). The Monument occurs along the entire coastline of California, including offshore of VAFB.

Vandenberg State Marine Reserve. Designated and managed by the CDFW, the Vandenberg State Marine Reserve is 33 square miles in area and spans 14 miles of shoreline (**Figure 3-2**) (CDFW 2020). State Marine Reserves are types of marine protected area that protects biologic, geologic, and cultural resources by prohibiting the recreational and/or commercial damage or take of those marine resources (CDFW 2020). The only take of marine resources allowed in this Marine Reserve is take incidental to base operations and mission critical commercial space launch operations at VAFB (CDFW 2020).

3.2.3 Climate Change – VAFB

Existing Conditions for Climate Change and Green House Gas

VAFB is located in Southern California. It is in a dry subtropical climate zone that experiences semi-wet winters, dry summers, and mild temperatures throughout the year. November to April is relatively wet and cool, while May to October is dry and warm. Also, due to its proximity to the Pacific Ocean, VAFB experiences coastal weather, including ocean winds, fog and cloudiness, and marine inversions. (VAFB 2013) Because VAFB is along the coast, the base would be impacted by sea level rise. Sea level is likely to rise between 1 and 4 feet in the next century (USEPA 2016b). According to a recent 2019 DoD report, VAFB is currently, and has the potential to be impacted by recurrent flooding, drought, and wildfires due to the effects of a changing climate (DoD 2019).

Over the course of the year, the temperature typically varies from 42°F to 71°F and is rarely below 34°F or above 81°F. The annual average precipitation at VAFB is 16.3 inches. Historically, November through March is the apex of the rainy season while May through October can see little to no rainfall. (County of Santa Barbara 2019)

The average percentage of the sky covered by clouds varies over the course of the year. The entire south-central coastal region experiences a persistent subsidence inversion resulting from a Pacific high-pressure region. The average maximum daily inversion height ranges from 1,600 feet during the summer to 2,800 feet during the winter (USAF 1998). VAFB is also affected by marine inversions, which are a result of relatively warmer moist air moving over very cold ocean water. Between the months of May and October, fog and stratus (marine layer) are the rule at Vandenberg. The resulting marine layer is carried onshore by prevailing northwesterly wind flow, the end result being a monthly increase in the number of days with fog and stratus. (VAFB 2009)

Wind and other meteorological conditions are essential for the dispersion of emissions at VAFB. The predominant average hourly wind direction in VAFB varies throughout the year. The average wind speed in the area is 7 miles per hour (mph) out of the northwest. The strongest winds occur during the winter and midday, and at ridgelines. (USAF 2019b) The wind is most often from the west from May to September 8, and is most often from the north for from

September to May. (Sperling's Best Places 2019) **Table 3-11** summarizes the climate averages for VAFB, CA.

Table 3-11. Climate Averages for Santa Barbara County, California

	Santa Barbara County, California
Rainfall	16.0 inches
Snowfall	0.0 inches
Precipitation	44.4 days
Sunny	280 days
Average July High	74.8°F
Average Jan low	39.9°F
Comfort Index (Higher =better)	80.8
Ultraviolet (UV) Index	5.7
Elevation	402 feet

Source: Sperling's Best Places 2019 (Data retrieved from National Climate Data Center, NOAA)

Greenhouse Gas Emissions for Santa Barbara County

Table 3-12 indicates the sources of greenhouse gas emissions tracked by Santa Barbara County, with transportation the largest contributor, followed by building energy use, agriculture, solid waste and water and wastewater (Hodgson 2018).

Table 3-12. GHG Emission Sources Categories for Santa Barbara County

Electricity
Waste
Agriculture
Commercial
Industrial
Residential
Transportation On Road

Source: County of Santa Barbara 2011

Greenhouse Gas Emissions for VAFB

The GHG emissions report indicates that the total carbon equivalent (CO_{2e}) produced at VAFB for the calendar year of 2019 (most recent year data) is 11,456 tons/year(**Table 3-13).**

Table 3-13. Greenhouse Gas Emissions for VAFB	
Source Category	**CO_{2e} Equivalent**
Nitrous Oxide	9.4
Carbon Dioxide	11,416.3
Methane	28.4
Carbon Tetrachloride	0.0139
1,1,1-Trichloroethane	0.0007
HCFC-22	0.0187
Fluorotrichloromethane	0.041
Dichlorodifluoromethane	1.58
Total	11,455.75

Source: VAFB 2019

3.2.4 Coastal Zone – VAFB

The Coastal Zone Management Act (CZMA), 16 USC §§ 1451 et seq., was passed in 1972 and provided a formal structure to address the challenges of continued growth in coastal areas. Coastal zone management involves managing coastal areas to balance environmental, economic, human health, and human activities.

3.2.4.1 Applicable Regulations

Refer to **Appendix E, Section E.2.3**.

3.2.4.2 Region of Influence

The ROI for the Proposed Action includes those on- and off-installation areas within the coastal zone that could be affected by project-related activities. These areas include each of the current Minuteman III launch and launch support facilities (i.e., LF-04, LF-09, and LF-10), proposed GBSD launch and launch support facilities (i.e., LF-04, LF-26, TP-01, PK PLTF; and Buildings 1818, and 2002), and other affected facilities (i.e., Buildings 1800 and 1860/1861) located within or bordering designated coastal zone areas on North Base. Several temporary construction laydown areas also would be established. Because of launch-related noise and range safety evacuation procedures, coastal zone areas just north of VAFB are also within the ROI. This ROI extends to those coastal resources that may be affected, including natural resources (e.g., wildlife and plants), land uses, and water uses as well as public access to and recreation within the California Coastal Zone.

3.2.4.3 Affected Environment

VAFB has 42 miles of Pacific Ocean coastline on its western boundary and a "coastal zone" has been established in this area by the CCC (VAFB 2019a). The California Coastal Zone extends, generally, 1,000 yards inland and up to 3 nm seaward. The coastal zone may also extend up to 5 miles inland for significant coastal estuarine, habitat, and recreational areas and less than 1,000 yards inland in urban areas (VAFB 2016a).

The installation has taken many steps to protect and maintain coastal resources in collaboration with federal, state, and local agencies. This includes funding for research of marine mammals on base, enforcing the limited access regulations to key wildlife areas on base, and minimizing the closure of public beaches.

3.2.5 Cultural Resources – VAFB

Cultural resources are sites, buildings, structures, objects, or districts considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural or engineering resources, and places of traditional religious and cultural importance to Native Americans.

3.2.5.1 Applicable Regulations

Refer to **Appendix E, Section E.2.4.**

3.2.5.2 Region of Influence

To identify potential direct and indirect effects to cultural resources at VAFB, an APE was delineated. The APE encompasses those areas that might be affected by construction and related activities at each proposed GBSD Test Program facility location and takes into consideration visual, noise, vibration, and other effects that might impact the cultural resources in the vicinity of the proposed facilities.

3.2.5.3 Affected Environment

To date, more than 90 percent of VAFB's 99,343 acres have been surveyed for cultural resources, including much of the APE (Lebow and Moratto 2005). These studies have documented more than 2,500 cultural resources on the installation, including archaeological sites; places of traditional religious and cultural importance to Native Americans; 19th- and early 20th-century historical structures; Cold War structures and buildings; and a variety of historic roads, trails, and landscapes. The facility also contains one National Historic Landmark (Space Launch Complex [SLC] 10 and associated buildings) and the Anza National Historic Trail.

Of the more than 2,200 known archaeological sites at VAFB, most date to the prehistoric period (before A.D. 1760), and include three named Chumash villages (Nocto, Lompoc, and Lospe), along with the remains of a variety of seasonal and temporary encampments, rockshelters, shell

middens, toolstone quarries, and rock art (Glassow 1996). The installation also contains a wide variety of historic-period archaeological resources that date to as early as the 1870s and relate to general historical themes of agriculture, defense, extractive industry, settlement, and transportation (Palmer et al. 2005b). More than 100 historic buildings and structures have been recorded on VAFB, and have been classified into thematic categories of agriculture, defense, domestic, funerary, and transportation (Palmer et al. 2005c). Of these, some are related to 19th- and early 20th-century agricultural activities, although many are associated with military themes, including at least 72 that are related to the Cold War. Other buildings on the installation include domestic properties such as residences, bunkhouses, and garages. Known places of traditional religious and cultural importance to Native Americans at VAFB include locations that are significant to the local Chumash people as reported in previous ethnographic and ethnohistorical investigations, as well as archaeologically recorded locations that match ethnohistorical descriptions of such places. Places of traditional religious and cultural importance to Native Americans on VAFB include shrines, rock art sites, villages (especially those with known cemeteries), landscape features, resource gathering areas, and trails (Mason et al. 1999; Palmer 2005a).

Archaeological Resources

Seventy-six previous studies identified a total of 52 archaeological resources within the APE associated with the proposed GBSD facilities. Of these, 19 resources have been determined eligible for listing in the NRHP, 31 have been determined not eligible for listing in the NRHP, and 2 have not been evaluated and were assumed eligible for the purposes of environmental review. The previously identified prehistoric resources range from substantial village sites with formal cemeteries to sparse scatters of artifacts and occasional pieces of marine shell; the historic resources include debris scatters, the remains of farmsteads, a World War II era and Korean War era shale quarry, and masonry ditches.

The California SHPO has concurred with all archaeological NRHP eligibility determinations for the GBSD Test Program (**Appendix B**). VAFB is consulting with the federally recognized Santa Ynez Band of Chumash Indians, the California SHPO, and the Advisory Council on Historic Preservation to comply with Section 106 of the NHPA regarding potential effects from the GBSD Test Program at VAFB. **Table 3-14** summarizes the documented archaeological cultural resources at VAFB that could be affected by the proposed GBSD facilities shown in **Figure 2-4** and **Figure 2-11**. These facilities and the associated infrastructure are reviewed in this EA/OEA for potential effects. Although it is likely that most of the surficial archaeological resources have been discovered at the installation, the potential for buried cultural resources remains. Therefore, it is important that all ground-disturbing activities that have the potential for impacts on subsurface archaeological materials be reviewed for effects on extant but previously unidentified cultural resources.

Table 3-14. Number of Archaeological Sites Potentially Affected by Proposed GBSD Facilities	
Proposed GBSD Facility	**Resources Within the APE[1]**
Launch Facility 04 (LF-04)	1 (1)
Launch Facility 26 (LF-26)	2 (1)
Test Pad 01 (TP-01)	3 (0)
Missile Alert Facility D0 (MAF-D0)	0
Launch Equipment Storage (Building 2002)	0
GBSD Component Processing Facility (Building 1900)	2 (0)
GBSD Contractor Vehicle/Support Equipment Test and Proof Load Facility (Building 1818 & PK PLTF)	1 (0)
GBSD Temporary Contractor Test Support Facilities (Buildings 8337 and 8339)	0
Consolidated Maintenance Facility	1 (0)
GBSD Depot Maintenance Facilities (Buildings 9320, 9325, 9327, and 9330)	0
GBSD Vehicle Maintenance Facilities (Buildings 7501, 10711, and 10713)	0
GBSD Component Operations Facility	0
GBSD Weapons Maintenance Facility (Building 1544)	0
Additional MSA Parking	0
GBSD Vehicle Processing Facility	2 (0)
Storage Igloos	0
Temporary Storage	0
GBSD Schoolhouse Alternative 1	0
GBSD Schoolhouse Alternative 2	0
Utility Corridor	49 (24)
Vehicle Processing (Building 1800)	1 (0)
Vehicle Processing and Training (Buildings 1860/1861)	1 (0)
Equipment Storage and Component Processing	0
Point Sal Road Laydown Area	0
Globe Laydown Area	0
Brioso Laydown Area	0
Igloo Laydown Area	0

[1] The number of NRHP-eligible and unevaluated (assumed eligible) resources is in parenthesis.

Architectural Resources

Architectural properties at VAFB include World War II era and Cold War era resources, as well as those present when the land was acquired by the U.S. Army in 1941. There are 24 built resources within the APE. Of these, 20 have been determined Not Eligible (including three Not Eligible districts), while four have been determined Eligible for NRHP listing. Four properties located within the APE were constructed after 1975, are not exceptionally significant, and do not require NRHP evaluation. GBSD Test Program project areas include buildings and structures that have been evaluated for their potential to contribute to one or more potential historic districts. Specifically, the Peacekeeper Rail Garrison district (Buildings 1800, 1818, 1860/1861, and 1900), the Nose Cone Training Facility district (Building 1544), and the Minuteman ICBM district (Buildings 6811 to 6815 and 6819 to 6821) have all been determined not eligible with SHPO concurrence. **Table 3-15** lists the architectural resources within the APE of proposed GBSD Test Program facilities and identifies their NRHP eligibility.

Places of Traditional Religious and Cultural Importance to Native Americans

No new places of traditional religious and cultural importance to Native Americans were identified during consultation with the federally recognized Santa Ynez Band of Chumash Indians for the GBSD Test Program. Previously identified places of traditional religious and cultural importance to the Tribe that are near the APE for the proposed GBSD facilities are located only in the northern portion of the project. The locations are on the San Antonio Terrace and along Point Sal Road north of Shuman Canyon, and include three village sites with known or likely cemeteries, a potential shrine, two rock art locations, a sacred landscape feature consisting of a waterfall and pools, and resource gathering areas. One place of traditional religious and cultural importance is within the APE for the proposed GBSD facilities: the historical Chumash village of Lospe, which is associated with NRHP-eligible archaeological sites CA-SBA-512, -513, and -941. A sacred landscape feature related to Lospe, the waterfall and pools at the mouth of Dairy Basin Canyon, is approximately 600 feet from the APE for LF-04. On April 7, 2021, the Santa Ynez Band of Chumash Indians concurred that efforts to identify the broadest range of cultural resources for the GBSD Test Program are complete (**Appendix B**).

Table 3-15. Architectural Resources within the APE of Proposed GBSD Test Program Facilities				
Proposed GBSD Facility	**Building #**	**Building Name**	**Year Constructed**	**NRHP Eligibility**
Test Launch Silo LF-26	1967	LF-026	1964-65	Eligible
Test Launch Silo LF-04	1976	LF-04	1961-62	Eligible
Launch Control MAF-D0	1450	MAF-D0	1966	Eligible
Temporary Construction Offices	1974	MAF-01A	1961-62	Eligible
		No existing buildings or structure		
Test Launch Pad	1840	TP-01	1982	Not Eligible
Consolidated Maintenance Facility	No existing buildings or structures			
GBSD Schoolhouse (Alternative 1)	No existing buildings or structures			
Launch Equipment Storage	2002	Equipment Storage Facility	1998	Not 45 years or older
GBSD Component Processing Facility	1900	Integration Refurbishment Facility	1988-90	Not Eligible
GBSD Contractor Vehicle/Support Equipment Test and Proof Load Facility	1818	Missile Maintenance Facility/Peacekeeper Proof Load Test Facility	1983/1988	Not Eligible
GBSD Temporary Contractor Test Support Facilities	8337	Payload Fairing Processing Facility	1958	Not Eligible
Consolidated Maintenance Facility	No existing buildings or structures			
GBSD Depot Maintenance Facilities	9320	30th Range Squadron Maintenance Facility	1958	Not Eligible
	9325	30th Space Command Squadron Receiving Warehouse	1959	Not Eligible
	9327	576th Missile Maintenance Paint Shop	1959	Not Eligible
	9330		1997	Not 45 years or older
GBSD Vehicle Maintenance Facilities	7501	Missile Service Shop	1962	Not Eligible
	10711	Vehicle Maintenance Facility	1993	Not 45 years or older
	10713	Vehicle Maintenance Facility	1984	Not 45 years or older

Table 3-15. Architectural Resources within the APE of Proposed GBSD Test Program Facilities (Continued)

Proposed GBSD Facility	Building #	Building Name	Year Constructed	NRHP Eligibility
GBSD Component Operations Facility	No existing buildings or structures			
GBSD Weapons Maintenance Facility	1544	Nose Cone Assembly Building	1958-59	Not Eligible
Additional MSA Parking	No existing buildings or structures			
Vehicle Processing Facility	No existing buildings or structures			
Storage Igloos	6811-6815, 6819-6821	Bunker 1-8	1961, 1968	Not Eligible
Temporary Storage	6809/6810	Hot Cargo Pads	1970	Not Eligible
GBSD Schoolhouse (Alternative 2)	No existing buildings or structures			
Utility Corridor	No existing buildings or structures			
Vehicle Processing	1800	Missile Maintenance Facility	1983	Not Eligible
Vehicle Processing and Training	1860/61	Integration Refurbishment Facility	1988	Not Eligible
Point Sal Laydown Area	No existing buildings or structures			
Globe Laydown Area	1974	No existing buildings or structures		
Brioso Laydown Area	1987	MAF-O1E/O1C		Eligible
Igloo Laydown Area	No existing buildings or structures			

3.2.6 Hazardous Material and Waste – VAFB

3.2.6.1 Applicable Regulations

Refer to **Appendix E, Section E.2.5**.

3.2.6.2 Region of Influence

The ROI for hazardous material and waste would be limited to facilities and test areas of VAFB to be used for launch preparation, launch, and post-launch activities and in areas where hazardous materials are generated, stored and handled on a short-term basis.

3.2.6.3 Affected Environment

Of the 146 IRP sites, they are grouped into six Operable Units with ongoing remediation efforts (USAF 2011b). No IRP OUs have been identified in the GBSD project areas.

Solid waste collection and disposal primarily occurs at VAFB's landfill and Defense Reutilization and Marketing Service / Materials Diversion Center (VAFB 2013). Solid waste may be disposed of offsite by franchise waste haulers at the Tajiguas Landfill in Goleta, CA (Santa Barbara County 2018a).

Some older buildings could contain hazardous materials used in their construction, such as asbestos-containing material (ACM) or LBP. All federal, state, and USAF regulations with regards to ACM or LBP will be followed by VAFB personnel or contractors

VAFB was a Word War II era training and artillery range, which left a legacy of unexploded ordnance (UXO) across multiple sites. The project areas for the Preferred Alternative are all within previously disturbed areas, so the risk of encountering UXO is low. **Section 3.2.7** discusses the health and safety risks surrounding UXO. TP-01 is located within the San Antonio Dune Terrace North, a UXO closure area described in Section 3.1 of Appendix B, 10-Year Vegetation Management Plan of the 2011 VAFB INRMP. See **Figure 3-4** for an overview of hazardous material sites on VAFB.

One aspect of the Proposed Action is to convert existing Peacekeeper facilities to GBSD usage. Specifically, the Strategic Missile Integration Center (SMIC) test LF was a Peacekeeper facility that was built in 1987 and further deactivated under the Minuteman III program in 2005. Much of the SMIC's structures are intact but would require updates before GBSD can utilize it. ACM, LBP, and mold may be present during construction at the SMIC. All government workers and contractors would be expected to follow applicable laws and regulations for human and environmental health and safety.

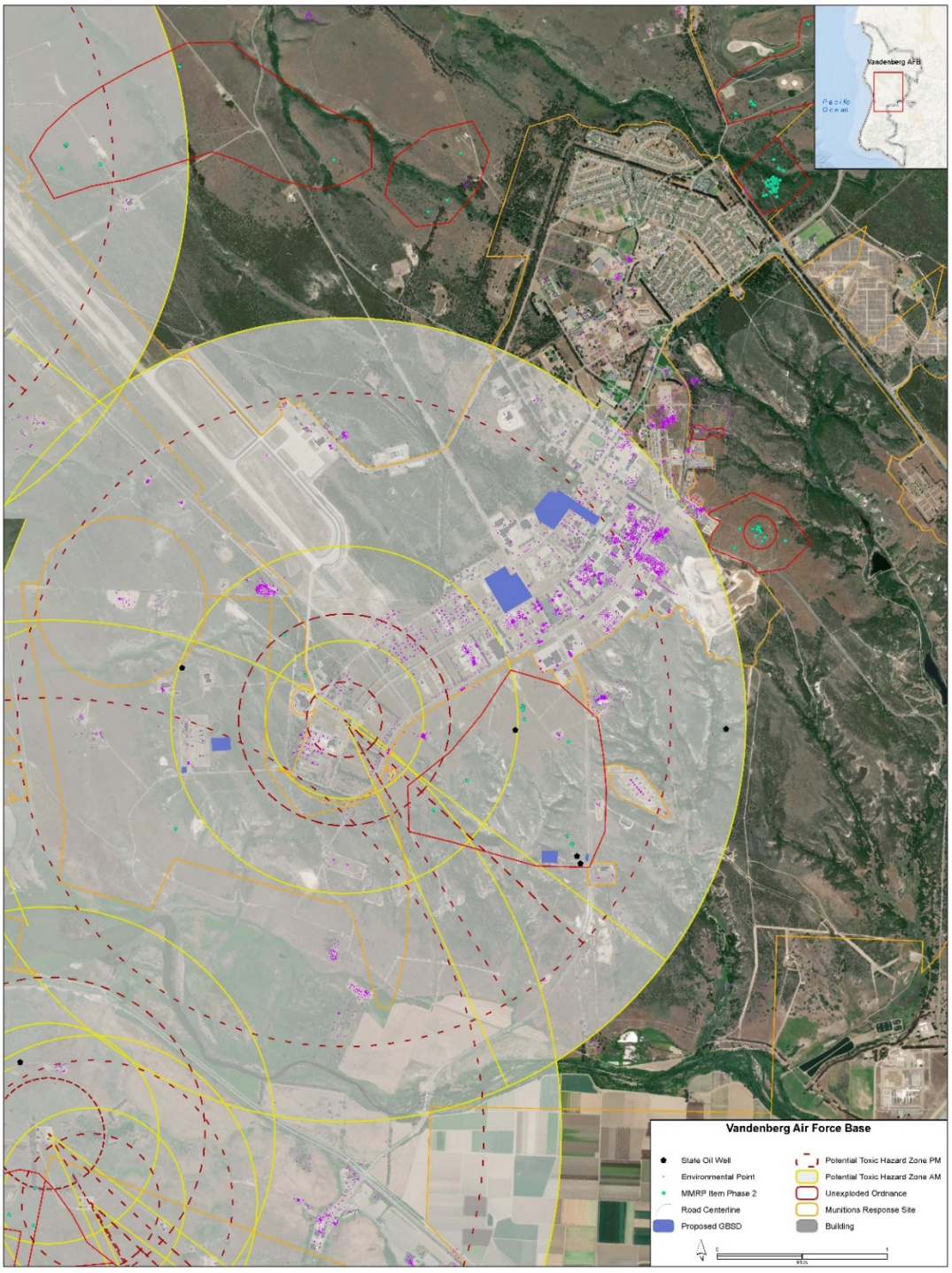


Figure 3-4. Overview of Hazardous Material Sites on VAFB

3.2.7 Health and Safety – VAFB

3.2.7.1 Applicable Regulations

Refer to **Appendix E, Section E.2.6**.

3.2.7.2 Region of Influence

The ROI for health and safety at VAFB is limited to ongoing Minuteman III program support areas, the proposed GBSD Test Program facilities and infrastructure, related explosive safety and launch hazard areas, offshore areas within missile flight paths, and debris impact corridors and the U.S. transportation network used in support of ICBM and rocket motor transport operations. The health and safety ROI includes military personnel, contractors, and the general public.

3.2.7.3 Affected Environment

All contractors performing construction and demolition activities at VAFB are responsible for following federal and state of California safety regulations and are required to conduct construction and demolition activities in a manner that does not increase risk to workers. Both USAF and applicable OSHA regulations and standards are used to implement safety and health requirements for all workers on the installation, including military personnel. As stated in **Section 2.2.3.2**, for project areas with potential soil or groundwater contamination, or potential presence of MECs (including UXO), appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance.

Health and safety requirements at VAFB include industrial hygiene, which is the joint responsibility of Bioenvironmental Services and the 30 SW Safety Office. Establishing and managing the overall safety program is the responsibility of the 30 SW Safety Office, which ensures safety during launch operations and other mission activities. Final responsibility and authority for the safe conduct of ballistic and space vehicle operations lies with the 30 SW Commander.

VAFB has its own emergency services that include the fire department, disaster control group, and security police force, in addition to contract support for the handling of accidental releases of propellants and other hazardous substances. Fire department elements are pre-positioned during launch operations to expedite response in the event of a launch anomaly. Fire breaks are established or maintained on a regular basis at LFs.

The 30th Medical Group’s Family Health Clinic, Pediatric Clinic, and Space Missile Medicine Clinic are the primary military medical facilities at VAFB. Several other clinics and hospitals are off-installation in the cities of Lompoc and Santa Maria. These facilities include the Lompoc Valley Medical Center and Marian Regional Medical Center (My Base Guide 2018).

As described in **Section 3.1.7.3**, interstate highways are the preferred route for the transportation of Minuteman III missile components, although some state and local routes are also used for the transport of missile systems to VAFB. The health and safety of travel on U.S. transportation corridors is under the jurisdiction of each state's Highway Patrol and DOT, and the U.S. DOT. USAF coordinates with each state's DOT when the transport of hazardous missile components is planned to occur. As previously discussed, USAF has an excellent safety record of transporting missile boosters and rocket motors.

Prior to conducting missile and other rocket launches, launch operations are evaluated by the 30 SW Safety Office to ensure populated areas, critical range assets, and civilian property susceptible to damage are outside predicted impact/debris limits near the launch site and along the flight corridor. Flight safety plans prepared for each mission include the evaluation of risks to inhabitants and property near the flight path, calculated trajectory and debris areas, and specific range clearance and notification procedures. Criteria used at VAFB to determine debris hazard risks are outlined in RCC Standard 321-17.

Atmospheric dispersal modeling is also conducted prior to each launch to ensure rocket emission concentrations do not exceed certain levels outside controlled areas. In accordance with 30 SWI 91-106 (*Toxic Hazard Assessments*), if hydrogen chloride (HCl) emission cloud concentrations of 20 parts per million (ppm) or higher are predicted to cross the base land boundary, then the launch is postponed until meteorological conditions improve.

Several days prior to a launch, an NTM and a NOTAM are published and circulated in accordance with 30 SWI 91-104 (*Operations Hazard Notice*) to warn personnel to avoid potential impact areas within established range Warning Areas off the coast, and in other international waters and airspace. Resources such as radar, ground roving security forces, and/or helicopter support are used prior to operations to ensure evacuation of non-critical personnel. Nearby access roads may be closed, and local recreational areas may be evacuated. For example, Point Sal State Beach just off the northern end of the base is closed on average 12 times a year under agreement with Santa Barbara County and the State of California (Ornelaz 2009, VAFB 2008). Evacuation procedures are implemented in accordance with 30 SWI 13-206 (*Park Evacuation and Santa Barbara County Sheriff Support*).

In accordance with 30 SWI 13-210 (*Evacuating or Sheltering of Personnel on Offshore Oil Rigs*), USAF notifies oil rig companies of an upcoming launch event 10 to 15 days in advance of a launch operation. The USAF's notification, provided through the Department of the Interior's Minerals Management Service, requests that the oil rigs located in the path of the launch vehicle overflight temporarily suspend operations and evacuate or shelter their personnel.

The coordination and monitoring of train traffic passing through the base during hazardous operations is conducted in accordance with 30 SWI 91-103 (*Train Hold Criteria*). An average of 10 trains pass through the base daily on the Union Pacific line (USAF 2004).

3.2.8 Infrastructure – VAFB

Refer to described in **Section 3.1.5**.

3.2.8.1 Applicable Regulations

Refer to **Appendix E, Section E.2.7**.

3.2.8.2 Region of Influence

The ROI for the analysis of infrastructure and utilities at VAFB includes the proposed GBSD Test Program facility locations where demolition and construction activities would occur. The analysis also considers the utility services and systems, supporting infrastructure, and supplies at VAFB that could be affected by the Proposed Action.

3.2.8.3 Affected Environment

Electrical Power

VAFB purchases its electricity from Pacific Gas and Electric (PG&E), which is primarily generated using natural gas and supplemented by renewable sources (hydro-turbines and PV arrays). PG&E owns net generating capacity of approximately 7,700 MW from hydroelectric, nuclear, natural gas, solar, and fuel cell generation (PG&E 2019). A new 22 MW PV solar farm on the installation's North Base, which is owned by PG&E, is expected to provide approximately 35 percent of VAFB's total energy requirement (22.5 MW). Additionally, there is a 15 MW natural gas power plant located on South Base. There is more than sufficient electrical system capacity for current demand on the installation. The system has a capacity of 100 MW with a maximum peak demand of 25 MW and minimum demand of 18 MW, which equates to a headroom capacity of at least 75 MW (VAFB 2019a).

Electrical power at VAFB is fed from two 69 kV feeder lines connected to nine substations that step voltage down to 12.47 kV. The power is then distributed through overhead and underground lines (VAFB 2019a). Generally, all of the proposed GBSD Test Program facility sites already have electrical service or service lines are accessible nearby.

Natural Gas

Southern California Gas Company supplies natural gas to VAFB (VAFB 2011). The installation natural gas distribution system provides adequate supply and distribution to meet requirements of existing and future facilities. The natural gas pipeline distribution capacity is 632 million cubic feet (mcf) per year and current demand is 265 mcf per year, which equates to headroom capacity of 367 mcf per year (VAFB 2019a). Natural gas mains are accessible in most areas of the Main Cantonment Area.

Potable Water

The Coastal Branch of the Central Coast Water Authority (CCWA) supplies water to VAFB as part of the California State Water Project, which is a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants (California DWR 2019). Water for the system is received from sources in northern California, and the water allotment for VAFB is based on a percentage of statewide precipitation during the previous year. The installation's minimum water allotment from CCWA is nearly 2 million gpd; however, on average the installation is allocated nearly 5 million gpd, but does not always use or receive that amount. Average water use is 1.6 million gpd and peak water use is 2.2 million gpd. The average headroom when using the CCWA allotment is approximately 364,000 gpd; however, during peak demand there is an approximate 254,000 gpd deficit. When the CCWA water allotment is below the installation's requirement and when the water supply system requires maintenance, the installation uses its own water supply from wells (VAFB 2019a).

The VAFB water distribution system, which is privatized, has a total combined storage capacity of 15 million gallons. There are four wells and two 4-million-gallon water storage tanks that serve as a backup water supply for the North Base when CCWA supply is shut down. There are four water storage tanks on South Base with a capacity of at least 750,000 gallons. Water is treated at six locations on the installation, including the San Antonio Plant, four booster plants, and one mobile emergency plant (VAFB 2019a). Underground water mains are available at or near all proposed GBSD Test Program facility locations.

Wastewater Management

VAFB has contracted with the City of Lompoc for treatment of wastewater from the installation's Main Cantonment Area. The sanitary sewer and wastewater collection system, which is privatized, consists of a series of seven siphons to transport wastewater from the Main Cantonment Area to the Lompoc Regional Wastewater Reclamation Plant. Wastewater flow to the plant is metered and capacity is under the purview of the city. The plant's overall average dry weather flow design capacity is 5.5 million gpd with a peak dry weather flow of 9.5 million gpd. The peak wet weather capacity is 15 million gpd. VAFB's contract is not to exceed an average of 1.3 million gpd during the dry weather flow or 3.4 million gpd during wet weather flow (WSC 2016). The average amount of wastewater treated at the plant is 3.2 million gpd, which includes sufficient capacity to accommodate the installation's average and peak discharges of 800,000 gpd and 1 million gpd, respectively. (VAFB 2019a).

For sanitary sewer and wastewater generated outside of the VAFB Main Cantonment Area, there are two package WWTPs on the installation: one in the South Cantonment Area and another at the Vandenberg Tracking Station. In addition, there are numerous septic and leach field systems at remote locations on both North and South Bases (VAFB 2019a).

Industrial wastewater generated on the installation is treated at the VAFB Industrial Waste Water Treatment Plant. The plant has two evaporation ponds with an ultraviolet O_3 management unit (VAFB 2018a).

Stormwater Drainage

VAFB does not have an installation-wide stormwater collection system. The majority of the installation is undeveloped with minimal paved areas. In developed areas, such as the Main Cantonment Area, storm runoff is collected locally and conveyed away from roads, streets, and structures via surface flow or open drainage swales and underground pipes (VAFB 2019a).

Solid Waste Management

Municipal solid waste generated at VAFB is collected by a contractor and disposed at off-installation landfills, including the Santa Maria Regional Landfill in Santa Maria and the Tajiguas Sanitary Landfill (for oversized waste) in Goleta. The general refuse contractor transports all recyclable materials (e.g., paper/cardboard, plastic containers, and aluminum cans) to off-installation recycling facilities (VAFB 2018a). As of 2018, the Santa Maria Regional Landfill had approximately 2.2 million cubic yards of remaining capacity, which is expected to last until around 2027. The landfill accepts mixed municipal, construction and demolition, agricultural and green materials, industrial, metals, and tires. As for the Tajiguas Sanitary Landfill, the remaining capacity was approximately 4.3 million cubic yards in 2016 and it is estimated to reach capacity in 2036. This landfill accepts mixed municipal, agricultural, asbestos, construction and demolition, industrial, sludge (biosolids), and tire wastes (CalRecycle 2020).

Contractors at VAFB are required to minimize the amount of solid waste generation and maximize landfill diversion efforts through source reduction, reuse, and recycling. This includes consideration of any construction and demolition debris that can be transported to the Vandenberg Recycling Center (VAFB 2018a). In FY 2018, VAFB generated approximately 8,453 tons of nonhazardous solid waste and diverted approximately 7,071 tons for recycling or reuse. The installation also generated 5,084 tons of construction and demolition debris and diverted 4,816 tons (VAFB 2019a).

3.2.9 Noise – VAFB

3.2.9.1 Applicable Regulations

Refer to **Appendix E, Section E.2.8**.

3.2.9.2 Region of Influence

The ROI for noise is the areas closest to the project site that would experience elevated noise from implementation of the Proposed Action. For noise analysis purposes in this EA/OEA, the ROI at VAFB is defined as the area within the 80-dB maximum (unweighted) sound level contours generated by proposed project activities and launch noise.

3.2.9.3 Affected Environment

Based on the latest available data, existing noise levels on VAFB are generally low, with higher levels occurring near industrial facilities and transportation routes. Noise at VAFB is typically produced by automobile and truck traffic, aircraft operations (approximately 32,000 per year, including landings, takeoffs, and training approaches and departures for both fixed-wing and rotary-wing aircraft), and Southern Pacific trains passing through the base (an average of 10 trains per day) (VAFB 2000).

The immediate area surrounding VAFB is largely composed of undeveloped and rural land, with some unincorporated residential areas in the Lompoc and Santa Maria valleys, and Northern Santa Barbara County. The cities of Lompoc and Santa Maria, which make up the two main urban areas in the region, support a small number of industrial areas and small airports. Sound levels measured for the area are typically low, except for higher levels in the industrial areas and along transportation corridors. The rural areas of the Lompoc and Santa Maria valleys typically have low overall Community Noise Equivalent Levels (CNELs), normally about 40 to 45 dBA (USAF 1998). Occasional aircraft flyovers can increase noise levels for a short period of time.

Other less frequent, but more intense, sources of noise in the region are from missile and space launches at VAFB. These include Minuteman III, Delta IV l Minotaur-C, Atlas V, Orbital Boost Vehicle Interceptor, North Base, South Base, Falcon 9, and Delta IV launches. Depending on the launch vehicle and launch location on the base, resulting noise levels in Lompoc and Santa Maria may reach estimated maximum unweighted sound pressure levels of 100 dB and 95 dB, respectively, and have an effective duration of about 20 seconds per launch. Equivalent A-weighted sound levels would be lower. Because launches from VAFB occur infrequently, and the launch noise generated from each event is of very short duration, the average (CNEL) noise levels in the nearby areas are not affected. (USAF 1997, 1998, VAFB 2000)

The typical noise level for a sonic boom is approximately 140 dBA. Although rocket launches from VAFB often produce sonic booms during the vehicle's ascent, the resulting overpressures are directed out over the ocean in the direction of the launch azimuth and generally do not affect the California coastal area.(USAF 2004)

3.2.10 Socioeconomics/Environmental Justice – VAFB

3.2.10.1 Applicable Regulations

Refer to **Appendix E, Section E.2.9**.

3.2.10.2 Region of Influence

The ROI for socioeconomics is defined as the communities and areas surrounding VAFB, California. Primary areas of analysis will concern the larger, more populous communities,

including the cities of Santa Maria, Santa Barbara, and Lompoc, as well as wider Santa Barbara County.

3.2.10.3 Affected Environment

VAFB is in the western part of unincorporated Santa Barbara County, California. The Santa Ynez River and SR 246 divide the base into North and South VAFB. North VAFB generally includes the developed portions of the base, whereas South VAFB includes primarily open space. The city of Lompoc lies to the east, the city of Santa Maria to the northeast, and the city of Guadalupe to the north. Two unincorporated communities, Vandenberg Village and Mission Hills, are north of the city of Lompoc.

Population and Housing

The total population of Santa Barbara County increased from 423,895 persons in 2010 to an estimated population of 446,527 persons as of 2019 (5.3 percent) (U.S. Census Bureau 2020b). The city of Santa Maria, with an estimated population of 107,408 in 2019, was the largest city in the county and contained 24 percent of the county population. Of the communities in the vicinity of VAFB, the city of Santa Barbara, with 91,350 persons is the second most populous, followed by the city of Lompoc with 42,760 people (U.S. Census Bureau 2020b).

As of 2019, there were an estimated 158,333 housing units within Santa Barbara County, of which 36,669 housing units were located within the City of Santa Barbara, and 27,651 and 13,468 units were in Santa Maria and Lompoc respectively (U.S. Census Bureau 2020b). As of 2010, 2,778 units were located in the community of Vandenberg Village (U.S. Census Bureau 2020b).

Income and Employment

The U.S. Census Bureau reported that the estimated per capita income in Santa Barbara County, as of 2018, was $34,229, only slightly lower (2.2 percent) than the average per capita income of the state at $35,021 (U.S. Census Bureau 2020b). Conversely, as of 2018 the median household income in Santa Barbara County, at $71,657, was only slightly higher than that of the state, at $71,228 (U.S. Census Bureau 2020b).

Major employers include the University of California Santa Barbara, VAFB, Lockheed Martin, and Raytheon Systems. In January 2019, VAFB employment of USAF personnel, DoD civilian, and contractors totaled 6,857. In 2020 the base had a major influence on the local and regional economy with a total economic impact of $1.75 billion on the local area (MyBaseGuide 2020). The University of California, Santa Barbara has an enrollment of 25,906 students in 2018 and is the area's largest employer with over 11,000 employees (University of California Santa Barbara 2020a). The University of California, Santa Barbara has an annual budget of $760 million (University of California Santa Barbara 2020b). VAFB employs approximately 1,143 civilian workers and has a military population of approximately 2,892 (VAFB. 2019a).

Public Service

Public services include fire, police, medical, and emergency services. Incorporated municipalities with their own municipal police department include Santa Maria, Lompoc, and Santa Barbara City. On base, the 30th Medical Group provides health care services, and the VAFB fire department provides 24-hour fire and emergency services. The 30 Force Support Service (FSS) at VAFB offers an assortment of services for military personnel, their families and eligible personnel.

3.2.11 Transportation/Traffic – VAFB

As described in **Section 3.1.7**, transportation/traffic addresses impacts on roadway networks consisting of streets, highways, and intersections; the operation and flow of vehicular traffic within roadway networks and at installation access control points (i.e., gates); the availability of vehicle parking; and traffic safety from a proposed action.

3.2.11.1 Applicable Regulations

See **Appendix E, Section E.2.10**.

3.2.11.2 Region of Influence

At VAFB, the transportation/traffic ROI consists of the on-installation roadways, parking areas, and access control points leading to the proposed GBSD Test Program facilities. The off-installation roadways leading to VAFB that could be affected by the Proposed Action are also part of the ROI. The main roadways leading to VAFB are SR-1 and SR-246. These roads are under the jurisdiction of the California Department of Transportation (Caltrans). **Figure 3-5** shows the major roadways and installation gates within the ROI for VAFB.

3.2.11.3 Affected Environment

On-installation Roadways and Gates

There are more than 184 miles of roads on VAFB. This total includes approximately 26 miles of primary roads, 53 miles of secondary roads, and 105 miles of tertiary roads. Specific roads in the vicinity of the proposed GBSD facilities include 13th Street, California Boulevard, New Mexico Avenue, Utah Avenue, and Nevada Avenue. Three demand-responsive traffic signals are within the cantonment area at the intersections of Washington Avenue and Pine Canyon Road, Nebraska Avenue and California Boulevard, and California Boulevard and Utah Avenue. Parking is plentiful on the installation (VAFB 2019).

Figure 3-5. Major Roads and Gates at VAFB

Vehicular access to VAFB currently is controlled through four principal access control points: the Santa Maria, Lompoc, Solvang, and South gates. These gates are described as follows.

- The Santa Maria Gate is the installation's main gate and includes the visitor center. It is located on California Boulevard just east of SR-1. It is open 24-hours-per-day, 7-days-per-week to provide access to North Base.
- The Lompoc Gate also provides access to North Base for automobiles and serves as the installation's primary truck inspection facility. It is open from 0600 to 1800 hours and is located on Washington Avenue just north of Santa Lucia Canyon Road.
- The Solvang Gate is on 13th Street just north of SR-246/West Ocean Avenue. The Solvang Gate is open 24-hours-per-day, 7-days-per-week and is the North Base alternative truck inspection gate for when the Lompoc Gate is closed.
- The South Gate is on Arguello Boulevard just south of SR-246/West Ocean Avenue. The South Gate is open 24-hours-per-day, 7-days-per-week and provides access to South Base (VAFB 2019a).

VAFB also has three secondary access control points. These are the Utah Gate, which is used only for school access; the Surf/Coast Gate, which is used only for mission transports; and Titan Gate, which is no longer in use (VAFB 2019a).

Off-installation Roadways

Regionally, US-101, SR-1, SR-135, SR-246, and numerous county roads provide vehicular access in the VAFB vicinity, which includes the communities between Santa Barbara and Santa Maria. SR-1 runs south-to-north along the Pacific coastline for over 650 miles in California. The portion of SR-1 adjacent to VAFB extends from the city of Lompoc in the south to the intersection of SR-135 in the north and provides access for the majority of travelers to the installation. The town of Orcutt and city of Santa Maria are to the north of the intersection with SR-135. This portion of SR-1 is characterized as a four-lane (two lanes in each direction), divided highway with a speed limit of 65 mph. Several secondary roads intersect with this portion of SR-1 including Santa Lucia Canyon Road and California Boulevard, both of which provide access to VAFB (VAFB 2019a).

SR-246 begins at the Amtrak Lompoc-Surf station, adjacent to the Pacific Ocean, and extends west-to-east through Lompoc. The portion of SR-246 between the Amtrak station and Lompoc is known as West Ocean Avenue and is characterized as a two-lane (one lane in each direction), non-divided roadway with a speed limit of 55 mph. It divides VAFB into North Base, which includes the Main Cantonment area, and South Base. Several secondary roads intersect with this portion of SR-246 including Arguello Boulevard and 13th Street, both of which provide access to VAFB (VAFB 2019a).

Traffic Counts

Caltrans collected traffic counts for SR-1 and SR-246 in the vicinity of VAFB. **Table 3-16** summarizes the traffic counts at four of these locations and includes traffic moving in both directions (Caltrans 2017).

Table 3-16. AADT in the Vicinity of VAFB

Route	Location	2018 AADT	2017 AADT	2016 AADT
SR-1	Approach to Santa Maria and Lompoc Gates from south at Santa Ynez River Bridge	25,040	27,101	28,000
SR-1	Approach to Santa Maria and Lompoc Gates at Santa Lucia Canyon Road (south/north of intersection)	15,800/16,500	15,900/16,600	15,300/15,700
SR-1	Approach to Santa Maria Gate at California Boulevard (south/north of intersection)	15,900/16,900	16,100/16,200	15,700/15,500
SR-1	Approach to VAFB from north at Route 135 (south/north of intersection)	16,100/19,800	15,000/19,100	14,900/17,800
SR-246	Approach to Solvang and South Gates at Lompoc city limits	4,300	4,000	3,600

Sources: Caltrans 2016a, 2017, 2018

3.2.12 Water – VAFB

3.2.12.1 Applicable Regulations

See **Appendix E, Section E.2.11**.

3.2.12.2 Region of Influence

The ROI for water resources at VAFB are surface waters, groundwater, and wetlands whose water quality or drainage could reasonably be altered by the Preferred Alternative actions at VAFB.

3.2.12.3 Affected Environment

VAFB is intersected by the Santa Ynez River. The area north of the river, approximately 2,397 acres in its entirety, contains the urbanized Main Cantonment, (VAFB 2013). Less than five percent of this area is within VAFB (USAF 2011b). A 100-year floodplain is next to the Santa Ynez River, and although the proposed project area is located across the Main Cantonment outside of this floodplain, new utilities would be located within the Santa Ynez River floodplain.

VAFB is also intersected by San Antonio Creek to the north of the Main Cantonment, near where proposed launch activity is anticipated. The lower reaches of the San Antonio Creek are perennial and fed by surfacing groundwater in Barka Slough, ending in a small lagoon which breaks through the sand dunes during large storms leading to tidal inundation (USAF 2011b). New utilities would be located within the 100 year floodplain of San Antonio Creek.

At the very northern end of the proposed project area is the Shuman Creek watershed and sensitive dune habitat of the San Antonio Terrace (USAF 2011b). Some of VAFB's missile launch and research test facilities are located here, including the Preferred Alternative's LFs described in **Section 2.2.3**. Shuman Creek is a narrow, shallow stream where during the summer there is little drainage to the Pacific Ocean but during the winter it empties directly into the Pacific Ocean (USAF 2011b).

According to the 2013 Stormwater Guidance Document, the San Antonio Creek (from Rancho del las Flores Bridge at State Highway 135 to the Railroad Bridge) is described as impaired for unionized ammonia, insecticides, chloride, sodium, nitrite, *E. coli* and fecal coliform, and boron. The Santa Ynez River (from Lompoc to the estuary into the Pacific Ocean) is described as impaired for chloride, sodium, total dissolved solids, nitrate, low dissolved oxygen, *E. coli* and fecal coliform, and temperature. The sources of these impairments stem from agricultural runoff, natural sources, municipal point sources, urban runoff, natural resource extraction, flow modifications, and/or grazing-related sources (VAFB 2013). VAFB conducts monthly water quality monitoring as part of its Ambient Water Quality Program to obtain baseline water quality data and detect deviations (VAFB 2013).

Groundwater at VAFB is stored within the Santa Ynez River aquifer and San Antonio aquifer. The VAFB Bioenvironmental Engineering Services Office is responsible for monitoring the groundwater quality of these aquifers three times per year (USAF 2011b). Santa Barbara county has a well-documented history of groundwater management. The county's Public Works and the U.S. Geological Survey (USGS) cooperate in a water resources monitoring program to measure depth of groundwater, and have indicated that water well levels in the San Antonio Valley are declining as a result of overuse and compounding drought conditions, but the Santa Ynez basin water well levels are remaining stable (USAF 2011b). Since 1997, VAFB has used publicly supplied water, reducing the pumping of groundwater to only 6 weeks per year during the annual maintenance of the state water system (USAF 2011b).

Vernal pools and seasonal wetlands occur at VAFB, near the proposed project area. A wetland study was commissioned for the project area. Vernal pools are depressions which contain water for only a portion of the year and are ecologically important and sensitive habitats (CDFW 2013). The VAFB INRMP estimated that between 10 to 114 acres (4 to 46 hectares [ha]) on VAFB are vernal pools (USAF 2011b). See **Section 3.2.2.3** for a discussion of vernal pool flora and fauna.

3.3 Dugway Proving Ground

U.S. Army Dugway Proving Ground (DPG) is approximately 800,000 acres located in western Utah. It is located in Toole County, and the closest urban area is the City of Tooele. DPG is located approximately 80 miles southwest of Salt Lake City (**Figure 2-5**). The DoD has designated DPG as a major range and testing facility, and the primary chemical and biological defense testing center under the Reliance Program. Testers at DPG determine the reliability and survivability of all types of military equipment in chemical or biological environments. Rationale for Environmental Resources Analyzed.

As it relates to the DPG section of this EA/OEA, air quality/climate change, biological resources, cultural resources, geology and soils, hazardous material and waste management (including pollution prevention), health and safety, infrastructure, noise, and water are the areas of concern requiring discussion.

Other resource areas were not analyzed further because no significant impacts to these resources are anticipated as a result of implementing the Proposed Action. The Proposed Action is well within the limits of current operations and permits at DPG. Thus, there would be no effects on land use resources. Any new construction would not alter the current landscape of the project area; therefore, no impacts to visual aesthetics would be expected. Construction of the proposed PSSTF would require the delivery of cement powder, sand, and stone aggregate by truck during construction. Although these deliveries may add several hundred truck movements in the region, they would occur on lightly traveled routes where the increased traffic would be barely noticeable. There would be no permanent changes to traffic accessing DPG. For these reasons, no significant effects on transportation/traffic would occur.

3.3.1 Air Quality – DPG

3.3.1.1 Applicable Regulations

Refer to **Appendix E, Section E.3.1**.

3.3.1.2 Region of Influence

The ROI is within Tooele County. The AQCR for Utah is code 219.

3.3.1.3 Affected Environment

Existing Emissions at Tooele County

Air quality in the vicinity of DPG (Tooele County) is impacted by vehicular, refinery, aircraft, and other on- and off-base industrial emissions. See **Table 3-17** for the emissions for Tooele County (the most recent year of data).

Table 3-17. Summary of Criteria Air Pollutant Emissions (tons/year) for Tooele County, Utah									
Pollutant	**CO**	**VOC**	**NO_x**	**O_3**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**HAPs**	**CO_2e**
Tooele County Emissions	33,907.7	48,350.5	5,721.6	N/A	7,645.5	2,680.9	202.3	6,504.1	746,486

Source: Utah Department of Environmental Quality 2020

Existing Emissions at DPG

DPG is located in an AQCR that is in attainment and is designated as a Class II area with all applicable air quality standards. It is a major stationary source as the emissions of, and the potential to emit, several regulated pollutants is 100 or more tons per year. As a result, the installation is subject to PSD review requirements of 40 CFR Sec. 52.21 and Utah Administrative Code R307-405 for modifications to stationary sources which would increase emissions of pollutants. DPG maintains a current CAA Title V Operating Permit (#4500003004) from the Utah Department of Air Quality. Under the terms of the Operating Permit DPG is required to estimate the potential to emit and to conduct an inventory of emissions annually in accordance with Utah Air Conservation R307-155. The inventory consists of identifying emission sources and estimating annual emissions for criteria pollutants and HAPs. Under the new source review permit program, DPG has a consolidated approval order for the Combined Chemical Test Facility, Lothar-Saloman Life Science Test Facility, Bushnel Material Test Facility, Cryofracture Test Facility, smoke and obscurant testing, and Open Burn/Open Detonation activities. There is no reporting requirement for GHG emissions under the terms of the current operating permit. (DPG 2011)

The major source of PM_{10} emissions at DPG is fugitive dust created by vehicles traveling on unpaved roads and off-road during testing, training, and routine mission support. When averaged over the last 3 years, this traffic produces approximately 180 tons of fugitive dust per year. Fugitive dust is not subject to a limitation within Dugway's Title V Operating Permit. Fugitive dust emissions vary from year to year dependent upon the testing and training activities performed under Dugway's mission. Criteria pollutants (PM_{10}, $PM_{2.5}$, SO_x, NO_x, CO, VOCs, and others) are tracked annually then reported to the Division of Air Quality with Utah's Department of Environmental Quality. These annual emissions totals also vary and are not dependent solely on training activities. Emissions from activities related to training capabilities and support are captured for inventory. (DPG 2011)

DPG has requested to administratively amend AO DAQE-AN107060054-20, to remove a 100 kW diesel-fired emergency generator engine from building 2040 and a 125 kW diesel-fired emergency generator engine from building 2041. These changes will result in a decrease in emissions. This permit action is being conducted as a Reduction in Air Pollutants, R307-401-12. (DPG 2020c)

Military-specific material emissions are related to testing and training at DPG that occur primarily during the summer months. Tests that involve the controlled release of materials, such as smokes, obscurants, and tracer gases, are conducted no closer than 1.2 miles from DPG's boundary to ensure there are no adverse emissions at DPG's boundary. Wildland fires naturally occur in the region but may also be caused by DPG mission activities including testing and training. Smoke from a wildland fire is a significant source of PM_{10}, and other pollutants such as VOCs and CO. The types and relative quantities of pollutants emitted vary according to the type of vegetation consumed as fuel. The types of fuel available for fire at DPG include grasslands, scrub juniper, sagebrush, and greasewood. These vegetation types occur most frequently on slightly elevated slopes. The dry lakebeds and salt flats do not have enough fuel to burn readily. (DPG 2011)

Table 3-18 summarizes the latest available information on the overall emissions for DPG in 2019 (the most recent year of data).

Table 3-18. Criteria Pollutant and HAP Emissions Attributable to DPG (Tons per Year)

	PM_{10}	$PM_{2.5}$	SO_x	NO_x	VOC	CO	Pb	NH_3	HAP	CO_2e
DPG Emissions	287.9	28.9	0.43	18.5	14.5	16.1	0.039	0.93	2.06	N/A (1)
Total	**287.9**	**28.9**	**0.43**	**18.5**	**14.5**	**16.1**	**0.039**	**0.93**	**2.06**	**N/A**
Tooele County Emissions	7,645.5	2,680.9	202.3	5,721.6	48,350.5	33,907.7	N/A	N/A	6,504.1	746,486
Percentage Contribution of DPG – Tooele County	3.77%	1.08%	0.21%	0.32%	0.033%	0.05%	N/A	N/A	0.03%	N/A

Source: DPG 2019; Utah Department of Environmental Quality 2020

Notes:

(1) According to 40 CFR 98.2(a)(5) Research and development activities, which the GBSD would fall under, are not considered to be part of any source category defined in this part - so CO_2e for this EA/OEA would be exempt from Mandatory Greenhouse Gas Reporting requirements.

3.3.2 Biological Resources – DPG

Biological resources are defined as in **Section 3.2.2**. The biological resources described in this section are those within the affected environment at DPG, specifically those areas subject to construction and operation of the GBSD PSSTF. The three alternative locations for the construction and operation of the GBSD PSSTF have very similar biological resources and are therefore described together in this section.

3.3.2.1 Applicable Regulations

Refer to **Appendix E, Section E.3.2**.

3.3.2.2 Region of Influence

The ROI for biological resources at DPG includes the areas subject to effects of the Proposed Action as described in **Chapter 2** including:

- the areas proposed for construction and testing of the PSSTF and related infrastructure (**Figure 2-15**), and
- areas in the vicinity of the sites which would be subject to effects of the Proposed Action including elevated noise levels and indirect habitat modification.

3.3.2.3 Affected Environment

This section summarizes existing information on plant and animal species and habitat types in the ROI with special emphasis on the presence of any special-status species and in proportion to the magnitude of potential effects. The existing condition of biological resources at DPG were recently described in the DPG INRMP (U.S. Army 2016) and are summarized in this section.

DPG is located in the Great Basin Desert, a high desert which is a continental, semi-arid, steppe region. Because of its mid-latitude location, summers are typically hot and dry, while winters are cold (U.S. Army 2016). Ten types of terrestrial habitats have been identified at DPG, including Great Basin cold desert playa, Great Basin cold desert chenopod shrubland (27%), Great Basin vegetated dune, exotic vegetation, Great Basin arid shrubland, and open woodland (U.S. Army 2016). No designated critical habitat occurs in the ROI.

Biological resources at DPG are currently managed under the installation's INRMP (U.S. Army 2016) which includes a Habitat Management Plan, Weed Management Plan, Pest Management Plan, Fire Management Plan, and programs to manage and monitor wildlife, special interest areas, sensitive species, and other natural resources.

Terrestrial Vegetation

Vegetation at the three alternative PSSTF sites consists of Great Basin vegetated dune habitat (U.S. Army 2016). Great Basin vegetated dunes are typically dominated by a mix of chenopod shrub species and Indian ricegrass (*Achnatherum hymenoides*) and herbaceous species such as scurfpea (*Psoralidium lanceolatum*), coin buckwheat (*Eriogonum nummulare*), and cushion buckwheat (*Eriogonum ovalifolium*) (U.S. Army 2016). Vegetated dunes have the greatest diversity of vegetation and wildlife species of all the habitat types occurring on DPG (U.S. Army 2016). No special status plant species are known to occur in the ROI.

Potential threats to vegetative communities at DPG include wildfires, mechanical disturbance, military testing and training activities, proximity to areas invaded with exotics, and climatic extremes (U.S. Army 2016). Cheatgrass (*Bromus tectorum*) is the highest ranked and most problematic invasive plant at DPG. Replacing widespread tracts of native habitat, cheatgrass has altered the natural fire cycle which has had adverse effects on native wildlife (U.S. Army 2016).

Terrestrial Wildlife

Terrestrial wildlife species that occur or have the potential to occur in the ROI include species typical of Great Basin vegetated dune such as least chipmunk (*Tamias minimus*), little pocket mouse (*Perognathus longimembris*), dark kangaroo mouse (*Microdipodops megacephalus*), Ord's kangaroo rat (*Dipodomys ordii*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), and kit fox (*Vulpes macrotis*) (DPG Environmental 2020).

No ESA listed wildlife species are known to occur near or within the ROI.

Some species listed as species of conservation concern by federal and state agencies, as well as birds protected under the MBTA, have the potential to occur in the ROI and are listed in **Table 3-19**. Table 3.3.2.5 of the DPG INRMP (U.S. Army 2016) has a complete list of special status species that occur or have the potential to occur on DPG and is incorporated here by reference.

Within 2.5 miles of the alternative PSSTF sites, a number of raptor nests have been recorded (DPG Environmental 2020). At least eight nests belonging to the federally protected golden eagle have been recorded within 2.5 miles of the sites (DPG Environmental 2020). The installation's INRMP (U.S. Army 2016) discusses the installation's policy to provide protection for eagles nesting on DPG. All eagle nests, including newly discovered nests, are surrounded by a 0.5-mile buffer zone, which limits disturbance-related activities and ensures compliance with the Bald and Golden Eagle Protection Act (U.S. Army 2016). The closest recorded golden eagle nest to the PSSTF alternative sites was approximately 0.9 mile away. Other nesting raptors in the area include prairie falcons (*Falco mexicanus*) and other unknown raptor species (DPG Environmental 2020). Since the closest recorded raptor nests are approximately 0.9 mile from the alternative construction sites, it is reasonable to assume that golden eagles and prairie falcons may regularly travel through and forage in the ROI. Special status species that are associated with vegetated dune habitat, such as the kit fox and burrowing owl (*Athene cunicularia*; **Table 3-19**) may also travel through, forage, or reproduce in the ROI at certain times of the year.

Environmentally Sensitive Habitats

The DPG INRMP (U.S. Army 2016) lists Great Basin vegetated dune as a sensitive habitat on DPG and lists this habitat type as a high priority for protection. Great Basin vegetated dune

habitats are somewhat sensitive to disturbance as these habitats have a high potential for wind erosion and a low potential for recovery after degradation or disturbance (U.S. Army 2020).

Table 3-19. Special Status Terrestrial Wildlife Species Known to or with the Potential to Occur in the ROI at DPG.

Species Name	Scientific Name	Federal Listing Status	State Listing Status	Habitat and Occurrence
Mammals				
Kit fox	*Vulpes macrotis*	DPG	UDWR	Cold desert playa, vegetated dune. Year-round.
Birds				
Bald eagle	*Haliaeetus leucocephalus*	MBTA, BCC	UDWR	Open woodland, cliffs, rivers, lakes. Winter.
Black rosy-finch	*Leucosticte atrata*	MBTA, BCC	UPIF	Open woodland. Vagrant/Winter.
Brewer's sparrow	*Spizella breweri*	MBTA, BCC	UPIF	Sagebrush, mixed shrubland. Summer.
Broad-tailed hummingbird	*Selasphorus platycercus*	MBTA	UPIF	Open woodland. Summer.
Burrowing owl	*Athene cunicularia*	MBTA, DPG	UDWR	Arid shrubland, chenopod shrubland, vegetated dune, grassland. Summer.
Golden eagle	*Aquila chrysaetos*	MBTA, BCC, DPG	-	Hilly or mountainous terrain. Year-round.
Gray vireo	*Vireo vicinoir*	MBTA	UPIF	Open woodland. Summer.
Green-tailed towhee	*Pipilo chlorurus*	MBTA, BCC	-	Mixed shrubland, chaparral, mountainsides. Summer.
Lewis's woodpecker	*Melanerpes lewis*	MBTA, BCC	UDWR, UPIF	Open woodlands.
Loggerhead shrike	*Lanius ludovicianus*	MBTA, BCC	-	Open woodland, arid shrubland, chenopod shrubland. Resident.
Peregrine falcon	*Falco peregrinus*	MBTA, BCC	-	Variety of habitats including cities. Transient Spring-Fall.
Pinyon jay	*Gymnorhinus cyanocephalus*	MBTA, BCC	UPIF	Open woodland. Vagrant.
Sage sparrow	*Artemisiospiza nevadensis*	MBTA, BCC	UPIF	Arid shrubland, chenopod shrubland, vegetated dune. Sagebrush, mixed shrubland. Summer.

Table 3-19. Special Status Terrestrial Wildlife Species Known to or with the Potential to Occur in the ROI at DPG. (Continued)				
Species Name	**Scientific Name**	**Federal Listing Status**	**State Listing Status**	**Habitat and Occurrence**
Sage thrasher	*Oreoscoptes montanus*	MBTA, BCC	-	Sagebrush, mixed shrubland. Summer.
Short-eared owl	*Asio flammeus*	MBTA	UDWR	Arid shrubland. Year-round.

Sources: U.S. Army 2016, USFWS 2020

Abbreviations: BCC = Birds of Conservation Concern, DPG = Dugway Proving Ground focus management species of concern, MBTA = Migratory Bird Treaty Act, UDWR = Utah Department of Wildlife Resources species of conservation concern, UPIF = Utah Partners in Flight species of conservation concern, "-" = not listed.

3.3.3 Climate Change – DPG

Existing Conditions for Climate Change

The western half of Tooele is mostly covered by the Great Salt Lake Desert and includes the city of Wendover (the immediate neighbor of West Wendover, Nevada) and Ibapah. Within the central section lies Skull Valley, between the Cedar and the Stansbury Mountains. It contains a few small towns as well as DPG. The population centers are on the eastern edge in the Tooele Valley, between the Stansbury and Oquirrh Mountains. This area contains the cities of Tooele and Grantsville and well as the unincorporated towns of Stansbury Park, Lake Point, and Erda. Tooele Army Depot is located on the southern edge of the valley. The Stockton Bar geologic feature separates Tooele Valley and Rush Valley, in which the towns of Stockton, Vernon, Faust, and Rush Valley are located. Additional small towns, Ophir and Mercur, are located in two canyons on the south western side of the Oquirrh Mountains. (Place and See 2021) **Table 3-20** summarizes the climate averages for Tooele County.

Greenhouse Gases

Approximately 85 percent of Utah's total GHG emissions result from the consumption of fossil fuels. Non-fossil fuel sources contribute the remaining 15 percent of Utah's total GHG emissions. The Utah electric utility sector produces about 60 percent of the state's total CO_2 emissions. (Utah Department of Natural Resources 2000)

Table 3-20. Climate Averages for Tooele County, Utah	
Rainfall	15.4 inches
Snowfall	53 inches
Precipitation	87 days
Sunny	231 days
Average High/Low	66.8/36°F
Average July High	96.2°F
Average January High	14.6°F
Comfort Index (Higher =better)	7.0
Ultraviolet (UV) Index	4.5
Elevation	5043 feet

Source: NOAA.Gov (http://www.noaa.gov/)

3.3.4 Cultural Resources – DPG

As described in **Section 3.2.5**, cultural resources are historic sites, buildings, structures, objects or districts considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural or engineering resources, and traditional resources. Refer to **Section 3.2.5** for further descriptions of cultural resources.

3.3.4.1 Applicable Regulations

Refer to **Appendix E, Section E.3.3**.

3.3.4.2 Region of Influence

To identify potential effects on historic properties at DPG, an initial 2.5-mile radius study area was delineated around the Rad Pad site that incorporates all three alternative sites. The study area was used to locate previously identified cultural resources and the extent of previous cultural resource surveys in the Rad Pad vicinity. An APE for Section 106 consultation was developed to include all three alternative sites and associated utility corridors at DPG and consulted on by DPG with the Utah SHPO in a letter dated January 11, 2021.

3.3.4.3 Affected Environment

All three of the PSSTF alternative sites within the Rad Pad study area have been surveyed for archaeological resources. Also within the study area is an NRHP-eligible historic district at the Rad Pad site itself. Previously surveyed areas within the Rad Pad study areas at DPG are shown on **Figure 3-6**.

Archaeological Resources

Within the Rad Pad study area, 7,202 acres have previously been surveyed for cultural resources. Non-surveyed areas include 2,399 acres of surveyable land, and the remainder is mountainous. According to the prehistoric site predictive model in the Integrated Cultural Resources Management Plan (ICRMP) (DPG 2020b), the probability of sites (and in turn historic properties) being present in the mountains is low. In addition, some areas are off limits to survey. NRHP-eligible archaeological sites account for 37.5 acres and not eligible sites encompass 14.2 acres.

Referring to the PSSTF alternative sites shown on **Figure 2-15**, Alternative 2 was surveyed in 2006, while Alternatives 1 and 3 were surveyed in 2009. There are no known NRHP-eligible archaeological sites in any of the three alternative sites.

Architectural Resources

Within the Rad Pad study area, there are 5 buildings and 28 structures. The Rad Pad Historic District is an NRHP-eligible district composed of buildings 8221, 8222, 8223, 8225, and 8227 located within 2,000 feet of the Rad Pad. Twenty-four structures are near Camels Back Ridge to the west and four are in the Defensive Test Chamber (DTC) area.

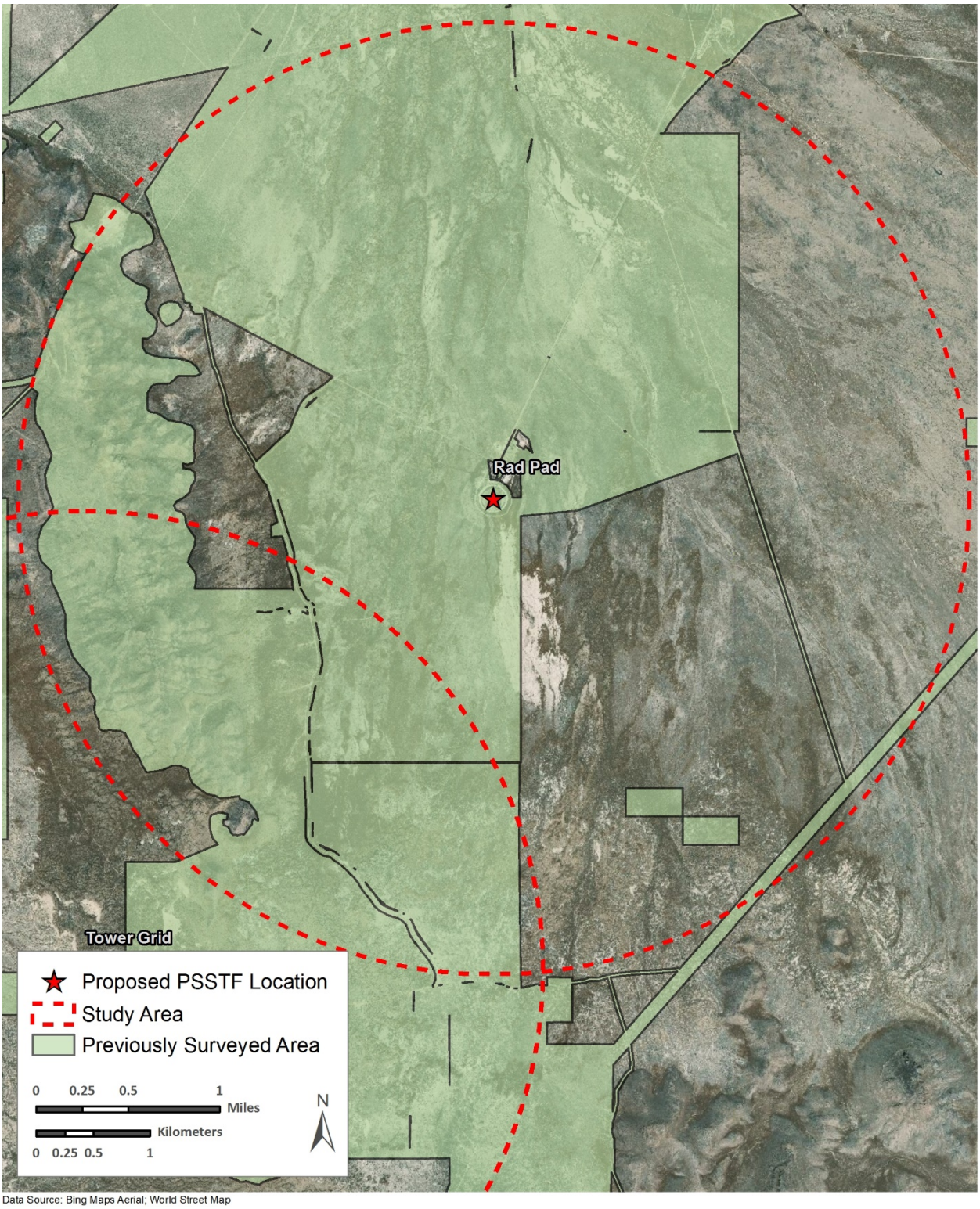


Figure 3-6. Previously Surveyed Areas within 2.5 miles of the Rad Pad Site

3.3.5 Geology and Soils – DPG

DPG is located to the southwest of HAFB in Utah's Great Salt Lake Desert. The installation covers the Government Creek Basin, Southern Cedar Mountains, Wildcat Mountain, Granite Peak, and the northern Dugway Range (USACE 2012a). Quaternary surficial deposits originated from the Bonneville lake cycle, including alluvial, eolian, and mixed environments (Clark, et al. 2016). Three soil types dominate DPG's training area. These include the Playas (27 percent), the Playas-Saltair Complex (22 percent), and the Saltair-Playas Complex (9 percent) (USACE 2012a).

The State of Utah occupies the Intermountain Seismic Belt, a zone of earthquake activity that extends from southern Nevada to northwestern Montana (USACE 2012a). This zone of active stretching and fracturing of the Earth's crust is in response to the deformation and uplift within the North American Plate (USACE 2012a). A 5.7 magnitude earthquake was felt in DPG on March 18, 2020 (Roberson, 2020). That earthquake was the largest earthquake to occur in Utah since a magnitude 5.9 earthquake in 1992 in southwestern Utah (Roberson, 2020). That 5.7 magnitude earthquake occurred in a seismically active part of the Salt Lake Valley, where six magnitude 3.0 or larger earthquakes have occurred since 1962. The largest of those events was a magnitude 5.2 on September 5, 1962, 0.8 miles northeast of Magna, Utah. Seismic risk in Utah is acute because 2.3 of Utah's 2.9 million residents live in the Salt Lake City-Provo-Ogden urban corridor, adjacent to the Wasatch Fault (University of Utah, 2020). Paleoseismic studies have found evidence for at least 20 M~7 earthquakes along the central segments of the Wasatch Fault in the last 6,000 years (University of Utah 2020).

Biological soil crusts known as cryptogamic crusts can be found across DPG (USAF 2012a). These cryptogamic crusts are formed when filamentous cyanobacteria, algae, and fungi, as well as rooting structures of lichens and bryophytes physically entwine soil particles, creating a stable matrix (Warren 2014). Cryptogamic crusts are important to the semiarid climates because they perform ecological functions such as nutrient cycling, enabling water retention, and soil stability (Warren, 2014).

3.3.5.1 Applicable Regulations

Refer to **Appendix E, Section E.3.4**.

3.3.5.2 Region of Influence

The ROI is limited to the GBSD PSSTF at DPG. The three potential alternatives are located from the central to eastern half of DPG. PSSTF will be built to the same physical specifications as an operational launch facility for all topside and below grade structures down to the lower Launch Equipment Room floor. The depth for the below-grade structure minus the launch tube is approximately 35 feet, however over-excavation will add up to an additional 10 feet of depth for a total excavation up to 45 feet.

3.3.5.3 Affected Environment

Seismicity

Utah occupies a significant segment of the Intermountain Seismic Belt, a zone of pronounced earthquake activity that extends from southern Nevada to northwestern Montana. This seismic belt corresponds to a zone of active stretching and fracturing of the earth's crust in response to deformation and uplift within the North American plate (DPG 2003). DPG is located approximately 60 miles west of the Wasatch Mountains and the associated Wasatch fault zone. Between 1962 and 1977, four earthquake epicenters were identified within DPG, and the magnitude of the associated earthquakes ranged from 1.3 to 2.3. (DPG 2012)

Rad Pad

The Rad Pad is an existing structure, albeit barren and out of regular use. These soils consist of very poorly drained, strongly calcareous, stratified silt loam, clay loam, and sand loam with a salt layer overlying alkaline sediments. Due to the site being previously disturbed, it is unlikely that cryptogamic crust exists at the site.

The three alternative sites depicted in **Figure 2-15** appear to be the same surface geology as the Rad Pad. All of the sites have previously been disturbed due to their road adjacent location and are not likely to have cryptogamic crusts.

3.3.6 Hazardous Material and Waste – DPG

Ordnances and explosives may include the use of explosively formed penetrators and plastic explosives. Quantities are yet to be determined. Following the completion of testing/training, disposition of the facility may include demolition and disposal; however, no determination has been made by the Program Managers.

3.3.6.1 Applicable Regulations

Refer to **Appendix E, Section E.3.5**.

3.3.6.2 Region of Influence

The ROI for hazardous material and waste would be limited to facilities and test areas of DPG to where hazardous materials are generated, stored and handled on a short-term basis.

3.3.6.3 Affected Environment

DPG has developed a Hazardous Waste Management Plan (HWMP) and a waste analysis plan (WAP) in DPG's Resource Conservation and Recovery Act permit which prescribes responsibilities, policies, and procedures for managing hazardous waste on the installation (USACE 2012b). The objective of the HWMP and WAP is to facilitate the responsible management of hazardous waste by identifying facilities that generate hazardous waste and to

summarize the hazardous waste generation processes. The HWMP provides guidance for the management of these facilities and processes in compliance with Resource Conservation and Recovery Act regulations, and other federal, state, and Army environmental protection laws. The WAP has been prepared to provide specific guidance for day-to-day operations associated with characterizing hazardous waste, and to facilitate compliance with DPG's Central Hazardous Waste Storage Facility Storage Permit (USACE 2012b). Each alternative site would have a designated area to store hazardous or petroleum materials.

Rad Pad

RP Sites in the area include 50, 51, 99, 154, 155, 156, and 157. A total of 11.37 acres of IRP sites have covers and should not be disturbed. They include sites 51, 99, and 154 (**Figure 3-7**). UXO and Safety Concerns are within the 2,406 acres of the White Sage Impact area and are off-limits for use.

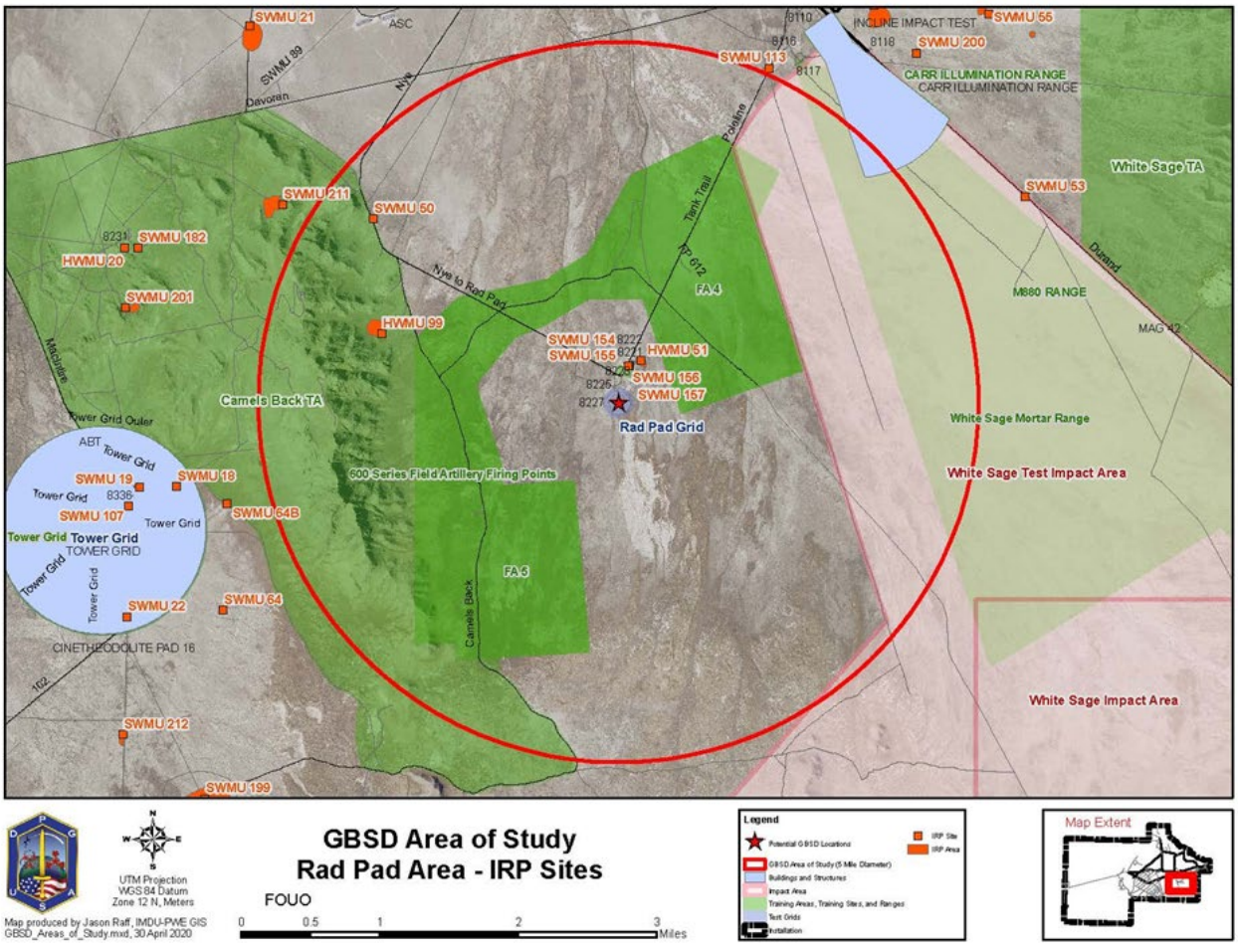


Figure 3-7. Rad Pad Area – IRP Sites (Alternative 1)

3.3.7 Health and Safety – DPG

Health and safety includes consideration of any activities, occurrences, or operations that have the potential to affect the well-being, safety, or health of workers and members of the public. For this analysis, the category includes the hazards and risks associated with the construction and use of program facilities, developmental testing of missile systems, and other related equipment.

3.3.7.1 Applicable Regulations

Refer to **Appendix E, Section E.3.6**.

3.3.7.2 Region of Influence

The ROI for health and safety at DPG is focused primarily on the three PSSTF alternative sites within the Rad Pad area of the range shown on **Figure 2-15**, but also includes the temporary concrete batch plant proposed near English Village. The health and safety ROI includes military personnel, contractors, and the general public.

3.3.7.3 Affected Environment

All contractors performing construction activities at DPG are responsible for following federal and state of Utah safety regulations, and are required to conduct construction activities in a manner that does not increase risk to workers.

Health and safety at DPG is managed by the DPG Safety Office. The mission of DPG Fire and Emergency Services is to protect the lives, property, and environment at DPG and partnering communities by responding to natural and man-made disasters, providing pre-hospital medical care, and reinforcing prevention through education with Tooele County and the surrounding region (GovServe 2020). The Dugway Health Clinic offers emergency care on a 24-hour, on-call basis. No pharmacy or dental services are offered at the Dugway Health Clinic. The closest full-service hospital is the Mountain West Medical Center in Tooele, Utah, which is approximately 40 miles east from the range (DPG 2020a).

3.3.8 Infrastructure – DPG

Refer to description in **Section 3.1.5.** Natural gas would not be necessary for the construction or operation of the proposed GBSD PSSTF, and potable water and wastewater management would be provided via portable systems. Therefore, these infrastructure systems are not discussed for DPG.

3.3.8.1 Applicable Regulations

Refer to **Appendix E, Section E.3.7**.

3.3.8.2 Region of Influence

The ROI for the analysis of infrastructure and utilities at DPG includes the three PSSTF alternative sites shown on **Figure 2-15** where construction and operational activities would occur, but also includes the temporary concrete batch plant proposed near English Village. The analysis also considers the utility services and systems supporting infrastructure and supplies at DPG that could be affected by the Proposed Action.

3.3.8.3 Affected Environment

Electrical Power

DPG obtains its electricity from Rocky Mountain Power, which as noted in **Section 3.1.5.3,** is a private utility company that has a net generating capacity of approximately 10,300 MW. In 2008, Rocky Mountain Power supplied approximately 39,153 megawatt-hours to DPG, with a minimum peak power demand of 5.3 MW and the maximum peak power demand of 6.9 MW that same year. DPG has a high reliance on electricity for space and water heating.

DPG is at the end of its electric feeder and power outages are common, which makes DPG reliant on fossil-fuel powered backup generators (PNNL 2010). There is no electrical power infrastructure at the three GBSD PSSTF alternative sites; however, electrical power infrastructure is available at the Rad Pad Grid Area, which is approximately 5 miles by road from the alternative sites.

Stormwater Drainage

DPG does not have an installation-wide stormwater collection system. The majority of the range is undeveloped with minimal paved areas. In the undeveloped portions of DPG, surface water runoff occurs as overland flow or moves through natural drainages. Government Creek is one of the most well-defined natural drainages at DPG. The drainage enters DPG along the southeastern boundary and trends northwestward passing to the west of the Carr area and through the Ditto area. In the developed portions of DPG, surface water runoff generally moves via roadside ditches. Stormwater sewers are located in portions of the Avery, Baker, and Ditto areas. The storm sewers outfall into nearby drainage ditches or into Government Creek (U.S. Army 2016).

Solid Waste Management

Nonhazardous solid waste generated at DPG is collected by a contractor and disposed of at the English Village Landfill, a Class II permitted landfill on the eastern side of the range. Wastes accepted at the landfill include municipal solid waste, commercial waste, industrial waste, construction and demolition debris, and special waste as defined in Utah Administrative Code R315-301. The landfill may also accept conditionally exempt small quantity generator hazardous waste and polychlorinated biphenyls (PCBs). Currently, most construction and demolition debris is taken to the English Village Landfill or off-range by project contractors for ultimate reuse,

recycling, or disposal. Recyclables, such as concrete, wood, and metals are segregated at the English Village Landfill and stored for reuse or recycling. As of the beginning of 2013, the landfill had a remaining capacity of 656,902 tons. Based on 2012 disposal rates and capacity, the landfill was expected to reach capacity in 2100 (USAPHC 2014).

The English Village Landfill also serves as the temporary storage area for recyclable materials awaiting sale through DPG's QRP. The program recycles cardboard, paper, metals, firing range scrap/small arms brass, tires, antifreeze, batteries, used oil, and kitchen grease. DPG currently shreds wood and wood pallets at the landfill and uses the chipped wood as an alternative daily cover at the landfill. Recycling operations are conducted by DPG personnel and recyclables are collected by a contractor (USAPHC 2014).

3.3.9 Noise – DPG

See **Section 3.1.6** for an overview of noise.

3.3.9.1 Applicable Regulations

Refer to **Appendix E, Section E.3.8**.

3.3.9.2 Region of Influence

The ROI for noise is the areas closest to the project sites that would experience elevated noise from implementation of the Proposed Action (approximate 1 to 1.5-acre area proposed for construction and testing of the PSSTF and related infrastructure. For noise analysis purposes in this EA, the ROI at DPG is defined as the area within the 80-dB maximum (unweighted) sound level contours generated by proposed project activities. One of three alternative sites would be chosen for construction of the PSSTF at DPG.

3.3.9.3 Affected Environment

DPG is located in the Great Basin Desert, a high desert which is a continental, semi-arid, steppe region. There is no available data on existing noise levels at the three alternative sites on DPG. The immediate area surrounding the three sites is largely composed of desert and undeveloped land. There are five buildings within the Rad Pad area: buildings 8221, 8222, 8223, 8225, and 8227 (these are historic properties). In general noise at DPG results from serval primary sources and activities:

- Aircraft noise and sonic booms from air testing and training activities;
- Detonations from conventional munitions, other testing activities, and ground training activities; and
- Artillery firing from conventional munitions and ground training activities.

3.3.10 Water – DPG

Water resources include those aspects of the natural environment related to the availability and characteristics of water. For the purposes of this document, water resources can be divided into three main sections: groundwater, surface waters, and seasonal wetlands.

Groundwater is water that collects or flows beneath the Earth's surface and saturates porous spaces in soil or rock, supplying springs and wells. Groundwater discussions focus on aquifer characteristics (such as depth from the surface, geologic composition and recharge rate), as well as general groundwater quality and water supply.

Surface water includes natural, modified, and constructed water confinement and conveyance features that may or may not have a defined channel and discernable water flows. These surface water features generally consist of marine waters, wetlands, lakes, rivers, streams, and natural or artificial ponds and lakes. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community. Surface water includes discussions of runoff, changes to surface drainage, and general surface water quality. A Total Maximum Daily Load is the maximum amount of a substance that can be assimilated by a water body without causing impairment. A water body can be deemed impaired if water quality analyses conclude that exceedances of water quality standards occur.

Wetlands are jointly defined by the USEPA 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" (40 CFR Section 230.3[t] and 33 CFR Section 328.3[b]).

3.3.10.1 Applicable Regulations

Refer to **Appendix E, Section E.3.9 – DPG**.

3.3.10.2 Region of Influence

The ROI for water resources at DPG includes surface waters, and groundwater whose water quality or drainage could reasonably be altered by the Preferred Alternative at DPG.

3.3.10.3 Affected Environment

The climate of DPG is characterized by extreme fluctuations in temperature (average daily temperatures of 39.2°F and 96.2°F in January and July, respectively) and minimal amounts of precipitation (approximately 8.9 inches annually) and snowfall (approximately 14.6 inches annually) (MilBases.com 2020). Annual runoff is negligible, and the region drains in a northwest direction into the Great Salt Lake Desert (USAF 2012). Area streams are ephemeral, except for short headwater portions of a few streams located in the higher elevation mountains (USAF 2012). Because of the general aridity of the area and the permeable alluvial deposits at the

base of the mountain ranges, which rapidly absorb stream flow, runoff from the Dugway Valley-Government Creek area to the Great Salt Lake Desert is minor (USAF 2012). Some overland run-off from thunderstorms flows onto the desert; but the surface gradient toward the northwest is very slight, the few channels that exist are small and intermittent, and evaporation rates are high (USAF 2012). Thus, essentially all the estimated precipitation that falls in the area each year is consumed by evapotranspiration within the area, except for the quantity that infiltrates to recharge to groundwater system (USAF 2012).

Natural surface water features at DPG include surface water drainages, springs, ponds, playas, and wetlands (USAF 2012). There are no large perennial surface water bodies that lie within or border DPG (DPG 2016). Constructed surface water features include wastewater lagoons, evaporation ponds, an excavated pond, a bermed pond, and roadside ditches (USAF 2012). DPG is classified as a D-Zone which is defined as having an undetermined but potential flood hazard (USAF 2012).

Principal sources of groundwater at DPG include snowmelt, thunderstorms, and flow from the Sevier Desert drainage through the Old River Bed Alluvium, located along DPG's southern boundary (USAF 2012). Hydrogeologic studies in the Ditto and Carr areas indicate basin-fill deposits consisting of silty sand units interbedded with clay layers (USAF 2012). The upper interbedded sand and clay unit hosts shallow groundwater (USAF 2012). A clay layer exists about 90 feet below ground surface and is between 65 to 80 feet thick (USAF 2012). This clay layer is continuous throughout the Ditto and Carr areas, acting as a barrier confining vertical groundwater movement (USAF 2012). Beneath the confining-clay is a sandy aquifer which provides potable groundwater for the Ditto and Carr areas (USAF 2012). For more in depth information on DPG's aquifer system, see the DPG INRMP (DPG 2016). Six wells on DPG produce drinking water and four wells produce other-use water supplies (DPG 2016).

Groundwater management consists of restoration projects associated with individual sources of pollution (DPG 2016). In 2007, DPG and Utah Department of Environmental Quality established four groundwater management areas based on the differing hydrogeological controls for contaminant migration: Ditto Technical Center, Carr, Downrange, and the English Village (DPG 2015). These groundwater management areas are monitored for contamination regularly.

Rad Pad

The Rad Pad Grid Area is located approximately 2.5 miles southwest of the Central Mission Operations Complex (see **Figure 2-5**), with localized Alternatives 1, 2, and 3 nearby (see **Figure 2-15**). Alternative 3 is roughly 1.9 miles southwest of the Rad Pad Grid Area and is the Preferred Alternative out of the three PSSTF alternative sites. The three PSSTF alternative sites are less than 1 mile apart, have similar water resources, and are therefore described together in this section.

In the developed portions of DPG, surface water runoff generally moves via roadside ditches. In general, these ditches are not interconnected. Storm water sewers are located in portions of Avery, Baker, and Ditto. The storm sewers outfall into nearby drainage ditches or into Government Creek. There is one small, unnamed stream located approximately 800 ft from the Alternative 3 site (**Figure 2-15**). This is the only surface water resource in this area. There are no wetlands located in any of the three PSSTF alternative sites.

3.4 Downrange Test and Support Locations

3.4.1 United States Army Garrison–Kwajalein Atoll (USAG-KA)

Rationale for Environmental Resources Analyzed

In compliance with NEPA, CEQ, and USAF EIAP regulations and guidelines, this EA/OEA focuses only on those environmental resources considered potentially subject to impacts from the installation development projects. As it relates to USAG-KA section of the EA/OEA biological resources, noise, and hazardous material and waste are the areas of concern requiring discussion. Environmental resources analysis would apply to Kwajalein Island, Gagan Islet, and Illeginni Islet.

The remaining environmental resources were not analyzed further because no significant impacts to these resources are anticipated as a result of implementing the Proposed Action. The following information explain why geology and soil, land use, water, and visual aesthetics were dismissed from detailed analysis in this EA/OEA.

The proposed activities are well within the limits of current operations and permits at the Base. Thus, there would be no effects on land use resources. There are no construction activities that would alter the landscape or require land disturbance, therefore no impacts to geology and soils, water, and visual aesthetics resources would be expected. The population of the USAG-KA will not increase; therefore, no impacts are anticipated for infrastructure, noise, socioeconomics, and transportation. See **Appendix G** (**Section G.1.1**) for a discussion of EO 12898 - *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (including Subsistence Fishing).*

The implementation of the Proposed Action for GBSD would not require site grading, ground disturbance associated with site preparation, and no construction requirements. Negligible adverse impacts on air quality are expected from the combined Minuteman III and GBSD flight tests that would be conducted at USAG-KA. Emissions are anticipated to disperse with the prevailing winds. Therefore, the implementation of the Proposed Action at USAG-KA would have no significant impact on air quality.

Under the Proposed Action, negligible adverse impacts on airspace are expected from the combined Minuteman III and GBSD flight tests that would be conducted at USAG-KA. Ongoing flight testing of Minuteman III missiles would continue, with RVs normally being targeted at the KMISS deep ocean range just east of the atoll. GBSD program test RVs would also target the KMISS, along with some test RVs targeting the vicinity of Illeginni Islet on the western side of the atoll. The Proposed Action would result in a slight increase in airspace usage due to the increase in number of annual flight tests, but it would not alter the procedures for airspace management that are used at and in the vicinity of the installation. All flight tests under the Proposed Action would continue to be conducted in accordance with established FAA,

International Civil Aviation Organization (ICAO), DoD, and U.S. Army navigation and airspace safety policies and procedures. Close coordination with the launch operations manager at VAFB and the Oakland ARTCC, and existing range safety and notification requirements, minimizes potential impacts on the use of airspace by general aviation during flight tests. Prior to each flight test mission conducted at USAG-KA, a NOTAM would be published to divert commercial and private aircraft from any hazard areas along the missile flight path. The flight tests would be infrequent and short-term events, after which the airspace is returned to the control of the Oakland ARTCC.

Under the Proposed Action, little or no adverse impacts on archaeological or architectural resources would be expected at USAG-KA. Ongoing flight testing of Minuteman III missiles at the KMISS would continue to be conducted in the same manner as under the No Action Alternative (see **Section 2.1** and **Section 2.4**). GBSD program test RVs also would target the KMISS, along with some test RVs targeting the vicinity of Illeginni Islet on the western side of the atoll. RV impacts within the KMISS, or in the ocean waters south and west of Illeginni Islet, would have no impacts on archaeological or architectural resources. At Illeginni Islet, there are no substantive archaeological resources. Although several Cold-War-era structures are located on the eastern side of Illeginni Islet, GBSD program test RVs would not target that portion of the islet. Thus, there would be little risk for any of the Cold-War structures to be damaged. Use of established standards and procedures for the preservation and protection of cultural resources at USAG-KA would continue throughout the Minuteman III and GBSD flight test programs.

Under the Proposed Action, no significant impacts on health and safety would be expected at USAG-KA. Ongoing flight testing of Minuteman III missiles would continue at USAG-KA, with RVs normally being targeted at the KMISS deep ocean range just east of the atoll. GBSD program test RVs also would target the KMISS, along with some test RVs targeting the vicinity of Illeginni Islet on the western side of the atoll. The Proposed Action would result in minor increases in risk from the increase in number of annual flight tests and from the addition of some flights over the Mid-Atoll Corridor impact area. All flight tests under the Proposed Action would continue to be conducted in accordance with established health and safety related policies and procedures, for the protection of onsite military personnel and contractors, and the general public. NTMs and NOTAMs would be published to warn ships and aircraft to avoid potential impact areas within established range Warning Areas offshore, and in international waters and airspace. Also, for GBSD RV flight tests conducted within the Mid-Atoll Corridor impact area, various precautions would be taken to protect personnel and the general public. For post-test operations conducted at Illeginni Islet, in the case of an RV land or shallow water impact, test support personnel entering the impact site would wear proper personal protective equipment, as necessary.

The USAKA Environmental Standards (UES) and procedures in the Standards apply to all activities of the U.S. Government that occur on the U.S. Army Garrison-Kwajalein Atoll (USAG-KA)/Ronald Reagan Ballistic Missile Defense Test Site (RTS) controlled islands and the Mid-

Atoll Corridor, as well as all USAG-KA/RTS controlled activities within the RMI, including the territorial waters of the RMI.

3.4.1.1 Biological Resources – USAG-KA

Biological resources are defined as in **Section 3.2.2**. This section summarizes existing information on plant and animal species and habitat types in the vicinity of the of the Proposed Action with special emphasis on the presence of any special-status species. Biological resources within the affected environment for the Proposed Action are described with the purpose of evaluating the effects of the Proposed Action and in proportion to the magnitude of potential effects. Biological resources are summarized separately for Illeginni Islet and nearshore waters and for the deep-water impact locations.

3.4.1.1.1 Applicable Regulations

Refer to **Appendix E, Section E.4.1.1**.

3.4.1.1.2 Region of Influence

The ROI for biological resources at USAG-KA includes the deep offshore waters of KMISS northeast of Kwajalein Atoll, Illeginni Islet, and waters in the vicinity of Illeginni Islet. The areas subject to the effects of the Minuteman III Action would be as described in the Minuteman III SEA (USAF 2020e) including deep ocean water areas which could be affected by splashdown of Minuteman III post-boost vehicle fragments, test RV impacts, and/or missile-related sonic booms (**Figure 2-7**). No land impacts would occur for Minuteman III flight testing. The areas subject to the effects of the GBSD Action would include the payload impact locations on Illeginni Islet in ocean waters in the vicinity of Illeginni Islet (southwest of the islet), and in deep ocean waters of KMISS northeast of Kwajalein Atoll. The ROI includes areas where the payload would impact on land or in water as well as the areas which might be exposed to elevated noise levels, increased human activity or equipment operation, or to hazardous chemicals. The USAG-KA ROI includes Illeginni Islet and territorial waters of the RMI. All biological resources in international waters are discussed in the Broad Ocean Area section (**Section 3.4.2.1**).

3.4.1.1.3 Affected Environment Deep Offshore Waters

Biological resources in the ROI were recently described in the Minuteman III Modification Supplemental EA (USAF 2020e) and in the FE-2 EA/OEA (U.S. Navy 2019). The status of biological resources in the ROI as described in these documents remains the best available information for the ROI and is incorporated here by reference. This section provides a brief summary of biological resources in the ROI, but detailed species descriptions and occurrence information can be found in the Minuteman III EA (USAF 2020e), FE-2 EA/OEA (U.S. Navy 2019), and in the GBSD Kwajalein Atoll Activities Biological Assessment (USAF 2020d), and are incorporated by reference. This section focuses on important habitats and special status species in the ROI, including species considered coordination or consultation species under the UES.

The waters of the ROI in the KMISS area are deep-water areas with ocean depth ranging from approximately 2,000 and 10,500 feet (USGS 2007). A wide variety of pelagic and benthic habitats occur in the USAG-KA ROI and these habitats support a diversity of marine life. Many special status marine species have the potential to occur in the ROI, including cetacean, sea turtle, and fish species protected under the UES (**Table 3-21)**; (USASMDC 2021a, U.S. Navy 2019). All of the special status species listed in **Table 3-21**, which have the potential to occur in deep waters of the ROI, are listed as consultation species under the UES. Distribution and abundance data in RMI waters is largely lacking for these species. Some species are migratory species which are present in RMI waters seasonally and some others are observed only rarely in the RMI.

Table 3-21. UES Consultation Fishes, Sea Turtles, and Marine Mammals Known or with the Potential to Occur in Deeper Offshore Waters of the ROI.			
Species Name	**Scientific Name**	**UES Listing Status**[1]	**Likelihood of Occurrence in Offshore Waters**
Fishes			
Bigeye thresher shark	*Alopias superciliosus*	UES § 3-4.5.1(a)	Potential
Oceanic whitetip shark	*Carcharhinus longimanus*	ESA-T	Potential
Reef manta ray	*Manta alfredi*	UES § 3-4.5.1(a)	Unlikely
Oceanic giant manta ray	*M. birostris*	ESA-T	Likely
Scalloped hammerhead (Indo-West Pacific DPS)	*Sphyrna lewini*	ESA-T	Potential
Pacific bluefin tuna	*Thunnus orientalis*	UES § 3-4.5.1(a)	Potential
Sea Turtles			
Green turtle (Central West Pacific DPS)	*Chelonia mydas*	ESA-E, RMI Statute 3	Likely
Hawksbill turtle	*Eretmochelys imbricata*	ESA-E, RMI Statutes 1 and 3	Likely
Cetaceans			
Minke whale	*Balaenoptera acutorostrata*	MMPA [2]	Likely
Sei Whale	*B. borealis*	ESA-E [2]	Potential
Blue whale	*B. musculus*	ESA-E, MMPA-Depleted, RMI Statute 1	Likely
Fin whale	*B. physalus*	ESA-E, MMPA-Depleted	Likely
Short-beaked common dolphin	*Delphinus delphis*	MMPA, RMI Statute 2	Likely
Pygmy killer whale	*Feresa attenuata*	MMPA, Resident	Potential
Short-finned pilot whale	*Globicephala macrorhynchus*	MMPA, Migratory	Likely
Risso's dolphin	*Grampus griseus*	MMPA, Resident	Potential
Pygmy sperm whale	*Kogia breviceps*	MMPA, Migratory	Potential
Humpback whale (Western North Pacific DPS)	*Megaptera novaeangliae*	ESA-E[3], MMPA-Depleted, Migratory	Likely
Blainville's beaked whale	*Mesoplodon densirostris*	MMPA, Migratory	Potential

Table 3-21. UES Consultation Fishes, Sea Turtles, and Marine Mammals Known or with the Potential to Occur in Deeper Offshore Waters of the ROI. (Continued)

Species Name	Scientific Name	UES Listing Status[1]	Likelihood of Occurrence in Offshore Waters
Killer whale	*Orcinus orca*	MMPA, Resident	Likely
Melon-headed whale	*Peponocephala electra*	MMPA, Resident	Likely
Sperm whale	*Physeter macrocephalus*	ESA-E, MMPA-Depleted, Resident, RMI Statute 1	Likely
False killer whale	*Pseudorca crassidens*	MMPA, Migratory, RMI Statute 2	
Pantropical spotted dolphin	*Stenella attenuata*	MMPA-Depleted, RMI Statute 2	Likely
Striped dolphin	*S. coeruleoalba*	MMPA, RMI Statute 2	Likely
Spinner dolphin	*S. longirostris*	MMPA, Resident, RMI Statute 2	Likely
Bottlenose dolphin	*Tursiops truncatus*	MMPA, Resident	Likely

Sources: U.S. Navy 2019, NOAA 2020, USASMDC 2021a

Notes:

DPS = distinct population segment, ESA = Endangered Species Act, ESA-E = ESA endangered, ESA-T = ESA threatened, MMPA = Marine Mammal Protection Act, UES = United States Army Kwajalein Atoll Environmental Standards

RMI Statutes: 1 = Endangered Species Act 1975, Title 8 MIRC Chapter 3; 2 = Marine Mammal Protection Act 1990, Title 33 MIRC Chapter 2; 3 = Fisheries Act 1997, Title 51 MIRC Chapter 2

[1] UES Listing Status based on Appendix 3-4A of the UES (USASMDC 2021a). All species in this table are considered consultation species under the UES.

[2] The minke whale and sei whale are not specifically listed in Section 3-4 of the UES but are protected under the MMPA and the sei whale is listed under the ESA. These species are therefore included as special status species.

[3] The humpback whale DPS likely in the ROI, the Oceania DPS (NOAA 2020), is not listed under the ESA and is not a depleted stock under the MMPA, However, the UES specifies the Western North Pacific DPS which is listed as endangered under the ESA.

Invertebrates

Habitats in deep offshore areas of the ROI may support a variety of pelagic and deep-water benthic invertebrates. Little information is known about species assemblages in the deep offshore waters of Kwajalein Atoll; however, deep water benthic communities have been documented around other island in the central Pacific including the Hawaiian Archipelago, Wake Island, and Johnston Atoll (Parrish and Baco 2007, Kelley et al. 2017, Kelley et al. 2018). Around Wake Atoll, large coral colonies with a diversity of deep-water coral and sponge species have been observed at depths of 4,600 – 5,000 feet (Kelley et al. 2017). In the Hawaiian Archipelago, deep water corals including members of several octocoral Families (Coralliidae,

Isididae, Primnoidae, and Chrysogorgiidae) and antipatharian black corals have been observed in waters between 2,000 – 6,000 feet deep (Parrish and Baco 2007). A diversity of corals, sponges, and other invertebrates have been found on crust substrate at depth of 3,300 – 8,200 feet near Johnston Atoll (Kelley et al. 2018). The presence and potential composition of benthic communities in the ROI is unknown; however, if coral species occurred in the deep-water impact area within RMI waters, those species would likely be UES coordination species (listed in Appendix 3-4C of USASMDC 2021a).

Gametes and larvae of many special status nearshore reef-associated invertebrate species also have the potential to occur in the ROI seasonally (USAF 2020e). Many nearshore, reef-associated special status coral, mollusk, and fish species are likely to occur near Gagan Islet and throughout Kwajalein Atoll (USAF 2020e) The presence and distribution of adults of these species is detailed in the Minuteman III SEA (USAF 2020e) and is included here by reference. However, no adult consultation corals or mollusks are known to occur in in the deep waters of the ROI (USAF 2020e). Any eggs, larvae, or juveniles of these special status species that do occur in deep waters are likely to occur at very low densities and with patchy distributions (USAF 2020e). The Proposed Action would have minimal to no effects on gametes or larvae of special status species and they are not discussed further in this EA.

Fish

Six consultation fish species have the potential to occur in the USAG-KA ROI (**Table 3-21)**. The bigeye thresher shark (*Alopias superciliosus*), Oceanic whitetip shark (*Carcharhinus longimanus*), oceanic giant manta ray (*Manta birostris*), and Pacific bluefin tuna (*Thunnus orientalis*) are more oceanic, deep water species and are the most likely to occur in the deep waters of the ROI (USAFGSC and USASMDC 2021). Scalloped hammerhead (*Sphyrna lewini*) and reef manta rays (*Manta alfredi*) generally have more coastal distributions. While scalloped hammerheads and reef manta rays are less likely to occur in the deep waters of ROI, individuals have been known to migrate further offshore (Marshall et al. 2011, Food and Agriculture Organization 2006) and these species have the potential to occur in the USAG-KA ROI.

Sea Turtles

Both green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles are considered likely to occur in the USAG-KA ROI (**Table 3-21**) (Maison et al. 2010). The primary threats to sea turtles in the ROI include bycatch in commercial fisheries, ship strikes, and marine debris (Lutcavage et al. 1997). Marine debris can be a problem for sea turtles through entanglement or ingestion. In addition to the threats all sea turtle species face throughout their ranges, sea turtles near Kwajalein Atoll have the potential to be affected by local harvest. In the RMI, sea turtles are an important part of Marshallese culture; they are featured in many myths, legends, and traditions, where they are revered as sacred animals (Kabua and Edwards 2010). Eating turtle meat and eggs on special occasions remains a prominent part of the culture (Kabua and Edwards 2010). The harvest of sea turtles in the RMI is regulated by the RMI Marine Resources

Act, which sets minimum size limits for greens (86 cm [34-inch] carapace length) and hawksbills (69 cm [27 inch] carapace length) and closed seasons from June 1 to August 31 and December 1 to January 31 (Kabua and Edwards 2010).

Birds

The open ocean areas of the ROI likely provide habitat for a number of foraging and resting seabirds. The UES provides protections for a number of seabirds that occur in the ROI. Several species of boobies (*Sula* spp.), frigatebirds (*Fregata minor*), gulls (*Larus pipizcan*), terns, noddies (*Anous* spp.), shearwaters (*Puffinus* spp.), petrels (*Pterodroma inexpectata*), and tropicbirds (*Phaethon* spp.) are considered coordination species under the UES (Appendix 3-4C of USASMDC 2021a). No terrestrial nesting habitat for birds occurs within the ROI; however, many species of seabirds likely use portions of the ROI for feeding and resting.

Marine Mammals

UES-protected cetaceans considered most likely to occur in the ROI include blue whales (*Balaenoptera musculus*), sperm whales (*Physeter macrocephalus*), short-beaked common dolphins (*Delphinus delphis*), short-finned pilot whales (*Globicephala macrorhynchus*), killer whales (*Orcinus orca*), melon-headed whales (*Peponocephala electra*), pantropical spotted dolphins (*Stenella attenuata*), striped dolphins (*S. coeruleoalba*), spinner dolphins (*S. longirostris*), and bottlenose dolphins (*Tursiops truncatus*; USAF 2020e, Miller 2007). Minke whales (*Balaenoptera acutorostrata*) are also considered likely to occur in the deep waters of the RMI (Miller 2007). Potential threats to cetacean species in the ROI include ingestion of marine debris, entanglement in fishing nets or other marine debris, collision with vessels, loss of prey species due to new seasonal shifts in prey species or overfishing, excessive noise above baseline levels in a given area, chemical and physical pollution of the marine environment, parasites and diseases, and changing sea surface temperatures due to global climate change (NOAA 2020).

3.4.1.1.4 Affected Environment Illeginni Islet and Nearshore Waters – USAG-KA

Biological resources on Illeginni Islet and in the nearshore waters of Illeginni Islet were recently described in the FE-2 EA/OEA (U.S. Navy 2019). The status of biological resources in the ROI as described in these documents remains the best available information for the ROI and is incorporated here by reference. This section provides a brief summary of biological resources in the ROI, but detailed species descriptions and occurrence information can be found in the Minuteman III EA (USAF 2020e), FE-2 EA/OEA (U.S. Navy 2019), and in the GBSD USAG-KA Biological Assessment (USAF 2020d), and are incorporated by reference. This section focuses on important habitats and special status species in the ROI, including species considered coordination or consultation species under the UES.

Terrestrial Vegetation

Vegetation on Illeginni Islet is previously disturbed and managed on much of the western end of the islet, including the payload impact zone (U.S. Navy 2019). The only native vegetation present on the islet consists of a patch of herbaceous vegetation and three patches of littoral (near shore) forest (U.S. Navy 2019; **Figure 3-8**). No special status vegetation species occur on Illeginni Islet.

Terrestrial Wildlife

Important or special-status terrestrial wildlife on Illeginni Islet includes sea turtles and several seabird species.

Suitable sea turtle haulout and nesting habitat exists on the northwestern and eastern beaches of Illeginni Islet (U.S. Navy 2019; **Figure 3-8**). However, no sea turtle nests, or nesting activity has been observed on Illeginni Islet in over 20 years (U.S. Navy 2019). Green and hawksbill turtles are known to use the nearshore waters of Illeginni Islet, but it is unlikely that sea turtles will haul out or nest on Illeginni Islet (U.S. Navy 2019).

At least 14 species of protected migratory and resident seabirds and shorebirds have been seen breeding, roosting, or foraging on Illeginni Islet (**Table 3-22**) during biological inventories conducted by the USFWS and NMFS (USFWS and NMFS 2012). A number of shorebirds use the littoral forest, littoral shrub, and managed vegetation throughout the islet's interior, including white terns (*Gygis alba*) and black noddies (*Anous minutus*) (**Figure 3-8**) (USFWS and NMFS 2012). Other species such as the great crested tern (*Thalasseus bergii*) and black-naped tern (*Sterna sumatrana*) roost on the shoreline embankment and exposed inner reef (USFWS and NMFS 2012). Black-naped tern are known to nest in the vicinity of the proposed impact area (U.S. Navy 2019, Fry 2017). All of these migratory and resident birds are protected under the MBTA and are considered coordination species under the UES. There are no known UES-consultation bird species present on Illeginni Islet.

Table 3-22. Birds Known to Occur on Illeginni Islet.

Common Name	Scientific Name		Common Name	Scientific Name
Brown noddy	*Anous stolidus*		Godwit sp.	*Limosa* sp.
Black noddy	*A. minutus*		Whimbrel	*Numenius phaeopus*
Ruddy turnstone	*Arenaria interpres*		Bristle-thighed curlew	*N. tahitiensis*
Pacific reef heron	*Egretta sacra*		Black-naped tern	*Sterna sumatrana*
Great frigatebird	*Fregata minor*		Great crested tern	*Thalasseus bergii*
White tern	*Gygis alba*		Gray-tailed tattler	*Tringa brevipes*
Pacific golden plover	*Pluvialis fulva*		Wandering tattler	*T. incana*

Source: USFWS and NMFS 2012

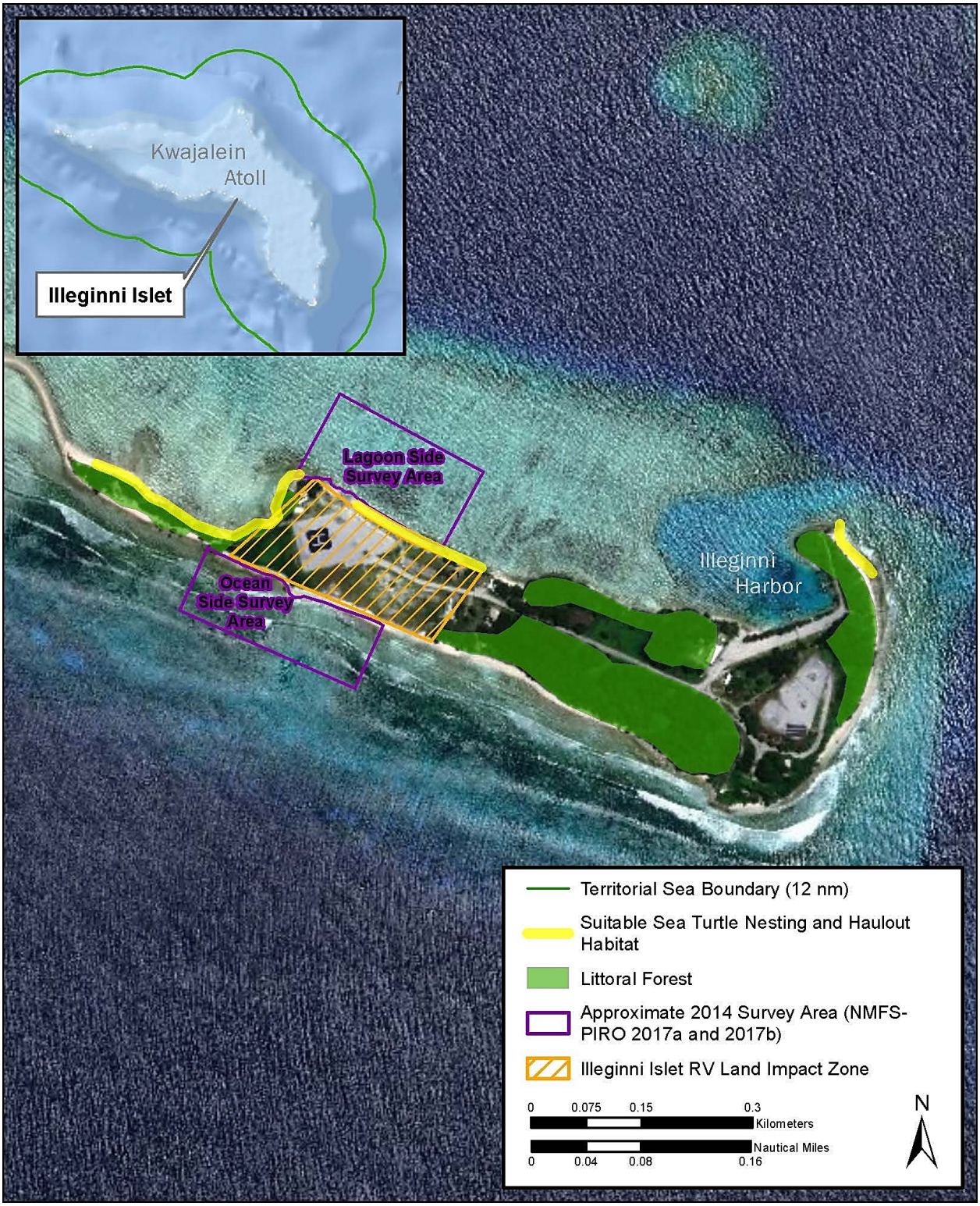


Figure 3-8. Terrestrial Habitats and Marine Survey Areas in the Vicinity of Illeginni Islet.

Marine Vegetation

Marine habitats around Illeginni Islet include both lagoon-side and ocean-side reef flats, crests, and slopes that provide habitat for a number of macroalgae species (U.S. Navy 2019, NMFS and USFWS 2017). The only special status algae species known to occur in the ROI is seagrass (*Halophila gaudichaudii*) which is listed as a coordination species under the UES (U.S. Navy 2019). Seagrass forms dense beds in Illeginni Harbor, as well as down the slopes in and near the harbor entrance (NMFS and USFWS 2017).

Marine Wildlife

Marine habitats of the Vicinity of Illeginni Islet ROI include shallow-water habitats near Illeginni Islet and deeper water ocean-side habitats. Important or special-status marine wildlife include a number of reef associated fish, corals, and mollusks as well as sea turtle, fish, and cetacean species.

This section focuses on marine wildlife in shallow-water habitats near Illeginni Islet. Water depths on the ocean-side of Illeginni increase rapidly as distance from shore increases. Wildlife likely to occur in deeper offshore waters near Illeginni Islet are the same as described for the KMISS area (**Section 3.4.1.1.3**; **Table 3-21**). With the exception of green turtles, hawksbill turtles, and reef manta rays, these species are not likely to occur in shallower nearshore waters in the vicinity of Illeginni Islet. The marine environment surrounding Illeginni Islet supports a diverse community of fishes, corals, and other invertebrates. In general, coral cover and invertebrate diversity is moderate to high on the lagoon-side reef crests and slopes and relatively high on ocean-side reef flats and ridges (U.S. Navy 2019).

A diverse invertebrate community exists in the shallow waters near Illeginni Islet that is typical of reef ecosystems in the tropical insular Pacific (U.S. Navy 2019). Typical benthic invertebrates include sea anemones, sponges, corals, sea stars, sea urchins, worms, bivalves, crabs, and many more (U.S. Navy 2019). Within the benthic invertebrate community are many coral and mollusk species that are protected as consultation or coordination species under the UES (U.S. Navy 2019, USASMDC 2021a). In 2014, NMFS surveyed the reef areas adjacent to the terrestrial impact area at Illeginni Islet (**Figure 3-8**) (NMFS-PIRO 2017a and 2017b, U.S. Navy 2019b). These surveys still represent the best available data on the invertebrate assemblages in these nearshore areas and are described in detail in the FE-2 EA/OEA (U.S. Navy 2019).

Overall, NMFS recorded 36 UES coordination coral species and 7 UES consultation corals in these nearshore marine survey areas (**Table 3-23**) (NMFS-PIRO 2017a and 2017b). Other corals species exist in the reefs surrounding other USAG-KA islets and may occur in other reefs around Illeginni Islet as described in the FE-2 EA/OEA (U.S. Navy 2019) and the GBSD USAG-KA Biological Assessment (USAF 2020d). However, these are the only species likely to occur offshore of the impact area at Illeginni Islet (U.S. Navy 2019). All of these species are relatively widespread in Kwajalein Atoll, with known occurrence in reefs at the majority of surveyed USAG-KA islets (**Table 3-23**).

Table 3-23. Species Requiring Consultation (Bold) and Coordination under the UES Observed in Nearshore Habitats at Illeginni Islet.				
Group Family Name Scientific Name	**Common Name**	**Ocean-Side Survey Area**	**Lagoon-Side Survey Area**	**Number of USAG-KA Islets Observed on (n=11)**
Corals				
Alcyoniidae				
Sinularia sp.		x	-	11
Milleporidae				
Millepora sp.		x	x	11
Helioporidae				
Heliopora coerulea		**-**	**x**	**11**
Acroporiidae				
Acropora abrotanoides		x	-	11
A. austera		x	-	11
A. digitifera		x	x	11
A. gemmifera		x	-	11
A. humilis		x	-	11
A. latistella		x	-	11
A. microclados		**x**	**-**	**11**
A. monticulosa		x	-	11
A. nana		x	-	10
A. nasuta		x	-	11
A. polystoma		**x**	**-**	**6**
A. robusta		x	x	10
A. secale		x	-	11
A. tenuis		x	x	11
Astreopora myriophthalma		-	x	11
Montipora aequituberculata		x	-	11
M. digitata		-	x	9
Agariciidae				
Gardineroseris planulata		x	x	10
Pavona duerdeni		x	-	11
P. varians		x	-	11
P. venosa		**-**	**x**	**11**
Dendrophylliidae				
Turbinaria reniformis		**-**	**x**	**11**
Faviidae				
Cyphastrea agassizi		**-**	**x**	**9**

Table 3-23. Species Requiring Consultation (Bold) and Coordination under the UES Observed in Nearshore Habitats at Illeginni Islet.				
Group Family Name Scientific Name	**Common Name**	**Ocean-Side Survey Area**	**Lagoon-Side Survey Area**	**Number of USAG-KA Islets Observed on (n=11)**
Favia matthaii		x	-	11
Favites abdita		-	x	10
Favites pentagona		-	x	9
Goniastrea edwardsi		x	-	11
G. reniformis		x	-	10
Leptastrea purpurea		x	x	11
Platygyra sinesis		x	x	11
Fungiidae				
Fungia scutaria		x	x	11
Meruliniidae				
Hydnophora microconis		x	-	11
Mussidae				
Symphyllia recta		x	-	10
Pocilloporiidae				
Pocillopora damicornis		-	x	11
P. eydouxi		x	x	11
P. meandrina	**Cauliflower coral**	**x**	**-**	**11**
P. verrucosa		x	-	11
Poritiidae				
Porites lobata		x	x	11
P. lutea		x	x	11
P. rus		x	-	11
Mollusks				
Trochiidae				
Tectus niloticus	**Top shell snail**	**-**	**x**	**11**
Cardiidae				
Hippopus hippopus	**Giant clam**	**x**	**x**	**11**
Tridacna gigas	**Giant clam**	**-**	**-**	**11**
T. maxima	Giant clam	-	x	11
T. squamosa	**Giant clam**	**-**	**x**	**9**
Pteriidae				
Pinctada margaritifera	**Black-lip pearl oyster**	**-**	**-**	**8**
Strombidae				
Lambis lambis	Spider conch	-	x	11

Table 3-23. Species Requiring Consultation (Bold) and Coordination under the UES Observed in Nearshore Habitats at Illeginni Islet.				
Group Family Name Scientific Name	**Common Name**	**Ocean-Side Survey Area**	**Lagoon-Side Survey Area**	**Number of USAG-KA Islets Observed on (n=11)**
L. c.f. *truncata*	Giant spider conch	x	-	11

Data Sources: NMFS-PIRO 2017a, NMFS-PIRO 2017b, NMFS and USFWS 2017
Abbreviations: "-" = not observed, "x" = observed during survey

During 2014 surveys, NMFS recorded three UES consultation mollusk species and three UES coordination mollusk species (**Table 3-23**) offshore of the proposed payload impact area (NMFS-PIRO 2017a and 2017b). These species are the only species likely to be in the ROI; however, two other consultation species (*Tridacna gigas* and *Pinctada margaritifera*) have been recorded elsewhere at Illeginni Islet reefs and potentially occur in the ROI (U.S. Navy 2019). All of these special status mollusk species are relatively widespread in Kwajalein Atoll, with known occurrence in reefs at the majority of surveyed USAG-KA islets (**Table 3-23**).

Sponges are ubiquitous on the seafloor in the ROI at all depths but are most common on hard bottom or reef substrates (U.S. Navy 2019). The sponges that inhabit coral reefs of the RMI are generally found throughout the tropical Indo-Pacific region. All artificially planted or cultivated sponges (phylum Porifera) within the RMI are afforded protection under the RMI Marine Resources Act and are protected under the UES (USASMDC 2021a, U.S. Navy 2019). However, no cultivated sponges are known to occur in the shallow waters near Illeginni Islet (U.S. Navy 2019).

In addition to the adults of these species, larvae and gametes of many of these marine invertebrates may be found in the ROI. Concentrations of these larvae and gametes would be episodic and seasonal in the ROI and averaged over the timespan of a year, densities would be very low (U.S. Navy 2019). Additional information about coral and mollusk reproduction, as well as threats to these species, is detailed in the FE-2 EA/OEA (U.S. Navy 2019) and the GBSD USAG-KA Biological Assessment (USAF 2020d) included here by reference.

The green turtle and hawksbill turtle are the only sea turtles known to occur in the waters of the RMI (U.S. Navy 2019). Green turtles are more common, while hawksbills are considered rare (U.S. Navy 2019, Maison et al. 2010). Sea turtles have been observed fairly regularly during biological inventories at Illeginni Islet (U.S. Navy 2019). Dense seagrass beds in and near Illeginni Harbor (USAF, 2020d), may provide valuable foraging habitat for green turtles. Both of these species are considered likely to occur in both nearshore waters of Illeginni and in deeper offshore waters. Additional information about sea turtle occurrence data and the threats to sea turtles in the ROI can be found in the FE-2 EA/OEA (U.S. Navy 2019) and the GBSD USAG-KA Biological Assessment (USAF 2020d) included here by reference.

A diversity and abundance of reef-associated fishes are found in the shallow waters near Illeginni Islet (U.S. Navy 2019) and have been recorded during biological inventories of USAG-KA islets. During the 2014 NMFS surveys of the nearshore areas adjacent to the proposed payload impact area (**Figure 3-8**), 45 fish species were recorded in the ocean-side survey area and 40 species in the lagoon-side survey area (NMFS-PIRO 2017a). The most abundant fish included Atherinid sp., *Chrysiptera brownriggii, Stethojoulis bandanensis, Halichoeres trimuculatus, H. margaritaceus,* and *Thalassoma quinquevittatum* (NMFS-PIRO 2017a). No UES consultation species were observed during these surveys. However, reef fish can be highly mobile species and the humphead wrasse (*Cheilinus undulatus*) and a *Manta* sp. have been observed on biological inventories at Illeginni Islet and may occur in nearshore waters (U.S. Navy 2019). One UES coordination species, the giant coral trout (*Plectropomus laevis*) was observed in the ocean-side survey area in 2014 and has been recorded in other reef inventories near Illeginni Islet (U.S. Navy 2019). Additional information about the occurrence and abundance of the humphead wrasse and manta ray species near Illeginni Islet can be found in the FE-2 EA/OEA (U.S. Navy 2019b) and the GBSD USAG-KA Biological Assessment (USAF 2020d) included here by reference.

3.4.1.2 Hazardous Material and Waste – USAG-KA

Pollution prevention, recycling, and waste minimization activities are performed in accordance with the UES and established contractor procedures in place at the installation (USASMDC 2021b). USAG-KA has removed all remaining hazardous materials and wastes (e.g., asbestos, polychlorinated biphenyls in old light ballasts, and cans of paint) from buildings and facilities on Illeginni Islet (USAF 2004). Range personnel would also ensure that any unexploded ordnance or material is consumed with each burn operation (USASMDC 2021b). Due to the intermittent nature of flight testing and consequent occupancy of Illeginni Islet, only small quantities of hazardous wastes are generated and managed at Illeginni Islet (USASMDC 2021b). Hazardous handling and disposal activities are closely monitored by the USAG-KA Environmental Office in accordance with the UES (USASMDC 2021b). Hazardous materials to be used by organizations on the RTS test range and its facilities are under the direct control of the user organization, which is responsible for ensuring that these materials are stored and used in accordance with UES requirements (USASMDC 2021b). Tenants, contractors, and program offices importing hazardous materials into USAKA must submit an activity-specific Hazardous Materials Procedure to the USAG-KA Commander for approval within 15 days of receipt of the material or before use, whichever comes first (USASMDC 2021a). The procedure describes how the user will import, use, handle, and dispose of materials in compliance with the UES and consistent with the Hazardous Materials Management Plan (USASMDC 2021a). The use of all hazardous materials is subject to ongoing inspection by USAG-KA environmental compliance and safety offices to ensure the safe use of all materials (USASMDC 2021b). These materials are stored in satellite supply facilities, are distributed through the base supply system, and are consumed in operational processes.

3.4.1.2.1 Applicable Regulations

Refer to **Appendix E, Section E.4.1.2**.

3.4.1.2.2 Region of Influence

The ROI for hazardous material and waste resources at USAG-KA includes the deep offshore waters of KMISS northeast of Gagan Islet, Illeginni Islet, and Kwajalein Islet. The ROI of the Minuteman III Action would be as described in the Minuteman III SEA (USAF 2020e) including deep ocean water areas which could be affected by splashdown of Minuteman III post-boost vehicle fragments, test RV impacts (**Figure 2-7**). No land impacts would occur from Minuteman III flight testing. The ROI of the GBSD Action would include USAG-KA, the payload impact locations on Illeginni Islet, in ocean waters in the vicinity of Illeginni Islet (southwest of Illeginni Islet), and in deep ocean waters of KMISS northeast of Gagan Islet.

3.4.1.2.3 Affected Environment

Illeginni Soil

Because of previous reentry vehicle tests on Illeginni Islet, residual concentrations of beryllium and DU remain in the soil near the helipad on the west side of the islet. In 2005, LLNL analyzed over 100 soil samples collected around the helipad to determine concentrations of beryllium and DU in the soil. Soil samples were collected again following subsequent flight tests and results were reported in 2010 and 2013 (Robison et al. 2013). The observed soil concentrations of beryllium and uranium (as a surrogate for DU) on Illeginni Islet are within compliance with USEPA Region 9 Preliminary Remediation Goals as outlined in the UES. Results from the soil sampling conducted in September 2018 indicated possible beryllium and uranium above the screening levels. Beryllium was not detected in any of the 20 parent soil samples collected from the Illeginni Islet borings; however, it was detected in one of the duplicate samples with a concentration of 1.9 mg/kg, which exceeded the 1.1 mg/kg screening level for beryllium (U.S. Navy 2019b). This sample was a field duplicate of a sample in which beryllium was not detected above 0.089 mg/kg (U.S. Navy 2019b). This large discrepancy may be due to the heterogeneous nature of the soil matrix (described as gravelly sand). A previous test program post-test survey and sampling report described pre-test and post-test soil sampling results for uranium, beryllium, and tungsten at 34 sites (RGNext 2020). The pre-and post-test sampling revealed beryllium and tungsten were undetected, and uranium detected, but well below the USEPA composite worker regional screening level (ingestion and inhalation) (RGNext 2020, USEPA 2020d). Residual concentrations of tungsten remaining in the soil following the flight tests from other programs were below the EPA Regional Screening Level (RSL) for residential areas (63 mg/kg) and commercial areas (930 mg/kg).

Illeginni Groundwater

In September 2018, groundwater samples collected from the groundwater monitoring wells were analyzed for tungsten, beryllium, and uranium. Beryllium was not detected in any of the nine

groundwater samples. Uranium was detected in three of the groundwater samples, but concentrations did not exceed the 30 ug/L USEPA Maximum Contaminant Level (MCL) screening level. Tungsten was detected in seven of the nine groundwater samples collected from the Illeginni Islet wells (U.S. Navy 2019b). Detected concentrations ranged from 0.055 milligrams per liter (mg/L) to 1.2 mg/L, and all detected concentrations exceeded the USEPA residential tap water screening level (0.016 mg/L) (U.S. Navy 2019b). However, because the groundwater at Illeginni Islet is currently deemed to be too saline and not available year-round, it is not considered a viable source of potable water and the USEPA residential screening level would not apply. Groundwater samples collected from monitoring wells following a program flight test were analyzed for tungsten, beryllium, and uranium. Water samples collected in the impact crater shortly after the flight test had tungsten concentrations of 0.65 mg/L (range of 0.64 to 0.67 mg/L) (U.S. Navy 2019b).

A 2018 post-test survey and sampling report from a previous program flight test described pre-test and post-test groundwater results for uranium, beryllium, and tungsten at seven wells (RGNext 2020). The pre-and post-test sampling showed little variation in values, with beryllium remaining undetected, tungsten exceeding residential tap water screening levels, and uranium well below the USEPA MCL for drinking water. The sampling report following the flight test showed lower levels of tungsten than the 2018 sample results—with detected concentrations ranging from 0.0023 mg/L to 0.99 mg/L (RGNext 2020) compared to previously detected concentrations ranging from 0.055 mg/L to 1.2 mg/L (U.S. Navy 2019b). Tungsten was detected in 8 of the 12 groundwater samples collected from the Illeginni wells. The 2020 sampling report described that monitoring wells MW-03, MW-04, and MW-05 were located within the flight test impact zone and could not be sampled. The DEP for the flight test explains that the wells on Illeginni were to be sampled every 3 to 6 months for metals, including tungsten.

3.4.1.3 Noise –USAG-KA

3.4.1.3.1 Applicable Regulations

Refer to **Appendix E, Section E.4.1.3**.

3.4.1.3.2 Region of Influence

As it relates to Minuteman III actions, the ROI for noise is focused on those islets within Kwajalein Atoll that could be affected.

3.4.1.3.3 Affected Environment

Natural sources of noise on remote islets include the constant wave action along shorelines, the occasional thunderstorm and noise from birds. On Kwajalein Island ambient noise levels are associated with wave action, commercial equipment, commercial flights, military aircraft and infrequent missile launches. Gagan noise levels are also affected by infrequent missile launches, helicopters and equipment. Typical daytime noise levels within local Marshallese

communities are expected to range between 55 and 65 dBA (U.S. Army Space and Strategic Defense Command (U.S. Army Space and Strategic Defense Command, 1993).

3.4.2 Broad Ocean Area

Rationale for Environmental Resources Analyzed

In compliance with NEPA, CEQ, and USAF EIAP regulations and guidelines, this EA/OEA focuses only on those environmental resources considered potentially subject to impacts from the installation development projects. These environmental resources are air quality, airspace, biological, and health and safety, are the areas of concern requiring discussion.

The remaining environmental resources were not analyzed further because no significant impacts to these resources are anticipated as a result of implementing the Proposed Action. The following information explain why, air quality, airspace, cultural, geology and soils, hazardous material and waste, health and safety, infrastructure, land use, noise, socioeconomics, transportation, water, and visual aesthetics were dismissed from detailed analysis in this EA/OEA.

The proposed activities are location in the open ocean and would have no impact to land based resources (cultural, geology and soils, infrastructure, land use, noise, socioeconomics, transportation). All water resources are address under biological resources.

Under the Proposed Action, the pre-test preparation and support may require the use of vessels and aircraft, which are mobile sources of air emissions. It is anticipated that the emissions from these sources would be minor and temporary. No exceedances of air quality standards are expected. The Minuteman III components impact in ocean waters and do not present any air quality issues. There would be no fugitive dust or other airborne pollutants during terminal flight and impact activities. As with pre-test, post-test operations may also require the use of mobile sources (i.e., vessels) of air emissions. These sources would be minor and temporary.

Under the Proposed Action, long-term, negligible, adverse impacts on airspace are expected within the BOA of the Pacific region. Ongoing flight testing of Minuteman III missiles would continue along its designated flight paths. Although there would be a doubling of the number of airspace closures in some years, such closures generally would occur in different locations of the Pacific region. All Minuteman III and GBSD flight tests would be conducted in accordance with established FAA, ICAO, and DoD navigation and airspace safety policies and procedures. Close coordination between the launch operations manager at VAFB and the responsible ARTCC, and the application of existing range safety and notification requirements, minimizes potential impacts on the use of airspace by general aviation during flight tests. Prior to each flight test over the Pacific region, a NOTAM and NTM would be published to divert commercial and private aircraft and ships from any hazard areas along the missile flight path. The flight tests would be infrequent and short-term events, after which the airspace is returned to the control of the responsible ARTCC.

Under the Proposed Action, no significant impacts on health and safety would be expected within the BOA of the Pacific region. All Minuteman III and GBSD flight tests would be conducted in accordance with established health and safety related policies and procedures. All vessels and aircraft would comply with existing safety regulations. NTMs and NOTAMs would be published to warn personnel to avoid potential impact areas within established range Warning Areas in international waters and airspace.

3.4.2.1 Biological Resources – BOA

Biological resources are defined as in **Section 3.2.2**. This section summarizes existing information on marine species and habitat types in the vicinity of the of the Proposed Action with special emphasis on the presence of any special-status species. Biological resources within the affected environment for the Proposed Action are described with the purpose of evaluating the effects of the Proposed Action and in proportion to the magnitude of potential effects.

3.4.2.1.1 Applicable Regulations

In this EA/OEA, the BOA is defined as any ocean area along the missile's flight path that is outside of territorial seas (generally up to 12 nm from a nation's coastline) and includes waters within the U.S. EEZ near the California coast as well as waters within the RMI EEZ (**Figure 2-6**). The regulatory requirements listed in **Section E.2.2** apply to the portions of the ROI within the U.S. EEZ. Since the BOA ROI includes international waters and EEZ waters of other nations, biological resources are evaluated in accordance with the requirements of EO 12114, Environmental Effects Abroad of Major Federal Actions and DOD procedures for implementing EO 12114 (32 CFR § 187).

3.4.2.1.2 Region of Influence

As it relates to Minuteman III, the BOA ROI for biological resources includes areas subject to the effects of the Minuteman III Action as described in the Minuteman III SEA (USAF 2020e) and in **Section 2.1.5** including the over-ocean flight corridor, spent motor drop zones, missile component splashdown areas, and RV impact areas (**Figure 2-6**).

3.4.2.1.3 Affected Environment

Biological resources in the BOA ROI were recently described in the Minuteman III Modification and Fuze Modernization SEA (USAF 2020e) and are incorporated by reference. The following section summarizes marine biological resources in the ROI, focusing on important habitats and special status species.

The BOA ROI consists of deep North Pacific Ocean waters with both pelagic and benthic habitats. Pelagic areas support communities of planktonic (drifting) and nektonic (swimming) organisms. Benthic communities are made up of marine organisms that live on or near the sea floor such as bottom dwelling fish, mollusks, crustaceans, and echinoderms. Given the large

extent of the North Pacific covered by the BOA ROI, a large number of special status marine mammals, sea turtles, fish, and seabirds have the potential to occur within this area. **Table 3-24** lists many of the special status species that are likely to occur somewhere in the ROI. It is important to note that these species are not equally likely to occur in all portions of the ROI and some only occur within the ROI seasonally.

Additional details about the status, life histories, distribution, and abundance of the special status species in the ROI can be found in the Biological Assessments for Minuteman III Modification (USAFGSC and USASMDC/ARSTRAT 2015) and the Biological Assessment Addendum for Minuteman III Modification (USAFGSC and USASMDC 2021).

Invertebrates

Given the large spatial extent of the BOA, there are a diversity of pelagic and benthic habitats for invertebrates. Waters beyond the EEZs are usually beyond the continental shelves and are mostly very deep waters (0.6–3.7 miles deep) (UNEP 2006). The greatest diversity of invertebrates in these waters occurs in the epipelagic zone where available sunlight enables primary production by phytoplankton and algae. Hotspots for diversity tend to occur near underwater features such as seamounts, submarine canyons, and shelf breaks where upwelling occurs, as well as in areas where warm and cold-water currents converge (UNEP 2006). Deep-water benthic habitats also support a diversity of invertebrates including echinoderms, sponges, tube worms, anemones, mollusks, and crustaceans (UNEP 2006). While many species of deepwater benthic and pelagic invertebrates are likely to occur in the Pacific Ocean BOA, the density and distribution of these organisms are largely unknown.

Fish

Fish are vital components of the marine ecosystem. They have great ecological and economic importance. The major fisheries in the Central Pacific include several tuna species, marlin, swordfish (*Xiphias gladius*), sharks, dolphinfish (*Coryphaena* spp.), and wahoo (*Acanthocybium solandri* (Lawseth 2007). Due to the large size of the BOA, there are a diversity of oceanic habitats for fish from epipelagic to deep benthic and seamount habitats, and therefore a wide diversity of fish species.

Three ESA listed species have the potential to occur in the BOA: the oceanic whitetip shark, oceanic giant manta ray, and scalloped hammerhead. The oceanic whitetip is a highly migratory species and is one of the most widespread shark species in tropical and subtropical waters of the world (Young et al. 2018). While these sharks may occasionally be found in coastal waters, they are usually found far offshore in the open ocean, on the outer continental shelf, or around oceanic islands in deeper waters (Young et al. 2018). The oceanic giant manta ray is commonly sighted along productive coastlines with upwelling, but primarily occurs near offshore pinnacles and seamounts (Marshall et al. 2011). This species is thought to spend the majority of its time in deep water, with occasional visits to coastal areas (Defenders of Wildlife 2015). The scalloped

hammerhead occurs primarily in coastal, warm temperate waters but is a highly mobile and partly migratory species (Food and Agriculture Organization of the United Nations 2006).

Table 3-24. Special Status Species with the Potential to Occur in the BOA Minuteman III ROI.

Common Name	Scientific Name	Federal Listing Status
Fish		
Oceanic whitetip shark	*Carcharhinus longimanus*	T
Oceanic giant manta ray	*Manta birostris*	T
Scalloped hammerhead	*Sphyrna lewini*	E, T(1)
Sea Turtles		
Loggerhead turtle (North Pacific Ocean DPS)	*Caretta caretta*	E
Green turtle[3]	*Chelonia mydas*	E, T(2)
Leatherback turtle	*Dermochelys coriacea*	E
Hawksbill turtle	*Enetmochelys imbricata*	E
Olive ridley turtle	*Lepidochelys olivacea*	T(3)
Birds		
Band-rumped storm petrel	*Oceanodroma castro*	E, MBTA
Hawaiian petrel	*Pterodroma sandwichensis*	E, MBTA
Short-tailed albatross	*Phoebastria albatrus*	E, MBTA
Newell's shearwater	*Puffinus auricularis newelli*	T, MBTA
Cetaceans		
Minke whale	*Balaenoptera acutorostrata*	MMPA
Sei whale	*B. borealis*	E, MMPA
Bryde's whale	*B. edeni*	MMPA
Blue whale	*B. musculus*	E, MMPA
Fin whale	*B. physalus*	E, MMPA
Baird's beaked whale	*Berardius bairdii*	MMPA
Long-beaked common dolphin	*Delphinus capensis*	MMPA
Short-beaked common dolphin	*D. delphis*	MMPA
Gray whale [1]	*Eschrichtius robustus*	MMPA
Pygmy killer whale	*Feresa attenuata*	MMPA
Short-finned pilot whale	*Globicephala macrorhynchus*	MMPA
Risso's dolphin	*Grampus griseus*	MMPA
Longman's beaked whale	*Indopacetus pacificus*	MMPA
Pygmy sperm whale	*Kogia breviceps*	MMPA
Dwarf sperm whale	*K. sima*	MMPA
Fraser's dolphin	*Lagenodelphis hosei*	MMPA

Table 3-24. Special Status Species with the Potential to Occur in the BOA Minuteman III ROI.		
Common Name	**Scientific Name**	**Federal Listing Status**
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	MMPA
Northern right whale dolphin	*Lissodelphis borealis*	MMPA
Humpback whale(1)	*Megaptera novaeangliae*	E, T(4), MMPA
Hubbs' beaked whale	*Mesoplodon carlhubbsi*	MMPA
Blainville's beaked whale	*M. densirostris*	MMPA
Ginkgo-toothed beaked whale	*M. ginkgodens*	MMPA
Stejneger's beaked whale	*M. stejnegeri*	MMPA
Perrin's beaked whale	*M. perrini*	MMPA
Pygmy beaked whale	*M. peruvianus*	MMPA
Killer whale	*Orcinus orca*	MMPA
Melon-headed whale	*Peponocephala electra*	MMPA
Harbor porpoise	*Phocoena phocoena*	MMPA
Dall's porpoise	*Phocoenoides dalli*	MMPA
Sperm whale	*Physeter macrocephalus*	E, MMPA
False killer whale2	*Pseudorca crassidens*	MMPA(5)
Pantropical spotted dolphin	*Stenella attenuata*	MMPA
Striped dolphin	*S. coeruleoalba*	MMPA
Spinner dolphin	*S. longirostris*	MMPA-Depleted
Rough-toothed dolphin	*Steno bredanensis*	MMPA
Bottlenose dolphin	*Tursiops truncatus*	MMPA-Depleted
Cuvier's beaked whale	*Ziphius cavirostris*	MMPA
Pinnipeds		
Guadalupe fur seal	*Arctocephalus townsendi*	T, MMPA
Northern fur seal	*Callorhinus ursinus*	MMPA
Northern elephant seal	*Mirounga angustirostris*	MMPA
Hawaiian monk seal	*Neomonachus schauinslandi*	E, MMPA
California sea lion	*Zalophus californianus*	MMPA

Sources: NOAA 2020, Hanser et al. 2017, U.S. Navy 2018, and various other species-specific literature sources.

Notes: DPS = Distinct Population Segment; E = ESA endangered; T = ESA threatened; MMPA = Marine Mammal Protection Act

(1) Scalloped hammerheads in the ROI could be from either the ESA-endangered Eastern Pacific DPS or from the ESA-threatened Indo-West Pacific DPS (Miller et al. 2014).

(2) Green turtles in the ROI may belong to one of four DPSs (Seminoff et al. 2015). The Central West Pacific DPS and Central South Pacific DPS are listed as endangered under the ESA and the Central North Pacific DPS and Eastern Pacific DPS are listed as threatened.

(3) As a species, the olive ridley turtle is listed as threatened, but the Mexican Pacific Coast nesting population is listed as endangered. Some olive ridley turtles in the ROI may be from this east Pacific Coast nesting population (NMFS and USFWS 2007, NMFS and USFWS 2014).

(4) Individuals from up to five humpback whale DPSs may occur in the BOA ROI (NOAA 2020, Bettridge et al. 2015), the Oceania DPS and Hawaii DPS are not listed under the ESA, the Mexico DPS is listed at threatened, and both the Central America DPS and Western North Pacific DPS are listed as endangered.

(5) The DPS of false killer whales likely in the ROI are not listed under the ESA; however, the Hawaiian Insular DPS is listed as endangered under the ESA.

Sea Turtles

Five species of sea turtle have the potential to occur in the BOA: green, hawksbill, leatherback, loggerhead (*Caretta caretta*), and olive ridley (*Lepidochelys olivacea*); all of which are listed under the ESA (**Table 3-24**). Green and hawksbill turtles are the most abundant species in the central Pacific and therefore are most abundant in the BOA. Each sea turtle species has unique life history characteristics that result in different patterns of distribution and abundance in the Pacific. Green, hawksbill, and loggerhead turtles primarily use coastal habitats as adults or large juveniles; however, these turtles use open ocean habitats as hatchlings and juveniles (Polovina et al. 2000, Dutton et al. 2008, NMFS and USFWS 2013a). Leatherback and olive ridley turtles spend the majority of the non-breeding portion of their life cycles in the open ocean (NMFS and USFWS 2013b, NMFS and USFWS 2014). Leatherbacks are more temperate in distribution, extending to waters as far north as the Gulf of Alaska (NMFS and USFWS 2013b), while olive ridleys are found in tropical waters (NMFS and USFWS 2014). Both of these species are known to make extensive migrations through the North Pacific and are likely to occur in some portion of the BOA. The abundance of leatherbacks and olive ridleys is likely very low in the BOA with concentrations near highly productive areas (NMFS and USFWS 2014) that vary seasonally and with changing ocean conditions.

Birds

While no terrestrial habitat occurs in the BOA ROI, many seabirds have wide ranging at-sea foraging distributions and extensive pelagic migrations in the Pacific. It is likely that several seabird species may forage or rest at sea in the BOA. Some seabird species are relatively common in portions of the BOA including sooty tern (*Onychoprion fuscatus*), wedge-tailed shearwaters (*Ardenna pacifica*), Juan Fernandez petrels (*Pterodroma externa*), white-necked petrels (*P. cervicalis*), black-winged petrels (*P. nigripennis*), Leach's storm petrels (*Oceanodroma leucorhoa*), sooty shearwaters (*A. gisea*), black-footed albatross (*Phoebastria nigripes*), Laysan albatross (*P. immutabilis*), and red-footed boobies (*Sula sula*) (Gould 1974, Ballance et al. 2002, Spear et al. 1999). Other less common or uncommon species known to occur in portions of the BOA include Bulwer's petrels (*Bulweria bulwerii*), pomarine jaegers (*Stercorarius pomarinus*), white terns (*Gygis alba*), masked boobies (*Sula dactylatra*), and red-tailed tropicbirds (*Phaethon rubricauda*) (Gould 1974, Ballance et al. 2002, Spear et al. 1999). All of these seabirds are migratory birds protected under the MBTA. The distribution and abundance of these and other seabirds in the BOA varies seasonally and often with prey availability (Gould 1974, Ballance et al. 2002). Four ESA-listed species have the potential to occur in the ROI (**Table 3-24**); band-rumped storm petrel (*Oceanodroma castro*), Hawaiian

petrel (*Pterodroma sandwichensis*), short-tailed albatross (*Phoebastria albatrus*), and Newell's shearwater (*Puffinus auricularis newelli*).

Marine Mammals

Given the large extent of the BOA ROI, many marine mammals species are likely to occur in some portion of the ROI (**Table 3-24**). Some of these species occur almost exclusively in coastal waters such as long-beaked common dolphins (*Delphinus capensis*), gray whales (*Eschrichtius robustus),* harbor porpoises (*Phocoena phocoena*), bottlenose dolphins, northern fur seals, Hawaiian monk seals (*Neomonachus schauinslandi*), and California sea lions. These species are more likely to occur in coastal waters which mostly occur within EEZs. Most of the BOA is offshore/oceanic waters and a number of cetaceans are likely to occur in this area. The distribution and abundance of cetaceans in the oceanic BOA varies seasonally but species such as large baleen whales (*Balaenoptera* spp.), short-finned pilot whales, Fraser's dolphins (*Lagenodelphis hosei*), humpback whales (*Megaptera novaeangliae*), sperm whales, pantropical spotted dolphins, and striped dolphins would occur regularly in the oceanic BOA. Potential threats for marine mammals in the BOA are the same as those in other portions of the affected environment (see **Section 3.4.1.1.3**).

Environmentally Sensitive Habitats

In the BOA ROI, no designated critical habitat, EFH, or marine protected areas occur outside the EEZs. Within the U.S. EEZ, designated critical habitat, EFH, marine protected areas occur off the California Coast. Because of the limited potential for effects to these habitats in the BOA ROI, sensitive habitats are only briefly summarized in this section.

Critical Habitat. Leatherback turtle critical habitat occurs within the U.S. EEZ off the coast of California. Leatherback sea turtle critical habitat was designated along the U.S. West Coast in 2012 (77 FR 4170 [January 26, 2012]). The designation covers approximately 16,910 square miles of waters along the California coast and includes waters from the surface down to a maximum of 262 feet from the shoreline out to the 9,840 foot depth contour (77 FR 4170 [January 26, 2012]). The primary constituent element essential for conservation of leatherback sea turtles identified in the final rule is "the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (e.g., Chrysaora, Aurelia, Phacellophora, and Cyanea), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks" (77 FR 4170 [January 26, 2012]).

Essential Fish Habitat. The Minuteman III flight path would cross over designated EFH within the U.S. EEZ off the coast of California. EFH and its geographic boundaries in the ROI have been designated by the Pacific Fisheries Management Council (PFMC) under the Magnuson-Stevens Fishery Conservation and Management Act. The PFMC has developed EFH and habitat areas of particular concern (HAPC) designations for Pacific coast groundfish, coastal Pelagic species, and highly migratory species. Complete descriptions of the designated EFH

and HAPCs for each life history stage for each managed species are incorporated by reference to the Fishery Management Plans for each group; Coastal pelagic species (PFMC 1998), Pacific coast groundfish (PFMC 2016), and highly migratory species (PFMC 2018). The designated EFH and HAPC in the ROI are summarized in **Table 3-25**.

Table 3-25. Designated Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) in the ROI.

Management Unit	EFH	HAPC
Coastal Pelagic Species	All marine and estuarine waters above the thermocline from the shoreline offshore to 200 nm offshore.	None
Pacific Coast Groundfish	All waters and substrate within the following areas: • Depths less than or equal to 11,500 feet to mean higher high-water level or the upriver extent of saltwater intrusion. • Seamounts in depths greater than 11,500 feet as mapped (PFMC 2016). • Areas designated as HAPCs not included above.	Estuaries, canopy kelp, seagrass, rocky reefs, and "areas of interest", including several seamounts off of California.
Highly Migratory Species	All marine waters from the shoreline offshore to 200 nm offshore.[1]	None

Sources: PFMC 1998, PFMC 2016, PFMC 2018

Note:

[1] Varies by species but encompassed by this definition.

4.0 Environmental Consequences

Chapter 4, environmental consequences has been prepared to provide the public, agencies, and the USAF decision maker with an understanding of the environmental consequences resulting from the development, testing of and training for a new ICBM weapon system that would eventually replace the aging Minuteman III weapon system. Implementation of the test program would include facility construction or modifications at HAFB, VAFB, and DPG. In addition, GBSD flight test activities would be conducted from VAFB and include target impacts at USAG-KA in the RMI. While technically not part of the Test Program, the Proposed Action includes the construction and operation of the GBSD FTU/Schoolhouse at VAFB. As described earlier, such training at VAFB would be needed in time to support the fielding of the new GBSD weapon system when that decision is made.

4.1 No Action Alternative

The ongoing flight tests and related operations were taken into consideration in describing the Affected Environment in **Chapter 3.0** and have been fully assessed in prior environmental documents referenced in this EA/OEA. Under the No Action Alternative, Minuteman III flight tests conducted from VAFB and supported by HAFB would continue until decisions are made to remove the Minuteman III weapon system from active status. See **Section 2.4** for a summary of environmental consequences for the No Action Alternative. Also under the No Action Alternative, operation of the Minuteman III Schoolhouse at VAFB would continue until such decisions on the Minuteman III system are made.

4.2 Proposed Action

4.2.1 Hill Air Force Base

4.2.1.1 Air Quality – HAFB

Air emissions were estimated using the USAF Air Conformity Applicability Model (ACAM) version 5.0.17b. ACAM is an air emissions estimating model that performs an analysis to assess potential air quality impacts. ACAM reports are located in **Appendix D.** Generally, emissions of criteria pollutants (i.e., PM_{10}, $PM_{2.5}$, NO_x, SO_x, VOC, and CO) and GHGs (i.e., mostly CO_2e) during construction activities would be expected. Project-specific direct and indirect emissions would primarily be driven by the following activities:

- Site Preparation and Construction
- Operations and Maintenance

4.2.1.1.1 Site Preparation and Construction

Direct impacts to air quality would occur as a result of increased emissions from construction equipment, vehicles, and fugitive dust during site preparation (beginning in FY 2021). A temporary increase in emissions (i.e., fugitive, VOCs, CO_2e) would occur as a result of demolition, site preparation, and construction activities. As listed below, associated activities are anticipated to begin in FY 2021 and end in FY 2024.

- Building construction: 170,800 ft^2
- Demolition: 23,293 ft^2
- Site grading: 1,105,400 ft^2
- Trenching: 6,182 ft^2
- Architectural coating: 170,800 ft^2
- Paving: 131,173 ft^2
- Personnel: 200 construction workers (including vehicle exhaust)
- GHG (CO_2e) from construction

Construction/Demolition Activities

Table 4-1 shows the estimated emissions from construction phases (i.e., tons). **Table 4-2** indicates the highest annual estimated emissions (construction equipment, construction workers and vehicle exhaust) during the 4-year construction are below the significant indicator levels for pollutants of concern and therefore no significant impacts to air quality are anticipated. In accordance with 40 CFR Part 93, a conformity applicability analysis has been performed and the anticipated emissions for ozone (O_3), carbon monoxide (CO), and $PM_{2.5}$ are below the applicable de minimis thresholds as set forth in 40 CFR § 93.153(b)(2). Additionally, construction-related emissions would be short-term, temporary, and would be confined to the construction site area. Exhaust emissions from construction equipment and vehicles would be minimized through implementation of BMPs by the construction contractors, including proper operation and maintenance of equipment. The inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soils by 50 percent from uncontrolled levels. Construction dust would be reduced by implementation of fugitive dust control measures as listed in **Section 4.2.1.1.3.**

An air quality permitting must be in place prior to construction. Failure to comply will result in fines and other penalties as applicable. All construction projects are to comply with Utah Administrative Code R307 which addresses the general emission standards, standards for fugitive emissions and fugitive dust, surface coating, and other emission sources for all areas of

the state except for sources listed in section IX, Part H of the state implementation placed or located in a PM_{10} non-attainment or maintenance area. (Utah Administrative Code 2020)

Table 4-1. Estimated Emissions from Construction – HAFB

Activity	Pollutant Emissions (tons)								
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Construction/Demolition (1)	3.01	7.15	6.49	0.02	11.5	0.28	0	0.02	1,912.6
Construction Personnel (1)	0.92	0.81	10.39	0.01	0.03	0.02	0	0.06	925.9
Total Proposed Action Estimated Emissions (FY2021–FY2025)	**3.93**	**7.96**	**16.88**	**0.03**	**11.53**	**0.30**	**0**	**0.08**	**2,838.5**

Notes: NA = Not Applicable

(1) ACAM calculations (**Appendix D**); Including construction equipment and vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

Table 4-2. Annual Estimated Emissions from Construction – HAFB -

Activity	Pollutant Emissions (tpy)								
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Construction Phases (tpy) (1)	**2.8**	**6.9**	**22.0**	**4.84**	**11.1**	**10.27**	**0.0**	**0.043**	**1,485.3**
Significant Indicator Levels (tpy)	100	100	100	250	250	70	25	250	N/A
Exceedance	No	No	No	No	No	No	No	No	N/A

Notes: NA = Not Applicable

(1) ACAM calculations (**Appendix D**); Including construction equipment and vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

4.2.1.1.2 Operations and Maintenance

There are no flight test launches associated with HAFB. An increase in emissions would occur as a result of the operations activities listed below. The activities are anticipated to begin in FY 2024 and end in FY 2034.

- 820 additional personnel
- Standby generators for the MIF, Software Sustainment Center, and the GBSD Launch Facility
- Fuel tanks for the MIF, Software Sustainment Center, and the GBSD Launch Facility
- Boilers for the TACC, MIF, and Software Sustainment Center

Table 4-3 shows the total project operations estimated emissions activities (tons) from FY2024 – FY2029 and **Table 4-4** shows the highest annual estimated emissions for the operational activities from FY2024 – FY2034 (tpy). As indicated in **Table 4-4** the total estimated annual operations (tpy) of the GBSD Test Program at HAFB does not exceed the significant indicator levels for criteria pollutants. See **Appendix D** for the full Record of Conformity Analysis (ROCA) Air Conformity. Implementation of mitigation measures listed below in **Section 4.2.1.1.3** could further reduce the estimated emissions and these measures are considered part of the Proposed Action.

Air quality permitting will be required for the use of standby/emergency generators. The use of emergency/standby diesel-fired generators is subject to National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart III. All HVAC systems must comply with federal standards. See **Table 4-5** for a list of potential backup generators associated with GBSD operations. To prevent significant impacts to air quality boilers (i.e., stationary source) should meet the minimum efficiency requirements as outlined in the State of Utah *Boiler and Pressure Vessel Compliance Manual*.

Table 4-3. Estimated Emissions for the Operations of Proposed Action at HAFB

Activity	Pollutant Emissions (tons)								
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
820 Operations Personnel [(1)] for GBSD Test	18.2	16.1	206.2	0.12	0.50	0.45	0	1.1	18,373
Standby Generator-MIF[(1)]	0.34	1.41	0.94	0.29	0.31	0.31	0	0	163.3
Standby Generator – Software Sustainment Center[(1)]	0.73	26.49	7.04	0.01	.83	0.83	0	0	1,360.3
Standby Generator – GBSD Launch Facility[(1)]	0.93	3.9	2.6	0.79	0.84	0.84	0	0	446
Fuel Tank – MIF[(1)]	0	0	0	0	0	0	0	0	0
Fuel Tank – Software Sustainment Center[(1)]	0	0	0	0	0	0	0	0	0
Fuel Tank – GBSD Launch Facility[(1)]	0.01	0	0	0	0	0	0	0	0
Boiler – TACC[(1)]	0.03	3.44	0.86	7.42	0.17	0.04	0	0	3,879.4
Boiler – MIF[(1)]	0.08	8.41	2.1	18.16	0.42	0.11	0	0	9,492.0
Boiler – Software Sustainment Center[(1)]	0.1	10.39	2.6	22.44	0.52	0.13	0	0	11,729.4
Total Estimated Emissions from the Operations of GBSD Facilities [(1)]	**20.42**	**70.14**	**222.34**	**49.23**	**3.59**	**2.71**	**0**	**1.1**	**45,443**

Notes: NA = Not Applicable

[(1)] ACAM calculations (**Appendix D**); Including workers vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

Table 4-4. Estimated Annual Emissions for the Proposed Action at HAFB – Operation									
Activity	**Pollutant Emissions (tpy)**								
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Operations (tpy) (1)	2.8	6.9	22.0	4.8	0.36	0.27	0.0	0.003	4,486
Total from GBSD Operations	**2.8**	**6.9**	**22.0**	**4.8**	**0.36**	**0.27**	**0.0**	**0.003**	**4,486**
2019 Annual Estimated Air Emissions for HAFB	**107**	**109**	**105**	**0.87**	**10.4**	**15.8**	**N/A**	**N/A**	**111,000**
Total Estimated Annual Emissions for HAFB with Operations of the GBSD Facilities	**109.8**	**115.9**	**127.0**	**5.67**	**10.76**	**16.07**	**N/A**	**N/A**	**115,486**
Significant Indicator Levels (tpy)	100	100	100	250	250	70	25	250	N/A
Exceedance	No	No	No	No	No	No	No	No	N/A
Percent Contributions from GBSD at HAFB	**2.6**	**6.0**	**17.3**	**84**	**3.3**	**1.62**	**N/A**	**N/A**	**3.9**
Emissions for Davis County	11,777	6,503	29,930	164	4,399	927	N/A	N/A	N/A
Percent Contributions from HAFB on Regional Air Quality (Davis County)	0.9	1.8	0.42	3.5	0.24	1.7	N/A	N/A	N/A

Notes: NA = Not Applicable

(1) ACAM calculations (**Appendix D**); Including workers vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

Table 4-5. GBSD Back-up Generators Associated with Operations at HAFB						
Type		**Megawatts (Kilowatts)**	**Horsepower (3)**	**Purpose**	**Use Duration (1,2)**	**Location**
1.	Diesel	0.06 MW (60 kW)	81	Backup power	200 hours	MIF
2.	Diesel	1.5 MW (1,500 kW)	2012	Backup power	200 hours	Software Sustainment Center
3.	Diesel	0.25 MW (250 kW)	335	Backup power	200 hours	GBSD Launch Facility

4.2.1.1.3 Mitigation Measures

Control Fugitive Dust

- Apply water periodically to disturbed areas.
- Use a gravel apron to reduce mud/dirt trackout from unpaved truck exit routes.
- Replace ground cover in disturbed areas as quickly as possible.
- All trucks hauling dirt, sand, soil, or other loose materials are to be tarped with a fabric cover.
- Comply with the HAFB Fugitive Dust Control Plan.

Reduce Carbon Monoxide (CO)

- Use hybrid gasoline-electric vehicles (alternate fuel source).
- Use battery electric vehicles.
- Follow vehicle maintenance practices for vehicle efficiency and use of fuel.
- Increase the use of low-carbon fuels.
- Reduce the number of vehicles used by construction workers.
- Use public transit.
- Develop and use transportation strategies to reduce CO production (i.e., car/van pool).

4.2.1.2 Climate Change – HAFB

4.2.1.2.1 Site Preparation, Construction and Operations and Maintenance

Considerations for GHG (CO2e)

The potential effects of GHG emissions from the Proposed Action are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the Proposed Action have been quantified to the extent feasible in this EA/OEA for information and comparison purposes, including possible reasoned choices among alternatives. **Table 4-1** shows the estimated annual emissions of CO_2e would be 2,838.5 tpy during construction of the GBSD test facilities and **Table 4-4** shows the estimated annual emissions of CO_2e would be 115,487 tpy during operations and maintenance of the GBSD test facilities.

4.2.1.3 Hazardous Material and Waste – HAFB

4.2.1.3.1 Site Preparation and Construction

The proposed construction and demolition activities at HAFB would require HAFB and its contractors to handle, use, store, and dispose of hazardous and non-hazardous solid waste in the short term under its Hazardous Materials Management Plan (HMMP). Hazardous materials anticipated to be used or encountered during demolition include ACM, LBP, Cd (batteries), PCBs and universal wastes (batteries, fluorescent lamps, and mercury containing equipment). Suspected hazardous materials will be tested prior to demolition activities, to ensure compliance with state and federal regulations for hazardous materials. Waste materials anticipated to be used or encountered during site preparation and construction include paints, thinners, solvents, adhesives, fuels, lubricants, coolants, used oil, soiled rags, etc. Hazardous construction and demolition material and waste would be handled, used, stored, and disposed of by authorized personnel under its HMMP and HWMP.

All label directions and safety data sheets would be followed to ensure proper handling and disposal of hazardous material and waste. Safety data sheets would be kept current at all construction and demolition sites on HAFB. Secondary containment would be utilized or installed as HAFB's environmental health regulations require. Appropriate life safety equipment would be maintained and operated to minimize human health risks.

HAFB has determined its existing locations with risk of soil and/or groundwater contamination under the CERCLA Superfund cleanup. Although unlikely, should contamination be discovered (chlorinated solvents, petroleum residues, etc.) in the shallow subsurface, sampling would be conducted to determine the location and whether concentrations are above regulatory limits. Any subsurface contamination would be managed and disposed of by authorized environmental professionals in coordination with Air Force Restoration Program personnel. Remediation and removal of contaminated media would be funded by the GBSD program. Suitable clean fill would be brought in as a replacement as needed.

The 2008 EA and 2016 SEA for the Falcon Hill EUL Area did not identify any hazards relating to asbestos, LBP, or munitions. However, the Peacekeeper LF (Building 11531) has the potential to contain ACM, LBP, and Cd (batteries). ACM samples will be required prior to demolition activities, with results submitted to the proposed disposal landfill and to local environmental regulators to ensure results are below USEPA regulations for disposal. The demolition volume for facilities must remain below 10 percent of the annual volume of the landfill to ensure no impact to landfill operations. ACM will need to be treated accordingly during demolition and disposal, to meet state and federal standards and guidelines. Dust controls must be used during ACM removal, and disposal vehicles must be covered during materials transport to limit fugitive dust. ACM must be disposed of in Class C landfills.

Generators of non-residential LBP waste must conduct a hazardous waste determination by initiating a Toxicity Characteristic Leaching Procedure (TCLP) test to determine if the material exhibits the toxicity characteristics of "hazardous waste." If the TCLP result is less than 5 ppm, the LBP waste is a solid waste and may be disposed at landfills that accept construction and demolition wastes. If the TCLP result for lead is equal to 5 ppm or greater, the LBP waste is a hazardous waste that must be disposed at a hazardous waste landfill. Building 11531 should be surveyed prior to any demolition actions, with resulting TCLP results submitted to the landfill and local environmental regulators, to identify if materials can be disposed in a construction and demolition landfill or if they need to be transported to a hazardous waste landfill. All federal, state, and USAF regulations with regards to asbestos, LBP, or munitions will be followed by HAFB personnel or contractors.

The proposed construction for GBSD facilities at HAFB would increase the use and generation of hazardous material and waste during site preparation and construction, however this would be temporary. Once site preparation and construction are completed, the hazardous material and waste generated would return to routine levels for HAFB's ongoing maintenance and operations. The short term impacts would not be expected to overwhelm HAFB's capacity to

manage, store, or dispose of hazardous material and waste in accordance with federal, state, and local regulations. The hazardous material and waste used or generated as a result of site preparation and construction for GBSD facilities are not anticipated to introduce unmitigable human health or environmental risks to HAFB.

4.2.1.3.2 Operations and Maintenance

As part of HAFB's ongoing mission, Minuteman III boosters are disassembled and reassembled to allow for rocket motor inspections and testing for flight worthiness, motor refurbishment, and motor change-outs and upgrades. HAFB also currently supports a variety of other tests and training on ICBM hardware and software components. These actions are considered routine and are dictated by standard operating procedures (USAF 2004). Ongoing Minuteman III pre-test preparation and support would not add any hazardous waste management requirements to the existing HAFB HMMP, nor any increased risks to human and environmental health.

Due to overlap, GBSD pre-test preparation and support activities at HAFB would be expected to be very similar to Minuteman III pre-test preparation and support activities. Any hazardous material and waste would be properly managed in accordance with federal, state, and local regulations. No unmitigable human or environmental health risks are anticipated from pre-test preparation and support for the Proposed Action at HAFB.

No flight test and impact activities are expected to occur at HAFB under the Proposed Action. See **Section 2.2.2.1** for a description of the proposed GBSD facilities at HAFB.

Routine operations and maintenance of the proposed GBSD facilities would likely require the use of hazardous materials and generate quantities of both hazardous waste and non-hazardous waste. At HAFB, hazardous material and waste that may be used in operations and maintenance of the GBSD Test Program include solvents, paints, thinners, chemical-based cleaning products, pesticides, fuels, lubricants, coolants, and fuel tanks for emergency generators. All hazardous material and waste associated with GBSD operations and maintenance would be managed by HAFB's HMMP and HWMP in accordance with installation regulations and policies (see **Section 3.1.3.1** for details). These impacts would not be expected to overwhelm HAFB's capacity to manage, store, or dispose of hazardous material and waste in accordance with federal, state, and local regulations. The hazardous material and waste used or generated as a result of operations and maintenance for GBSD facilities are not anticipated to introduce unmitigable human health or environmental risks to HAFB.

4.2.1.4 Health and Safety – HAFB

4.2.1.4.1 Site Preparation and Construction

Short-term, negligible impacts on health and safety would result from construction and demolition associated with the proposed GBSD Test Program campus at HAFB. No site

preparation and construction are currently planned for the Minuteman III program. These activities would increase the health and safety risks for construction workers because of the inherently hazardous activities associated with facility construction. Workers would be potentially exposed to hazards from heavy equipment operation; hazardous materials and chemicals use; and working in confined, poorly-ventilated, and noisy environments. The selected construction contractors would be required to develop a comprehensive health and safety plan containing site-specific guidance and direction to prevent or minimize potential risks. The plan would include, at a minimum, emergency response and evacuation procedures; operational manuals; personal protective equipment requirements (e.g., breathing and hearing protection); protocols and procedures for handling, storing, and disposing of hazardous material and waste; information on the effects and symptoms of potential exposures; and guidance with respect to hazard identification.

Contractor personnel would be responsible for compliance with applicable federal, state, and local safety regulations and would be educated through daily briefings to review daily activities and potential hazards. The construction areas would be appropriately delineated and posted with access limited to construction personnel, thereby reducing the potential for impacts on other installation personnel. Because the proposed construction and demolition would occur within the boundaries of HAFB, an active military installation that is not open to the public, the construction and demolition associated with the Proposed Action would not pose a safety risk to the public or off-installation areas.

4.2.1.4.2 Operations and Maintenance

There are no flight test launches associated with HAFB.

Long-term, minor, adverse impacts are anticipated at HAFB over the approximate 10-year period during which the ongoing Minuteman III test program and the proposed GBSD Test Program campus activities would be conducted in parallel. Although the extent of ICBM test support actions and numbers of personnel would increase substantially at the installation, all program-related actions would be conducted in accordance with the established health and safety policies and procedures identified in **Section 3.1.4.1** for the protection of onsite military personnel and contractors, and the general public. Also, as discussed in **Section 3.1.4.3**, the USAF has an excellent safety record of transporting missile rocket motors and boosters. During the transportation of hazardous Minuteman III and GBSD missile components over public roadways or commercial rail lines, USAF and supporting contractors would coordinate and comply with each state's Highway Patrol and DOT, and the U.S. DOT rules and regulations.

4.2.1.5 Infrastructure – HAFB

4.2.1.5.1 Site Preparation and Construction

No site preparation or new construction is currently planned for the Minuteman III test program at HAFB; thus, there would be no effects on infrastructure. Potential effects associated with site

preparation and construction for the proposed GBSD Test Program campus are described in the following paragraphs.

Electrical Power–Natural Gas–Potable Water–Wastewater Management

Short-term, negligible, adverse impacts on the utility systems (i.e., electrical power, natural gas, potable water, and wastewater management) would be expected during site preparation and construction at HAFB. Utility infrastructure, including overhead and underground distribution and collection lines, is located near and adjacent to the proposed GBSD campus, generally along roadways and walkways. Temporary service interruptions might be experienced if service is required to be disconnected in the vicinity of work areas while the proposed facilities are connected to the existing infrastructure. Where necessary, affected areas within the installation would be notified prior to possible service disruptions. There are no plans to disrupt or impact the existing water production well located next to Building 1571 (**Figure 2-10**) during construction. The construction contractor would coordinate any utilities needed for site preparation and construction activities. Water needed for fugitive dust control and other site preparation and construction activities would be minimal and within the capacity of the HAFB water system. If needed, portable supplies and mobile systems (e.g., generators, water tanks, and latrines) would be used temporarily.

Stormwater Drainage

Short-term, minor, adverse impacts on stormwater drainage would be expected during site preparation and construction at HAFB. There are storm sewer inlets within and near the proposed GBSD Test Program campus. Site preparation and construction could disturb up to 26 acres. Ground disturbance during these activities would temporarily increase the potential for soil erosion and sediment transport during rain events that could disrupt existing natural drainage patterns and the stormwater drainage infrastructure. Storm sewer inlets within and near the GBSD Test Program campus would be protected during construction to prevent debris from entering the drainage system.

Because site preparation and construction would disturb more than 1 acre, coverage under the UPDES Construction General Permit (CGP) would be required. The discharge of stormwater runoff from construction activities must be authorized by the Utah Division of Water Quality under the UPDES Stormwater Permit for Construction Activities (i.e., CGP) (UPDES Permit UTRC00000). The CGP would require development of a site-specific stormwater pollution prevention plan (SWPPP) that includes soil erosion and sediment control measures and other BMPs to reduce pollutants in construction stormwater runoff. Implementation of site-specific and standard construction BMPs and other structural controls (e.g., interceptor dikes, silt fences) as well as compliance with applicable statutes, standards, regulations, and procedures would minimize the potential for increased runoff during construction.

Solid Waste Management

Short-term, minor, adverse impacts on solid waste management would be expected as a result of site preparation and construction, including demolition, at HAFB. Solid waste generated during site preparation, construction, and demolition would consist mainly of building materials such as concrete, metals (e.g., conduit, piping, and wiring), and lumber; soil piles; and vegetation debris, such as trees, shrubs, and other vegetation. **Table 4-6** summarizes the amounts of solid waste (construction and demolition debris) anticipated to be generated during site preparation, construction, and demolition based on the sizes of the proposed facilities and known sizes of existing facilities proposed for demolition. Contractors would be required to recycle solid waste, including construction and demolition debris to the greatest extent possible, thereby diverting it from being landfilled. Asphalt removed through demolition would be recycled, stored, and made available for reuse during future HAFB construction projects or disposed at an offsite permitted landfill. Construction and demolition debris, including uncontaminated concrete, can be disposed of at the HAFB landfill.

Table 4-6. Estimated Construction and Demolition Debris Generated at HAFB

Activity	Total Square Feet	Multipliers (pounds/square foot)	Debris Generated	
			Pounds	Tons
Pavement Demolition	43,560	69.9	3,044,844	1,522.4
Building Construction	70,000	4.34	303,800	151.9
Pavement Construction	696,960	1	696,960	348.5
		Total	**4,045,604**	**2,022.8**

Source: USEPA 2009

Contractors would be required to comply with all relevant federal, state, and local regulations and USAF policies and specifications regarding recycling and disposal of construction and demolition debris. Construction and demolition debris and other solid waste that could not be recycled would likely be disposed of at the HAFB landfill or Davis Landfill. The Davis Landfill has remaining capacity to accept waste through 2044.

4.2.1.5.2 Operations and Maintenance

There are no flight test launches associated with HAFB.

In addition to the GBSD Test Program activities proposed to occur at HAFB, Minuteman III-related test activities at the installation, as previously described under the No Action Alternative (**Section 2.4**), would continue. The potential effects from these parallel actions are described in the following paragraphs.

Electrical Power

No adverse impacts and long-term, negligible, beneficial impacts on the HAFB electrical power system would be expected from the flight test activities conducted during operations of the GBSD Test Program. Operations of the GBSD Test Program campus would increase demand on the electrical power system due to the proposed facilities, the approximate 70,000 ft^2 TACC, and an approximate 560-stall parking structure. To estimate the electricity usage by the new facilities, site electricity consumption data from the U.S. Energy Information Administration's (EIA) 2012 Commercial Buildings Energy Consumption Survey (CBECS) was used. The CBECS identified that the site electricity consumption of administration and professional office buildings was 16.9 kilowatt hour (kWh) per square foot on annual basis (EIA 2016a). Using this electricity consumption as a planning factor, the new facilities would increase HAFB's electrical demand by 1,183,000 kWh per year. Assuming the new facilities require electricity for 2,860 operating hours per year (55 hours per week), the electricity demand would increase by approximately 0.4 MW. The Rocky Mountain Power utility system is large enough that GBSD test activities, as well the ongoing Minuteman III test program and other HAFB missions, would have no impact on the system's generation capacity. The installation has headroom of approximately 24 MW, which can support expanded missions. Fixed electrical generators would provide backup power at the MIF and SSC facilities. Additionally, existing facilities planned for use may require upgrades or modifications to electrical infrastructure, which could result in long-term, beneficial impacts on the installation's electrical power system.

Natural Gas

No adverse impacts and long-term, negligible, beneficial impacts on the HAFB natural gas supply system would be expected from the flight test activities conducted during operation of the GBSD Test Program. Similar to the electrical power system, operation of the GBSD Test Program campus would increase demand on the natural gas supply system due to the proposed TACC. This facility would include HVAC and water heating systems that would most likely be natural gas-fired. To estimate the natural gas usage by the TACC, natural gas consumption data from the EIA 2012 CBECS was used. The CBECS identified that natural gas consumption of administration and professional office buildings was 30.4 cubic feet per square foot on an annual basis (EIA 2016b). Using this natural gas consumption as a planning factor, the TACC would increase HAFB's natural gas demand by 2,128,000 cubic feet or 2,128.5 dekatherms per year. Assuming the TACC uses natural gas 365 days per year for building heating/cooling and water heating, the natural gas demand would increase by approximately 5.8 dekatherms per day. The installation's existing headroom capacity of 6,000 dekatherms per day would easily accommodate this increase, in addition to the ongoing Minuteman III test program. Other facilities planned for use at the campus location may require upgrades or modifications to natural gas infrastructure, which could result in long-term, beneficial impacts on the installation's natural gas supply system.

Potable Water

No adverse impacts and long-term, negligible, beneficial impacts on the HAFB potable water supply system would be expected from the test activities conducted during operation of the GBSD Test Program. Operation of the proposed campus would increase demand on the potable water supply system due to the increase of 820 new personnel. To estimate the potable water usage by the new personnel, a rate of 78 gallons of potable water per person per day was used as identified by the HAFB Installation Development Plan (HAFB 2016a). Using this planning factor, the 820 new personnel would increase HAFB's potable water demand by 63,960 gpd. The installation has headroom of approximately 6.8 million gpd during average demand and 2.6 million gpd during peak demand, which is sufficient to support the GBSD Test Program as well as the ongoing Minuteman III test program and other missions. Additionally, other facilities planned for use at the campus location may require upgrades or modifications to water infrastructure, which could result in long-term, beneficial impacts on the installation's water supply system.

Wastewater Management

Long-term, negligible, adverse, and beneficial impacts on the HAFB wastewater management system would be expected from the flight test activities conducted during operation of the GBSD Test Program. Operation of the proposed campus would increase demand on the wastewater management system due to the increase of 820 new personnel. Based on guidance in Air Force Pamphlet (AFPAM) 32-10144, a sewage rate of 80 percent of domestic water consumption, which is 51,168 gpd, was used to estimate the increased demand on the wastewater management system from 820 new personnel. The installation wastewater collection system is designed for a maximum daily flow of 836,452 gpd and on average discharges 824,211 gpd to the NDSD WWTP, but discharges 1,043,167 gpd during peak demand (HAFB 2016a). The additional 51,168 gpd of wastewater would increase the installation's average discharge to the WWTP by approximately 6 percent to 875,379 gpd, which is approximately 5 percent greater than the maximum design daily flow of 836,452 gpd. The necessary sewer infrastructure would be extended and upgraded as needed to accommodate the new GBSD facility (TACC) and some of the increased demand would be accommodated at other facilities within the GBSD Test Program campus. Treatment of the increased wastewater could be accommodated by the NDSD WWTP as it equates to less than 0.2 percent of the wastewater treated by the WWTP during average and peak demand, and there would be no increase from the ongoing Minuteman III test program. Additionally, other facilities planned for use at the campus location may require upgrades or modifications to wastewater infrastructure, which could result in long-term, beneficial impacts on the installation's wastewater management system.

Stormwater Drainage

Long-term, negligible, adverse impacts on stormwater drainage at HAFB would be expected from the flight test activities conducted during operation of the GBSD Test Program. Operation of the proposed campus would increase impervious surfaces at HAFB by 15 acres, which could

increase stormwater runoff. The campus area would be graded to direct stormwater runoff away from proposed facilities and required drainage infrastructure (e.g., inlets and underground piping) would be installed to collect, transport, and control additional runoff to minimize impacts. The proposed stormwater drainage infrastructure would connect to the installation's system, which would transport runoff to an on-installation detention/retention pond. The stormwater infrastructure on the GBSD Test Program campus would be designed to comply with the installation's MS4 permit requirements and applicable federal, state, and local regulations. If necessary, the MS4 permit and SWMP would be modified. Additionally, in accordance with Section 438 of the EISA, design of the campus would incorporate appropriate low impact development techniques to the maximum extent technically feasible to minimize potential increases in stormwater runoff and associated pollutants in order to maintain the predevelopment hydrology of the project areas. Areas disturbed during construction would be revegetated and the campus area would include landscaping features to facilitate on-site infiltration, and vegetated drainage ditches/swales and porous pavements may be incorporated into the design. There would be no increase in stormwater runoff from the ongoing Minuteman III test program.

Solid Waste Management

Long-term, negligible, adverse impacts would be expected on solid waste management at HAFB from the flight test activities conducted during operation of the GBSD Test Program. Operation of the GBSD Test Program would increase the quantity of solid waste generated at HAFB due to the 820 new personnel. To estimate the solid waste generated by the new personnel, a rate of 4.5 pounds of municipal solid waste per person per day was used (USEPA 2019b). Therefore, 820 new personnel would generate an additional 3,608 pounds of municipal solid waste per day. HAFB diverts approximately 51 percent of the nonhazardous municipal solid waste generated on the installation through recycling or reuse. As applicable, recyclable materials would be recycled by the QRP to generate revenue. Assuming the same diversion rate, the GBSD Test Program would generate approximately 1,768 pounds of municipal solid waste per day. This increase in waste generation would be negligible and could be handled by current solid waste disposal practices and disposed of at the Wasatch Integrated Waste Davis Landfill, which has capacity through 2044. There would be no increase in solid waste from the ongoing Minuteman III test program. The existing HAFB solid waste management contract would be amended to accommodate collection and disposal of solid waste generated at the GBSD Test Program Campus.

4.2.1.6 Noise – HAFB

4.2.1.6.1 Site Preparation and Construction

Short-term noise is anticipated to occur during the construction/modification phase of the GBSD facilities at HAFB (GBSD Launch Facility, TACC, parking structure, other parking and roadways). Short-term effects would be due to noise from the use of construction equipment

(i.e., light and heavy equipment) during construction and demolition. These activities would take place over a 3-year period (FY 2021–2024). The noisiest construction equipment such as saws, bulldozers, backhoes, and tractors would primarily occur during the first phase of construction, such as site preparation and foundation development that could last approximately 1 year.

General Construction Noise

Throughout the approximately 3-year construction period, construction noise would occur in phases based on the construction completion schedule. Construction would typically occur during normal working hours (8:00 a.m. to 5:00 p.m.) on Monday through Friday. Nighttime construction activities are not planned.

Typical noise levels of construction equipment at a distance of 50 feet are listed in **Table 4-7.**

Standard ambient background noise at HAFB is associated with the airfield and vehicle traffic. The 2018 HAFB Air Installation Compatible Use Zone indicates that the GBSD project area is outside the 65-dB Day-Night Level (DNL) of the airfield. Typically vehicle traffic is approximately 60 dB. Based on the typical DNL of the construction equipment (83 dB DNL) and the typical ambient background noise of the proposed GBSD project site (approximately ≤ 60 dB (DNL) there would be an increase in the overall noise level during the construction phase. In summary, construction noise could be audible during certain phases of construction at the closest noise-sensitive locations (i.e., buildings within 100 feet of project area). Additionally, noise attenuates by 6 dB at each doubling of the distance away from the source. For example, if the source is 60 dB 50 feet away, it would be expected to be 54 dB 100 feet away and 48 dB at 200 feet away (Cowan 1994). Overall impacts from noise during construction would be short-term and are not anticipated to cause significant noise impacts.

Occupational noise exposure prevention procedures, such as hearing protection, would be required at the construction sites to comply with all applicable OSHA occupational noise exposure regulations. Therefore, significant impacts to workers at the construction sites from proposed construction related activities are not anticipated. Standard ambient background noise at HAFB is associated with the airfield and vehicle traffic.

Occupational noise exposure prevention procedures, such as hearing protection, would be required at the construction sites to comply with all applicable OSHA occupational noise exposure regulations. Therefore, significant impacts to workers at the construction sites from proposed construction related activities are not anticipated.

Table 4-7. Construction Equipment Noise Emission Levels (greatest-to-least)	
Equipment	**Typical Lmax at 50 feet from Sources (dBA)**
Paver	85
Drilling Machinery	85
Scraper	85
Cane	85
Jackhammer	85
Concrete Mixer Truck	85
Dozer	85
Grader	85
Pneumatic Tool	85
Crane	85
Chain Saw	85
Roller	85
Tractor	84
Excavator	83
Concrete Pump Truck	82
Generator	82
Compactor (ground)	80
Compressor (air)	80
Backhoe	80
Vibratory Concrete Mixer	80
Loader	80
Skid Steer	80
Dump Truck	80
Water Truck	80
Pumps	77
Support Vehicles (Pickup Truck)	75

Source: Federal Highway Administration 2006

4.2.1.6.2 Operations and Maintenance

There are no flight test launches associated with HAFB.

The GBSD project areas would consist of a launch facility, office, laboratory, and administrative space and other training classrooms and equipment storage. In some open-plan offices, noise ranges from 60 to 65 dB. Noise levels for various areas are identified according to the use of the area. Levels of 45 dB are associated with indoor residential areas, hospitals and schools, whereas 55 dB is identified for certain outdoor areas (i.e., above ground area at the GBSD Launch Facility) where human activity takes place. The level of 70 dB at 24-hour exposure is identified for all areas to prevent hearing loss. (USEPA 1974) Personnel associated with the operation and maintenance of the GBSD complex are anticipated to be exposed to a noise level less than 70 dB (i.e., normal conversation is 60 dB) for less than 24 hours. Therefore, significant impacts to workers during operation and maintenance activities are not anticipated.

4.2.1.7 Transportation/Traffic – HAFB

4.2.1.7.1 Site Preparation and Construction

Short-term, negligible, adverse impacts on transportation/traffic at and near HAFB would occur during site preparation and construction. No site preparation and construction are currently planned for the Minuteman III program. Based on the amount of construction and modifications for the proposed GBSD facilities at HAFB, site preparation and construction activities are expected to require up to approximately 200 workers on site and 10 truck deliveries per day. Assuming each worker drives separately, this would result in a total of 220 trips per day (one entering the base and one leaving). Construction would begin in FY 2021 with planned completion of all facilities by FY 2024.

The proposed GBSD Test Program campus at HAFB would use some existing facilities and require the construction of several new facilities. Within the proposed campus area, existing paved and gravel parking would be relocated, and a new 560-stall parking structure would be built. Facilities would be built on vacant lots and parking areas along Georgia Street, Jonquil Lane, and Wardleigh Road. Approximately 16 acres of new paved roadways, surface parking, and sidewalks would be constructed. Additionally, portions of Georgia Street and Jonquil Lane adjacent to the building sites would be widened and repaved. With these modifications, sufficient parking and on-installation roadway capacity would be available to support the proposed GBSD Test Program and existing installation missions.

4.2.1.7.2 Operations and Maintenance

Long-term, minor, adverse impacts on transportation/traffic at and near HAFB would occur under the Proposed Action. Minuteman III-related activities at the installation, would continue. Initial operation of the GBSD Test Program campus would begin in FY 2024 once all facilities are completed and usable. Up to approximately 1,660 personnel would work at the campus

throughout the approximate 10-year test program. This would include approximately 820 new personnel brought in from outside HAFB. The remaining approximate 840 personnel would relocate from other areas of the installation, which would result in no impact on regional traffic conditions. Assuming the 820 new personnel would drive separately, the Proposed Action would result in a total of 1,640 additional trips per day (one entering the installation and one leaving). Although the new campus is located close to the West Gate, employees could access the campus from any of the three installation gates.

Based on UDOT data from 2015 to 2017, the average AADT on state routes leading directly to HAFB gates is 74,500 (**Table 4-8**). The Proposed Action would add 1,640 trips per day, which is an increase of approximately 2.2 percent. The Proposed Action would contribute to congestion on surrounding roads; however, the impacts would be minor given the existing congestion and background traffic growth rate of the region.

Table 4-8. Average AADT Leading to HAFB Gates

Route	Location	Average AADT[1] 2015 to 2017
SR-97	Approach to Roy Gate	34,100
SR-103	Approach to West Gate	16,900
SR-232	Approach to South Gate (north of SR-193)	23,500[2]
	Total (all gates)	**74,500**

Sources: Calculations based on AADT from UDOT 2016a, UDOT 2017a.

Notes:

[1] Average AADT is rounded to nearest hundred.

[2] 2017 traffic was excluded from average due to likely data error.

WFRC is responsible for maintaining the regional travel demand model including household and employment growth projections. WFRC works with UDOT and local municipalities to distribute predicted growth into Traffic Analysis Zones (TAZs). HAFB is divided into several TAZs. Based on the *I-15 & 5600 South SPUI Concept Report*, the GBSD campus would be located in TAZ 327. This TAZ encompasses roughly 288 acres within HAFB and is bounded by Maine Street on the north, Lemon Lane on the east, and Wardleigh Road on the west and south. When the concept report was completed in 2016, WFRC assumed an increase of 2,030 jobs in TAZ 327 (i.e., from 150 in 2011 to 2,180 in 2040). Thus, WFRC and UDOT are accounting for an increase in employment on HAFB in long-range transportation planning and future planned road improvements (UDOT 2016b).

The GBSD Test Program campus at HAFB is expected to be operational by 2024. The WFRC 2019-2050 Regional Transportation Plan (WFRC 2019) includes improvements for roads leading to the Roy and West Gates by 2030 and for roads leading to the South Gate in Phase 2 (by 2040), as described in **Section 3.1.7.3**. The minor adverse impacts on traffic from the Proposed Action could be reduced with these planned transportation improvements. Additionally, HAFB could stagger work hours to spread the peak traffic out over a longer period. Potential impacts from the shipment of rocket components between the manufacturer, HAFB, and VAFB are addressed in **Section 4.2.2.11.3**.

4.2.2 Vandenberg Air Force Base

4.2.2.1 Air Quality – VAFB

Air emissions were estimated using ACAM version 5.0.17b. ACAM is an air emissions estimating model that performs an analysis to assess potential air quality impacts. ACAM reports are located in **Appendix D**. The analysis used the prevention significant deterioration permitting threshold of 250 tons per year for all criteria pollutants. For criteria pollutants for which the area has always been in attainment the initial indicator of significance is the PSD threshold. These values are being used as first tier air quality significant indicators for NEPA purposes. Generally, emissions of criteria pollutants (i.e., PM_{10}, $PM_{2.5}$, NO_x, SO_x, VOC, and CO) and GHGs (i.e., mostly CO_2e) during construction activities would be expected. Project-specific direct and indirect emissions would primarily be driven by the following activities:

- Site Preparation and Construction
- Flight Test
- Operations and Maintenance

4.2.2.1.1 Site Preparation and Construction

Direct impacts to air quality would occur as a result of increased emissions from construction equipment, vehicles, and fugitive dust during site preparation (beginning in FY 2021). A temporary increase in emissions (i.e., fugitive, VOCs, CO_2e) would occur as a result of site preparation and construction activities. As listed below, associated activities are anticipated to begin in FY 2021 and end in FY 2025. **Table 4-9** provides the estimated emissions for the Proposed Action.

- Building construction: 513,300 ft^2
- Site grading: 4,447,256 ft^2
- Trenching: 132,260 ft^2
- Architectural coating: 513,300 ft^2
- Paving: 1,618,636 ft^2

- Personnel: 200 construction workers (including vehicle exhaust)
- Placement of 46,250 ft^3 (1,715 yd^3) shale rock
- GHG (CO_2e) from construction

Construction/Demolition Activities

Table 4-9 shows the estimated emissions from construction phases (i.e., tons). **Table 4-10** indicates the highest annual estimated emissions (construction equipment and construction workers) during the 4-year construction are below significant indicator levels for pollutants of concern and therefore no significant impacts to air quality are anticipated during construction. Additionally, construction-related emissions would be short-term, temporary, and would be confined to the construction site area. Exhaust emissions from construction equipment and vehicles would be minimized through implementation of mitigation measures by the construction contractors, including proper operation and maintenance of equipment. Construction personnel-related emissions would be short-term, temporary, and would be confined to the construction site area. The inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soils by 50 percent from uncontrolled levels. Emissions from construction (i.e., dust emission, vehicle traffic) could be reduced by the implementation of control measures listed in **Sections 4.2.2.1.4** and the measures are considered part of the Proposed Action.

Table 4-9. Estimated Emissions from Construction – VAFB

Activity	Pollutant Emissions (tons)								
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Construction Phases (tons) (1)	7.56	9.59	10.6	0.03	93.0	0.39	0	0.0007	2,592
Construction Personnel (tons) (1)	1.26	0.69	4.1	0.02	0.1	0.04	0	0.05	1451.4
Total Proposed Action Estimated Emissions (FY2021- FY2025)	**8.82**	**10.28**	**14.7**	**0.05**	**93.1**	**0.43**	**0**	**0.05**	**4,043**

Notes: NA = Not Applicable

(1) ACAM calculations (**Appendix D**). Including construction equipment, construction workers and vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

Table 4-10. Annual Estimated Emissions from Construction – VAFB									
Activity	**Pollutant Emissions (tpy)**								
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Construction Phases (tpy) (1)	**6.6**	**3.1**	**4.8**	**0.06**	**92.6**	**0.14**	**0.0**	**0.03**	**996**
Significant Indicator Levels (tpy)	250	250	250	250	250	250	25	250	N/A
Exceedance	No	No	No	No	No	No	No	No	N/A

Notes: NA = Not Applicable

(1) ACAM calculations (**Appendix D**). Including construction equipment, construction workers and vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

An air quality permit must be in place prior to construction. Failure to comply will result in fines and other penalties as applicable. It recommended to review the Santa Barbara County Air Pollution Control District Rule 323 addressing Architectural Coatings, which is applicable to any person who supplies, sells, offers for sale, applies, or solicits the application of any architectural coating, or who manufactures any architectural coating for use within the District.

4.2.2.1.2 Flight Test Activities

As indicated in **Table 2-4**, between FY 2021 and FY 2029 there could be up to 33 Minuteman III test flights and up to 28 GBSD test flights, for a total of 61 test flight over a 9-year period. **Table 4-11** shows the historical estimated annual emissions for a Minuteman III launch. **Table 4-12** shows the estimated annual emissions for Minuteman III and GBSD flight tests for the 9-year period.

Table 4-11. Historical Estimated Emissions for Minuteman III Launches (tpy)									
Activity Source	**VOC**	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**NH_3**	**CO_2e**
Pre-Test Preparation and Support	0.07	0.001	0.13	0.62	0.01	0.01	N/A	N/A	N/A
Launch Activities	0.00	0.002	0.18	0.01	1.84	1.29	N/A	N/A	N/A
Post-Launch Operations	0.06	0.000	0.01	0.07	0.00	0.00	N/A	N/A	N/A
Total (Single Launch)	**0.13**	**0.003**	**0.32**	**0.70**	**1.85**	**1.30**	N/A	N/A	N/A
Significant Indicator Levels (tpy)	250	250	250	250	250	250	25	250	N/A

Source: USAF 2019b

Table 4-12. Estimated Emissions for Minuteman III and GBSD Launches from FY2021-FY2029 (tpy)										
Year	**Number of Flights**	**VOC**	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**NH_3**	**CO_2e**
FY 2021	4	0.52	0.012	1.28	2.8	7.4	5.2	N/A	N/A	N/A
FY 2022	5	0.65	0.015	1.6	3.5	9.25	6.5	N/A	N/A	N/A
FY 2023	3	0.39	0.009	0.96	2.13	5.55	3.9	N/A	N/A	N/A
FY 2024	8	1.04	0.024	2.56	5.6	14.8	10.4	N/A	N/A	N/A
FY 2025	8	1.04	0.024	2.56	5.6	14.8	10.4	N/A	N/A	N/A
FY 2026	9	1.17	0.027	2.88	6.3	16.65	11.7	N/A	N/A	N/A
FY 2027	9	1.17	0.027	2.88	6.3	16.65	11.7	N/A	N/A	N/A
FY 2028	8	1.04	0.024	2.56	5.6	14.8	10.4	N/A	N/A	N/A
FY 2029	7	0.91	0.021	2.24	4.9	12.95	9.1	N/A	N/A	N/A

Source: USAF 2019b
Notes:
(1) Only 1st-stage rocket emissions occur within the ROI for VAFB

Based on **Tables 4-11** and **Table 4-12,** the estimated annual emissions do not exceed the PSD significant indicator levels for pollutants of concern. Where appliable, launch activities are conducted in compliance with all applicable SBCAPCD rules and regulations equating to insignificance. Therefore, no significant impacts to air quality are anticipated from flight test.

After each flight test a safety check and cleanup of the launch site is completed (i.e., removal of equipment from the launch site). All estimated emissions from post-test operation are below the significant indicator levels for pollutants of concern and therefore no significant impacts to air quality are anticipated (see **Table 4-11)**.

4.2.2.1.3 Operations and Maintenance

In addition to the operations activities listed in **Table 4-11** (flight tests/launches), the operations and maintenance would require the following:

- Additional 260 personnel test program
- Additional 17 FTU Instructors
- Additional 140 FTU Students
- Standby Generators for LF-04, LF-26, LC, GBSD Temporary Contractor Test Support Facilities (Building 8337), and GBSD Temporary Contractor Test Support Facilities (Building 8339)

- Fuel Tanks for LF-04, LF-26, LC, GBSD Temporary Contractor Test Support Facilities (Building 8337), and GBSD Temporary Contractor Test Support Facilities (Building 8339)

Table 4-13 shows the total project operations estimated emissions activities (tons) from FY2021 – FY2029 and **Table 4-14** shows the highest annual estimated emissions for the operational activities from FY2024 – FY2029 (tpy); first GBSD test flight planned for 2024. As indicated in **Table 4-11** the total estimated annual operations (tpy) of the GBSD Test Program at VAFB does not exceed the significant indicator levels for criteria pollutants. **See Appendix D for the full Record of Air Analysis (ROAA) Air Conformity.**

As indicated on **Table 4-12** there is an increase in emissions levels from the GBSD and Minuteman III Programs. However, this emissions level is anticipated to decrease after the Minuteman III program is discontinued in 2029. It is anticipated that the planned upgrades to existing buildings (i.e., replace/repair HVACs, replacing propane boilers with electrical boilers) would reduce emissions. Overall, as indicated in **Table 4-14**, VAFB would account for less than 2 percent of criteria air pollutants in Santa Barbara County.

Additionally, the implementation of mitigation measures listed in **Section 4.2.2.1.4** would reduce emissions. It is important to note that the air permitting effort that would ultimately authorize the installation of the generators and ensure compliance with all federal and state air quality regulations would be conducted prior to construction of the Proposed Action. The permitting assessment would determine the categorization of the engines (i.e., emergency) as defined by the federal NESHAP and New Source Performance Standards (NSPS) regulations that cover these types of engines and would determine the number of hours annually each engine would be allowed to operate. See **Table 4-15** for a list of potential backup generators associated with GBSD operations. See **Appendix D** for generators estimated emissions using EPA Tier III and Tier IV emissions factors for generators listed in **Table 4-15**. Any external combustion source (boilers, water heaters, furnaces, etc.) fired on natural gas or propane with a heat input rating greater than 2 MMbtu/hr will require a permit prior to installation as do any combination units with an aggregate heat input rating of 2 MMbtu/hr.

Table 4-13. Estimated Emissions for the Operations of Proposed Action at VAFB									
Activity	**Pollutant Emissions (tons)**								
	VOC	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**NH_3**	**CO_2e**
260 Operations Additional Personnel (tpy) (1) for GBSD Test	4.53	0.05	2.46	29.37	0.71	0.31	0.00	0.36	5,188.9
17 FTU Instructors(1)	0.26	0.04	0.14	1.71	0.04	0.02	0	0.02	302.8
140 FTU Students(1)	0.54	0.01	0.3	3.53	0.09	0.04	0	0.04	623.5
Pre-Launch Preparation(1)	0.07	0.001	0.13	0.62	0.01	0.01	N/A	N/A	N/A
Flight	0	0.002	0.18	0.01	1.84	1.30	N/A	N/A	N/A
Post Launch	0.06	0.00	0.01	0.07	0.00	0.00	N/A	N/A	N/A
LF-04 Generators (2) (1)	0.59	0.25	2.43	1.62	0.53	0.53	0.0	0.0	281.3
LF-26 Generators (2) (1)	0.59	0.25	2.43	1.62	0.53	0.53	0.0	0.0	281.3
LC-A Generator(1)	0.08	0.012	39.1	10.4	1.2	1.2	0	0	2,007.0
LC-B Generator(1)	0.7	0.59	2.89	1.92	0.63	0.63	0	0	334.2
GBSD Temporary Contractor TSF (Building 8337) Generator(1)	0.28	0.24	1.16	0.77	0.25	0.25	0	0	133.7
GBSD Temporary Contractor TSF (Building 8339) Generator(1)	0.28	0.24	1.16	0.77	0.25	0.25	0	0	133.7
LF-04 Fuel Tank (2) (1)	0.0010	0	0	0	0	0	0	0	0
LF-26 Fuel Tank (2) (1)	0.0010	0	0	0	0	0	0	0	0
LC-A Fuel Tank (5) (1)	0.10	0	0	0	0	0	0	0	0
LC-B Fuel Tank(1)	0.003	0	0	0	0	0	0	0	0
GBSD Temporary Contractor TSF (Building 8337) Fuel Tank(1)	0.00006	0	0	0	0	0	0	0	0
GBSD Temporary Contractor TSF (Building 8339) Fuel Tank(1)	0.00006	0	0	0	0	0	0	0	0
Total Operations of GBSD	**8.08**	**1.68**	**52.39**	**52.41**	**6.08**	**5.07**	**N/A**	**0.42**	**9,289.4**
Total Flight Test Activities	**7.93**	**0.183**	**19.52**	**42.7**	**112.85**	**79.3**	**N/A**	**N/A**	**N/A**
GBSD Test Program Operations	**16.01**	**1.86**	**71.91**	**95.11**	**118.93**	**84.37**	**N/A**	**0.42**	**9,289.4**

Notes: NA = Not Applicable, TSF = Test Support Facility

(1) ACAM calculations (**Appendix D**); Including workers' vehicle exhaust

Table 4-14. Estimated Annual Emissions for the Operations of Proposed Action at VAFB									
Activity	**Pollutant Emissions (tpy)**								
	VOC	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**NH_3**	**CO_2e**
Operations	6.6	0.21	5.2	5.2	0.43	0.38	0.0	0.04	996
Flight Test Activities	1.17	0.027	2.88	4.9	16.65	11.7	0.0	N/A	N/A
Total - GBSD Test Program Estimated Annual Operations	**7.77**	**0.24**	**8.08**	**10.1**	**17.08**	**12.08**	**0.0**	**0.04**	**996**
Annual Estimated Air Emissions for VAFB	**39.90**	**3.51**	**82.74**	**212.73**	**6.86**	**N/A**	**0.0**	**N/A**	**11,456**
Total Estimated Emissions for VAFB	**47.67**	**3.75**	**90.82**	**222.83**	**23.94**	**12.08**	**0.0**	**0.04**	**12,452**
Significant Indicator Levels (2) (tpy)	250	250	250	250	250	250	25	250	**N/A**
Exceedance	No	No	No	No	No	No	No	No	**N/A**
Percent from GBSD Test Program at VAFB	16.3	6.4	8.9	44.2	71.3	N/A	N/A	N/A	8.0
Emissions for Santa Barbara County	**8,619**	**200**	**5,287**	**20,245**	**4,656**	**1,155**	**N/A**	**N/A**	**2,230,774**
Percent Emission of VAFB on Santa Barbara County	**0.6**	**1.9**	**1.7**	**1.1**	**0.5**	**0.06**	**N/A**	**N/A**	**0.6**

Notes: NA = Not Applicable, TSF = Test Support Facility

(1) ACAM calculations (**Appendix D**); Including workers' vehicle exhaust

Table 4-15. GBSD Back-up Generators Associated with Operations at VAFB					
Type	**Megawatts (Kilowatts)**	**Horsepower (3)**	**Purpose**	**Use Duration (1,2)**	**Location**
Diesel	0.105 MW (105 kW)	141 hp	Backup power	150 hours/year	LF-04
Diesel	0.105 MW (105 kW)	141 hp	Backup power	150 hours/year	LF-04
Diesel	0.105 MW (105 kW)	141 hp	Backup power	150 hours/year	LF-26
Diesel	0.105 MW (105 kW)	141 hp	Backup power	150 hours/year	LF-26
Diesel	1.5 MW (1,500 kW)	2,012 hp	Backup power	150 hours/year	Launch Control -A
Diesel	30.25 MW (250 kW)	335 hp	Backup power	150 hours/year	Launch Control -B
Diesel	0.2 MW (200 kW)	268 hp	Backup power	75 hours/year	Building 8337
Diesel	0.4 MW (400 kW)	536 hp	Backup power	75 hours/year	Building 8339

4.2.2.1.4 Mitigation Measures

General

Control Fugitive Dust

- Apply water periodically to disturbed areas.
- Use a gravel apron to reduce mud/dirt trackout from unpaved truck exit routes.
- Replace ground cover in disturbed areas as quickly as possible.
- All trucks hauling dirt, sand, soil, or other loose materials are to be tarped with a fabric cover.
- Comply with the Vandenberg Air Force Base Standard Measure listed below. 1.2.2.

Reduce Carbon Monoxide (CO)

- Use hybrid gasoline-electric vehicles (alternate fuel source).
- Use battery electric vehicles.
- Follow vehicle maintenance practices for vehicle efficiency and use of fuel.
- Increase the use of low-carbon fuels.
- Reduce the number of vehicles used by construction workers.
- Use public transit.
- Develop and use transportation strategies to reduce CO production (i.e., car/van pool).

Standard VAFB Measures:

- All soil excavated or graded shall be sufficiently watered to prevent excessive dust. Watering shall occur as needed with complete coverage of disturbed soil areas. Watering shall be conducted as needed on unpaved/untreated roads and on disturbed soil areas with active operations.
- All clearing, earth moving, and excavation activities shall cease during periods of high winds, if disturbed material is easily windblown, or when dust plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property.
- All fine material transported off-site shall be either sufficiently watered or securely covered to prevent excessive dust.
- All haul trucks shall be required to exit the site via an access point where a gravel pad or grizzly has been installed.
- Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.

- Once initial leveling has ceased, all inactive soil areas within the construction site shall be treated by watering, revegetating, or spreading soil binders until the area is replanted.
- On-site vehicle speed should be limited to 15 miles per hour on unpaved surfaces.
- All areas with regular vehicle traffic should be paved, treated with soil binders, or watered a minimum of twice daily.
- All internal combustion engine powered equipment shall be properly maintained and tuned.
- Employees and subcontractors shall comply with the California Air Resource Board (CARB) idling restrictions for compression ignition engines (5-minute limit on idling).
- Whenever feasible, heavy-duty diesel-powered construction equipment manufactured after 2003 would be used. However, Tier 2 and up compliant vehicles that meet the CARB's In-Use Off-Road Diesel Vehicle Regulation are preferred.
- All applicable 2003 and older engine model diesel-vehicles with a gross vehicle weight rating (GVWR) between 14,001 and 26,000 pounds (e.g., water trucks, cement mixers, and trucks delivering materials) must meet 2010 manufacturing year engine emission standards as specified in the CARB Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles. Vehicles with a GVWR greater than 26,000 pounds (e.g., trucks and buses) must meet particulate matter best available control technology and engine model year emission requirements as specified by CARB.

Fugitive Dust Control Measures Required for all Projects Involving Earthmoving Activities

These measures are required for all projects involving earthmoving activities regardless of the project size or duration. Projects are expected to manage fugitive dust emissions such that emissions do not exceed APCD's visible emissions limit (APCD Rule 302), create a public nuisance (APCD Rule 303), and are in compliance with the APCD's requirements and standards for visible dust (APCD Rule 345).

- During construction, use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the site and from exceeding the APCD's limit of 20% opacity for greater than 3 minutes in any 60 minute period. At a minimum, this should include wetting down such areas in the late morning and after work is completed for the day. Increased watering frequency should be required when sustained wind speed exceeds 15 mph. Reclaimed water should be used whenever possible. However, reclaimed water should not be used in or around crops for human consumption.

- Onsite vehicle speeds shall be no greater than 15 miles per hour when traveling on unpaved surfaces.
- Install and operate a track-out prevention device where vehicles enter and exit unpaved roads onto paved streets. The track-out prevention device can include any device or combination of devices that are effective at preventing track out of dirt such as gravel pads, pipe-grid track-out control devices, rumble strips, or wheel-washing systems.
- If importation, exportation, and stockpiling of fill material is involved, soil stockpiled for more than one day shall be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting fill material to and from the site shall be tarped from the point of origin.
- Minimize the amount of disturbed area. After clearing, grading, earthmoving, or excavation is completed, treat the disturbed area by watering, OR using roll-compaction, OR revegetating, OR by spreading soil binders until the area is paved or otherwise developed so that dust generation will not occur. All roadways, driveways, sidewalks etc. to be paved should be completed as soon as possible.
- Schedule clearing, grading, earthmoving, and excavation activities during periods of low wind speed to the extent feasible. During periods of high winds (>25 mph) clearing, grading, earthmoving, and excavation operations shall be minimized to prevent fugitive dust created by onsite operations from becoming a nuisance or hazard.
- The contractor or builder shall designate a person or persons to monitor and document the dust control program requirements to ensure any fugitive dust emissions do not result in a nuisance and to enhance the implementation of the mitigation measures as necessary to prevent transport of dust offsite. Their duties shall include holiday and weekend periods when work may not be in progress. The name and telephone number of such persons shall be provided to the Air Pollution Control District prior to grading/building permit issuance and/or map clearance.

Plan Requirements: All requirements shall be shown on grading and building plans and/or as a separate information sheet listing the conditions of approval to be recorded with the map. Timing: Requirements shall be shown on plans prior to grading/building permit issuance and/or recorded with the map during map recordation. Conditions shall be adhered to throughout all grading and construction periods.

Monitoring: The Lead Agency shall ensure measures are on project plans and/or recorded with maps. The Lead Agency staff shall ensure compliance onsite. APCD inspectors will respond to nuisance complaints.

Diesel Particulate and NOx Emission Reduction Measures

Particulate emissions from diesel exhaust are classified as carcinogenic by the state of California. The following is a list of regulatory requirements and control strategies that should be implemented to the maximum extent feasible.

The following measures are required by state law:

- All portable diesel-powered construction equipment greater than 50 brake horsepower (bhp) shall be registered with the state's portable equipment registration program OR shall obtain an APCD permit.
- Fleet owners of diesel-powered mobile construction equipment greater than 25 hp are subject to the California Air Resource Board (CARB) In-Use Off-Road Diesel-Fueled Fleets Regulation (Title 13, California Code of Regulations (CCR), §2449), the purpose of which is to reduce oxides of nitrogen (NOx), diesel particulate matter (DPM), and other criteria pollutant emissions from in-use off-road diesel-fueled vehicles. Off-road heavy-duty trucks shall comply with the State Off-Road Regulation. For more information, see www.arb.ca.gov/msprog/ordiesel/ordiesel.htm.
- Fleet owners of diesel-fueled heavy-duty trucks and buses are subject to CARB's On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation (Title 13, CCR, §2025), the purpose of which is to reduce DPM, NOx and other criteria pollutants from in- use (on-road) diesel-fueled vehicles. For more information, see www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm.
- All commercial off-road and on-road diesel vehicles are subject, respectively, to Title 13, CCR, §2449(d)(3) and §2485, limiting engine idling time. Off-road vehicles subject to the State Off-Road Regulation are limited to idling no more than five minutes. Idling of heavy-duty diesel trucks during loading and unloading shall be limited to five minutes, unless the truck engine meets the optional low-NOx idling emission standard, the truck is labeled with a clean-idle sticker, and it is not operating within 100 feet of a restricted area.

The following measures are recommended:

- Diesel equipment meeting the CARB Tier 3 or higher emission standards for off-road heavy-duty diesel engines should be used to the maximum extent feasible.
- On-road heavy-duty equipment with model year 2010 engines or newer should be used to the maximum extent feasible.
- Diesel powered equipment should be replaced by electric equipment whenever feasible. Electric auxiliary power units should be used to the maximum extent feasible.
- Equipment/vehicles using alternative fuels, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane or biodiesel, should be used on-site where feasible.

- Catalytic converters shall be installed on gasoline-powered equipment, if feasible.
- All construction equipment shall be maintained in tune per the manufacturer's specifications.
- The engine size of construction equipment shall be the minimum practical size.
- The number of construction equipment operating simultaneously shall be minimized through efficient management practices to ensure that the smallest practical number is operating at any one time.
- Construction worker trips should be minimized by requiring carpooling and by providing for lunch onsite.
- Construction truck trips should be scheduled during non-peak hours to reduce peak hour emissions whenever feasible.
- Proposed truck routes should minimize to the extent feasible impacts to residential communities and sensitive receptors.
- Construction staging areas should be located away from sensitive receptors such that exhaust and other construction emissions do not enter the fresh air intakes to buildings, air conditioners, and windows.

Plan Requirements and Timing: Prior to grading/building permit issuance and/or map recordation, all requirements shall be shown as conditions of approval on grading/building plans, and/or on a separate sheet to be recorded with the map. Conditions shall be adhered to throughout all grading and construction periods. The contractor shall retain the Certificate of Compliance for CARB's In-Use Regulation for Off-Road Diesel Vehicles onsite and have it available for inspection.

Monitoring: The Lead Agency shall ensure measures are on project plans and/or recorded with maps. The Lead Agency staff shall ensure compliance onsite. APCD inspectors will respond to nuisance complaints.

4.2.2.2 Biological Resources – VAFB

Under the Proposed Action, several new facilities and infrastructure would be built at VAFB and other existing facilities would be remodeled to support GBSD system development and testing. The Proposed Action includes flight test activities for GBSD as well as the ongoing flight testing of Minuteman III missiles as described for the No Action Alternative. Since the proposed GBSD flight tests would utilize one of the Minuteman III launch facilities (LF-04), the frequency of Minuteman III launches at LF-09 and LF-10 would increase slightly under the Proposed Action (i.e., up to four Minuteman III missile launches annually from two LFs rather than three LFs). The environmental consequences of ongoing Minuteman III testing for biological resources at VAFB are not expected to be different under the Proposed Action than under the No Action

Alternative (see **Sections 2.1** and **2.4**). However, cumulative effects of both programs' activities are evaluated in this section.

Determination of the significance of potential impacts to biological resources is based on (1) the importance of the resource (i.e., threatened or endangered species; critical habitats; recreationally, commercially, ecologically, culturally, or scientifically important species); (2) the sensitivity of the resource to proposed activities; (3) the proportion of the resource that would be affected relative to its occurrence in the region; and (4) the duration of ecological ramifications. For example, impacts to vegetation would be considered significant if species or habitats of concern were substantially affected over relatively large areas or habitat disturbances resulted in reductions in the population size or distribution of an important species, or the introduction of invasive species to sensitive habitats. Impacts to terrestrial wildlife would be considered significant if species or habitats of concern were substantially affected over relatively large areas or disturbances resulted in reductions in the population size or distribution that might limit the ability of a local or regional population to sustain itself. Impacts to federally listed threatened or endangered species would be considered significant if they resulted in reductions in the population size or distribution of the species. Impacts to designated critical habitats would be considered significant if these habitats were destroyed or substantially modified.

4.2.2.2.1 Site Preparation and Construction

This section evaluates the environmental consequences for biological resources of proposed new facility site preparation, construction, and operation, as well as installation of new utility lines at VAFB. No potential stressors have been identified for modification of existing facilities as all renovations will take place within existing structures. Modification of existing structures would not impact biological resources and is not evaluated further in this section. However, any construction laydown or staging areas associated with renovation of existing facilities are evaluated in this section.

Site preparation and new construction of facilities may result in stressors to biological resources including direct physical disturbance, habitat loss and modification, human activity and equipment operation, exposure to hazardous chemicals, and elevated noise levels.

Installation of new utility lines may result in the same stressors as construction of facilities; however, the timeframe of human activity, equipment operation, and elevated noise levels would be shorter as installation would progress along the linear proposed corridor. Most of the new lines would be installed in trenches within 5 feet of existing road shoulders on either side of the roadway. In areas where the proposed utility line corridor transects sensitive habitats or sensitive biological resources area such as areas containing listed plants or vernal pool habitats, utility lines would either be placed on the opposite side of the roadway to avoid the sensitive habitat or would be placed within the existing roadway pavement to avoid sensitive resource areas.

See **Section 4.2.2.2.4** for the list of avoidance, minimization, and monitoring measures that would be implemented to protect sensitive vegetation and wildlife. These measures are considered part of the Proposed Action during Site Preparation and Construction.

Site Preparation and Construction Consequences

Vegetation. The majority of the vegetation coverage within proposed new construction and utility line areas consists of previously disturbed vegetation types with a high proportion of introduced and invasive species (**Table 4-16**). The Proposed Action may result in habitat modification and/or direct physical injury for vegetation in the ROI.

Habitat Loss and Modification. The Proposed Action would result in permanent loss or modification of vegetation types within new construction and construction laydown areas. Most of the vegetation within the new construction ROI is highly modified or disturbed including areas where introduced and invasive species predominate such as habitats dominated by iceplant or non-native trees (**Section 3.2.2.3**, **Table 4-16**). The most sensitive or important vegetation types in the new construction ROI are vernal pool vegetation, Burton Mesa chaparral, and riparian habitats. Within the new facility construction and laydown areas, up to 29.5 acres of maritime chaparral and less than 0.1 acres of vernal pool habitat may be lost or modified (**Table 4-16**). As final facility and infrastructure footprints for facilities have not reached final design, these estimates were based on the maximum limits of construction disturbance and should be considered maximum estimates. Several avoidance and mitigation measures would be in place as part of the Proposed Action to avoid impacting vernal pool habitats, riparian habitats, and habitats for ESA-listed species during utility line installation and to avoid impacts to habitats adjacent to construction areas (listed earlier in this section).

Maritime chaparral (including Burton Mesa chaparral) currently occupies approximately 13,061 acres in California, mostly on VAFB (USAF 2011b). Estimates of the extent of vernal pool habitat on VAFB vary (USAF 2011b) but based on mapping efforts focused on potential vernal pool fairy shrimp habitat, there are approximately 139 acres of vernal pool habitat on VAFB (VAFB 2019b). While these are important and sensitive habitats at VAFB, with implementation of avoidance and mitigation measures, the Proposed Action would not change the relative abundance or distribution of these vegetation types at VAFB or in the region. Overall, there would be moderate impacts to important maritime chapparal vegetation in the ROI, but impact to important vegetation in other vegetation types would be minimal.

Table 4-16. Approximate Coverage (acres) of Vegetation Types in Proposed New Facility Construction Areas. (1)						
Vegetation Type or Landcover	**GBSD Schoolhouse/FTU**	**Consolidated Maintenance Complex**	**GBSD Vehicle Processing Facility**	**Component Operations Facility**	**Other New Construction and Laydown Areas**	**Total**
Central coast scrub	0	0	0.3	0.2	0.4	**0.9**
Central dune scrub	0	0	0	0	0.8	**0.8**
Developed (e.g., roadways, structures)	1.7	3.6	0	0	6.8	**12.1**
Disturbed/cleared	0.9	0.1	1.2	0.5	5.3	**8.0**
Iceplant	24.7	21.3	0	0	0.6	**46.6**
Maritime chaparral	0	0	21.0	3.9	4.6	**29.5**
Non-native grasses and forbs	0	0.1	0.5	0.1	8.1	**8.8**
Non-native trees	0.1	1.2	0.1	0	0.7	**2.1**
Vernal pool	0	0	<0.1	0	0	**<0.1**
Total	**27.5**	**26.3**	**23.1**	**4.7**	**27.3**	

Source: MSRS 2020

Notes:

(1) Maximum acers covered by the limit of work based on implementation of the preferred alternatives for the Proposed Action.

Wildlife. Wildlife in and near proposed new construction sites and new utility lines may be exposed to habitat loss and modification, elevated noise levels, exposure to hazardous chemicals, and in the case of less mobile species, direct physical disturbance.

Habitat Loss and Modification. As discussed for vegetation above, the Proposed Action would result in permanent loss or modification of vegetation types within new construction areas (**Table 4-16**). The most important of these for rare, sensitive, or important wildlife species are vernal pool habitats, riparian habitats, and Burton Mesa chaparral. As discussed above, loss of habitat as a result of proposed construction and operations would not substantially change the available habitat for any rare, sensitive, or special-status wildlife species at VAFB and impacts would be less than significant.

Freshwater habitats and seasonal wetlands have the potential to be modified by construction or operations related erosion, sedimentation, hazardous chemicals, and changes in hydrology. Habitats near construction sites have the potential to be modified by introduction or spread of invasive species. Several mitigation measures would be implemented during construction and

operations to avoid or minimize potential habitat modification impacts including measures listed in this section and in the VAFB Spill Prevention, Control, and Countermeasure Plan; Waste Management Plan; Hazardous Materials Emergency Response Plan; SWPPP; and Integrated Pest Management Plan (USAF 2011b). Additional measures for vernal pools near construction sites are outlined in **Section 4.2.2.2.4**. With implementation of avoidance and minimization measures, new construction and operation under the preferred alternatives would have minimal impact to wildlife through habitat modification.

Physical Injury. Highly mobile species such as birds, mammals, and many reptiles are likely to leave the construction area when site preparation begins and would not be subject to physical injury. Other less mobile species and unfledged birds have the potential to be injured during construction. Rare or special status wildlife known to occur at proposed new construction sites which may be subject to physical injury include monarch butterflies (*Danaus plexippus*), blue butterfly caterpillars, western spadefoots, and young of several bird species (**Table 3-9**). Potential habitat for blue butterflies, specifically seacliff buckwheat plants, has the potential to occur in roadsides near TP-01 where utility lines would be installed. Biological monitors will search for and flag seacliff buckwheat plants in this area prior to utility line installation and plants would be avoided to the extent possible during installation. Overall, physical injury is not expected to change the relative abundance or distribution of any wildlife species on VAFB and impacts would be less than significant.

Elevated Noise Levels. Site preparation and construction would result in elevated noise levels at and near the construction sites. Sources of noise during construction would include the use of heavy equipment and generator operation. Typical construction equipment that may be used during construction and noise levels of construction equipment at a distance of 50 feet are presented in **Table 4-7** in **Section 4.2.1.6** (Noise). Construction noise would take place over 3 to 5 years, during which time construction equipment would be expected to generate maximum noise levels of 90 dBA at 50 feet during work hours. More information about general characteristics of sound as well explanations of sound metrics can be found in **Section 4.2.1.6** (Noise*)*.

Realized effects of elevated noise levels on wildlife can range from physical injury to temporary behavioral response. The extent of the effect depends on the frequency and intensity of the sound as well as on the distance from the sound source and hearing ability of the species. Animal species have widely different hearing abilities and thresholds for effects which have been described in detail in the GBSD USAG-KA Biological Assessment (USAF 2020d) and are included here by reference. In general, a noise level sufficient to cause physical injury to auditory receptors is a sound that exceeds an organism's permanent threshold shift level. A temporary threshold shift is when an animal is exposed to sound pressures below the threshold of permanent auditory injury but may result in temporary hearing alteration which can temporarily impair an animal's ability to communicate, navigate, forage, and detect predators. Elevated noise levels at lower levels can also cause behavioral modification. Most observed

behavioral response to anthropogenic sounds has been limited to short-term behavioral responses, which include disturbance to feeding, resting, or social interactions (National Research Council 2003). Behavioral responses vary greatly between species and even among populations or individuals within a species.

Site preparation and construction noise levels would not exceed the known auditory injury thresholds for any sensitive or special-status wildlife species; therefore, no physical injury due to noise would occur. Construction noise levels would be likely be above ambient noise levels for wildlife, but only within a few hundred feet of average construction equipment such as dozers, cranes, excavators, concrete trucks, and generators. Construction noise may disturb wildlife; however, effects would be limited to short duration behavioral response such as startle response or leaving the construction area. Furthermore, there is some evidence that certain wildlife, including birds, may acclimate or become habituated to noises after frequent exposure and cease to respond behaviorally (Caltrans 2016b).

Elevated noise levels due to construction would not significantly impact wildlife at VAFB.

Exposure to Hazardous Chemicals. Construction would include use of heavy equipment such as cement mixers, excavators, dozers, compactors, and dump trucks. Use of this heavy equipment has the potential to introduce fuels, hydraulic fluids, and battery acids to terrestrial habitats. Chemical control of weedy or invasive species also has the potential to introduce hazardous chemicals into surrounding habitats. As discussed for Habitat Loss and Modification above, several mitigation measures would be implemented during construction and operations to avoid or minimize the potential for wildlife exposure to hazardous chemicals including measures in the VAFB Spill Prevention, Control, and Countermeasure Plan; Waste Management Plan; Hazardous Materials Emergency Response Plan; and Integrated Pest Management Plan (USAF 2011b). Wildlife are not expected to be exposed to hazardous chemicals and impacts would be less than significant.

Threatened and Endangered Species. The stressors for threatened and endangered species are the same as those described for vegetation and wildlife above. Because proposed new construction and utility line installation have the potential to affect ESA-listed species, the USAF prepared a Biological Assessment to evaluate the potential for new construction to affect listed species in detail. The USAF concluded that proposed construction activities at VAFB may affect but are not likely to adversely affect Lompoc yerba santa but are likely to adversely affect Gaviota tarplant, vernal pool fairy shrimp, and California red-legged frog (USAF 2020b). The USAF submitted the Biological Assessment to the USFWS with a request for formal consultation under Section 7 of the ESA in November 2020. The USFWS issued a Biological Opinion for proposed construction at VAFB on April 5, 2021 (**Appendix A**). Detailed analyses and conclusions for ESA-listed species are included in the biological opinion in **Appendix A**. The USFWS concluded that with implementation of habitat enhancement mitigation measures, there would be a net benefit to Gaviota tarplant. The USFWS also concluded that the Proposed

Action would not affect the ability of the local California red-legged frog population to sustain itself, nor would there be any long-term effects to the local population of vernal pool fairy shrimp. Overall, with implementation of several minimization and mitigation measures, new construction would not change the regional distribution or abundance of or reduce the likelihood of survival and recovery of any ESA-listed species. Therefore, the impact of proposed new construction on threatened and endangered species is considered less than significant.

Environmentally Sensitive Habitats. Proposed new construction and operations have the potential to impact the environmentally sensitive habitats discussed in **Section 3.2.2.3** through habitat modification due to erosion, sedimentation, hazardous chemicals, and changes in hydrology. Several mitigation measures would be implemented during construction and operations to avoid or minimize potential impacts including measure in the VAFB Spill Prevention, Control, and Countermeasure Plan Waste Management Plan; Hazardous Materials Emergency Response Plan; SWPPP; and Integrated Pest Management Plan (USAF 2011b).

With implementation of avoidance and minimization measures detailed in the above plans, new construction and operation would have no impact on designated critical habitats, EFH, Vandenberg State Marine Reserve, or riparian habitats.

Vernal pool habitat is the most sensitive to proposed construction as vernal pools occur in close proximity to the proposed Component Operations Facility construction site (**Figure 3-3**) as well as within the proposed GBSD Vehicle Processing Facility construction site and proposed utility line corridor. With the exception of the pools at the GBSD Vehicle Processing Facility, all known vernal pool habitat (as identified in GBSD biological resource surveys and wetland delineation surveys,) would be avoided during planning and construction. Prior to site-preparation or construction at the Component Operations Facility site, a buffer zone around vernal pool habitat would be clearly marked as a keep out area. Additionally, the other avoidance and minimization measures detailed in this section would be implemented during construction and operations. Where the proposed utility line corridor transects sensitive vernal pool habitats, utility lines would be placed on the opposite side of the roadway or within the existing roadway to avoid the vernal pool habitat.

Due to the potential loss of less than 0.1 acre of vernal pool habitat at the GBSD Vehicle Processing Facility site, the USAF would mitigate the habitat loss by enhancing other vernal pool habitat for fairy shrimp and other species through removal of invasive tree species at a 3:1 ratio (habitat enhanced: habitat affected). With implementation of these measures, proposed new construction under the preferred alternatives would not significantly impact vernal pool habitat at VAFB.

If the alternative GBSD Schoolhouse site were selected, the Proposed Action would have additional impacts on wetland habitats. Wetland delineation surveys would need to be conducted if this alternative site were selected for implementation of the Proposed Action to

determine the extent and status of wetlands in this area. If this site were selected, additional coordination with VAFB 30 SW Natural Resource Management would be conducted for wetland resources.

Since Burton Mesa chaparral is a rare and declining plant community distinguished by the presence of a number of rare plant species, the reductions in this sensitive habitat have the potential impact many rare species on VAFB. As discussed in the *Vegetation* subsection, up to 29.5 acres of chaparral habitat may be permanently lost or modified due to proposed GBSD construction activities at VAFB. If the Alternative 2 Laydown area for the Component Operations Facility were used for construction, an additional 5 acres of this habitat might be modified. The proposed avoidance and mitigation measures include additional measures to reduce impacts at this site if it were selected. Overall an as discussed in the *Vegetation* subsection, there would be moderate impacts to the sensitive Burton Mesa chapparal habitat in the ROI.

4.2.2.2.2 Flight Test Activities

The types of potential stressors for biological resources from flight test activities at VAFB under the Proposed Action would be the same as those under the No Action Alternative; helicopter overflights (if conducted), launch noise, heat and harmful chemicals from exhaust emissions, and the potential for propellent release in the event of launch failure or termination. However, the frequency of ICBM flight test events would be greater under the Proposed Action, with up to 10 flight tests in some years (**Table 2-4**).

Pre-launch preparation would include the maintenance of firebreaks around LFs as well as noise from human activity and equipment operation. Pre-launch activities would include intermittent use of vehicles and equipment on existing paved and gravel areas.

See **Section 4.2.2.2.4** for the avoidance, minimization, and monitoring measures from the VAFB Marine Mammal Protection Act LOA (NMFS 2019) that would be implemented as part of the Proposed Action for Flight Test and Launch Activities.

Flight Test and Launch Activities Consequences

Vegetation. Under the No Action Alternative, impacts to vegetation surrounding LFs would be minimal and short-term (USAF 2020e). The impacts to vegetation would not be expected to be different under the Proposed Action. Heat and emissions from launch vehicle exhaust have the potential to damage nearby vegetation. However, previous analyses of launch activities have concluded that these effects on vegetation are temporary (USAF 2020e). Routine maintenance of firebreaks around the LFs and test pads at VAFB minimizes the potential for impacts to vegetation by reducing vegetation exposure and reducing the risk of wildfire. Proposed launch activities are not expected to change the abundance or distribution of any plant species or vegetation type at VAFB.

If any ESA-listed Gaviota tarplant were to occur within the managed firebreaks around the LFs, periodic mowing and other vegetation maintenance would have an “adverse effect” on the species (USAF 2020e). However, these firebreaks are routinely maintained by the USAF and maintenance is conducted using minimization measures to avoid and reduce the adverse effects to Gaviota tarplant (USFWS 2015). In their 2018 Programmatic Biological Opinion for base-wide operations and maintenance at VAFB (USFWS 2018, USFWS 2015), the USFWS determined that these actions would not reduce the reproduction, numbers, or distribution of this species. Firebreak maintenance would continue under the terms of the 2018 Biological Opinion and would not significantly impact Gaviota tarplant or other vegetation at VAFB.

Wildlife. Wildlife may be exposed to elevated noise and visual disturbance from vehicle launch and overflight (including helicopters); launch emissions; and contact with fragments or hazardous chemicals in the event of a launch failure or early flight termination.

Elevated Noise Levels and Visual Disturbance. Vehicle launch and helicopter overflights would result in elevated noise levels for wildlife as well as potential visual disturbance from vehicles passing overhead. For most terrestrial wildlife, including migratory birds, elevated noise and vehicle overflight would not impact local populations. While some individual animals may be temporarily startled by launch noise or helicopter overflight, no physical harm would occur, and animals would be expected to resume their normal behaviors and distribution soon after a launch event. The species most sensitive to disturbance from launch activities include threatened and endangered species (discussed later in this section) and MMPA protected marine mammals hauled out near launch sites. Launch activities would be part of ongoing operations at VAFB and the USAF, NMFS, and USFWS have evaluated the impacts of ongoing launch activities on the aforementioned sensitive wildlife in several documents (e.g., USAF 2018b, USAF 2019b, NMFS 2019, USFWS 2018, USFWS 2015).

The GBSD missiles are expected to have similar launch characteristics as other missiles (i.e., Minuteman III ICBMs) that are routinely launched from VAFB. Due to the potential marine mammals disturbance from all types of vehicle launches and aircraft overflights at VAFB, the USAF has consulted with NMFS and has obtained a base-wide incidental take by Level B harassment permit for Pacific harbor seals, California sea lions, elephant seals, and Steller sea lions (NMFS 2019, USAF 2020e). Analysis for the incidental take permit application concluded that there would be no take of marine mammals on the northern Channel Islands or on VAFB due to nominal missile launch operations (USAF 2018b). These analyses are based on implementation of minimization measures including conducting biological monitoring for launches of new types of missiles occurring from August 1 through December 31 following protocol detailed in the LOA (NMFS 2019). The USAF has conducted years of biological monitoring during missile launches and because there was little recorded disturbance of hauled out pinniped during missile launches, there is no requirement for monitoring of existing missile launches (USAF 2018b). Since GBSD is a new type of missile, the USAF would monitor pinniped response during at least the first three GBSD.

Helicopters may be flown over the ROI on the day of a launch as part of safety operations. Helicopter overflights have the potential to disturb hauled out pinnipeds and other wildlife; however, pinnipeds that haul out at VAFB are acclimatized to aircraft and helicopter overflights and measures are in place to minimize disturbance (NMFS 2019). Previous observations have provided evidence that when helicopter flight distance restrictions are maintained, no take of hauled out pinnipeds is expected (NMFS 2019). While take by Level B harassment is not expected for the Proposed GBSD Action, NMFS has concluded that any permitted takes by Level B harassment due to test activities at VAFB would have no more than a negligible impact on the affected species and stocks (NMFS 2019, USAF 2020e). No significant impacts to hauled out pinnipeds or to other wildlife species are expected to occur as a result of elevated noise levels or vehicle overflight at VAFB (USAF 2020e).

Launch Emissions. The types and quantities of emission products which would be produced by the GBSD vehicle are expected to be similar to those of Minuteman III. Primary Minuteman III 1st stage launch emissions include CO, nitrogen oxides, aluminum oxide, and hydrogen chloride (HCl) (USAF 2020e). HCl gas forms hydrochloric acid in the presence of moisture; therefore, atmospheric deposition of these launch emissions, particularly HCl, has the potential to acidify surface waters (USAF 2020e). Acidification of surface waters near the LFs would potentially affect aquatic wildlife including any special-status species present (USAF 2020e). However, it is expected that deposition of acid-neutralizing sea salt on soils in the vicinity of the launch pads would reduce or eliminate the potential of acid runoff (USAF 2020e). Monitoring conducted on Vandenberg's South Base where launch systems larger than Minuteman III or proposed GBSD systems are used has not shown any long-term acidification of surface waters (USAF 2020e).

Blue butterflies are likely to occur close to TP-01. Flight test activities at TP-01 have the potential to harm blue butterflies through physical harm due to blast effects of the vehicle launch or by adversely affecting seacliff buckwheat, the butterflies necessary host plant. TP-01 has been and continues to be used for other VAFB mission launches and the USAF has determined that launch activities are unlikely to physically harm butterflies as the vegetation around LFs and TP-01 is maintained as a cleared firebreak and it is unlikely butterflies would be traveling across the firebreak and launch pad area (USFWS 2015, USAF 2010). While acid deposition resulting from vehicle emissions has the potential to adversely affect vegetation in the vicinity of launch pads, previous monitoring of seacliff buckwheat plants after launches has not documented adverse effects from acid deposition (USFWS 2015).

Overall, launch emissions from proposed tests are not expected to impact wildlife species, including blue butterflies, at VAFB.

Launch Failure or Early Flight Termination. A failure during launch is unexpected but is possible. If a launch failure of early flight termination were to occur at one of the LFs, the Minuteman III or GBSD system would likely fall into the ocean (USAF 2020e). Any components contained on or

of which the vehicle was made would be introduced into the surrounding habitats. Data for Minuteman III launches show that the probability of an aborted ICBM launch is very low, with a 4 percent failure rate for Minuteman III ICBM launch vehicles (USAF 2020e).

The propellent which would be used for GBSD missiles is unknown at this time but is assumed it would be similar to propellants used for Minuteman III missiles. The three rocket motor stages used for Minuteman III would use solid propellant which is composed of ammonium perchlorate, aluminum, and other materials (USAF 2020e). Any unburned propellant could be widely dispersed in the event of a failure or flight termination and the ammonium perchlorate would have the potential to leach out and create toxic conditions for plants and animals. Laboratory studies have shown that in freshwater at 68° F, leaching of all the perchlorate from solid propellant fragments can take many years and that rates are even slower at lower water temperatures or in more saline waters (USAF 2020e). For Minuteman III missiles, another potential risk for marine wildlife has been identified in the liquid propellant contained in the propulsion system rocket engine (USAF 2020e). Each Minuteman III system would contain approximately 13 gallons of monomethylhydrazine fuel and 13 gallons of nitrogen tetroxide oxidizer (USAF 2020e). The effects of these chemicals on animals are not well understood; however, nitrogen tetroxide would be expected to quickly form nitric and nitrous acid in water and hydrazine fuel would be expected to quickly oxidize into amines and amino acids (USAF 2020e). There is some short term potential for marine animal exposure to harmful levels of these substances, but it is expected that these quantities would be quickly diluted and buffered by the large volume of seawater (USAF 2020e)

If an early abort were to occur, VAFB personnel would take immediate action to recover and cleanup any unburned propellants, or other hazardous material that had fallen on the beach, in nearshore ocean waters up to 6 feet deep, or in any freshwater creeks, retention ponds, and wetland areas (USAF 2020e). Cleanup and recovery from deeper coastal waters would occur on a case-by-case basis (USAF 2020e) to minimize potential harm to biological resources within human health, safety, and mission requirements.

Given the low probability of a launch failure or early flight termination based on Minuteman III vehicles and the relatively low potential for effects to biological resources, no significant impact on biological resources would be expected.

Threatened and Endangered Species. The types of potential stressors for threatened and endangered species from flight test activities at VAFB would be the same as those described for vegetation and wildlife above. Flight test activities under the Proposed Action have the potential to affect the same ESA-listed species on VAFB as flight test activities under the No Action Alternative and for many of these species the potential effects are the same under the Proposed Action as under the No Action Alternative (**Table 4-17**). Due to addition of launches from TP-01 and increased launch frequency under the Proposed Action, the potential effects to western snowy plovers and California least terns are discussed in more detail in this section. The USAF

has consulted with the USFWS and NMFS on the effects of base-wide operations, including the Proposed ICBM launches, on ESA-listed species. With implementation of measures identified in the USFWS Programmatic Biological Opinion, the USFWS concluded that ICBM launch activities within the scope specified as would not jeopardize the continued existence of federally listed species (USFWS 2015, USFWS 2018, USAF 2020e). The avoidance and minimization measures specified in the USFWS Programmatic Biological Opinion (USFWS 2018, USFWS 2015) which are relevant to the Proposed Action would be implemented.

Proposed vehicle launch activities at LFs and TP-01 have the potential to affect California least terns and western snowy plover due to disturbance from elevated noise levels and vehicle overflight. Proposed activities have the greatest potential to adversely affect these species during their nesting season when disturbance may result in temporary or permanent nest abandonment or increased vulnerability to predators (USFWS 2015). Western snowy plover habitat occurs near LF-04, LF-09, and TP-01 (**Figure 3-2**). However, during more than 10 years of monitoring during space and missile launches, no evidence of injury, mortality, or post-launch abnormal behavior has been recorded (USFWS 2015). Based on this previous monitoring data, launch activities would at most only result in temporary flushing of western snowy plovers from nests or brief startle response. The USAF has consulted with the USFWS on the potential effect of base-wide launch operations (USFWS 2018, USFWS 2015). The USFWS concluded that western snowy plovers would be adversely affected by routine operations at VAFB, including missile launches (USFWS 2018, USFWS 2015). However, as part of the Programmatic Biological Opinion (USFWS 2018, USFWS 2015), the USFWS concluded that base-wide operations would not jeopardize the continued existence of this species because the population and the range of this species would not be reduced. Overall, proposed flight test activities are not expected to significantly impact western snowy plovers.

A small number of California least terns nest along the southern end of Minuteman Beach in some years (**Figure 3-2**). Least terns may be more sensitive to launch activities and nesting birds could be startled by elevated noise levels and vehicle overflight (USAF 2020e). There is some evidence that larger space vehicles launches may result in permanent emigration of least terns from nesting colonies and reduced reproductive success (USFWS 2015). The effects to California least terns from ICBM missile launches are unclear; however, it is possible that launches from TP-01 may result in disturbance to nesting or foraging birds. In a 2010 analysis of a missile launch from TP-01 outside the tern nesting season, the USAF concluded that the launch would have no effect on terns because the launch vehicle would be at a high altitude (25,000 feet) before in crossing over Minuteman Beach and because previous monitoring has shown no significant impact form base operations (USAF 2010). Due to the potential for base-wide launch operations to affect California least terns, the USAF has consulted with the USFWS (USFWS 2018, USFWS 2015) and the USFWS concluded that base-wide operations would not jeopardize the continued existence of the California least tern. The flight test activities under the Proposed Action are not expected to significantly impact California least terns.

Table 4-17. Summary of Conclusions for Threatened and Endangered Species at VAFB for the Effects of Base-wide Operations including Proposed Action Launch Activities. (1)

Species Name	Potential Effects	Effect Determination	USFWS Biological Opinion Conclusions
Gaviota tarplant	Individuals occur near LF-09 and LF-10. Small risk of being affected by launch emissions and firebreak maintenance activities.	May affect and likely to adversely affect.	Base-wide activities would not appreciably reduce the likelihood survival and recovery.
California red-legged frog	Occur within 1,000 feet of LF-09. Unlikely to be affected by launch noise. No adverse effects to water quality from launch exhaust expected.	May affect but not likely to adversely affect.	With implementation of mitigation measures, base-wide activities would not jeopardize the continued existence.
Western snowy plover	Occur within 1,300 feet of LF-04 and 4,000 feet of LF-10. Temporary behavioral disturbance from elevated noise levels and vehicles passing overhead. Prior monitoring indicates that launch vehicles do not substantially affect this species or their reproductive success.	May affect and may adversely affect.	Actions would not jeopardize the continued existence because the population and the range of this species would not be reduced.
California least tern	May be sensitive to launch disturbance. Closest breeding habitat is over 4 miles from LF-10. May forage on beaches near LF-04 and LF-10 and launch noise may flush birds. Helicopters and aircraft must fly at least 500 feet from tern habitat.	May affect and may adversely affect.	Actions would not jeopardize the continued existence because the population and the range of this species would not be reduced.
Southern sea otter	Occur in offshore marine habitats. Monitoring data indicates that launch noise and helicopter overflights do not affect the number or activities of sea otters.	May affect but not likely to adversely affect.	Not likely to adversely affect.

Sources: USAF 2019b, USFWS 2015, USFWS 2018

Notes:

(1) This table applies only to proposed GBSD operations at VAFB, the effects of which are covered under the existing Programmatic Biological Opinion and LOA. No additional consultation with the USFWS or NMFS is required under Section 7 of the ESA for proposed GBSD operations at VAFB.

Environmentally Sensitive Habitats. As under the No Action Alternative, the Proposed Action is expected to have no effects on designated critical habitats, western snowy plover nesting habitat, or California least tern nesting habitat. In the unplanned and unlikely event that launch debris would fall within sensitive habitat areas, base biologists would assist in recovery operations and recovery methods that minimize surface disturbance would be used (USAF 2020e).

Under the Proposed Action, launch emissions are not expected to impact the water quality of local surface waters, including vernal pools (discussed in the *Wildlife* subsection above). If a launch anomaly were to occur, personnel would take immediate action to recover and cleanup unburned propellants or any other hazardous materials introduced into terrestrial habitats or in any of the freshwater creeks, retention ponds, wetlands, and shoreline areas (USAF 2020e). As a result, there would be no significant impacts to wetlands or other freshwater habitats on VAFB or to nearshore habitats (USAF 2020e).

For nominal flight test activities, all post-test human activity and equipment operation would occur within established roadways, launch facilities, or other facilities that are routinely used for mission support operations. These post-test activities would have no significant impacts on vegetation, wildlife, or environmentally sensitive habitats on or near VAFB.

4.2.2.2.3 Operations and Maintenance

Operation and maintenance of new facilities and existing facilities under the Proposed Action would occur in compliance with the requirements of programmatic operations at VAFB. Biological resources at VAFB are managed by the installations Natural Resource Management Division under the installations INRMP (USAF 2011b) and associated plans such as the VAFB Spill Prevention, Control, and Countermeasure Plan; Waste Management Plan; Hazardous Materials Emergency Response Plan; SWPPP; and Integrated Pest Management Plan (USAF 2011b). Daily operations and maintenance of Minuteman III and GBSD facilities would have minimal impacts to biological resources at VAFB.

4.2.2.2.4 Mitigation Measures

Site Preparation and Construction Mitigation Measures

The avoidance, minimization, and monitoring measures listed below would be implemented to avoid, minimize, or characterize the effects of the GBSD Test Program new construction on sensitive vegetation and wildlife and are considered part of the Proposed Action:

- Utilities would be placed in the existing roadway in any areas where necessary to avoid impacts to vernal pool habitat, riparian habitat, Gaviota tarplant, or Lompoc yerba santa.
- Qualified biological monitors shall be present and monitor activities at all times during construction when a VAFB biologist or a project-specific biologist determines that impacts to protected species are possible. The biological monitors shall be responsible for delineating areas where special-status species are located or concentrated, relocating special-status species during construction activities, and inspecting equipment and equipment laydown areas for cleanliness and gas and oil leaks. Qualified biological monitors shall be individuals who are familiar with and possess necessary qualifications to identify special status species that may occur within the proposed Action Area and, when needed, some will be authorized to capture, handle, and relocate California red-

legged frogs. Biological monitors shall be approved by USFWS and 30 SW Installation Management Flight Environmental Conservation (30 CES/CEIEA). Prior to the onset of construction activities, the name(s) and credentials of the biologist(s) who would conduct the monitoring, surveying, species relocation, and other biological field activities shall be submitted to the USFWS for their approval at least 30 days prior to activities requiring a monitor.

- The qualified biological monitor(s) shall brief all project personnel prior to participating in project implementation activities. At a minimum, the training would include a description of the ESA-listed species and sensitive biological resources occurring in the area, the general and specific measures and restrictions to protect these resources during project implementation, the provisions of the ESA and the necessity of adhering to the provisions of the ESA, and the penalties associated with violations of the ESA.
- Disturbances shall be kept to the minimum extent necessary to accomplish project objectives.
- Road and shoulder work west of Rhea Road would be kept to a minimum to minimize impacts to blue butterfly habitat. Seacliff buckwheat would be flagged for avoidance during construction in this area to minimize impacts.
- All excess materials excavated shall be removed and transported to a designated waste or fill site.
- All erosion control materials used would be from weed-free sources and, if left in place following project completion, constructed from 100% biodegradable erosion control materials (e.g., erosion blankets, wattles, etc.).
- All human generated trash at the project site shall be disposed of in proper containers and removed from the work site and disposed of properly at the end of each workday. Large dumpsters can be maintained at staging areas for this purpose. All construction debris and trash shall be removed from the work areas upon completion of the project.
- Equipment vehicles (dozers, mowers, etc.) shall be cleaned of weed seeds prior to use in the project area to prevent the introduction of weeds. Prior to site transport, any skid plates shall be removed and cleaned. Equipment should be cleaned of weed seeds daily especially wheels, undercarriages, and bumpers. Prior to leaving the project area, vehicles with caked-on soil or mud shall be cleaned with hand tools such as bristle brushes and brooms at a designated exit area; vehicles subsequently may be washed at an approved wash area. Vehicles with dry dusted soil (not caked-on soil or mud), prior to leaving a site at a designated exit area, shall be thoroughly brushed; vehicles may alternatively be air blasted on site.
- Fueling of equipment would be conducted in pre-designated location within the staging area and spill containment materials would be placed around the equipment before refueling.

- Equipment refueling or washing of concrete or paint will not occur in areas that may drain into vernal pool fairy shrimp habitat. Secondary containment, such as drip pans, will be used to prevent spills of potential contaminants. A spill containment and cleanup plan will be developed prior to the start of work and project personnel will have spill kits available to them at all times.
- A qualified biological monitor shall inspect any equipment left overnight prior to the start of work. Equipment would be checked for presence of special status species in the vicinity and for fluid leaks.
- No holes or trenches would be left open overnight. Plywood sheets or steel plates may be used to cover holes or trenches. Weights or sandbags would be used as necessary to ensure covers remain in place and without gaps. The biological monitor would inspect any open holes or trenches for entrapped animals the following morning before resuming work.
- Where construction activities would be near Lompoc yerba santa or vernal pool fairy shrimp habitat, these sensitive areas would be demarcated using high-visibility temporary fencing and signage to prevent vehicles and workers from accidentally accessing these areas.
- Utility lines installed in or adjacent to sensitive habitats, such as maritime chaparral, shall be accessed directly from existing roadways and trails to the maximum degree feasible. Construction and support vehicles will stay on roadways, trails, and mowed ruderal zones to the maximum degree feasible.
- Stormwater retention basins will be kept to the minimum size and depth necessary to contain site storm water runoff from the facility during a 5-year storm event. Basins will allow natural infiltration of water; at least one side will have a slope of no more than 45 degrees to allow easy exit of animals; no fencing will be placed around basins that would impede the movement of small animals such as amphibians. No chemicals harmful to amphibians or invertebrates will be used for management or maintenance of basins and no non-native species (i.e., mosquito fish [*Gambusia affinis*]) will be introduced into basins.
- Stormwater retention basins will be monitored for waterfowl use. If basins are found to consistently attract significant numbers of waterfowl (6 or more ducks, 3 or more geese, or any number of waterfowl staying for more than 48 hours) such that they are deemed to constitute a Bird Air Strike Hazard, a bird abatement plan will be developed in consultation with 30 CES/CEIEA and implemented.
- Stormwater retention basins will be monitored for California red-legged frog egg masses during storm events for a period of 5 years to determine if the basins are properly draining and that they do not hold water for more than a 24-hour period. If basin features are found to hold water for over 24 hours at any point following their construction, the

basin will be surveyed for California red-legged frog egg masses and egg masses would be relocated to suitable habitat prior to basin drainage.

  - A stormwater retention basin management plan will be developed in coordination with the USFWS to form guidelines to reduce the potential injury or mortality of California red-legged frog egg masses resulting from desiccation. The management plan must ensure that any California red-legged frog egg masses present are collected and relocated prior to basin drainage.

- Any required maintenance conducted within stormwater retention basins (e.g., sediment removal or vegetation clearance), will be conducted when basins are completely dry to avoid incidental take of adult California red-legged frog that could inhabit these features. The stormwater retention basins will be surveyed for California red-legged frogs prior to any maintenance and monitoring work activities.
- Irrigation systems associated with landscaping will be designed in a way that minimizes the potential for sedimentation and water runoff into adjacent vernal pool features. Operation of irrigation systems will include procedures to promptly identify and address leaks to reduce impacts to vernal pool fairy shrimp resting cysts (e.g., early hatching or fungus introduction).
- Each proposed GBSD facility construction site would be encircled with minimum 3-foot high silt fencing, anchored with metal T-posts, and buried along the bottom edge to inhibit terrestrial wildlife, including California red-legged frog, from entering the site. The biological monitor would inspect the fence daily and direct maintenance to ensure its efficacy.
- All work would occur during daylight hours during periods where there is no rainfall.
- The USAF will limit all project-related artificial night lighting on adjacent natural habitats. Light will be shielded in a manner to ensure that light falls only on intended surfaces. Light design considerations will include use of embedded lights, cutoff shields, and light timers to decrease light intensity and duration. Lighting with no ultraviolet emissions that attract insects will be used.
- To reduce potential injury of California red-legged frog and vernal pool fairy shrimp, herbicides/pesticides will not be applied within 48 hours of a predicted (greater than 50 percent chance forecast) significant rain event (0.2 inch or greater within a 24-hour period). The National Weather Service 72-hour forecast will be consulted for the project area. 30 CES/CEIEA staff familiar with California red-legged frog biology will review and approve all individual chemical to be used within suitable California red-legged frog habitat. All chemical label specifications will be followed. Marker dyes must be utilized in all herbicide mixtures so workers can readily see spills, drift, or misapplication. To avoid chemical drift, no foliar spray applications may be conducted when wind speeds exceed

12-mph. Foliar spray applications must use directed sprayers with low-pressure, large droplet nozzles.

- Initial vegetation removal on all sites would either occur outside of bird nesting season or vegetation to be removed would be surveyed for nesting birds by a qualified biologist prior to removal.
- A qualified biologist would survey all potentially impacted areas in or near suitable Lompoc yerba santa habitat prior to vegetation removal or other construction related impacts to ensure that no Lompoc yerba santa plants are present.
    - If a new population is found within the work area during pre-work surveys, it will be avoided to maximum extent feasible and work would only proceed after coordination with 30 CES/CEIEA and USFWS. Any impacts to such Lompoc yerba santa would be minimized by implementing the following:
        - A Service Approved Biologist would monitor ground-disturbing work within occupied areas. Monitors would mark plants for avoidance and document damage to individual plants or rhizomes during work.
        - The Service Approved Biologist could remove and replace soil around in or adjacent to the work area as necessary to determine underground characteristics. Soil removal and replacement would be done without removal or damage to rhizomes or individual plants. This would facilitate avoidance and salvage efforts.
        - If Lompoc yerba santa are present that cannot be avoided, such rhizomes or plants would be salvaged, prepared for planting, and planted in nearby suitable habitat where the USAF does not anticipate future disturbance.
- The qualified biological monitor would be present to verify that the distance between the known Lompoc yerba santa population at 35th Street and the construction activities north of 35th Street remains at least 150 feet. Construction activities within 150 feet of plants would be restricted to the existing 35th Street roadway or on the south side of 35th Street. The biological monitor would also be present to verify that the distance between the Lompoc yerba santa population and the construction activities within and south of 35th Street roadway remains at least 65 feet.
- If the Alternative 2 Laydown Area for the Component Operations Facility were used for the Proposed Action in its entirety or in part, the following measures would be implemented to preserve potential maritime chaparral habitat:
    - All chaparral shrubs in this area would be hand cut during late summer or dormant period. Cut shrubs shall be properly pruned with a sharp blade and shall have a clean, smooth cut. No large shrub, trunk, branch, or stump shall be left with frays, incisions, or scars.

  - Any soil removed or graded off an area shall be salvaged in an area free of weeds. Prior to replacing the soil, the ground shall be properly prepared for native seed germination.
  - Protective construction matting such as Dura-Base mats that are designed for vegetation protection shall be used in the entire laydown area. Construction mats shall be removed as soon as possible.
  - A restoration plan covering at least 2 years shall be developed and approved by 30 CES/CEIEA. The plan shall, at a minimum, include weed control measures.

- Clearing vegetation in areas known to support or with potential to support Gaviota tarplant would occur after seed has set (October) and before the rainy season to the maximum degree feasible. A USFWS-qualified biologist would determine when a particular area has gone to seed and inform project proponents and contractors of the optimal period to work in the subject area; however, project activities may occur any time of year, including while the ground is wet or while the plants are flowering.
- Where construction activities create a temporary soil disturbance in known occupied Gaviota tarplant habitat, a qualified biologist would monitor a bulldozer equipped with a flat scraper that would preserve the seedbank by lightly scraping the topsoil, setting it aside, and replacing it after completing the project. Prior to replacement of reserved topsoil, the site would be properly prepared for seed germination. Gaviota tarplant habitat would be enhanced by the removal of invasive plants in areas adjacent to occupied Gaviota tarplant habitat along Point Sal Road in the vicinity of Casmalia Beach, Globe, and/or Oculto Roads. The removal of invasive plants, particularly iceplant, would occur at a 2:1 ratio (habitat enhanced: occupied habitat affected) and subsequently manage these areas for a period of at least 5 years, as funding is available. Sites would be seeded with any collected Gaviota tarplant seeds as well as a native grass seed mix using a formulation approved by the VAFB botanist to prevent reinfestation.
- To determine the location(s) and extent of Gaviota tarplant and seedbank within the Action Area historic Gaviota tarplant occurrence data would be used in conjunction with surveys of suitable habitat in the Action Area north of the Point Sal and El Rancho Road intersection. Surveys would be conducted during the summer/fall preceding construction. In combination these data would be used to identify areas requiring topsoil preservation and the extent of habitat enhancement required.
- One day prior to any vegetation removal within 0.1 mile of Shuman Creek and the drainage northwest of GBSD Schoolhouse location and within or adjacent to areas subject to seasonal inundation and/or dominated by riparian vegetation, a qualified biological monitor would conduct surveys for California red-legged frogs within the area to be cleared. Any red-legged frogs present would be captured by the qualified biologist, if possible, and released at the nearest suitable habitat outside the area where vegetation is to be cleared. Because ground conditions change depending on rainfall

and season, most of these locations cannot be identified in advance. The monitor would also be present during vegetation removal to capture and relocate California red-legged frogs that may be encountered, to the extent that safety precautions allow. This monitor would also search for injured or dead California red-legged grogs after vegetation removal to document take.

- If any California red-legged frogs are encountered during construction activities that need to be moved out of harm's way, a qualified biological monitor would capture and relocate them to the nearest suitable habitat. The risk of introducing or spreading chytrid fungus would be reduced by requiring implementation of the Declining Amphibian Populations Task Force (DAPTF) Fieldwork Code of Practice (DAPTF 1998). To reduce the time a California red-legged frog is in captivity, suitable habitat areas to relocate individuals must be identified prior to surveys. California red-legged frogs that are relocated must be maintained in a manner that does not expose them to temperatures or any other environmental conditions that could cause injury or undue stress.
- During construction of the GBSD facilities at LF-4, the GBSD Schoolhouse location west of California Boulevard, and the Component Operations Facility and adjacent laydown areas, a qualified biological monitor would survey the site, including any open holes or trenches, each day prior to initiation of work.
- Where occupied vernal pool fairy shrimp habitat is to be preserved within 25 feet of a construction area, appropriate sedimentation barriers would be placed down-slope of the project site and construction fencing or other appropriate protective fencing would be placed around pools. Fencing would be used in locations where project equipment and/or personnel are situated adjacent to, or in the near vicinity of, vernal pool fairy shrimp habitat. Work would be avoided within occupied habitat to be preserved until the soil is dry to the touch. Fill material would not be placed into vernal pool habitats to be preserved.
- If project activities may result in the alteration of the hydrological integrity of the area feeding pools, wet season surveys would be conducted in affected pools prior to construction to document baseline conditions. After construction, the area of impact would be reevaluated for two seasons with average or above average rainfall within a 2 to 5-year period post construction to determine if the hydrology of the pool has been affected.
    - Potential impacts to pool hydrology are expected to be restricted to pools near the proposed Component Operations Facility. These pools were both assessed during wet season vernal pool fairy shrimp surveys in the 2015-2016 wet season during which they did not hold water (MSRS 2019a) and in the 2018-2019 wet season during which they did hold water (MSRS 2019b). Vernal pool fairy shrimp were not detected during 2018-2019 wet season. Hydroperiod data collected during these seasons and the season preceding construction would be analyzed

in conjunction with VAFB rainfall data and compared to data collected post construction to determine if hydrological impacts may have occurred.

- If excavation is required within occupied vernal pool fairy shrimp habitat during the dry season, the cyst bank in the area impacted would be removed before the project begins. Using a hand trowel, one-liter volume sample per pool/swale of the top 0.4 to 1.2 inches of pool sediment would be collected. Whenever possible, soil samples shall be collected in chunks to best protect the cysts. Soil samples containing any residual moisture shall be allowed to air dry thoroughly before storage of the sample. The bags containing the soil samples shall be kept out of direct sunlight to avoid excessively heating the sample. Samples would be retained and used to reinoculate the impacted pool or retained for use in other impacted pools.
- If the work impacts a pool during the wet season, the impacted pool would be surveyed for two wet seasons with at least average rainfall to determine vernal pool fairy shrimp presence. If, after 2 years of survey, no vernal pool fairy shrimp are detected, then seed cysts from a nearby occupied pool would be collected and used to restore the impacted pool. The pool would then be surveyed for another two seasons to monitor occupancy.
- If permanent loss or impacts occur to an occupied or potentially occupied vernal pool fairy shrimp pool, habitat would be enhanced at a 3:1 ratio (habitat enhanced: habitat affected). Habitat would be enhanced through the removal of invasive trees and other invasive plant species adversely affecting occupied or potentially occupied vernal pool fairy shrimp habitat between New Mexico Avenue and California Boulevard and/or along Nevada Avenue on VAFB.
- The USAF will notify the USFWS by telephone and in writing within 3 days of finding an injured or dead California red-legged frog. The notification must include the time and date, location of the carcass, a photograph, cause of death if known, and any other pertinent information. Any California red-legged frog remains will be handled with care and would be placed with educational or research institutions holding the appropriate State and Federal permits.
- If an injured California red-legged frog is found, care will be taken in handling the animal and the animal will be transported to a qualified veterinarian. If the injured frog survives, the USFWS will be contacted regarding final disposition of the animal.
- In the event that dead or injured vernal pool fairy shrimp are discovered, the USFWS will be contacted regarding further disposition of the specimens.
- The USAF will prepare a written report due by January 30 for each fiscal year describing how activities were conducted pursuant to the biological opinion issued by the USFWS in April 2021. The report must include a statement of impacts to Gaviota tarplant and vernal pool fairy shrimp habitat; datasheets detailing Gaviota tarplant seed collection and storage; topsoil salvage and storage methods; location of habitat enhancement sites,

results of habitat enhancement area seeding, weed removal, and topsoil salvage efforts; the number of days the stormwater retention basins are found to hold water for over a 24-hour period per year; the total number and description of California red-legged frogs killed or injured; the number and size of any California red-legged frogs and egg masses relocated from the action area, the date and time of relocation, and a description of relocation sites; a brief discussion of any problems encountered while implementing minimization measures; and results of biological surveys.

Flight Test and Launch Activities Mitigation Measures

The avoidance, minimization, and monitoring measures detailed in the VAFB Marine Mammal Protection Act LOA (NMFS 2019) would be implemented as part of the Proposed Action and include:

- The USAF would monitor launch acoustics and pinniped response following approved launch monitoring protocols for VAFB during the first three GBSD launches between January 1 and July 31, and would likely monitor more than three launches if the GBSD vehicle launch were louder than Minuteman III launches.
- Helicopters and other aircraft would fly at least 1,000 feet from recognized seal haul outs and rookeries; including Purisima Point, Rocky Point, Point Sal, and Lion's Head, as required under the current Marine Mammal Protection Act LOA.

Avoidance and minimization measure specified in the USFWS Programmatic Biological Opinion (USFWS 2018, USFWS 2015) which are relevant to the Proposed Action and would be implemented include:

- The fueling of vehicles and equipment would occur on impervious surfaces to the maximum extent practicable. Spill containment equipment would be present at all project sites where fuels or other hazardous substances are brought to the site. In addition, qualified personnel would conduct daily inspections of the equipment and the staging and maintenance areas for leaks of hazardous substances.
- Project proponents would clean all equipment and vehicles frequently to reduce the spread of invasive plant species.
- Routine flight operations would be restricted along the coast from Minuteman Beach to 3.7 mile south of the Santa Ynez River and Jalama Beach. A 500-foot minimum altitude requirement is in effect year-round in these areas. All non-mission essential aircraft must maintain a minimum altitude of 1,900 feet at Purisima Point and the neighboring terrain along the shoreline to LF-576E from March 1 through September 30.

4.2.2.3 Climate Change – VAFB

4.2.2.3.1 Site Preparations, Construction and Operations and Maintenance

Considerations for GHG (CO_2e)

The potential effects of GHG emissions from the Proposed Action and alternatives are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the Proposed Action and alternatives have been quantified to the extent feasible in this EA/OEA for information and comparison purposes, including possible reasoned choices among alternatives. **Table 4-10** shows the estimated annual emissions of CO_2e would be 996 tpy during construction of GBSD test facilities and **Table 4-14** shows the estimated annual emissions of CO_2e would be 12,452 tpy during operations and maintenance of the GBSD test facilities.

4.2.2.4 Coastal Zone – VAFB

4.2.2.4.1 Site Preparation and Construction

As discussed in other sections of **Chapter 4.0**, the construction activities that are proposed to occur within the coastal zone would not result in significant impacts to sensitive biological or cultural resources, nor would such actions have lasting effects on the scenic beauty along the coast. Under the Proposed Action described in **Section 2.2.3.1**, repairs and modifications would be made to two launch sites (i.e., LF-04 and LF-26) and several support facilities located on North Base. A new 20,000 ft^2 building would be constructed at the site of Buildings 1860/1861. In addition, several miles of new conduit for utility lines would be installed and buried in trenches, mostly within 5 feet of existing roadway shoulders or in roadway pavements and fire breaks around launch sites would be maintained or reestablished, as necessary. Use of construction laydown areas would be temporary. These actions would occur primarily in already developed areas, are generally spread far apart, and result in limited impacts on the coastal zone.

4.2.2.4.2 Flight Test Activities

Under the Proposed Action, the combination of the ongoing Minuteman III flight test activities and proposed GBSD Test Program activities would not result in significant impacts on the coastal zone at VAFB. With the increase in the total number ICBM flight tests conducted from North Base, from 3 to 5 annually to a maximum of nine flights annually in some years (see **Table 2-4**), Point Sal State Beach (located off the northern end of the base) would temporarily be closed more often for public safety purposes. Under agreement with Santa Barbara County and the State of California, the base can close the state beach during launch operations (VAFB 2008). Point Sal State Beach is closed on average 12 times a year, which usually coincides with

any launch activity (Ornelaz 2009). There would be no increase in restrictions, other than for these additional launches, to public access at Point Sal State Beach or for any other public beaches at VAFB beyond what is already agreed to in existing county and state agreements. Because the flight test events are temporary and only occur a few times per year, the increase in beach closures would be minimal and would not have a major effect on local recreation.

4.2.2.4.3 Operations and Maintenance

Under the Proposed Action, USAF would continue to comply with Federal Coastal Zone Consistency regulations (15 CFR Part 930) and the California Coastal Management Program. Although facilities at VAFB would be used to support a new launch program, the types of operations and maintenance activities proposed to occur would be similar to that of their current or prior usage. Because the overall proposed activities would not have a significant impact on physical and natural resources, require implementation of new restrictions to beach access or other recreational areas, or adversely affect the visual qualities of the coastline, USAF anticipates that the GBSD Test Program-related actions will be consistent with the enforceable policies of the state's certified program and not adversely affect coastal zone resources. To comply with the program's requirements, USAF submitted a negative determination to the CCC, requesting their concurrence. On April 1, 2021the CCC concurred with the negative determination pursuant to Section 15 CFR 930.35(d) of the NOAA implementation regulations (**Appendix A**).

4.2.2.5 Cultural Resources – VAFB

4.2.2.5.1 Site Preparation and Construction

Under the Proposed Action, site preparation, new construction, and refurbishing of existing buildings and structures are currently planned for the GBSD Test Program at VAFB. There are three architectural historic properties and two prehistoric archaeological historic properties in the APE that would be adversely affected by the proposed undertaking. One of the prehistoric archaeological historic properties that would be adversely affected by the proposed undertaking is also recognized as a place of traditional religious and cultural importance to Native Americans. The signed May 2021 MOA resolves the potential adverse effects to these historic properties. Additionally, because one archaeological site is known to contain a large number of Native American burials, USAF will consult with the Santa Ynez Band of Chumash Indians to develop a Written Plan of Action pursuant to NAGPRA that would guide the USAF on procedures to follow in the event of discovery of human remains and funerary items covered under NAGPRA. Potential effects associated with site preparation and construction for the proposed GBSD Test Program facilities and infrastructure are described in the following paragraphs.

Archaeological Resources

Adverse effects on archaeological resources are anticipated under Section 106 as a result of the proposed construction activities and facility modifications that would occur in support of the GBSD Test Program at VAFB. The anticipated impacts of these actions, summarized in **Table 4-18**, would alter features and characteristics of one or more archaeological sites that make them eligible for NRHP listing. These impacts would be characterized as long-term, moderate to major impacts that would be reduced below a significant impact threshold through consultation to avoid, minimize, or mitigate the adverse effects under Section 106. Therefore, no significant impacts are anticipated. Additionally, 31 archaeological resources that have been determined not eligible for the NRHP are within the APE for the proposed GBSD facilities. Most of the 25 ineligible prehistoric resources are sparse scatters of lithic materials. Ineligible resources from the historical period include quarries, masonry drainage ditches, a cattle ranching camp, and a dismantled oil transport facility. Ten of the ineligible prehistoric resources were subjected to archaeological testing for the present undertaking, and the remaining 15 were either tested or data recovered prior to destruction for previous undertakings. All ineligible prehistoric resources either lack integrity due to previous disturbance or do not possess archaeological deposits that may contribute to an understanding of prehistory. The six ineligible resources from the historic period either lack integrity or do not meet any of the NRHP criteria of significance. Although some of these ineligible resources would be impacted by the project, the impacts would not be considered adverse effects under Section 106 and do not reach the threshold of significant impacts under NEPA.

Adverse effects to archaeological sites determined under Section 106 of the NHPA would be mitigated through activities developed by VAFB in consultation with the California SHPO. These mitigation activities listed in **Section 4.2.2.5.4** are described in the signed May 2021 MOA that details the activities and the timeline for completion are considered part of the Proposed Action. The signed May 2021 MOA concluded compliance with Section 106 of the NHPA. The mitigation of these adverse effects through the Section 106 process would reduce impacts under NEPA below a threshold of significant impacts.

Table 4-18. Potential Adverse Effects Resulting from the Construction and Modification of GBSD Facilities and Infrastructure at VAFB	
Proposed GBSD Facility	**Potential Adverse Effects**
GBSD Launch and Launch Support Facilities and Infrastructure	
LF-04	Archaeological site CA-SBA-512, determined eligible for listing in the NRHP, and also recognized as a place of traditional religious and cultural importance to Native Americans, is located within the APE for actions associated with this facility. Proposed ground-disturbing activities, including facility excavations, utility connections, laydown areas, and maintenance of vegetation fire breaks around the facility, have the potential to cause a direct adverse impact to this historic property. Additionally, because CA-SBA-512 is a village site that is known to contain a large number of Native American burials, USAF will consult with the Santa Ynez Band of Chumash Indians to develop a NAGPRA Written Plan of Action, pursuant to 43 CFR § 10.5, that would guide the USAF on procedures to follow in the event of discovery of human remains and NAGPRA items.
LF-26	Archaeological sites CA-SBA-760/761/1748 (determined eligible for the NRHP) and CA-SBA-2127 (determined not eligible), are located within the APE for actions associated with this facility. A portion of CA-SBA-760/761/1748 within the fire break around LF-26 has been determined to contribute to the resource's NRHP eligibility. Therefore, maintenance of vegetation fire breaks around the facility has the potential to cause a direct adverse impact to this historic property. All other proposed ground-disturbing activities—including facility excavations; external repairs to the concrete pad, abutment walls, and perimeter fence; possible new utility connections; and laydown areas—would occur in portions of CA-SBA-760/761/1748 that have been determined to lack sufficient integrity to contribute to the resource's NRHP eligibility. Therefore, the above actions would have no adverse impacts on this historic property
TP-01	Three ineligible archaeological resources (CA-SBA-1155, CA-SBA-1181, and CA-SBA-1687) are located within the APE for actions associated with this facility. These resources do not constitute historic properties. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
MAF-D0	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Launch Equipment Storage (Building 2002)	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.

Table 4-18. Potential Adverse Effects Resulting from the Construction and Modification of GBSD Facilities and Infrastructure at VAFB (Continued)	
Proposed GBSD Facility	**Potential Adverse Effects**
Other GBSD Test Program Support Facilities and Infrastructure	
GBSD Component Processing Facility (Building 1900)	Archaeological sites CA-SBA-2246 and CA-SBA-2250 are located within the APE for actions associated with this facility. These resources do not constitute historic properties. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Contractor Vehicle/Support Equipment Test and Proof Load Facility (Building 1818 & PK PLTF)	Archaeological site CA-SBA-1777, which has been determined not eligible for listing in the NRHP, is located within the APE for actions associated with this facility. This resource does not constitute a historic property. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Temporary Contractor Test Support Facilities (Buildings 8337 and 8339)	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Consolidated Maintenance Facility	Archaeological site CA-SBA-3575H, which has been determined not eligible for listing in the NRHP, is located within the APE for actions associated with this facility. This resource does not constitute a historic property. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Depot Maintenance Facilities (Buildings 9320, 9325, 9327, and 9330)	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Vehicle Maintenance Facilities (Buildings 7501, 10711, and 10713)	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Component Operations Facility	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Weapons Maintenance Facility (Building 1544)	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Additional MSA Parking	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Vehicle Processing Facility	Archaeological sites CA-SBA-1759 and CA-SBA-3203, which have been determined not eligible for listing in the NRHP, are located within the APE for actions associated with this facility. These resources do not constitute historic properties. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.

Table 4-18. Potential Adverse Effects Resulting from the Construction and Modification of GBSD Facilities and Infrastructure at VAFB (Continued)	
Proposed GBSD Facility	**Potential Adverse Effects**
Storage Igloos	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Temporary Storage (Facilities 6809 and 6810)	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Schoolhouse/FTU Alternative 1	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
GBSD Schoolhouse Alternative 2	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Utility Corridor	There are 49 archaeological resources located within the APE for the approximately 25.2 miles of proposed communication utility lines alignment. These include 20 archaeological resources previously determined eligible for listing in the NRHP (CA-SBA-228, -512, -513, -594, -722, -730, -739, -740, -741, -760/761/1748, -939, -940, -941, -990, -998, -1853, -1865/H, -2128H, -2352, and -2471), 4 unevaluated archaeological resources that were assumed eligible for listing in the NRHP (CA-SBA-743, -955, -2320, and -3649), and 25 archaeological resources determined not eligible for listing in the NRHP (CA-SBA-592, -1155, -1177, -1181, -1687, -1777, -1866, -2127, -2159H, -2164, -2172, -2224, -2233, -2238, -2244, -2245, -2307, -2876, -2884, -2885, -3288/H, -3289, -3562H, -3563H, and -3565H). For 20 eligible or unevaluated resources, the portions of the resource within the APE have been determined to lack sufficient integrity to contribute to the resource's NRHP eligibility. Four additional resources were determined to be outside the area of physical impacts. Potential direct adverse impacts to eligible site CA-SBA-990 resulting from proposed ground-disturbing activities, including installation of new conduit, were avoided by a commitment from the USAF to route the utility corridor near the site to the southern half of El Rancho Road.
Other Mission Relocations due to the GBSD Test Program	
Vehicle Processing (Building 1800)	Archaeological site CA-SBA-1777, which has been determined not eligible for listing in the NRHP, is located within the APE for actions associated with this facility. This resource does not constitute a historic property. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Vehicle Processing and Training (Buildings 1860/1861)	Archaeological site CA-SBA-2161, which has been determined not eligible for listing in the NRHP, is located within the APE for actions associated with this facility. This resource does not constitute a historic property. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.

Table 4-18. Potential Adverse Effects Resulting from the Construction and Modification of GBSD Facilities and Infrastructure at VAFB (Continued)	
Proposed GBSD Facility	**Potential Adverse Effects**
Offices (Building 5500)	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Equipment Storage and Component Processing	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Other GBSD Temporary Construction Laydown and Office Areas	
Point Sal Road Laydown Area	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Globe Laydown Area	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Brioso Laydown Area	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.
Igloo Laydown Area	There are no archaeological resources located within the APE for actions associated with this facility. Therefore, the Proposed Action would have no adverse impacts on archaeological historic properties.

Architectural Resources

Adverse effects on architectural resources under Section 106 are anticipated as a result of the proposed construction activities and facility modifications that would occur in support of the GBSD Test Program at VAFB. The modifications summarized below would alter the characteristics that make one or more architectural resources NRHP-eligible in a manner that would reduce the resource's ability to convey that significance. These impacts would be characterized as long-term, moderate to major impacts that would be reduced below a significant impact threshold through consultation to avoid, minimize, or mitigate the adverse effects under Section 106. Therefore, no significant impacts are anticipated.

Actions associated with the proposed GBSD Test Program at VAFB include modifications to an existing, in-use Minuteman III silo (LF-04) and a currently unused Minuteman III silo (LF-26), both of which are NRHP-eligible. At each Launch Facility (LF), the launch tube and surrounding two-story Launch Equipment Rooms would be abated, modified, and refurbished to accommodate test launches of the GBSD vehicle. Other subsurface structures at the two LFs will either be abandoned in place or refurbished for use with GBSD. Additional sheltered equipment spaces would be housed in prefabricated equipment trailers brought on site and placed on new concrete pads. Additional activities at both LFs will include replacing the surface

concrete pad, replacement or repair of internal equipment and cabling, excavations of underground access ways and utility corridors, and exterior/surface repairs or replacement of equipment. These actions would have a direct adverse impact on the LFs' integrity of design, materials, workmanship and feeling, and the resource's ability to convey its significance as an intact Minuteman ICBM launch complex.

Actions associated with MAF-D0 are described in **Table 2-3**. Under the Proposed Action, the Launch Control Support Building would be demolished. The underground Launch Control Equipment Building and Launch Control Capsule would be abandoned in place or functionally demolished through filling and sealing the entrance to the underground spaces. A new building would be constructed within the fenceline at MAF-D0. The new building would be completely aboveground and would not reuse any of the existing component features associated with the use of MAF-D0 as a Minuteman test site. These actions would have a direct adverse impact on the MAF and its integrity of design and workmanship relating to the resource's significance under NRHP Criterion C. The primary features that convey this significance include one above ground and two below ground structures, all of which would be demolished, abandoned in place, or functionally demolished. Specifically, these actions would have a direct, adverse impact on the resource's integrity of design, materials, workmanship, feeling, and association, and diminish the resource's ability to convey its significance as an intact Minuteman launch control complex.

Actions in the vicinity of MAF-O1E/O1C are temporary laydown areas for construction materials. No modification of MAF-O1E/O1C is planned as part of the GBSD Test Program. Any impacts as a result of laydown materials storage would be characterized as temporary, negligible to minimal impacts. These impacts would not be considered adverse under Section 106 nor significant impacts under NEPA.

The other various GBSD Test Program project areas at VAFB do not contain NRHP-eligible buildings and structures. The main cantonment area of VAFB has the World War II era street pattern with very few World War II era buildings. The current setting is of a sporadically developed military industrial character, interspersed with warehouses and office buildings. No NRHP-eligible properties are adjacent to the GBSD Test Program project areas, nor are there adjacent or surrounding areas with potential as a NRHP-eligible historic district. The GBSD Test Program APE also includes areas where trenching for fiber optic and installation of other utilities may occur. No NRHP-eligible buildings or structures are within or adjacent to the GBSD Test Program project areas.

Adverse effects to LF-04, LF-26, and MAF-D0 determined under Section 106 of the NHPA would be mitigated through activities developed by VAFB in consultation with the California SHPO that is presently underway. These mitigation activities in the May 2021 signed MOA details the activities and the timeline for completion. The signed MOA concludes compliance with Section 106 of the NHPA. The mitigation of these adverse effects through the Section 106 process would reduce impacts under NEPA below a threshold of significant impacts.

4.2.2.5.2 Flight Test Activities

Under the Proposed Action, no adverse effects on cultural resources are anticipated. Flight test activities associated with the GBSD Test Program at VAFB would be conducted similarly to that of the ongoing Minuteman III flight tests. Because there would be no additional construction activities, major facility modifications, or ground disturbance during long-term test operations for either of the Minuteman III or GBSD test programs (except for general maintenance and repair of facilities and infrastructure), there would be no adverse impacts on cultural resources.

4.2.2.5.3 Operations and Maintenance

Under the Proposed Action, no adverse effects on cultural resources are anticipated from operations. As noted in **Section 4.2.2.5.2**, operations and flight test activities would be similar to those conducted under the ongoing Minuteman III program. Maintenance activities are unlikely to impact cultural resources in the short term. Over the life of the GBSD weapon system, resources associated with it may be determined to be eligible for NRHP listing due to exceptional significance for resources less than 50 years of age. Future unknown maintenance activities would be evaluated in the context of regulatory compliance with Section 106 and NEPA, as appropriate. Likewise, future operations and maintenance activities that involve ground disturbance would be evaluated in the context of future undertakings under Section 106.

4.2.2.5.4 Mitigation Measures

Mitigation activities for adverse effects under Section 106 developed by VAFB in consultation with the SHPO and are documented in the signed May 2021 MOA. Present recommendations include the following:

- Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER) documentation of MAF-D0, LF-04, and LF-26
- Historical interpretive booklet on the Minuteman development and testing history at VAFB, and brochures for LF-04, LF-26, and MAF-D0
- Light Detection and Ranging (LiDAR) documentation of LF-04, LF-26, and MAF-D0
- Preparation of a Historic Properties Treatment Plan to guide archaeological data recovery
- Development of a NAGPRA Written Plan of Action
- Archaeological and Native American monitoring of ground disturbance at culturally sensitive locations.
- Potential adverse effects to archaeological site CA-SBA-990 would be avoided by a commitment from the USAF to route the utility corridor near the site to the southern half of El Rancho Road.

4.2.2.6 Hazardous Material and Waste – VAFB

4.2.2.6.1 Site Preparation and Construction

The proposed construction and demolition activities at VAFB would require VAFB and its contractors to handle, use, store, and dispose of hazardous and non-hazardous solid waste in the short term. Waste materials anticipated to be used or encountered during site preparation and construction include paints, thinners, solvents, adhesives, fuels, lubricants, coolants, used oil, and soiled rags. Hazardous construction and demolition material and waste would be handled, used, stored, and disposed of by authorized personnel under VAFB's hazardous waste management plan.

All label and safety data sheets directions would be followed to ensure proper handling and disposal of hazardous material and waste. Safety data sheets would be kept current at all construction and demolition sites on VAFB. Secondary containment would be utilized or installed as VAFB's environmental health regulations require. Appropriate life safety equipment would be maintained and operated to minimize human health risks.

Although unlikely, should contamination be discovered (petroleum residues, etc.) in the shallow subsurface, sampling would be conducted to determine the location and whether concentrations are above regulatory limits. Any subsurface contamination would be managed and disposed of by authorized installation personnel, and suitable clean fill would be brought in as a replacement as needed.

While there are areas of VAFB's Main Cantonment that have ACM and/or LBPs, the sites of the proposed GBSD construction are not anticipated to encounter ACM or LBP. As discussed in **Section 3.2.6.3**, TP-01 is located in a UXO closure area. Although unlikely, any UXO discovered would be safely removed in accordance with USAF Explosive Ordnance Disposal policies.

The proposed construction for GBSD facilities at VAFB would increase the use and generation of hazardous material and waste during site preparation and construction, however this would be temporary. Once site preparation and construction are completed, the hazardous material and waste generated would return to routine levels for VAFB's ongoing maintenance and operations. The short term impacts would not be expected to overwhelm VAFB's capacity to manage, store, or dispose of hazardous material and waste in accordance with federal, state, and local regulations. The hazardous material and waste used or generated as a result of site preparation and construction for GBSD facilities are not anticipated to introduce unmitigable human health or environmental risks to VAFB.

4.2.2.6.2 Flight Test Activities

Minuteman III pre-test motor inspections, system checks, addition of test RVs and FTS are routine activities that do not exceed VAFB's hazardous waste management plan. These actions

are considered routine at VAFB and are dictated by standard operating procedures (USAF 2004, 2006, 2013). See **Section 2.1.3** for a full description of pre-test preparation and support. Similar pre-test preparation and support are expected for the GBSD Test Program. All hazardous material and waste would be properly managed in accordance with federal, state, and local regulations. No unmitigable human or environmental health risks are anticipated from pre-test preparation and support for the Proposed Action.

A nominal test would not use or generate any hazardous materials or waste. However, if an early launch abort were to occur, base actions would immediately be taken to remove unburned propellant and any other hazardous materials that had fallen on land or off the beach in waters up to 6 feet deep. Any recovery from deeper water would be treated on a case-by-case basis. Hazardous cleanup material would be disposed of in accordance with all federal, state, and local laws. VAFB's hazardous waste management plan covers launch abort procedures, so VAFB's waste management would not be overwhelmed by the potential additional hazardous waste and material, nor would additional planning be required. No unmitigable human or environmental health risks from flight test and impact activities would occur as a result of the Proposed Action.

Routine post-test refurbishment would follow established standard operating procedures (USAF 2004, 2006, 2013). VAFB's waste management would not be overwhelmed by the potential additional hazardous waste and material, nor would additional planning be required. No unmitigable human or environmental health risks from flight test and impact activities would occur as a result of the Proposed Action. Any hazardous material or waste generated as a result of post-test operations would be disposed of in accordance with federal, state, and local regulations.

4.2.2.6.3 Operations and Maintenance

Routine operations and maintenance of the proposed GBSD facilities would likely require the use of hazardous materials and generate quantities of both hazardous waste and non-hazardous waste. At VAFB, hazardous material and waste that may be used in operations and maintenance of the GBSD Test Program include solvents, paints, thinners, chemical-based cleaning products, pesticides, fuels, lubricants, coolants, and fuel tanks for emergency generators. All hazardous material and waste associated with GBSD operations and maintenance would be managed by VAFB's HazMat, in accordance with installation regulations and policies. These impacts would not be expected to overwhelm VAFB's capacity to manage, store, or dispose of hazardous material and waste in accordance with federal, state, and local regulations. The hazardous material and waste used or generated as a result of operations and maintenance for GBSD facilities are not anticipated to introduce unmitigable human health or environmental risks to VAFB.

4.2.2.7 Health and Safety – VAFB

4.2.2.7.1 Site Preparation and Construction

Impacts on health and safety from construction and demolition associated with the Proposed Action at VAFB would be similar to those discussed for HAFB in **Section 4.2.1.4.1**. Short-term, negligible, adverse impacts on health and safety would result from construction and demolition associated with the proposed GBSD Test Program facilities and infrastructure on North Base. No site preparation and construction are currently planned for the Minuteman III program.

The selected construction contractors would be required to develop a comprehensive health and safety plan containing site-specific guidance and direction to prevent or minimize potential risks, and comply with all applicable federal, state, and local safety regulations. For any construction areas with potential soil contamination or presence of MEC, appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance. The construction areas would be appropriately delineated and posted with access limited to construction personnel, thereby reducing the potential to impact installation personnel. Because the proposed construction and demolition would occur within the boundaries of VAFB, an active military installation that is not open to the public, the construction and demolition associated with the Proposed Action would not pose a safety risk to the public or off-installation areas.

4.2.2.7.2 Flight Test Activities

Long-term, minor, adverse impacts are anticipated at VAFB over the approximate 10-year period during which the ongoing Minuteman III test program and the proposed GBSD Test Program campus activities would be conducted in parallel. Although the extent of ICBM test support actions and numbers of personnel would increase substantially at the installation, all program-related actions would be conducted in accordance with the established health and safety policies and procedures identified in **Sections 3.1.4.1** and **3.2.7.1** for the protection of onsite military personnel and contractors, and the general public.

4.2.2.7.3 Operations and Maintenance

For the ongoing Minuteman III flight tests, public health and safety for the proposed GBSD flight tests would be ensured through the establishment of launch hazard areas and debris impact corridors; beach and access road closures (as necessary); evacuation of offshore oil rigs (as necessary); and the coordination and monitoring of train traffic passing through the installation. In addition, NTMs and NOTAMs would be published to warn personnel to avoid potential impact areas within established range Warning Areas off the coast, and in other international waters and airspace. In support of each mission, a flight safety analysis would be conducted prior to launch activities to identify and evaluate potential hazards and reduce the associated risks to a level acceptable to the 30 SW Safety Office. This analysis would include the application of the RCC Standard 321-17 criteria for determining debris hazard risks for each flight test.

Also, as discussed in **Section 3.1.4.3**, the USAF has an excellent safety record of transporting missile rocket motors and boosters. During the transportation of hazardous Minuteman III and GBSD missile components over public roadways or commercial rail lines, USAF and supporting contractors would coordinate and comply with each state's Highway Patrol and DOT, and the U.S. DOT rules and regulations.

4.2.2.8 Infrastructure – VAFB

4.2.2.8.1 Site Preparation and Construction

No site preparation or new construction is currently planned for the Minuteman III flight test program at VAFB; thus, there would be no effects on infrastructure. Potential effects associated with site preparation and construction for the proposed GBSD Test Program facilities and infrastructure are described in the following paragraphs.

Electrical Power–Natural Gas–Potable Water–Wastewater Management

Short-term, negligible, adverse impacts on the utility systems (i.e., electrical power, natural gas, potable water, and wastewater management) would be expected during site preparation and construction at VAFB. Utility infrastructure, including overhead and underground distribution and collection lines, are located near and adjacent to the proposed GBSD facilities, generally along roadways and walkways. Temporary service interruptions might be experienced if service is required to be disconnected in the vicinity of work areas while the proposed facilities are connected to the existing infrastructure. It is expected that no septic systems would be disturbed. Where necessary, affected areas within the installation would be notified prior to possible service disruptions. The construction contractor would coordinate any utilities needed for site preparation and construction activities. Portable supplies and mobile systems (e.g., generators, water tanks and bottle water, and latrines) would be used temporarily. Some work sites would draw needed electricity from on-site connections.

Short-term, negligible, adverse impacts on the VAFB water supply system could occur during site preparation and construction due to increased water usage. During site preparation and construction, water would be necessary for fugitive dust control, earthworks and backfill operations, and mechanical system flushing and hydrostatic testing. The estimated total water usage for these proposed activities at VAFB is approximately 261,000 gallons. The source of construction water would be either from the VAFB fire water system as accessed through a local hydrant valve or a commercial water source. In both scenarios, the water would be transported to the work site via trucks, and it is assumed approximately 251 gpd over the 3-year construction period would be needed. The primary source of potable water on the installation is via a water allotment from CCWA, which is variable based on the statewide precipitation of the previous year. This water supply is usually sufficient as the headroom when using the average CCWA allotment is 364,033 gpd; however, during peak demand there is a 253,967 gpd deficit. If the VAFB fire water system is selected as the source of site preparation/construction water, the

CCWA water allotment would be sufficient to support site preparation and construction and other existing missions during average demand. During peak water demand, site preparation and construction would increase the water deficit by approximately 0.4 percent. When the CCWA allotment is below the installation's requirement, VAFB supplements the CCWA allotment with water from on-installation wells. Therefore, the water supply provided by CCWA allotment and on-installation wells would be able to accommodate the increased demand of site preparation and construction even during CCWA deficits, and impacts would be negligible. There would be no impacts on the VAFB water supply system if commercial water is selected as the source of site preparation/construction water.

Stormwater Drainage

Short-term, minor, adverse impacts on stormwater drainage would be expected during site preparation and construction at VAFB. Site preparation and construction could disturb approximately 35 acres. Ground disturbance during these activities would temporarily increase the potential for soil erosion and sediment transport during rain events that could disrupt existing natural drainage patterns and the stormwater drainage infrastructure. Swales and stormwater drains within and near work sites in the Main Cantonment Area would be protected during construction to prevent debris from entering the drainage system. Other erosion and debris control measures would be used at work sites in undeveloped areas.

Because site preparation and construction would disturb more than 1 acre, coverage under the NPDES CGP would be required. The discharge of stormwater runoff from construction activities must be authorized by the Central Coast Regional Water Quality Control Board under the General Permit for Discharges of Stormwater Associated with Construction Activity (Order No. 2009-0009-DWQ). The CGP would require development of a site-specific SWPPP that includes soil erosion and sediment control measures and other BMPs to reduce pollutants in construction stormwater runoff. Implementation of site-specific and standard construction BMPs and other structural controls as well as compliance with applicable statutes, standards, regulations, and procedures would minimize the potential for increased runoff during construction.

Solid Waste Management

Short-term, minor, adverse impacts on solid waste management would be expected as a result of site preparation and construction, including any demolition, at VAFB. Solid waste generated during site preparation and construction would consist mainly of building materials such as concrete, metals (e.g., conduit, piping, and wiring), and lumber; soil piles; and vegetation debris, such as trees, shrubs, and other vegetation. **Table 4-19** summarizes the approximate amounts of solid waste (construction and demolition debris) anticipated to be generated during site preparation and construction based on the sizes of the proposed facilities. Additional debris would be generated from the demolition of pavement and the MAF-D0 topside building. Contractors would be required to recycle solid waste, including construction and demolition debris to the greatest extent possible, thereby diverting it from being landfilled.

Table 4-19. Estimated Construction and Demolition Debris Generated at VAFB				
Activity	Total Square Feet	Multipliers (pounds/ft²)	Debris Generated	
			Pounds	Tons
Building Construction	517,656	4.34	2,246,627	1,123.3
Pavement Construction	1,396,480	1	1,396,480	698.2
Total			**3,643,107**	**1,821.5**

Source: USEPA 2009

Contractors would be required to comply with all relevant federal, state, and local regulations and USAF policies and specifications regarding recycling and disposal of construction and demolition debris. Construction and demolition debris and other solid waste that could not be recycled would likely be disposed of at the Santa Maria Regional Landfill or the Tajiguas Sanitary Landfill. The off-installation landfills have remaining capacity to accept waste through 2027 and 2036, respectively. Vegetation clearing would result in the generation of vegetation debris that would be converted to firewood or mulch, or composted.

4.2.2.8.2 Flight Test Activities

Because the proposed flight test activities at VAFB would occur no more than 10 times per year and each test event would last just a few days, the overall effects on infrastructure from such actions would be minor and are incorporated in the overall evaluation of program operations and maintenance in **Section 4.2.2.8.3**.

4.2.2.8.3 Operations and Maintenance

In addition to the GBSD Test Program activities proposed to occur at VAFB, Minuteman III-related activities at the installation, as described for the No Action Alternative (see **Section 2.1**), would continue. The potential effects from these parallel actions are described in the following paragraphs.

Electrical Power

No adverse impacts and long-term, negligible, beneficial impacts on the VAFB electrical power system would be expected from the test activities conducted during operations and maintenance for the GBSD Test Program. Operation of the GBSD facilities would increase demand on the electrical supply system due to the new GBSD facilities and relocation/reuse of other mission facilities, including approximately 44,350 ft^2 of administrative facilities, 398,600 ft^2 of other light industrial facilities, and 75,000 ft^2 of dormitory facilities. Several GBSD facilities would include standby, fixed diesel generators for backup power.

To estimate the electricity usage by the new GBSD facilities, site electricity consumption data from EIA's 2012 CBECS was used. The CBECS identified that the site electricity consumption

of administration and professional office buildings, other buildings, and dormitories was 16.9 kWh, 24.5 kWh, and 12.0 kWh per square foot on annual basis, respectively (EIA 2016a). Using these electricity consumption rates as planning factors, the new GBSD facilities would increase VAFB's electrical demand by 11,415,215 kWh per year (749,515 kWh for administrative facilities, 9,765,700 kWh for other light industrial facilities, and 900,000 kWh for dormitory facilities). Assuming the administrative and light industrial facilities require electricity for 2,860 operating hours per year (55 hours per week) and the dormitory is operated continuously, the electricity demand would increase by approximately 4 MW. The PG&E utility system is large enough that GBSD program activities, as well as the ongoing Minuteman III test program and other VAFB missions, would have no impact on the system's generation capacity. The installation has a headroom capacity of approximately 75 MW during peak demand (and 82 MW during average demand), which can support expanded missions. Additionally, existing facilities proposed for use may require upgrades or modifications to the electrical infrastructure, which could result in long-term, beneficial impacts on the installation's electrical supply system.

Natural Gas

No adverse impacts and long-term, negligible, beneficial impacts on the VAFB natural gas supply system would be expected from the activities conducted during operations and maintenance of the GBSD Test Program. Similar to the electrical supply system, operation of the new GBSD facilities would increase demand on the natural gas supply system. These facilities would include HVAC and water heating systems that would most likely be natural gas-fired. To estimate the natural gas usage by these new facilities, natural gas consumption data from the EIA 2012 CBECS was used. The CBECS identified that natural gas consumption of administration and professional office facilities, other facilities, and dormitories was 30.4, 33.3, and 29.3 cubic feet per square foot on an annual basis, respectively (EIA 2016b). Using these natural gas consumption rates as planning factors, the new GBSD facilities would increase VAFB's natural gas demand by 16,819,120 cubic feet (1,348,240 cubic feet for administrative facilities, 13,273,380 cubic feet for other light industrial facilities, and 2,197,500 cubic feet for dormitory facilities) per year. The installation's existing headroom capacity of 367 mcf per year would easily accommodate this increase, in addition to the ongoing Minuteman III test program. Additionally, existing facilities proposed for use may require upgrades or modifications to natural gas infrastructure, which could result in long-term, beneficial impacts on the installation's natural gas supply system.

Potable Water

Long-term, minor, adverse and negligible, beneficial impacts on the VAFB water supply system would be expected from the activities conducted during operations and maintenance of the GBSD Test Program. Operation of the proposed facilities would increase demand on the water supply system due to the increase of 417 new personnel, including new GBSD FTU/Schoolhouse instructors and students. To estimate the potable water usage by the new personnel, a rate of 150 gallons per person per day was used for the 140 personnel that would

reside on VAFB and 50 gallons per person per day was used for the 277 personnel that would reside off-installation. These potable water rates are identified in AFPAM 32-10144, which specifies 150 gallons per person per day for facilities occupied on a 24-hour-per-day basis and 50 gallons per person per day for administrative or industrial facilities occupied on an 8-hour-shift-per-day basis, plus any water needed for industrial or irrigation purposes. Using these planning rates, 417 new personnel would increase VAFB's potable water demand by approximately 34,850 gpd. The primary source of potable water on the installation is via a water allotment from CCWA, which is variable based on the statewide precipitation of the previous year. This water supply is usually sufficient as the headroom when using the average CCWA allotment is 364,033 gpd; however, during peak demand there is a 253,967 gpd deficit. During average demand, the CCWA water allotment would be sufficient to support the GBSD Test Program, as well as the ongoing Minuteman III program activities and other existing missions. However, during peak water demand, the GBSD Test Program would increase the water deficit by approximately 14 percent. When the CCWA allotment is below the installation's requirement, VAFB supplements the CCWA allotment with water from on-installation wells. Therefore, the water supply provided by CCWA allotment and on-installation wells would be able to accommodate the increased demand of the GBSD Test Program even during CCWA deficits, and long-term impacts would be minor. Additionally, existing facilities proposed for use may require upgrades or modifications to water infrastructure, which could result in long-term, beneficial impacts on the installation's water supply system. Beyond the 10-year test program, the water usage would be expected to decrease once the transition from Minuteman III to the GBSD system is complete.

Wastewater Management

Long-term, negligible, adverse, and beneficial impacts on the VAFB wastewater management system would be expected from the activities conducted during operations and maintenance of the GBSD Test Program. Operation of the GBSD facilities would increase demand on the wastewater management system due to the increase of 417 new personnel. Based on guidance in AFPAM 32-10144, a sewage rate of 80 percent of domestic water consumption, which is 27,880 gpd, was used to estimate the increased demand on the wastewater management system from 417 new personnel. The additional wastewater would increase the installation's average discharge to the Lompoc Regional Wastewater Reclamation Plant by approximately 3 percent, which the WWTP would be able to accommodate. The necessary sewer infrastructure would be extended and upgraded as needed to accommodate the new GBSD facilities, and some of the increased demand would be accommodated at other wastewater treatment facilities (septic and leach field systems) at more remote areas of the installation. There would be no increase in wastewater generation from the ongoing Minuteman III test program. Existing facilities proposed for GBSD Test Program use may require upgrades or modifications to wastewater infrastructure, which could result in long-term, beneficial impacts on the installation's wastewater management system. Beyond the 10-year test program, the

wastewater demands would be expected to decrease once the transition from Minuteman III to the GBSD system is complete.

Stormwater Drainage

Long-term, negligible, adverse impacts on stormwater drainage at VAFB would be expected from the activities conducted during operations and maintenance of the GBSD Test Program. Operation of the proposed facilities and infrastructure would increase impervious surfaces at VAFB by 35 acres, which could increase stormwater runoff. The sites of the proposed GBSD facilities in the Main Cantonment Area would be graded to direct stormwater runoff away from the facilities and required drainage infrastructure (e.g., swales, inlets, and underground piping) would be installed to collect, transport, and control additional runoff to minimize impacts. There would be no new impervious surface at the launch and launch support facilities that are outside of the Main Cantonment Area. The new GBSD facilities would be designed to comply with the VAFB Post-Construction Stormwater Standards. Additionally, in accordance with Section 438 of the EISA, design of the new GBSD facilities would incorporate appropriate low impact development techniques to the maximum extent technically feasible to minimize potential increases in stormwater runoff associated pollutants in order to maintain the predevelopment hydrology of the project areas. All areas disturbed during construction would be revegetated and the new GBSD facilities in the Main Cantonment Area would include appropriate landscaping features to facilitate on-site infiltration, and vegetated drainage ditches/swales and porous pavements may be incorporated into the design. Several facilities within the Main Cantonment Area would have permanent stormwater retention ponds. There would be no increase in stormwater runoff from the ongoing Minuteman III test program.

Solid Waste Management

Long-term, negligible, adverse impacts on the solid waste management system at VAFB would be expected from the activities conducted during operations and maintenance of the GBSD Test Program. Operation of the GBSD Test Program would increase the quantity of solid waste generated at VAFB due to the 417 new personnel. To estimate the solid waste generated by the new personnel, a rate of 4.5 pounds of municipal solid waste per person per day was used (USEPA 2019b). Therefore, 417 new personnel would generate an additional 1,877 pounds of municipal solid waste per day. VAFB diverts approximately 84 percent of the nonhazardous municipal solid waste generated on the installation through recycling or reuse. Assuming the same diversion rate, the GBSD Test Program would generate approximately 300 pounds of municipal solid waste per day. This increase in waste generation would be negligible and could be handled by current solid waste disposal practices and disposed of at the Santa Maria Regional Landfill or Tajiguas Sanitary Landfill, which have capacity through 2027 and 2036, respectively. There would be no increase in solid waste from the ongoing Minuteman III program. The existing VAFB solid waste management contract would be amended to accommodate collection and disposal of solid waste generated at the proposed GBSD facilities.

Beyond the 10-year test program, the amount of solid waste generated would be expected to decrease once the transition from Minuteman III to the GBSD system is complete.

4.2.2.9 Noise – VAFB

4.2.2.9.1 Site Preparation and Construction

Short-term noise is anticipated to occur during the construction and/or modification phase of the LFs, test pad, launch control, the new Consolidated Maintenance Facility, new GBSD Component Operation Facility, parking, new booster processing facility, and new GBSD Schoolhouse. Short-term effects would be due to noise from the use of construction equipment (i.e., light and heavy equipment) during construction and modification. These activities would take place over a 3-year period (FY 2021–2025). The noisiest construction equipment such as saws, bulldozers, backhoes, and tractors would primarily occur during the first phase of construction, such as site preparation and foundation development that could last approximately 1 year.

General Construction Noise: Throughout the approximately 3-year construction period, construction noise would occur in phases based on the construction completion schedule. Construction would typically occur during normal working hours (6:00 a.m. to 5:00 p.m.) on Monday through Saturday. Nighttime construction activities are not planned.

Standard ambient background noise at VAFB is associated with automobile and truck traffic, aircraft operations (approximately 32,000 per year, including landings, takeoffs, and training approaches and departures for both fixed-wing and rotary-wing aircraft), and Southern Pacific trains passing through the base (an average of 10 trains per day). **Table 4-20** shows the typical background noise levels at VAFB. Typical noise levels of construction equipment at a distance of 50 feet are listed in **Table 4-7**.

Table 4-20. Typical Background Noise Levels at VAFB

Activity	Noise Level (dB)
Automobile	60 dB
Truck	90 dB
Aircraft Operations	110 dB
Train	85 dB

As indicated in **Table 4-7**, the typical noise level of the construction equipment (83 dB) and the typical ambient background noise of the proposed GBSD project sites (approximately ≤ 110 dB) there would be no impact in the overall noise level during the construction phase. In summary, construction noise could be audible during certain phases of construction at the closest noise-sensitive locations (i.e., buildings within 100 feet of project area). Additionally, noise attenuate

by 6 dB at each doubling of the distance away from the source. For example, if the source is 90 dB 50 feet away, it would be expected to be 84 dB 100 feet away and 78 dB at 200 feet away (Cowan 1994).

Overall impacts from noise during construction would be short-term and is not anticipated to cause significant noise impacts.

Occupational noise exposure prevention procedures, such as hearing protection, would be required at the construction sites to comply with all applicable OSHA occupational noise exposure regulations. Therefore, significant impacts to workers at the construction sites from proposed construction related activities are not anticipated.

4.2.2.9.2 Flight Test Activities

Noise exposure from pre-flight activities is minimal. Noise exposure from pre-test preparation and support would be generated by the use of vehicles, personnel, and other handing equipment. Noise exposure must comply with Air Force Instruction 48-127 governing the Occupational Nose and Hearing Conservation Program as described in **Section 3.1.6.1**. Therefore, no significant impact is anticipated from noise during pre-test preparation and support activities.

The Proposed Action would involve a continuation of Minuteman III launches from VAFB with the addition of GBSD launches. During the 10-year test period there would be an increase in the annual flight tests for the last 6 years (FY 2024–2029). **Table 4-21** shows the percent increase in number of flight test events would range from 25-150 percent. Historically the noise levels generated can range from 125 dB (or higher [Lmax]) in the immediate vicinity of the launch site, to around 80 dB near Lompoc. Santa Maria can experience maximum noise levels of approximately 95 dB, while the community of Guadalupe may be exposed to maximum noise levels of around 105 dB. (USAF 2004)

Table 4-21. Proposed Number of GBSD and Minuteman III Flight Tests from VAFB by Fiscal Year

Test Program	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
GBSD	0	0	0	4	4	5	6	5	4
Minuteman III	4	5	3	4	4	4	3	3	3
Total Flight Tests	4	5	3	8	8	9	9	8	7
Percent Increase	0%	0%	0%	100%	100%	125%	200%	166%	133%

While these noise exposure levels can be characterized from moderately loud to uncomfortable, they occur infrequently and are very short in duration (about 20 seconds per launch audibility). The additional GBSD flight tests beginning in FY 2024 are anticipated to have similar noise

levels and duration as the Minuteman III, and the GBSD flight test would not occur at the same time as the Minuteman III flight tests. Although the GBSD test would increase the overall annual flight tests, the total number of tests equates to one test per month (or less) with a duration of about 20 seconds per launch. Therefore, no significant impact from noises is anticipated during flight test of both Minuteman III and GBSD launches. Additionally, during flight test activities all personnel (USAF and contractors) working in close proximity of the launch site during the near the area at time of launch are required to wear adequate hearing protection in accordance with USAF Hearing Conservation Program requirements. It is anticipated that overall noise levels would decrease after Minuteman III launches are discontinued. Therefore, no significant impact is anticipated from noise levels during flight test and impact activities.

Sonic booms generated by the flight test missile typically start reaching the surface some distance downrange of the launch site. These sonic booms generally occur far off the coast over ocean waters, and therefore are not an issue affecting coastal land areas to the south. In addition, the sonic booms are typically audible for only a few milliseconds. (USAF 2004) There would be limited activities associated with the post-launch operations (i.e., site cleanup operations) at VAFB. Because of the limited activities, limited levels of noise would be generated. Therefore, no significant impacts to ambient noise levels are anticipated.

4.2.2.9.3 Operations and Maintenance

Overall, based on the most recent data and this analysis, the continuing Minuteman III launch actions combined with the GBSD launch actions, the launches per year would have no significant impact on ambient noise levels. The potential for launch noise and sonic boom impacts on protected wildlife species and sensitive habitats is discussed in **Section 4.2.2.2**. Sonic booms generally occur far off the coast over ocean waters, and therefore are not an issue affecting coastal land areas to the south. In addition, the sonic booms are typically audible for only a few milliseconds.

4.2.2.10 Socioeconomic/Environmental Justice – VAFB

4.2.2.10.1 Site Preparation and Construction

Implementation of the Proposed Action would be expected to have a positive socioeconomic impact on the ROI during the site preparation and construction phase. The adjacent jurisdictions would secure a positive socioeconomic impact if local contractors are hired to construct the interim or permanent facilities associated with the Proposed Action. If workers from outside the region are used to implement the Proposed Action, positive socioeconomic impacts also would be expected, with direct benefits to accommodation, food, retail, and other industries, in addition to local fiscal benefits from associated sales tax revenues.

Temporary site preparation and construction activities are expected to require up to approximately 100 support personnel during construction. Construction personnel would be

housed in motels or hotels within the surrounding cities of VAFB. Site preparation and construction activities would not cause any displacement of populations, residences, or businesses within the areas surrounding VAFB. There are numerous hotels and motels situated within the surrounding cities of Lompoc, Santa Maria, and Guadalupe, and the availability of temporary accommodation is adequate.

By spending money in the local economy, mainly via accommodation and procurement of goods and services, the additional personnel would represent both a potential increase in local service based employment opportunities and a small but positive temporary economic impact to the local communities. The overall impact would, however, be slight and would not cause any population growth. No significant impacts to locally significant businesses or industries such as services, agriculture or manufacturing are anticipated during operational activities. No significant socioeconomic impacts would occur through the construction activities associated with the proposed action.

4.2.2.10.2 Flight Test Activities

Santa Maria and Lompoc are the nearest sizable municipalities to VAFB. Combined, these cities had a total of 1,835 vacant housing units in 2017 (USAF 2019e). Additionally, there are a limited number of vacant on-base housing units at VAFB. As of 2018, VAFB had 999 homes, of which 132 homes were vacant (USAF 2019e). Assuming that the majority of the personnel would be from the region, the current housing supply and associated public and private services should be able to meet the demands of the new population required for the Proposed Action without resulting in significant long-term socioeconomic and environmental justice impacts.

Based upon the 2019 estimated Census of Population and Housing, the total population of Santa Barbara County is 446,527 persons (U.S. Census Bureau 2020). Of that total, 56,262 persons, or 12.6 percent, were low income, equally distributed amongst the communities of Lompoc, Santa Maria, Solvang, and Guadalupe, and 65,192 persons, or 14.6 percent, were minority. The Proposed Action would occur on an existing installation, and proposed activities would be conducted in a manner that would not substantially affect human health or the environment. This EA/OEA or previous NEPA documents have identified no effects that would result in disproportionately high and adverse effect on minority and low-income populations in the area. The activities would also be conducted in a manner that would not exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination because of their race, national origin, or income.

4.2.2.10.3 Operations and Maintenance

GBSD Test Program operations at VAFB are expected to begin in FY 2021 as facilities become available for use. Once all facilities are completed and usable, approximately 277 new personnel (i.e., 260 personnel, 17 FTU instructors) would work on site throughout the approximate 10-year test program. All new military personnel, FTU instructors, government

civilians, and contractors working at the GBSD Test Program would be expected to have or find housing and related amenities/services in the local communities. Personnel who are community-based could already be living in the area, which may not add to the housing demand. Based on the increase in population and the possibility that a percentage of the increased population are already living in the area and would not have a negative impact on the housing shortfall, the housing shortfall would cause negligible impacts over a 10-year period. The temporary FTU students (approximate 140 monthly) are anticipated to lodge temporary on VAFB during class/training periods, which will not add to the housing demand or other services. FTU students may have a positive impact by their potential use of amenities/services (i.e., restaurants, shopping, car rental) in the local communities.

This EA/OEA has identified no effects that would result in disproportionately high or adverse effects on minority or low-income populations in the area. The activities would also be conducted in a manner that would not exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination because of their race, color, national origin, or socioeconomic status.

4.2.2.11 Transportation/Traffic – VAFB

4.2.2.11.1 Site Preparation and Construction

Short-term, negligible, adverse impacts on transportation/traffic at and near VAFB would occur during site preparation and construction. No site preparation and construction are currently planned for the Minuteman III program. Based on the amount of construction and modifications for the proposed GBSD facilities at VAFB, site preparation and construction activities are expected to require up to approximately 200 workers on site and 10 truck deliveries per day. Assuming each worker drives separately, this would result in a total of 420 trips per day (one entering the base and one leaving). Construction would begin in FY 2021 with planned completion of all facilities by FY 2025.

As part of site preparation and construction, approximately 150 haul truck trips would be needed to transport approximately 1,715 cubic yards (46,250 cubic feet) of shale rock from the Curly Borrow Pit on VAFB (near the Titan Gate) to LF-04 for the firebreak. Each haul truck is assumed capable of transporting up to 12 cubic yards of material per trip. These haul trucks trips would stay entirely on existing VAFB roadways for the approximately 6.5-mile distance and avoid the most heavily trafficked portions of the installation. As such, only short-term, negligible, adverse impacts on transportation/traffic would result from the haul truck trips.

The proposed GBSD Test Program at VAFB would use some existing facilities and require the construction of several new facilities. Roadway and parking improvements would be implemented, which include construction of approximately 590,000 ft^2 of paved roadways, parking, and sidewalks at the Consolidated Maintenance Facility; 504,000 ft^2 of paved roadways, parking, and sidewalks at the GBSD Component Operation Facility; 40,700 ft^2 of

paved roadways, parking, and sidewalks at the GBSD Vehicle Processing Facility; and an undetermined amount of paved roadways, parking, and sidewalks at the GBSD Schoolhouse. Twenty additional parking stalls would be constructed for the MSA. With these modifications, sufficient parking and on-installation roadway capacity would be available to support the proposed GBSD Test Program and existing installation missions.

4.2.2.11.2 Flight Test Activities

Long-term, negligible, adverse impacts on transportation/traffic at and near VAFB would occur during GBSD Test Program activities. Minuteman III-related activities at the installation, as under the No Action Alternative (see **Section 2.1**), would continue. GBSD Test Program operations at VAFB would begin in FY 2021 as facilities become available for use. Up to approximately 277 new personnel, including 17 new Schoolhouse instructors, would work on site throughout most of the approximate 10-year test program. Assuming the 277 new personnel would drive separately, the Proposed Action would result in a total of 554 additional trips per day (one entering the installation and one leaving). It is likely employees would access VAFB from more than one gate. Beyond the 10-year test program, the 17 new instructors would be expected to continue working at and commuting to VAFB until FY 2036 or until the transition from Minuteman III to the GBSD system is complete. Very little additional traffic would be expected from the 140 students using the GBSD FTU/Schoolhouse because these students would be housed on VAFB and would not commute to the installation.

Quantifying AADT on roads approaching VAFB gates is not as straightforward as it is for HAFB. The Lompoc Gate is accessed from Santa Lucia Canyon Road, which is under the jurisdiction of Santa Barbara County and AADT is not available. However, it is reasonable to assume some of the traffic on Santa Lucia Canyon Road is accounted for in the AADT on SR-1 because Santa Lucia Canyon Road is accessed by SR-1 on the north end.

Based on Caltrans data from 2016 to 2018, the average AADT on state routes leading to VAFB gates is 20,100 (**Table 4-22**). This does not account for AADT on Santa Lucia Canyon Road coming from the south. The Proposed Action would add 554 trips per day, which is an increase of approximately 6.8 percent (the percentage increase in AADT would be less if Santa Lucia Canyon Road were included).

Another way to evaluate impacts is to compare the maximum capacity of a highway facility to the AADT. The maximum capacity of a four-lane signalized highway, like SR-1 near VAFB, ranges from 27,300 for stable flow and 40 percent green time at traffic signals to 70,900 for unstable traffic flow and 80 percent green time. Under the worst case scenario, the maximum capacity for SR-1 would be 27,400. The actual AADT is 16,100, which is well below the capacity; thus, the Proposed Action's 554 additional trips per day could be absorbed, if needed. The maximum capacity of a two-lane highway, like SR-246 (in flat terrain with a speed limit of 55 mph), ranges from 13,900 for stable traffic flow to 24,200 for traffic approaching unstable free flow. The existing AADT on SR-246 is 4,000, which is well below the capacity; thus, the

Proposed Action's 554 additional trips per day could easily be absorbed, if needed. Therefore, the flight test activities would not result in more than negligible adverse impacts on traffic on SR-1 and SR-246 (Federal Highway Administration 2017).

Table 4-22. Average AADT Leading to VAFB Gates

Route	Location	Average AADT[1] 2016 to 2018
SR-1	Approach to Santa Maria and Lompoc[2] Gate	16,100[3]
SR-246	Approach to Solvang Gate	4,000
	Total (all gates)	**20,100**

Sources: Calculations based on AADT from Caltrans 2016a, 2017, 2018

Notes:

[1] Average AADT is rounded to nearest hundred.

[2] Lompoc Gate located off Santa Lucia Canyon Road, which is accessed from SR-1.

[3] Average AADT on SR-1 at intersection with California Boulevard.

4.2.2.11.3 Operations and Maintenance

The Proposed Action would result in up to 10 combined Minuteman III and GBSD flight tests per year. In preparation for each flight test, the missile components would be shipped to VAFB from HAFB, the component manufacturer, or other DoD facility by truck or by rail following established routes. The primary manufacturing facility for booster components is in Promontory, Utah, and the shipment of boosters to HAFB likely would occur over south SR-83 to south I-15 for a distance of approximately 55 miles. Interstate highways would be the preferred route for the transportation of missile components to VAFB, although some state and local routes are also used. The most direct vehicular route from Promontory, Utah, to VAFB uses I-15 south through Las Vegas, Nevada, to Southern California, and then west on regional roads to VAFB for an approximate distance of 870 miles. Components would be transported within VAFB to the LFs using installation roads. Like the Minuteman III program, all transportation for GBSD would be accomplished in accordance with DoD, USAF, U.S. DOT, and state DOT policies and regulations. Impacts on traffic/transportation systems from shipping components for the test flights under the Proposed Action would be negligible due to their infrequency.

4.2.2.12 Water

4.2.2.12.1 Site Preparation and Construction

The Consolidated Maintenance Facility, the GBSD Component Operation Facility, the GBSD Vehicle Processing Facility, and the GBSD Schoolhouse would disturb approximately 62 acres across various locations of VAFB. Although this is a large footprint, the VAFB ROI is 98,000 acres and is therefore determined to be negligible. Locally, these large sites would convert

permeable surface area to impermeable surface area, which may have the potential to lessen natural drainage and increase stormwater runoff. To combat this, VAFB and its contractors would follow federal, state, and local regulations regarding maintaining original site hydrology, and revegetate or leave unpaved areas in a permeable state to allow for maximum surface drainage. Revegetating also has the added benefit of reducing potential soil erosion.

The proposed construction for GBSD facilities would not be anticipated to redirect, dam, drain, or withdraw from any of VAFB's surface water or groundwater bodies. Ground disturbing activities may cause soil erosion by wind and water, locally increasing the turbidity of stormwater. Best building and management practices would be in effect during the proposed construction to mitigate site soil erosion, so this effect would be minimal and temporary. VAFB and its contractors would follow the established stormwater management plan and the hazardous waste management plan to ensure there would be no changes to water quality during site preparation and construction. See **Section 4.2.2.12.4** for measures to minimize or prevent impacts to water resources during site preparation and construction are considered part of the Proposed Action.

4.2.2.12.2 Flight Test Activities

VAFB would adhere to all established permits, standard operating procedures, and regulations to maintain water quality health. No water resources would be impacted by pre-test preparation and support for the Proposed Action.

A nominal test would not be anticipated to affect water resources. However, if an early launch abort were to occur, base actions would immediately be taken to remove unburned propellant and any other hazardous materials that had fallen into waterbodies or off the beach in waters up to 6 feet deep. Any recovery from deeper water would be treated on a case-by-case basis.

VAFB would adhere to all established permits, standard operating procedures, and regulations to maintain water quality health. No water resources would be impacted by post-test operations for the Proposed Action.

4.2.2.12.3 Operations and Maintenance

VAFB would adhere to all established permits, standard operating procedures, and regulations to maintain water quality health. No water resources would be impacted by operations and maintenance actions for the Proposed Action.

4.2.2.12.4 Mitigation Measures

The following measures will be implemented to minimize impacts on water resources during construction activities:

- Implement Best Management Practices (BMPs) to prevent soil, chemicals or other pollutants from entering into the storm water system, natural surface water drainages or groundwater.
- BMPs will include erosion and sediment controls, tracking controls, vehicle and equipment fueling and maintenance, spill prevention and control, solid waste management, liquid waste management, concrete waste management, stockpile management and septic waste management as applicable.
- BMPS shall be effectively implemented and maintained as described in a current California Stormwater BMP Manual (California Stormwater Quality Association or similar).
- Erosion and sediment control measures will be in place throughout grading and development of the sites until all disturbed areas are permanently stabilized. Only 100-percent biodegradable erosion control materials would be left in place following project completion.
- Exposed soils will be permanently stabilized with vegetation to prevent erosion and, if applicable, meet the NPDES Construction General Permit Notice of Termination requirements.
- Dust emissions will be controlled.
- Trash will be contained and regularly disposed of. Any trash that escapes from containers shall be collected daily.
- All temporary sediment and erosion control devices including silt fence and wattles with plastic netting will be removed upon project completion.
- Construction materials will be stored in a manner that prevents contact with stormwater. Liquids, petroleum products and hazardous materials will be stored in approved containers and drums and placed in proper containment facilities covered prior to rain events.
- Conduct fueling in a designated location with appropriate spill prevention and control.
- Properly manage concrete curing compound, concrete waste and washout water to prevent pollution. Contain concrete washout water for evaporation in a temporary pit in the staging area or washout trucks off-base. (updated 9/20).
- Portable toilets will have secondary containment and be secured to the ground to prevent falling.
- The placement of poles and access roads, vegetation removal, and heavy equipment access would be completely avoided in surface water drainages to the ordinary high-water mark. This includes dry drainages and drainage areas.

- The VAFB Post-Construction Storm Water Standard requires Low Impact Development measures to maintain or restore, to the maximum extent technically feasible, the predevelopment flow hydrology of the drainage area or areas. A Storm Water Control Plan will be prepared for approval by 30 CES Water Resources.
- Preservation of existing vegetation to the extent feasible.
- Each facility or proximate facilities with construction activity that disturbs one acre or more of soil would obtain coverage under the NPDES Construction General Permit. Contact 30 CES/CEIE Water Resources to begin the process or determine if a permit exemption applies. Draft and final Storm Water Pollution Prevention Plan or Erosivity Waiver documents shall be provided to 30 CES/CEIE. 30 CES will electronically submit final documents to the State Water Resources Control Board (SWRCB) via their SMARTS system. The Contractor shall assist 30 CES/CEIE with the Notice of Intent and file the associated annual fee with the SWRCB. The contractor will implement the SWPPP including BMPs, monitoring, reporting, and sampling and analysis requirements.

4.2.3 Dugway Proving Ground

4.2.3.1 Air Quality – DPG

Air emissions were estimated using ACAM version 5.0.17b. ACAM is an air emissions estimating model that performs an analysis to assess potential air quality impacts. See **Appendix D** for ACAM reports. Generally, emissions of criteria pollutants (i.e., PM_{10}, $PM_{2.5}$, NO_x, SO_x, VOC, and CO) and GHGs (i.e., mostly CO_2e) during construction activities would be expected. Project-specific direct and indirect emissions would primarily be driven by the following activity:

- Site Preparation and Construction

4.2.3.1.1 Site Preparation and Construction

Direct impacts to air quality would occur as a result of increased emissions from construction equipment, vehicles, and fugitive dust during site preparation (beginning in FY 2022). A temporary increase in emissions (i.e., fugitive, VOCs, CO_2e) would occur as a result of site preparation and construction activities. As listed below, associated activities are anticipated to begin in FY 2022 and end in FY 2025.

- Site grading: 435,600 ft^2
- Trenching: 79,488 ft^2
- Construction: 50,000 ft^2
- Personnel: 40 Construction Workers (including vehicle exhaust)

- Temporary Concrete Batch Plant
- GHG (CO_2e) from Construction

Construction/Demolition Activities

Table 4-23 shows the estimated emissions from construction phases (i.e., tons). **Table 4-24** indicates the highest annual estimated emissions (construction equipment and construction workers) during the 4-year construction are below significant indicator levels for pollutants of concern and therefore no significant impacts to air quality are anticipated during construction. There is a potential for high wind gusts at DPG that could impact the amount of fugitive dust produced. The implementation of the dust control measures in **Section 4.2.3.1.3** could reduce the fugitive dust from high winds during construction. Emissions would be temporary and decrease as construction work is completed. Additionally, construction-related emissions would be short-term, temporary, and would be confined to the construction site area. Exhaust emissions from construction equipment and vehicles would be minimized through implementation of mitigation measures by the construction contractors, including proper operation and maintenance of equipment. Construction personnel-related emissions would be short-term, temporary, and would be confined to the construction site area. The inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soils by 50 percent from uncontrolled levels. Emissions from construction (i.e., dust emission, vehicle traffic) could be reduced by the implementation of control measures listed in **Sections 4.2.3.1.3** and the measures are considered part of the Proposed Action.

Concrete Batch Plant

The estimated emissions for the temporary concrete batch plant were based on the use of 8,200 yd^3 of concrete. The use of concrete trucks over the 30 month period would have a PM_{10} emission of less than 3.0 tpy and thus not included in the annual emissions. Any additional activities not included in the Proposed Action would be considered a separate undertaking under NEPA.

Table 4-23. Estimated Emissions from Construction - DPG									
Activity	**Pollutant Emissions (tons)**								
	VOC	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**NH_3**	**CO_2e**
Construction Phases (tons) (1)	2.2	12.9	15.8	0.04	138.4	0.52	0	0.007	3,637.1
Construction Personnel (tons) (1)	0.26	0.23	2.9	0.002	0.007	0.006	0	0.01	266.7
Concrete Batch Plant (8,200 yd^3)	2.49	31.23	6.73	2.07	19.69	4.49	0	0	N/A
Total Proposed Action Estimated Emissions (FY2022 – FY2025)	**4.95**	**44.36**	**25.4**	**2.11**	**158.1**	**5.0**	**0**	**0.02**	**3,903.8**

Notes: NA = Not Applicable

(1) ACAM calculations (**Appendix D**). Including construction equipment and vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

Table 4-24. Annual Estimated Emissions from Construction - DPG									
Activity	**Pollutant Emissions (tpy)**								
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Construction Phases (tpy) (1)	**0.79**	**4.2**	**5.8**	**0.012**	**57.7**	**0.17**	**0.0**	**0.007**	**1,240**
Significant Indicator Levels (tpy)	100	100	100	250	250	70	25	250	N/A
Exceedance	No	No	No	No	No	No	No	No	N/A

Notes: NA = Not Applicable

(2) ACAM calculations (**Appendix D**). Including construction equipment and vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

4.2.3.1.2 Operations and Maintenance

There are no flight test launches associated with DPG.

An increase in emissions would occur as a result of the operation activities listed below. The activities are anticipated to begin in FY 2025 and end in FY 2029. Overall, the GBSD PSSTF would not have a significant impact to air quality at DPG. Any additional activities not included in the Proposed Action would be considered a separate undertaking under NEPA.

- 100 temporary additional personnel
- Standby Generator and Fuel Tank for PSSTF

Table 4-25 shows the total project operations estimated emissions activities (tons) from FY2025 – FY2029. **Table 4-26** shows the highest annual estimated emissions for the operational activities from FY2025 – FY2029 (tpy). As indicated in **Table 4-26** the estimated emissions for PM_{10} for the installation exceed the significant indicator level by 20.4%. GBSD PSSTF would account for 4.6 percent of the DPGs PM_{10} emissions. DPG would continue to comply with the

current air permit that address the current exceedance of the significant indicator level. See **Appendix D** for the full Record of Conformity Analysis (ROCA) Air Conformity. Additionally, emissions from operations (i.e., dust emission, vehicle traffic) could be reduced by the implementation of control measures listed in **Sections 4.2.3.1.3** and the measures are considered part of the Proposed Action.

Table 4-25. Estimated Emissions for the Operations of Proposed Action at DPG

Activity	Pollutant Emissions (tons)									
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	HAP	CO_2e
40 Operation Personnel (1) for GBSD test	0.87	0.77	9.9	0.006	0.024	0.021	0	0.05	N/A	888.8
Standby Generator(1)	0.04	0.18	0.12	0.038	0.04	0.04	0	0	N/A	21.5
Fuel Tank (1)	0.003	0	0	0	0	0	0	0	N/A	0
Total from Operations of GBSD Facility (1)	**0.913**	**0.95**	**10.02**	**0.044**	**0.064**	**0.061**	**0**	**0**	N/A	**910.3**

Notes: NA = Not Applicable

(1) ACAM calculations (**Appendix D**). Including workers vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

Table 4-26. Estimated Annual Emissions for the Operations of Proposed Action at DPG

Activity	Pollutant Emissions (tpy)									
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	Pb	NH_3	HAP	CO_2e
Operations (tpy)	0.51	2.4	4.6	0.10	13.09	0.92	0.0	0.009	N/A	756.6
Total from Operations of GBSD Facility (1)	**0.51**	**2.4**	**4.6**	**0.10**	**13.09**	**0.92**	**0.0**	**0.009**	**N/A**	**756.6**
2019 Annual Estimated Air Emissions for DPG	**14.5**	**18.5**	**16.1**	**0.43**	**287.9**	**28.9**	**0.039**	**0.93**	**2.06**	**8,377**
Total Estimated Annual Emissions for DPG	**15.01**	**20.9**	**20.7**	**0.53**	**300.99**	**29.82**	**0.039**	**0.94**	**2.06**	**9,134**
Significant Indicator Levels (tpy)	100	100	100	250	250	70	25	250	N/A	N/A
Exceedance	No	No	No	No	Yes	No	No	No	No	N/A
Percent Impact from GBSD to DPG	**3.4**	**11.5**	**22**	**18.9**	**4.6**	**3.1**	**N/A**	**0.95**	**N/A**	**8.2**
Total Emissions for Tooele County	**48,350.5**	**5,721.6**	**33,907.7**	**202.3**	**7,645.5**	**2,680.9**	**N/A**	**N/A**	**6,504.7**	**N/A**
Percent Impact from DPG to Regional Air Quality	**0.03**	**0.36**	**.06**	**0.3**	**3.9**	**1.1**	**N/A**	**N/A**	**0.03**	**N/A**

Notes: NA = Not Applicable

(2) ACAM calculations (**Appendix D**). Including workers vehicle exhaust. NH_3 is included as a precursor to $PM_{2.5}$

Air quality permitting will be required for the use of standby/emergency generators. The use of emergency/standby diesel-fired generators is subject to NESHAP Subpart III. All HVAC systems must comply with federal standards. To prevent significant impacts to air quality boilers (i.e., stationary source) should meet the minimum efficiency requirements as outlined in the State of Utah *Boiler and Pressure Vessel Compliance Manual*. See **Table 4-27** for a list of potential backup generators associated with GBSD operations.

Table 4-27. GBSD Back-up Generators Associated with Operations at DPG

Type		Megawatts (Kilowatts)	Horsepower [3]	Purpose	Use Duration [1,2]	Location
1.	Diesel	0.06 MW (60 kW)	80 hp	Power Source	1,200 hours/year	PSSTF

4.2.3.1.3 Mitigation Measures

Dust Control Measures During High Wind

- Have a water truck on site for daily maintenance of roads during heavy traffic times or high wind days.
- Limit activities during a high-wind event.
- Consider the use of artificial wind barriers to disrupt the erosive flow of wind over unprotected areas.
- Reduce the number of trips on access roads.
- Reduce vehicle speed.

4.2.3.2 Biological Resources – DPG

4.2.3.2.1 Site Preparation and Construction

Under the Proposed Action, construction of the GBSD PSSTF would take place at one of the three alternative locations on DPG. The Proposed Action includes construction of new test facilities for GBSD, possible munitions and live fire test evaluations, and eventual dismantling and disposal of the test facility following completion of testing. This section evaluates the environmental consequences for biological resources of proposed new facility site preparation, construction, and operation at the three alternative locations on DPG.

For all sites, the construction footprint within the proposed sites would be approximately 1 to 1.5 acres in size with an additional temporary laydown area for equipment and material adjacent to the construction site. Construction would take place over a 12-month period and include installation of a 6-foot tall perimeter fence and several 10- to 20-foot tall lighting towers.

See **Section 4.2.3.2.3** for the avoidance, minimization, and monitoring measures that would be implemented to avoid, minimize, or characterize the effects of the GBSD Test Program site preparation and construction on biological resources and are considered part of the Proposed Action.

Site Preparation and Construction Consequences

Site preparation and new construction of facilities at DPG may result in stressors to biological resources including direct physical disturbance, habitat loss and modification, human activity and equipment operation, exposure to hazardous chemicals, and elevated noise levels.

Terrestrial Vegetation. The vegetation in the ROI consists mostly of previously disturbed vegetation types and introduced and invasive species. Habitat loss would occur within the construction area and the laydown area adjacent to the site. Additionally, utilities may need to be extended to the site which would disturb existing vegetation in the utilities corridor. No sensitive or ESA-listed vegetation occurs in the ROI and with implementation of avoidance and minimization measures, proposed new construction would not significantly impact vegetation for any of the three alternative sites.

Terrestrial Wildlife. Wildlife in and near proposed new construction sites and new utility lines may be exposed to habitat loss and modification, elevated noise levels, exposure to hazardous chemicals, and in the case of less mobile species, direct physical disturbance. While some individual animals may be disturbed by construction and leave the construction site or may be affected by physical injury or habitat loss, all of the wildlife known to occur in the ROI are typical and common species on DPG. Implementation of typical construction BMPs for erosion control, for minimizing the risk of introduction or spread of invasive species, and for pollution prevention would further reduce the potential for impacts to wildlife. Proposed construction and operations would not substantially change the available habitat or the population size or distribution for any wildlife species at DPG and impacts would be less than significant under all three PSSTF construction alternatives.

4.2.3.2.2 Operations and Maintenance

Operations and maintenance of the PSSTF would include up to 100 personnel on site during test and training activities and would include munitions and live fire tests (including the use of explosives) at the site. Potential explosives use at the site may result in elevated noise levels of 140 dB at 1,148 feet from the source. The frequency of testing events at the site is unknown but this type of testing is a regular occurrence at DPG.

After sufficient testing of the GBSD PSS has taken place, the test facility will likely be dismantled and disposed of. During dismantling and disposal of the PSSTF, BMPs would be implemented to avoid and minimize impacts to vegetation and wildlife and to ensure proper disposal of hazardous material and waste. Similar to construction, dismantling and disposal of the test facility would have minimal to no impact on biological resources in the ROI.

Operations and Maintenance Consequences

Terrestrial Vegetation. Operation of the PSSTF may result in increased risk of introduction or spread of invasive species, increased risk of wildlife, and exposure to hazardous chemicals. The vegetation in the ROI consists mostly of previously disturbed vegetation types and introduced and invasive species; therefore, no impacts to sensitive vegetation are expected. Munitions and live fire tests do pose increased fire risks. However, measures specified by the DPG Fire Management Plan (U.S. Army 2016) would be implemented to avoid and minimize the risk of fires caused by munitions, live fire, and ordnances, including green-stripping and restoration/rehabilitation measures (U.S. Army 2016). Operations and maintenance would not significantly impact vegetation at DPG.

Terrestrial Wildlife. Wildlife have the potential to be affected by elevated noise levels during operations at the PSSTF. Based on the expected maximum sound pressure levels (140 dB at 1,148 feet), sensitive or special-status wildlife would not be exposed to sound that could cause physical injury. While some common wildlife species near the site may be temporarily startled by munitions and explosives, no physical harm would occur, and wildlife would be expected to resume their normal behaviors and distribution soon after a test event. Elevated noise levels would have minimal to no impact on terrestrial wildlife, including migratory birds.

4.2.3.2.3 Mitigation Measures

Site Preparation and Construction Mitigation Measures

The avoidance, minimization, and monitoring measures listed below would be implemented to avoid, minimize, or characterize the effects of the GBSD Test Program on biological resources and are considered part of the Proposed Action:

- Disturbance shall be kept to the minimum extent necessary to accomplish project objectives and laydown areas should be located in previously disturbed areas when possible.
- All excess materials excavated shall be removed and transported to a designated waste or fill site.
- All erosion control materials used would be from weed-free sources and, if left in place following project completion, constructed from 100% biodegradable erosion control materials (e.g., erosion blankets, wattles, etc.).
- Equipment vehicles (dozers, mowers, etc.) shall be cleaned of weed seeds prior to use in the project area to prevent the introduction of weeds. Prior to site transport, any skid plates shall be removed and cleaned. Equipment should be cleaned of weed seeds daily especially wheels, undercarriages, and bumpers. Prior to leaving the project area, vehicles with caked-on soil or mud shall be cleaned with hand tools such as bristle brushes and brooms at a designated exit area; vehicles may subsequently be washed at an approved wash area. Vehicles with dry dusted soil (not caked-on soil or mud), prior to

leaving a site at a designated exit area, shall be thoroughly brushed; vehicles may alternatively be air blasted on site.

- Fueling of equipment would be conducted in pre-designated location within the staging area and spill containment materials would be placed around the equipment before refueling.
- Heavy equipment operators would inspect and clean equipment for fuel or fluid leaks prior to use or transport and would not intentionally discharge fuels or waste materials into the environment.
- Hazardous material and waste would be handled in adherence with the Best Management Practices detailed in **Section 4.2.3.6** (Hazardous Materials and Waste).

4.2.3.3 Climate Change – DPG

4.2.3.3.1 Site Preparation, Construction and Operations and Maintenance

Considerations for GHG (CO_2e)

The potential effects of GHG emissions from the Proposed Action and alternatives are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the Proposed Action and alternatives have been quantified to the extent feasible in this EA/OEA for information and comparison purposes, including possible reasoned choices among alternatives. **Table 4-24** shows the estimated annual emissions of CO_2e would be 1,240 tpy during construction of GBSD test facility and **Table 4-26** shows the estimated annual emissions of CO_2e would be 756.6 tpy during operations of GBSD test facility.

No indirect impacts would be expected as a result of construction activities associated with the GBSD PSSTF.

4.2.3.4 Cultural Resources – DPG

4.2.3.4.1 Site Preparation and Construction

Potential effects associated with site preparation and construction for the proposed PSSTF are described in the following paragraphs.

Archaeological Resources

Under the Proposed Action, no significant impacts on archaeological resources are anticipated. The Rad Pad alternative sites are within areas that have been previously surveyed. One archaeological site is in close proximity to the utility corridor and would be monitored during construction to ensure its avoidance. DPG would follow its Unanticipated Discovery of Archaeological Resources Protocol in the event that cultural material is found. HAFB's Section

106 determination of no historic properties affected was concurred with by the Utah SHPO on January 15, 2021.

Architectural Resources

Under the Proposed Action, no impacts on architectural resources are anticipated. The three alternative sites are previously undeveloped, and the nearest NRHP-eligible resources are at the Rad Pad site. If utility corridors are extended from the Rad Pad site, long-term impacts would be anticipated to be negligible to minor. Temporary construction impacts associated with utility corridors would be minor and not extend beyond the construction period.

4.2.3.4.2 Operations and Maintenance

Under the Proposed Action, no adverse effects on archaeological or architectural resources are anticipated from operations. PSSTF-related operations and maintenance activities would be similar in nature to other activities currently conducted at DPG.

Any additional activities not included in the Proposed Action would be considered a separate undertaking under Section 106. Such activities would require determination of a new APE specific to that activity, as well as new efforts to identify and evaluate historic properties and determine potential effects on historic properties from the undertaking.

4.2.3.5 Geology and Soil – Alternatives 1, 2, and 3 – DPG

The construction and operation of the PSSTF at DPG would occur at one of three alternative sites were identified, all within a few miles of the Rad Pad Grid Area shown on **Figure 2-5**. The locations of Alternatives 1, 2, and 3 are shown on **Figure 2-15**, with Alternative 3 being the preferred site. Only a portion of the selected parcel would be used for the new facility and temporary construction laydown area. The low-lying facility would be situated on an approximate 1 to 1.5-acre site covered mostly with gravel. Much of the underground facility would be topped with a concrete pad. At most, the underground structure would extend approximately 35 feet in depth.

4.2.3.5.1 Site Preparation and Construction

Constructing the PSSTF would require excavation and other ground disturbance within an approximate 25,000 ft^2 area to a maximum depth of approximately 45 feet. Apart from the access driveway and parking area, all ground disturbance activities are expected to occur within the approximate 1 to 1.5-acre site. Additional temporary laydown areas for equipment and materials would be located adjacent to the construction site within the 10-acre parcel. Little or no ground disturbance would be required for the remote command center trailer or vehicle. For any construction areas with potential soil contamination or presence of MEC, appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance.

During construction, temporary soil erosion would be expected to occur. With proper BMPs, NPDES constraints, and low-impact development during construction temporary soil erosion should be mitigable.

The Rad Pad and its alternative sites are located in is a previously disturbed area and is therefore unlikely to host cryptogamic crust. If cryptogamic crusts are in the Rad Pad area, soil erosion could be a longer-term problem. Destruction of cryptogamic crust by trampling or exposure to fire leads to loss of moisture retention in the soil and therefore greater water and wind erosion impacts (Warren 2014). In studies across multiple arid regions, cryptogamic crusts that were destroyed by military training actions have proven to take decades to rebound, or were sacrificed altogether (Warren, 2014).

4.2.3.5.2 Operations and Maintenance

The Proposed Action at DPG is to establish and operate the PSSTF for the foreseeable future. Long-term soil erosion by water or wind is a possibility at any disturbed site; however, the activity proposed will likely increase the disturbance of natural soil stability at the site (live-fire training exercises, etc.).

4.2.3.6 Hazardous Material and Waste – Alternatives 1, 2, and 3 – DPG

The Proposed Action would have short-term, negligible, adverse impacts on DPG's Hazardous Material and Waste resources during site preparation, construction, operation, and maintenance of the PSSTF. DPG has the hazardous material and waste management resources accessible to accommodate construction and long-term use of the PSSTF. Established hazardous materials and waste management practices would be followed including all local, state, federal, and DoD laws, rules, and regulations.

4.2.3.6.1 Site Preparation and Construction

The proposed PSSTF would be built to the same physical specs as an operational LF for all topside and below grade structures down to the lower floors, but without the full underground missile silo. The steel and concrete structure would be furnished with both operational and non-operational equipment that is representative of what would be installed in a fielded LF facility, excluding the missile. The site would include several poles for lighting and security systems.

For any construction areas with potential soil contamination or presence of MEC, appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance. Standard BMPs for new construction would be followed by DPG personnel and contractors at all times.

Construction of the PSSTF would require excavation and other ground disturbance within an approximate 25,000 ft^2 area to a maximum depth of approximately 45 feet. All excess fill material removed would be disposed of at a designated waste or fill site.

Concrete pads would be constructed for equipment storage, and the fixed power generator and fuel tank. Per DPG's Central Hazardous Waste Storage Facility Storage Permit, an area would be designated to store hazardous or petroleum materials at the site. Additional temporary laydown areas for equipment and materials would be located adjacent to the construction site within the 10-acre parcel.

Hazardous material and waste generated during site preparation and construction would consist mainly of building materials (concrete, metals [pipes, electrical, etc.], lumber), soil, and vegetation debris. All hazardous material and waste generated would be disposed of properly under the WAP and the HWMP.

Potable water and wastewater would be managed by portable systems and would have no additional impact on hazardous materials and waste management at DPG.

4.2.3.6.2 Operations and Maintenance

A gravel access road would extend to the PSSTF from the nearest existing road and gravel-covered parking would be provided outside the fenced facility. Electrical power and fiber optic cable would be extended to the site. For electrical power backup and occasional primary power, a fixed 60 kW generator with an approximate 450 gallon aboveground diesel fuel tank would be installed on site.

The mobile command center trailer or vehicle would be placed approximately 1 mile from the PSSTF for observation and communication purposes. Little or no ground disturbance would be required for the remote command center trailer or vehicle.

Fueling of equipment would be conducted in a predesignated location within the staging area, with spill containment materials accessible at all times. Heavy equipment operators would inspect equipment for fuel or fluid leaks prior to use or transport and would not intentionally discharge fuel or waste materials into the environment.

4.2.3.7 Health and Safety – Alternatives 1, 2, and 3 – DPG

4.2.3.7.1 Site Preparation and Construction

Short-term, negligible, adverse impacts on health and safety would result from construction associated with the proposed PSSTF near any of the three Rad Pad alternative sites and the temporary concrete batch plant at DPG. These activities would increase the health and safety risks for construction workers because of the inherently hazardous activities associated with facility construction. Workers would be potentially exposed to hazards from heavy equipment operation; hazardous materials and chemicals use; and working in confined and noisy environments. For any construction areas with potential soil contamination or presence of MEC, appropriate coordination, investigations, and mitigations would occur or be implemented prior to any ground disturbance.

The selected construction contractor for the PSSTF would be required to develop a comprehensive health and safety plan containing site-specific guidance and direction to prevent or minimize potential risks. The plan would include, at a minimum, emergency response and evacuation procedures; operational manuals; personal protective equipment requirements (e.g., breathing and hearing protection); protocols and procedures for handling, storing, and disposing of hazardous material and waste; information on the effects and symptoms of potential exposures; and guidance with respect to hazard identification.

4.2.3.7.2 Operations and Maintenance

Long-term, negligible, adverse impacts on health and safety would be expected from GBSD program-related actions at any of the three PSSTF alternative sites. Operation of the GBSD PSSTF would include live-fire test and evaluation activities; however, these types of activities are commonly conducted at DPG. Prior to initiating test activities at the PSSTF that would involve use of ordnance or explosive materials, USAF would coordinate with the DPG Safety Office for any readiness requirements associated with range emergency and firefighting services, and for potential post-test UXO inspections. For range safety purposes during operations, an SDZ would be established around the facility. All test activities would be conducted in accordance with the established health and safety policies and procedures that are outlined in **Section 3.3.7.1** for the protection of onsite military personnel and contractors, and the general public.

4.2.3.8 Infrastructure – DPG

As described in **Section 3.3.8**, the analysis of infrastructure for DPG includes electrical power, stormwater drainage, and solid waste management. Natural gas would not be necessary for the construction or operation of the proposed PSSTF, and potable water and wastewater management would be provided via portable systems. Therefore, these infrastructure systems are not discussed for DPG.

4.2.3.8.1 Site Preparation and Construction

Electrical Power

Short-term, negligible, adverse impacts on the electrical power supply system could occur during PSSTF site preparation and construction, and installing power line connections from the DPG electrical power system to the selected alternative site. The pole-mounted electrical lines most likely would be installed along existing roads and trails for a distance of approximately 5 miles to one of the three alternative sites. Temporary service interruptions might be experienced if service is required to be disconnected in the vicinity of work areas while the proposed PSSTF is connected to the existing infrastructure. Where necessary, affected areas within the installation would be notified prior to possible service disruptions. The construction contractor would coordinate any electrical power needed for site preparation and construction activities. Portable generators would be used to supply electrical power needed for site preparation and

construction activities. However, if connection to the DPG electrical power system is complete, the on-site electrical power connection could be used to provide the needed electricity during construction. The increase in electricity demand during site preparation and construction would be negligible.

Stormwater Drainage

Short-term, minor, adverse impacts on stormwater drainage would be expected during site preparation and construction at any of the three PSSTF alternative sites. With the possible exception of the access driveway and parking area, site preparation, staging, and construction could disturb up to approximately 1.5 acres at the selected alternative location. Ground disturbance during these activities would temporarily increase the potential for soil erosion and sediment transport during rain events. Swales and storm sewers within and near work sites in the Main Cantonment Area would be protected during construction to prevent debris from entering the drainage system. Other erosion and debris control measures would be used at work sites in undeveloped areas.

Because site preparation and construction would disturb more than 1 acre, coverage under the UPDES CGP would be required for any of the three alternatives. The discharge of stormwater runoff from construction activities must be authorized by the Utah Division of Water Quality under the UPDES Storm Water Permit for Construction Activities (i.e., CGP) (UPDES Permit UTRC00000). The CGP would require development of a site-specific SWPPP that includes soil erosion and sediment control measures and other BMPs to reduce pollutants in construction stormwater runoff. Implementation of site-specific and standard construction BMPs and other structural controls (e.g., interceptor dikes, silt fences) as well as compliance with applicable statutes, standards, regulations, and procedures would minimize the potential for increased runoff during construction. Impacts on water quality and recharge are addressed in **Section 4.2.3.10**.

Solid Waste Management

Short-term, minor, adverse impacts on solid waste management would be expected as a result of site preparation and construction at any of the three PSSTF alternative sites. Solid waste generated during site preparation and construction of the proposed PSSTF would consist mainly of building materials such as concrete, metals (e.g., conduit, piping, and wiring), and lumber; soil piles; and vegetation debris. **Table 4-28** summarizes the amounts of solid waste (construction debris) anticipated to be generated during site preparation and construction based on an estimated size of the proposed facility (approximately 25,000 ft^2). Contractors would be required to recycle solid waste, including construction debris to the greatest extent possible, thereby diverting it from being landfilled.

Table 4-28. Estimated Construction Debris Generated at DPG				
Activity	Total Square Feet	Multipliers (pounds/ft²)	Debris Generated	
			Pounds	Tons
Building Construction	25,000	4.34	108,500	54.3
Pavement Construction	25,000	1	25,000	12.5
Total			**133,500**	**66.8**

Source: USEPA 2009

Contractors would be required to comply with all relevant federal, state, and local regulations and U.S. Army policies and specifications regarding recycling and disposal of construction debris. Construction and demolition debris and other solid waste that could not be recycled would be disposed of at the English Village Landfill. The landfill has remaining capacity to accept waste through 2100.

4.2.3.8.2 Operations and Maintenance

Electrical Power

No adverse impacts and long-term, negligible, beneficial impacts on the DPG electrical power supply system would be expected during operations and maintenance of the GBSD PSSTF. Alternatives 1, 2, and 3 would increase demand on the electrical power system due to operation of the proposed PSSTF. To estimate the electricity usage by the new facility, site electricity consumption data from the EIA's 2012 CBECS was used. The CBECS did not provide a complementary building type to identify the site electricity consumption of the proposed PSSTF facility; therefore, the electricity consumption for 'other buildings' (24.5 kWh per square foot on annual basis) was used as a conservative proxy (EIA 2016a). Using this electricity consumption as a planning factor, the PSSTF would increase DPG's electrical demand by 612,500 kWh per year. Assuming the PSSTF requires electricity for 2,860 operating hours per year (55 hours per week), the electricity demand would increase by approximately 0.2 MW. The Rocky Mountain Power utility system is large enough that operation of the PSSTF and other DPG missions, would have no impact on the system's generation capacity. The increased demand from operation of the PSSTF would be 3.8 percent and 2.9 percent of the installation's minimum and maximum peak power demand, respectively. For electrical power backup and occasional primary power, a fixed 60 kW generator with an approximate 450-gallon aboveground diesel fuel tank would be installed on site.

Stormwater Drainage

Long-term, negligible, adverse impacts on stormwater drainage at DPG would be expected during operation and maintenance of Alternative 1, 2, or 3 at DPG. Operation of the proposed PSSTF would increase impervious surfaces at DPG by approximately 2 acres, which could

increase stormwater runoff. The site would be graded to direct stormwater runoff away from the facility to minimize impacts. Additionally, in accordance with Section 438 of the EISA, design of the new PSSTF would incorporate appropriate low impact development techniques to the maximum extent technically feasible to minimize potential increases in stormwater runoff associated pollutants in order to maintain the predevelopment hydrology of the project areas. Impacts on stormwater drainage are addressed in **Section 4.2.3.10**.

Solid Waste Management

Long-term, negligible, adverse impacts on the solid waste management system at DPG would be expected during operations and maintenance of Alternatives 1, 2, or 3 at DPG. Operation of the PSSTF would increase the quantity of solid waste generated at DPG due to the increase in personnel. To estimate the solid waste generated, a rate of 4.5 pounds of municipal solid waste per person per day was used (USEPA 2019b). Therefore, the up to 100 additional personnel would generate an additional 450 pounds of municipal solid waste per day. DPG diverts approximately 79 percent of the nonhazardous municipal solid waste generated on the installation through recycling or reuse. Assuming the same diversion rate, each PSSTF alternative could generate approximately 95 pounds of municipal solid waste per day. This increase in waste generation would be negligible and could be handled at the English Village Landfill, which has capacity through 2100. The existing DPG solid waste management contract would be amended to accommodate collection and disposal of the additional solid waste generated by the Proposed Action.

4.2.3.9 Noise – Alternatives 1, 2, and 3 – DPG

4.2.3.9.1 Site Preparation and Construction

Short-term noise is anticipated to occur during the construction phase of the PSSTF. Short-term effects would be due to noise from the use of construction equipment (i.e., light and heavy equipment) during construction and modification. These activities would take place over a 30-month period (FY 2022–2025). The noisiest construction equipment such as saws, bulldozers, backhoes, and tractors would primarily occur during the first phase of construction, such as site preparation and foundation development that could last approximately one year. Any additional activities not included in the Proposed Action would be considered a separate undertaking under NEPA.

General Construction Noise

Throughout the approximately 30-month construction period, construction noise would occur in phases based on the construction completion schedule. Construction would typically occur during normal working hours (8:00 a.m. to 5:00 p.m.) on Monday through Friday. Nighttime construction activities are not planned. Typical noise levels of construction equipment at a distance of 50 feet are listed in **Table 4-7**.

For the three alternative sites, overall impacts from noise during construction would be short-term and are not anticipated to cause significant noise impacts. Any additional activities not included in the Proposed Action would be considered a separate undertaking under NEPA.

Occupational noise exposure prevention procedures, such as hearing protection, would be required at the construction sites to comply with all applicable OSHA occupational noise exposure regulations. Therefore, significant impacts to workers at the construction sites from proposed construction related activities are not anticipated.

4.2.3.9.2 Operations and Maintenance

Operation of the PSSTF (live fire, explosives) would result in temporary increased noise levels during each test event. Test events are anticipated to occur monthly from FY 2025 and potentially last through FY 2029. Overall, elevated noise levels are not expected to impact surrounding buildings, facilities, or ranges on DPG.

4.2.3.10 Water – Alternatives 1, 2, and 3 – DPG

The Proposed Action would have short-term, negligible, adverse impacts on DPG's water resources during site preparation, construction, operation, and maintenance of the PSSTF. DPG has the water management resources accessible to accommodate construction and long-term use of the PSSTF. Established water management practices would be followed including all local, state, federal, and DoD laws, rules, and regulations.

4.2.3.10.1 Site Preparation and Construction

Site preparation, staging, and construction could disturb less than 10 acres at one of the three PSSTF alternative locations. Ground disturbance during these activities would temporarily increase the potential for soil erosion and sediment transport during rain events. A site-specific SWPPP would include sediment control measures and other BMPs to reduce pollutants in construction stormwater runoff.

The underground structure of the PSSTF would extend up to 35 feet in depth into the basin-fill deposits. The depth to water table at each of the three PSSTF alternative sites is unknown, so there is a potential need to waterproof the underground structure. Waterproofing the structure would prevent effects of hydrostatic pressure such as cracking, as well as interior humidity that could potentially cause rust, bacteria, or mold. As discussed in **Section 3.3.10**, the upper interbedded sand and clay units host shallow groundwater and is referred to as the shallow waterbearing zone (DPG 2016).

Potable water and wastewater management would be provided via portable systems. Compliance with federal, state, DoD, and local applicable statutes, standards, regulations, permits, and procedures would minimize the potential effects of runoff or encountered ground water table during construction.

4.2.3.10.2 Operations and Maintenance

Operation of the proposed GBSD PSSTF would increase impervious surfaces due to portions of the facility being topped with a concrete pad. The majority of the site would be covered with gravel, allowing for natural recharge of water into the subsurface. The surrounding area of each of the three PSSTF alternatives is undeveloped, and the soil would be capable of absorbing the excess runoff without altering the hydrogeologic characteristics of the landscape.

Live Fire Test and Evaluation activities also are planned to take place at the PSSTF, which would involve the occasional use of munitions and explosives. This action is a regular occurrence at DPG and would not involve additional controls for maintaining water quality than what is previously established by DPG. Long-term soil erosion by water or wind is a possibility as this activity may increase the disturbance of natural soil stability at the site.

Potable water and wastewater management would be provided via portable systems throughout the operations and maintenance of the PSSTF.

Compliance with federal, state, DoD, and local applicable statutes, standards, regulations, permits, and procedures would minimize the potential effects of stormwater and Live Fire Test and Evaluation activities during operations and maintenance of the PSSTF.

4.2.4 Downrange Test and Support Locations

4.2.4.1 United States Army Garrison–Kwajalein Atoll (USAG-KA)

4.2.4.1.1 Biological Resources – USAG-KA

Under the Proposed Action, both Minuteman III and GBSD testing would occur at USAG-KA. Minuteman III testing would continue with RV impacts in the KMISS area as described (**Section 2.4**) for the No Action Alternative and analyzed in the Minuteman III Modification Supplemental EA (pages 70 to 74 in USAF 2020e). GBSD testing would be similar to Minuteman III testing in many respects but RV impacts may occur either in the deep waters of the KMISS area, on Illeginni Islet, or in the vicinity of Illeginni Islet (i.e., the waters southwest of Illeginni Islet). GBSD testing would involve approximately six tests per year between FY 2024 and FY 2029, which would impact in ocean waters of KMISS or in the vicinity of Illeginni Islet for the majority of flights. Only up to three total tests over the entire test program would impact on land at Illeginni Islet. Each test could involve up to three RVs which may, in some cases, impact in more than one area. Up to three total land RV impacts on Illeginni Islet are planned for GBSD through 2029. The majority of flights would not have an air burst but up to two per year may occur.

This section evaluates the environmental consequences of Proposed Action activities involved with RV impacts in both the KMISS area and in the vicinity of Illeginni Islet in the context of the regulatory setting discussed in **Section 3.4.1.1**.

Flight Test Mitigation Measures at USAG-KA

Over time and through consultation with NMFS and USFWS for Minuteman III activities and for proposed GBSD activities, USAF has developed several avoidance, minimization, and mitigation measures to minimize the impacts of flight testing on protected species and their habitats. These measures, which would be implemented as part of GBSD Test Program activities at Kwajalein Atoll, are very similar to those implemented for Minuteman III (USAF 2015, USAF 2020e) and other recent test programs with payload impacts at Illeginni Islet (U.S. Navy 2019, U.S. Navy 2017). The measures listed in this section would be implemented as part of the Proposed Action and are included in the DEP for GBSD Test Program activities at Kwajalein Atoll.

Consequences of Activities in Deep Offshore Waters

Under the Proposed Action, potential impacts on biological resources in the offshore waters of Kwajalein Atoll may include exposure to elevated noise levels, direct contact from RV components, disturbance from human activity and vessel operation, and exposure to hazardous chemicals. The potential impacts from the GBSD tests are expected to be of the same types and magnitude as for Minuteman III tests under the No Action Alternative. The addition of GBSD tests to this area may lead to additional accumulation of marine debris in the KMISS area and would slightly increase the risk to marine wildlife due to the increased number of tests per year. However, the impacts of the Proposed Action on wildlife species in the offshore waters ROI would still be less than significant.

As under the No Action Alternative, pre-test preparation and post-test activities in deep-water impact zones would include aircraft overflights and potential vessel traffic for placement of sensor rafts. The same avoidance and minimization measures implemented for Minuteman III testing would also be implemented for GBSD testing. With implementation of avoidance and mitigation measures, pre-test and post-test activities are not likely to impact marine wildlife.

During test activities, stressors to marine wildlife would be the same as under the No Action Alternative: sonic boom overpressures, direct contact and shock/sound waves from RV impact, and exposure to contaminants.

Elevated noise levels from sonic booms, air bursts, and RV impact would be the same for GBSD testing as for Minuteman III tests. Physical injury caused by elevated noise levels is extremely unlikely. Even given the increased testing frequency (assuming a total of 10 RV impact events in the KMISS area per year), the estimated number of animal exposures would be substantially less than one per year for marine mammal and sea turtle species (USAF 2019d) These expected sound pressure levels may cause some startle and temporary flush responses in birds, marine mammals, sea turtles, and fish (USAF 2020e); however, no long-term or population-level effects are expected.

Marine wildlife would have the potential to be impacted by direct contact and hazardous chemicals from RV impact in deep water impact zones. While there is a chance that marine mammals and sea turtles near the surface might be struck by RV debris, the chances are very low. The area of potential direct contact would be less than the area with elevated noise levels; therefore, the potential for wildlife exposures to direct contact would be less than those discussed for elevated noise levels and impacts would be less than significant.

Effects from exposure to hazardous chemicals are not expected in deep water impact zones. Most RV components would sink to the ocean floor where they would not be a risk to wildlife. Small quantities of hazardous chemicals such as battery acids and residual fuels may enter the water but would be rapidly diluted by the large volume of ocean water. Materials released during RV impact are not expected to be present in sufficient quantities or concentrations to adversely affect any sensitive or special-status wildlife.

The USAF prepared a Biological Assessment (USAF 2020d) to evaluate the effects of the Proposed Action on UES-consultation species at Kwajalein Atoll and to support consultation with NMFS and USFWS under the UES. The USAF concluded that proposed GBSD Test Program activities in the deep ocean waters of KMISS and the vicinity of Illeginni Islet were not likely to adversely affect UES-consultation species and that impacts would be less than significant. In their Biological Opinion on the effects of GBSD Test Program activities, the NMFS concurred that species in deep offshore waters were not likely to be adversely affected (**Appendix A**).

Consequences of Activities at Illeginni Islet and in Nearshore Waters

Land RV impacts have been discontinued for the Minuteman III program; therefore, future Minuteman III activities would not contribute to consequences at Illeginni Islet. Proposed GBSD testing would include up to three total tests with RV impact on land at Illeginni Islet through 2029. The Proposed Action has the potential to impact biological resources through elevated sound pressure levels, direct contact and shock waves, exposure to hazardous materials, disturbance due to human activity or equipment operation, and vessel strike. The potential impacts from GBSD testing on Illeginni Islet are expected to be similar in types and magnitude as for previously evaluated Minuteman III land impacts (USAFGSC and USASMDC/ARSTRAT 2015) and other recent flight tests with payload impact at Illeginni Islet (U.S. Navy 2019, U.S. Navy 2017). The potential consequences of testing activity at USAG-KA are explained in detail in these documents which are incorporated by reference and summarized below as relevant to GBSD test activities.

Terrestrial Vegetation. Under the Proposed Action, RV impacts on Illeginni Islet would result in crater formation as well as debris and natural substrate being ejected outward from the point of impact. No sensitive vegetation species occur on Illeginni Islet, and the RV impact zone is on a previously disturbed, mostly cleared area on the western end of Illeginni Islet. Any impacts to terrestrial vegetation would be minor and short term.

Terrestrial Wildlife. Under the Proposed Action, GBSD activities would include human activity, equipment operation, elevated noise levels, and RV impact resulting in crater formation and debris. A number of avoidance and minimization measures would be in place for activities at Illeginni Islet to avoid impacts on birds and sea turtles. Despite the presence of suitable habitat, no sea turtle nesting activity has been observed on Illeginni Islet in over 20 years. With implementation of pre-test monitoring, it is not likely that sea turtles would be impacted by the Proposed Action. The USAF has prepared a Biological Assessment (USAF 2020d) to evaluate the effects of the Proposed Action on sea turtles at Illeginni Islet. The USAF has initiated informal consultation with the USFWS on potential effects of the Proposed Action on sea turtles in terrestrial habitats and requested their concurrence with the USAF determination that the Proposed Action may affect but is not likely to adversely affect sea turtles on Illeginni Islet.

Birds in and near the payload impact zone also have the potential to be impacted by elevated noise levels, direct contact, and human disturbance. The impact zone is composed primarily of previously disturbed habitat, but some black-naped terns have the potential to nest in the impact zone (U.S. Navy 2019). For previous testing, USFWS estimated that no more than 12 black-naped terns (4 adults and 8 eggs or chicks) would be expected to be in the impact area during daylight hours (Appendix A of U.S. Navy 2019). A maximum of 16 black-naped terns could be in the area when both adults are roosting at or near the nests (U.S. Navy 2019). Several avoidance and minimization measures would be implemented as part of the Proposed Action based on recommendations from the USFWS for past tests (U.S. Navy 2019) as detailed earlier in this section. With these mitigation measures in place, no adverse effects to black-naped terns are expected. The impacts to black-naped terns and other birds from direct contact, elevated noise levels, and human activity on Illeginni Islet would be less than significant.

Marine Vegetation. Marine vegetation, including seagrass, is not expected to be impacted by the Proposed Action at Illeginni Islet. Most macroalgae species found at Illeginni Islet are common and likely to be found throughout Kwajalein Atoll (U.S. Navy 2019). Seagrass beds are known to occur in Illeginni Harbor as well as down the slopes in and near the harbor entrance (U.S. Navy 2019). However, vessel traffic as a result of the Proposed Action is not expected to alter benthic habitats or impact seagrass beds.

Marine Wildlife. Under the Proposed Action, marine wildlife in nearshore habitats have the potential to be impacted by direct contact from RV debris and ejecta, elevated noise levels, vessel strike, exposure to hazardous materials, and human activity and equipment operation.

Elevated noise levels due to sonic booms, RV impact, and equipment operation have the potential to affect the behavior and hearing sensitivity in birds, sea turtles, and fish. Loud sounds might cause these organisms to quickly react, altering their normal behavior either briefly or more long term or may even cause physical injury. The extent of these effects depends on the frequency, intensity, and duration of the sound pressures as well as on the hearing ability and physiology of the organism. Additional information about the potential effects

of elevated noise levels and effect thresholds can be found in the GBSD USAG-KA Biological Assessment (USAF 2020d). As discussed for deep ocean waters of Kwajalein Atoll, the expected sound pressure levels may cause some startle and temporary flush responses in birds, sea turtles, and fish near Illeginni Islet (USAF 2020d). However, animals are expected to return to normal behaviors within moments of exposure and impacts would be minor and short-term.

At Illeginni Islet, impact of the RV on land would result in ejecta and/or shock waves radiating out from the point of impact. For Minuteman III, ejecta resulting from crater formations was estimated to extend no more than 200 to 300 feet from the impact location (USAF 2015, U.S. Navy 2019). Based on observations from Minuteman III and other payload testing at Illeginni Islet, most of the RV materials and substrate ejecta would remain close to the edge of the crater and the density of ejecta would be expected to decrease with distance from the impact point (USAF 2015). Since a nearshore or shoreline strike is not expected, most of this ejecta would fall on land. However, since the exact impact location and distribution of ejecta is unknown, these analyses assume a worst-case scenario of a shoreline strike where ejected debris could enter the nearshore marine environment. UES-listed consultation and coordination corals, mollusks, fish, and sea turtles within 300 feet of an RV impact have the potential to be harmed by debris.

For Minuteman III tests, shock waves resulting from payload impact were estimated to be strong enough to damage corals out as far as 123 feet from the point of impact (USAF 2015). If impact occurred on the shoreline, shock waves would propagate into the submerged seafloor (USAF 2015). No shoreline impact is planned for GBSD testing; however, is assumed that shock waves strong enough to damage corals might propagate up to 123 feet into the marine environment. These shock waves may damage corals but are not likely to impact mollusks, sea turtles, or fish near Illeginni Islet.

The USAF and NMFS calculated the number of UES-consultation species which are likely to be exposed to debris and shock waves based for the worst-case scenario of a shoreline RV impact (details in USAF 2020d and **Appendix A**). The NMFS concluded that up to 31,224 UES-consultation coral colonies and 228 individual UES-consultation mollusks might be exposed to direct contact and shock waves (see **Table 4-29**) for all proposed land impacts combined. A number of other non-consultation invertebrates might also be exposed to debris and shock waves. Not all corals and mollusks exposed to debris or shock waves would be damaged, as the extent of damage would depend on the structure of the coral (i.e., plate-forming corals are more easily broken), but the most likely realized effects would be broken branches or plates or damaged soft tissue. Coral also have the potential to regrow after damage, but regrowth and stress could still have a negative impact on growth rate, reproduction, and disease susceptibility (NMFS 2019). In the event of a shoreline nearshore land RV impact, some consultation invertebrates would likely be harmed. However, based on the known populations and distribution of invertebrate species and the expected effects, the Proposed Action is not likely to

change the distribution, relative abundance, or recovery ability of any species at Kwajalein Atoll. Therefore, the impacts of direct contact and shock waves would be less than significant to invertebrates in the ROI.

Humphead wrasses have the potential to be injured if exposed to direct contact from debris. However, humphead wrasses are generally not found at the surface where they would be most vulnerable to effects from direct contact. These fish are most commonly found in waters a few feet to 197 feet deep (USAF 2020d). The NMFS has concluded that up to 324 humphead wrasse could be harassed, injured, or killed through exposure to direct contact and shock waves (**Appendix A**). Some other, more common species of fish might be harmed. However, no change in the population or distribution of any species at Kwajalein Atoll would be expected and impacts would be less than significant.

Exposure to hazardous materials as a result of the Proposed Action would have minor to no impact on marine wildlife. Several avoidance and minimization measures would be in place as part of the Proposed Action to minimize the potential for hazardous material to affect biological resources. The Proposed Action may result in introduction of potentially hazardous materials (i.e., DU, beryllium, cadmium, chromium, and lead) into terrestrial and marine habitats. Heavy metals may accumulate in sediments and benthic invertebrates and even fish have the potential to accumulate heavy metals (França et al. 2005, Eisler et al. 1978). The potential for accumulation is metal specific and species specific, dependent on the trophic level of the wildlife and in some cases on metal concentrations (Chen et al. 2016). There is some evidence that uranium concentrations in some freshwater invertebrates is related to uranium concentrations in water and sediments; however, uranium is not known to biomagnify in food webs (Bergmann and Graça 2019). There is also evidence that beryllium does not bioconcentrate in aquatic organisms or food webs (U.S. Department of Health and Human Services 2002). As described in **Section 3.4.1.2**, soil and groundwater testing at Illeginni Islet indicate that beryllium and uranium in samples remain below the USEPA screening levels. Since DoD test activities primarily occur on land at Illeginni Islet, it is unlikely that marine waters or sediments would have higher concentrations of these hazardous materials than samples from Illeginni Islet. It is not expected that proposed testing would result in hazardous material concentrations in the marine environment that would result in accumulation of these chemicals in wildlife, such as mollusks or fish, or that would significantly impact marine wildlife. Considering the planned cleanup of man-made materials, the very small quantities of hazardous materials expected to be introduced into terrestrial and marine habitats, and the dilution and mixing capabilities of the ocean and lagoon waters, materials released during RV impact would not be present in sufficient quantities or concentrations to adversely affect marine wildlife.

Planned human activity and equipment operation in marine areas would only involve vessel traffic to and from Illeginni Islet and use of sensor rafts. No debris recovery or other cleanup activities are expected to be required in shallow nearshore waters. In the event that debris entered the nearshore marine environment, several measures would be in place to protect reef

habitats and UES-consultation species. During planned test activities, nearshore reef-associated species including corals and mollusks would not be impacted by human activity and equipment operation.

Table 4-29. Estimated Total Number of Consultation Coral Colonies and Individual Mollusks Potentially Adversely Affected by Proposed GBSD Activities.

Species	Estimated Total Number of Colonies or Individuals That May be Adversely Affected[1]
Corals	
Acropora microclados	51
Acropora polystoma	51
Cyphastrea agassizi	42
Heliopora coerulea	14,049
Pavona venosa	42
Pocillopora meandrina	16,947
Turbinaria reniformis	42
Coral Subtotal	**31,224**
Mollusks	
Hippopus hippopus	186
Tectus niloticus	9
Tridacna squamosa	33
Mollusk Subtotal	**128**
Fish	
Cheilinus undulatus	**324**

Notes:
[1] The estimated total number of colonies or individuals that may be adversely affected for all three tests with land impact was based on conclusions in the NMFS Biological Opinion for Test activities at USAG-KA (**Appendix A**).

The USAF prepared a Biological Assessment (USAF 2020d) to address the effects of the Proposed Action on UES-consultation species at Illeginni Islet and to support consultation with NMFS and USFWS under requirements of the UES. The USAF has concluded that the Proposed Action may adversely affect seven coral species, three mollusk species, and one fish species (**Table 4-29**) but is not likely to adversely affect consultation sea turtles, or other consultation corals, mollusks, and fish at Illeginni Islet. The USAF has consulted with NMFS and USFWS under the requirements of the UES on the effects of the proposed GBSD test activities at Kwajalein Atoll. The USFWS has concurred with the USAF determination that the Proposed Action is not likely to adversely affect sea turtles on Illeginni Islet or elsewhere on land on Kwajalein Atoll islets (letter of concurrence dated January 7, 2021 in **Appendix A**). The NMFS

concurred with the USAF determination that the Proposed Action is not likely to adversely affect 25 marine consultation species but may result in incidental take of up to 31,224 UES consultation coral colonies, 128 UES consultation mollusks, and 324 UES consultation fish (Biological Opinion dated March 15, 2021 in **Appendix A**). The NMFS has concluded that this level of incidental take is not likely to jeopardize the continued existence of any of the UES-protected species considered in their Biological Opinion.

Flight Test Mitigation Measures – USAG-KA

The following measures would be implemented as part of the Proposed Action and would be included in the DEP for GBSD Test Program activities at Kwajalein Atoll.

Marine Mammal and Sea Turtle Protection Measures

- During travel to and from impact zones, including Illeginni Islet, ship personnel would monitor for marine mammals and sea turtles to avoid potential ship strikes. Vessel operators would adjust speed or raft deployment based on expected animal locations, densities, and/or lighting and turbidity conditions.
- USAG-KA personnel would conduct a helicopter or fixed-wing aircraft overflight of the impact area three times over the week preceding a flight test and as close to launch as safely practical to survey for marine mammals and sea turtles. The final overflight would be within 1 day of the proposed launch. If personnel observe marine mammals or sea turtles in the vicinity, they would report such findings to the USAG-KA Environmental Office.
- Any observations of marine mammals or sea turtles during ship travel or overflights would be reported (including location, date, time, species or taxa, and number of individuals) to the USAG-KA Environmental Engineer who would maintain records of these observations and report sightings to that National Marine Fisheries Service (NMFS) and USFWS.
- Pre-flight monitoring by qualified personnel will be conducted on Illeginni Islet for sea turtles or sea turtle nests. For at least 8 weeks preceding the launch, Illeginni Islet would be surveyed by pre-test personnel for sea turtles, sea turtle nesting activity, and sea turtle nests. If possible, personnel will inspect the area within days of the launch. If sea turtles or sea turtle nests are observed near the impact area, observations would be reported to appropriate test and USAG-KA personnel for consideration in approval of the launch, and to USFWS and NMFS.
- Personnel will report any observations (including location, date, time, species, and number of individuals) of sea turtles or sea turtle nests on Illeginni Islet to the USAG-KA Environmental Engineer who would maintain records of these observations and report sightings to USFWS.

- Although unexpected, any dead or injured marine mammals or sea turtles sighted by post-flight personnel would be reported to the USAG-KA Environmental Office and USASMDC, who would then inform NMFS, USFWS, and the RMI Environmental Protection Authority. USAG-KA aircraft pilots otherwise flying in the vicinity of the impact and test support areas would also similarly report any opportunistic sightings of dead or injured marine mammals or sea turtles.
- Human activity and equipment operation would avoid use or modification of the beach/dune environment during peak sea turtle nesting or hatching season (October through March).
- No native dune vegetation would be removed.
- If a basking sea turtle is found within the project area, all human activity and equipment operation within 100 feet of the animal or between the animal and the ocean would cease until the animal voluntarily leaves the area.

Hazardous Materials and Waste Measures

- Vessel and equipment operations would not involve any intentional discharges of fuel, toxic wastes, or plastics and other solid wastes that could harm terrestrial or marine life.
- Any accidental spills from support equipment operations would be contained and cleaned up and all waste materials would be transported to Kwajalein Islet for proper disposal.
- Hazardous materials would be handled in adherence to the hazardous materials and waste management systems of USAG-KA. Hazardous waste incidents would comply with the emergency procedures set out in the Kwajalein Environmental Emergency Management Plan and the UES.
- Vessel and heavy equipment operators would inspect and clean equipment for fuel or fluid leaks prior to use or transport and would not intentionally discharge fuels or waste materials into terrestrial or marine environments.
- All equipment and packages shipped to Kwajalein Atoll will undergo inspection prior to shipment to prevent the introduction of alien species into Kwajalein Atoll.
- Following a land-impact test, the USAF and USAG-KA would collect soil and groundwater samples at various locations around the impact site and test the samples for beryllium, depleted uranium, and other metals. Testing results that exceed UES criteria would require a soil investigation as detailed in the UES and may require subsequent soil removal or other remediation.
- All project related debris, trash, and equipment would be removed from the beach and dunes if not actively being used.

- No project-related materials or equipment would be stockpiled or stored in the intertidal zone, reef flats, sandy beach and adjacent vegetated areas, or stream channels.

Reef Protection Measures

- To avoid impacts on coral heads in waters near Illeginni Islet, sensor rafts would not be located in waters less than 10 feet deep.
- When feasible, within 1 day after the land impact test at Illeginni Islet, USAG-KA environmental staff would survey the islet and the near-shore waters for any injured wildlife, damaged coral, or damage to sensitive habitats (i.e., reef habitat). Any impacts to biological resources would be reported to the Appropriate Agencies, with USFWS and NMFS offered the opportunity to inspect the impact area to provide guidance on mitigations.
- If an inadvertent impact occurs on the reef, reef flat, or in shallow waters less than 10 feet deep, an inspection by project personnel would occur within 24 hours. Representatives from NMFS and USFWS would also be invited to inspect the site as soon as practical after the test. The inspectors would assess any damage to coral and other natural and biological resources and, in coordination with USAF, USAG-KA, and RTS representatives, decide on any response measures that may be required.
- If any man-made debris were to enter the marine environment and divers were required to search for payload debris on the adjacent reef flat, they would be briefed prior to operations about coral fragility and provided guidance on how to carefully retrieve the very small pieces of payload debris that they would be looking for.
- In the event a payload land impact affects the reef at Illeginni Islet, the USAF will require its personnel to secure or remove from the water any substrate or coral rubble from the ejecta impact zone that may become mobilized by wave action as soon as possible.
    - Ejecta greater than 6 inches in any dimension will be removed from the water or positioned such that it would not become mobilized by expected wave action, including replacement in the payload crater.
    - If possible, coral fragments greater than 6 inches in any dimension will be positioned on the reef such that they would not become mobilized by expected wave action, and in a manner that would enhance its survival; away from fine sediments with the majority of the living tissue (polyps) facing up.
    - UES consultation coral fragments that cannot be secured in-place would be relocated to suitable habitat where they are not likely to become mobilized.
- In the event the payload land impact affects the reef at Illeginni, the USAF will require its personnel to reduce impacts on top shell snails and clams.

  - Rescue and reposition any living top shell snails and giant clams that are buried or trapped by rubble.
  - Relocate to suitable habitat, any living top shell snails and giant clams that are in the path of any heavy equipment that must be used in the marine environment.

- The USAF will assign appropriately qualified personnel to record all suspected incidences of take of any UES-consultation species.
- The USAF will utilize digital photography to record any UES consultation species found injured or killed in or near the ocean target areas and/or at Illeginni Islet. As practicable, the USAF will: (1) photograph all damaged corals and/or other UES-consultation species that are observed injured or dead; (2) include a scaling device (such as a ruler) in photographs to aid in the determination of size; and (3) record the location of the photograph.
- In the event the payload impact affects the reef at Illeginni Islet, the USAF will survey the ejecta field for impacted corals, top shell snails, and clams while also recording any other UES consultation species that may have been affected.
- Within 60 days of completing post-test clean-up and restoration, the USAF will provide photographs and records to the USAG-KA environmental office to be reviewed by the USAG-KA environmental personnel and NMFS biologists.
- Within 6 months of completion of the action, the USAF and/or USAG-KA will provide a report to the NMFS. The report shall identify: 1) The flight test and date; 2) The target area; 3) The results of the pre- and post-flight surveys; 4) The identity and quantity of affected resources (include photographs and videos as applicable); and 5) The disposition of any relocation efforts.

Protective Measures for Birds

- Payload impact would be in the non-forested area.
- The impact zone would be searched for black-naped tern nests and chicks prior to any pre-flight equipment mobilization. Any discovered nests would be covered with an A-frame structure per current USFWS guidance. The area would be monitored to ensure no black-naped tern nests were disturbed during heavy equipment use.
- To prevent birds from nesting on the support equipment after initial setup, the equipment would be appropriately covered with tarps or other materials and “scare” techniques (e.g., scarecrows, mylar ribbons, and/or flags) would be used on or near the equipment.

General Measures at Illeginni Islet

- All relevant project personnel associated with project activities at Kwajalein Atoll will be fully briefed on the BMPs and the requirement to adhere to them for the duration of the GBSD Test Program.
- At Illeginni Islet, should any missile components or debris impact areas of sensitive biological resources (i.e., sea turtle nesting habitat or coral reef), a USFWS or NMFS biologist would be allowed to provide guidance and/or assistance in recovery operations to minimize impacts on such resources. To the greatest extent practicable, protected marine species including invertebrates will be avoided or effects to them will be minimized. This may include movement of these organisms out of the area likely to be affected.
- Debris recovery and site cleanup would be performed for the land impact. To minimize long-term risks to marine life, all visible project-related man-made debris would be recovered during post-flight operations. In all cases, recovery and cleanup would be conducted in a manner to minimize further impacts on biological resources.
- For recovery and rehabilitation of any injured migratory birds or sea turtles found at Illeginni Islet, USFWS and NMFS would be notified to advise on best care practices and qualified biologists would be allowed to assist in recovering and rehabilitating any injured sea turtles found.
- During post-test recovery and cleanup, should personnel observe endangered, threatened, or other species requiring consultation moving into the area, work would be delayed until such species were out of harm's way or leave the area.
- Project activities would incorporate the applicable USFWS "Recommended Standard Best Management Practices" regarding work in aquatic environments including:
    - Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.
    - Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods.
    - Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
    - All project-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for

pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fw1.html) can help to prevent attraction and introduction of non-native species.

- Project-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.
- Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
- All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

4.2.4.1.2 Hazardous Material and Waste

Site Preparation Activities

Other than the use of fuels and lubricants for operating transportation and related support equipment, there would be limited use of hazardous materials at USAG-KA in support of Minuteman III and GBSD site preparation activities. Site preparation activities that would have the potential to develop hazardous material or waste include deployment of radar and heavy equipment to Illeginni Islet.

Any releases of hazardous or non-hazardous waste during site preparation activity at Illeginni Islet would be cleaned up per current UES and KEEP regulations. Impacts on hazardous material and waste at USAG-KA would be considered environmentally significant if the following were to occur:

- If an increase of hazardous material and waste as a result of the Proposed Action exceeded USAG-KA's capacity to manage, store, or dispose of them in accordance with federal, state, or local laws.

- If the hazardous material and waste as a result of the Proposed Action increased the risk of soil or groundwater contamination; or created new human and environmental health risks.
- Minuteman III testing would continue with RV impacts in the KMISS area as applied to the No Action Alternative and analyzed in the Minuteman III Modification SEA (USAF 2020e). GBSD testing would involve approximately six tests per year between FY 2024 and FY 2029 which would impact in ocean waters of KMISS or in the vicinity of Illeginni Islet. Each test could involve up to three RVs which may, in some cases, impact in more than one area. Up to three total land RV impacts on Illeginni Islet are planned for GBSD in total through 2029. Most flight tests would not have an air burst, but up to two per year may occur.

The Minuteman III RS employs either the Mark 12A or Mark 21 operational RV. A Mark 21A RV is currently under development, which is anticipated to include similar materials utilized in the legacy hardware design of the Mk21. For the Minuteman III flight tests conducted from VAFB, the operational RVs are replaced with one to three test RVs (one Mark 21 or up to three Mark 12A RVs) (**Figure 2-2**). The test RVs do not contain any fissile materials; however, they do contain batteries, high explosives, asbestos, DU, and other heavy metals. The individual Mark 12A RVs contain one silver zinc battery (approximately 1.6 pounds), while the Mark 21 RV contains one silver zinc and one thermal battery (total battery weight of approximately 2.4 pounds). All test RVs typically include 0.29 to 22 ounces of asbestos; approximately 0.035 to 0.353 ounces each of beryllium, cadmium, and chromium; approximately 4.8 ounces of lead; and less than 187 pounds of DU. Only two test RVs per year contain high explosives (USAF 2004, 2013a, 2020e). As described in **Section 2.2.1**, the design of the GBSD Weapon System would be similar to the Minuteman III system described above. The GBSD flight test missile PBACM includes a PBPS with liquid hypergolic propellants and a PRS. For electrical power, the GBSD weapon system also would contain multiple batteries like those described above for Minuteman III. Although the PRS may be of a new design, the test RVs used for flight testing would be the same or similar to those used for Minuteman III flight testing.

Flight Test Activities

Launch Activities

Illeginni Soil: Up to three total land RV impacts on Illeginni Islet are planned for GBSD. Since existing speed, altitude, and size data are not available for a GBSD payload impact, estimates of reentry vehicle cratering from Minuteman III test flights (USAFGSC and USASMDC/ARSTRAT 2015) were used as a bounding case for potential impacts. Minuteman III RV data was used as an analog for GBSD to understand the potential environmental consequences of the Proposed Action. No Minuteman III RVs are anticipated to impact Illeginni as a result of this Proposed Action. The Minuteman III RV ejecta field from crater formation at impact was expected to cover a semicircular area (approximately 120º) extending 200 to 300 feet from the impact, and the density of ejecta was expected to decrease with distance from the

point of impact (USAFGSC and USASMDC/ARSTRAT 2015). Craters from Minuteman III RVs have been documented to be 20 to 30 feet in diameter and 7 to 10 feet deep. During impact, the GBSD payload particles could partially disintegrate into fugitive dust around the impact site and a short distance downwind. Based on the composition of existing Minuteman III RVs, if all the payload particles deposited into the top 1 inch of soil on Illeginni Islet then the expected concentration of toxic heavy metals would be very low. The maximum potential concentrations on Illeginni Islet would be far below toxic concentrations for humans. Illeginni Islet is an active range it not considered a residential area (USASMDC 2021a). Therefore, the Regional Screening Levels in Soil for Composite Workers shall be used as the basis of understanding risk (USEPA 2020d). The most stringent criteria shall be utilized where the UES (USASMDC 2021a) does not specify an RSL. For beryllium, the RSL is 160 mg/kg (USASMDC 2021a). For cadmium, the RSL is 1,200 mg/kg (USEPA 2020d). For chromium (Cr-III), the RSL is 1,800,000 mg/kg, and for Cr-VI the RSL is 6.3 mg/kg (USEPA 2020d). For lead, the RSL is 800 mg/kg (USEPA 2020d) (HQ=1). For DU, the RSL is 47 mg/kg (USASMDC 2021a).

Soil samples taken at Illeginni Islet for a previous program flight test post-test survey and sampling report described pre-test and post-test soil sampling results for uranium, beryllium, and tungsten at 34 sites (RGNext 2020). The pre-and post-test sampling revealed beryllium and tungsten were undetected, and uranium detected in 9 out of 34 soil samples (results ranging from 1.8 mg/kg to 4.3 mg/kg), but well below the USEPA composite worker regional screening level (ingestion and inhalation) (RGNext 2020, USEPA 2020d). Observed soil concentrations of beryllium and DU on Illeginni Islet from prior RV tests do not exceed the USEPA RSLs for assessing the need for soil cleanup under the UES (USAF 2020e). Comprehensive soil analyses have shown that the concentrations of beryllium and uranium on Illeginni Islet are at the natural background concentrations found in soils on other coral atolls in the northern Marshall Islands and at other global locations, and additional missile tests would not cause redistribution of the pre-existing contaminants on the islet (RGNext 2020; Robison 2005, 2006, 2010, 2013).

Illeginni Groundwater: Illeginni Islet is an active range and is not considered a residential area (USASMDC 2021a). Illeginni Islet has no surface water; groundwater is very limited in quantity with no pathways to public or private consumption, is saline, and non-potable. Freshwater used to minimize fugitive dust following impacts would not be allowed to flow to the lagoon or ocean and would evaporate in place. In the unlikely event of an accidental release of a hazardous material or petroleum product at the impact site, emergency response personnel would comply with the UES KEEP. The most stringent groundwater quality criteria shall be utilized where the UES does not specify an MCL for hazardous pollutants in non-residential groundwater. For beryllium, the Primary Standard MCL is 0.004 mg/L (USASMDC 2021a). For cadmium, the Primary Standard MCL is 0.005 mg/L (USASMDC 2021a). For chromium, the Primary Standard MCL is 0.1 mg/L (USASMDC 2021a). For lead, the Primary Standard MCL is 0.015 mg/L (action level) (USASMDC 2021a). For DU, the Primary Standard MCL is 0.030 mg/L (USASMDC 2021a). Minuteman III RV data was used as an analog for GBSD to understand the potential

environmental consequences of the Proposed Action. No Minuteman III RVs are anticipated to impact Illeginni as a result of this Proposed Action. Based on the composition of existing Minuteman III RVs, the maximum potential concentrations would be far below toxic concentrations for humans and based on similar past actions at Illeginni Islet such as Minuteman III, AHW, FE-1, FE-2, and ARRW, this Proposed Activity would not be expected to reach the above screening criteria (Robison, 2005, 2006, 2010, 2013; RGNext, 2020).

A post-test survey and sampling report from a previous program flight test described pre-test and post-test groundwater results for uranium, beryllium, and tungsten at seven wells on Illeginni Islet (RGNext 2020). The pre-and post-test sampling showed little variation in values, with beryllium remaining undetected, tungsten exceeding residential tap water screening levels in 6 of the 12 samples (detected concentrations ranged from 2.3 micrograms per liter [µg/L] to 990 µg/L), and uranium was detected in all 12 samples well below the USEPA MCL for drinking water (detected concentrations ranged from 0.57 µg/L to 5.4 µg/L). Although the groundwater at Illeginni Islet shows tungsten levels above the MCL, the groundwater is not potable under the UES standards. Tungsten is not included in the Minuteman III or GBSD weapon system and are not analyzed further for environmental consequences in this EA/OEA. With the reasonably foreseeable land use at Illeginni Islet as an active range and with the groundwater being not potable, further risk-based analysis and remediation planning is not required at this time. If in the future the land use designation changes, Illeginni Islet would be evaluated under the UES Restoration requirements to determine if the new land use requires institutional controls or remediation.

Post-launch Activities

The GBSD payload would descend onto Illeginni Islet or into the KMISS northeast of Gagan Islet. Post-launch activities include any necessary debris recovery and disposal per the UES for land or water impact, and impact crater remediation for a land-impact. Explosive Ordnance Disposal would be tasked with scanning the impact crater for explosive hazards and properly recovering them if found.

Any floating debris would be recovered and disposed of according to federal and UES standards. NASA conducted a thorough study of the seawater quality effects of missile components deposited in ocean waters (U.S. Navy 2017). NASA concluded that the release of hazardous materials from missiles into seawater would not be significant. The materials would be rapidly diluted and, except in the immediate vicinity of the debris, would not be found at concentrations that produce adverse effects. The payload materials are insoluble and the depth of the Pacific Ocean at the KMISS impact site is thousands of feet where light does not penetrate, levels of oxygen that might interact with materials at the surface are too low for that to occur, and water temperature differences from the upper water layers hamper any mixing between them. Any area on the ocean bottom affected by the slow dissolution of the payload debris would be relatively small, due to the size of the payload debris pieces as compared relative to the volume of surrounding seawater. Therefore, adverse water quality effects from

the payload are expected to be minimal to insignificant. There are no plans to monitor deep water impacts in the BOA, where no mixing with upper layers of water occurs.

Mitigation Measures listed in this section apply to all aspect of flight test and would be included in the DEP for GBSD Test Program activities at Kwajalein Atoll.

Operations and Maintenance

All hazardous and non-hazardous waste would be properly disposed of in accordance with the UES. Hazardous material and waste-handling capacities would not be exceeded, and management programs do not have to change. As a result, no significant impacts from hazardous material and waste management are expected. No hazardous material and waste from the Proposed Action would increase the risk of soil or groundwater contamination or create new human and environmental health risks. If exceedances of UES regulations occur, soil excavation will be conducted to clean up contaminated soil in accordance with the KEEP. No groundwater remediation planning is necessary despite existing tungsten exceedances from past test events because Illeginni Islet groundwater is not potable under the UES, and the land use is designated as an active range. Tungsten is not a contaminant of concern in the Minuteman III or GBSD weapon system. GBSD spent booster motors, PBACM components, and test RVs would be expected to impact primarily in ocean waters at the KMISS away from populations and land areas. Although unlikely, if there were any floating debris it would be recovered and brought onboard a vessel for appropriate handling and disposal from USAG-KA to the United States per the hazardous waste management plan. Considering the small quantities of hazardous materials expected in the payload RVs; the capacity of the USAG-KA hazardous waste management to accept and properly dispose of potential debris per UES standards; and the dilution and mixing capabilities of the ocean waters, the potential for hazardous materials released during the GBSD tests to adversely affect human health or the environment should be deemed insignificant.

Mitigation Measures

Flight Test Mitigation Measures – USAG-KA

The following measures would be implemented as part of the Proposed Action and would be included in the DEP for GBSD Test Program activities at Kwajalein Atoll.

Hazardous Materials and Waste Measures

- Vessel and equipment operations would not involve any intentional discharges of fuel, toxic wastes, or plastics and other solid wastes that could harm terrestrial or marine life.
- Any accidental spills from support equipment operations would be contained and cleaned up and all waste materials would be transported to Kwajalein Islet for proper disposal.

- Hazardous materials would be handled in adherence to the hazardous materials and waste management systems of USAG-KA. Hazardous waste incidents would comply with the emergency procedures set out in the Kwajalein Environmental Emergency Management Plan and the UES.
- Vessel and heavy equipment operators would inspect and clean equipment for fuel or fluid leaks prior to use or transport and would not intentionally discharge fuels or waste materials into terrestrial or marine environments.
- All equipment and packages shipped to Kwajalein Atoll will undergo inspection prior to shipment to prevent the introduction of alien species into Kwajalein Atoll.
- Following a land-impact test, the USAF and USAG-KA would collect soil and groundwater samples at various locations around the impact site and test the samples for beryllium, depleted uranium, and other metals. Testing results that exceed UES criteria would require a soil investigation as detailed in the UES and may require subsequent soil removal or other remediation.
- All project related debris, trash, and equipment would be removed from the beach and dunes if not actively being used.
- No project-related materials or equipment would be stockpiled or stored in the intertidal zone, reef flats, sandy beach and adjacent vegetated areas, or stream channels.

4.2.4.1.3 Noise – USAG-KA

The implementation of the Proposed Action would not require site grading, ground disturbance associated with site preparation, and no construction requirements. Therefore, the implementation of the Proposed Action within the downrange area would have no significant impact to ambient noise levels from site preparation and construction.

Pre-test preparation activities, which may include operations of rafts/sensors, vessel and aircraft operations, are not expected to have any noise impacts downrange. Personnel would comply with all applicable DoD noise management program and noise management requirements as well as with any established international requirements. Therefore, no significant impacts to ambient noise levels are anticipated from pre-test preparation and support of the Proposed Action.

There would be an increase in the number of flight tests between FY 2024 and FY 2029 (see **Table 2-4**). Each flight will be an individual separate flight test. As each descending test flight approaches its designated termination point, sonic booms may initially generate over a very broad area of the open ocean. At the ocean surface, the sound pressure levels for the sonic booms would vary close to the point of impact. The sonic boom footprint would occur almost entirely over open ocean. The duration for sonic boom overpressures produced by the test

could range from 40 milliseconds where the boom is strongest to 124 milliseconds where it is weakest (Moody 2004).

Within the majority of the sonic boom footprint, sound levels are below the 120 dB produced by a thunderclap (Vavrek et al. 2008) and well within the DoD standard of 140 dB (peak sound pressure level) for impulse noise. However, close to the point of impact, maximum sound levels of 150 dB could break windows or crack plaster in structures and cause hearing loss in people. Because the sonic boom footprints normally do not overlap any communities and because of range evacuation procedures during such flight tests, no residents or personnel are expected to be subjected to significant noise-related impacts.

Therefore, no significant impacts to ambient noise levels are anticipated from the flight test segment of the Proposed Action.

In general, noise levels associated with post-test operations would be similar to those generated during pre-test preparation. Thus, no significant impacts to ambient noise levels are expected.

4.2.4.2 Broad Ocean Areas

4.2.4.2.1 Biological Resources – BOA

The locations for GBSD testing are not presented in this EA/OEA; however, based on testing of the Minuteman III and other missile systems and the expected parameters of the GBSD system, we describe the potential types of impacts for biological resources in the BOA. The types of downrange test support activities for GBSD are expected to be similar to those described in **Section 2.1.5** for Minuteman III flight tests. GBSD spent booster motors, PBV components, and test RVs would be expected to impact somewhere in the BOA. For purposes of this EA/OEA, the BOA is defined as any ocean area along the missile's flight path that is outside of territorial seas. Territorial seas are defined as extending 12 nm from a nation's coastline; therefore, the BOA includes international waters but may include the EEZ of some countries. Biological resources in the BOA ROI would depend on the location but would include marine vegetation and wildlife and would likely be similar to the biological resources described for Minuteman III (**Section 3.4.2.1**) and for other missile tests in the BOA of the Pacific (e.g., U.S. Navy 2017, U.S. Navy 2019, and USAF 2020c).

For biological resources, the significance of potential impacts would depend on the biological resources present at proposed BOA locations. However, biological resources could be exposed to elevated sound pressure levels from sonic booms or component splashdown (both in-air and underwater), direct contact from vehicle components or RV debris, and exposure to hazardous chemicals. Environmental analyses for a number of other missile system flight tests within open ocean areas of the Pacific Ocean have been conducted, including for Minuteman III. Generally, environmental analyses for Minuteman III and other missile systems have concluded that there would be no significant impacts to biological resources in the BOA (USAF 2020e, USAF 2013a,

U.S. Navy 2017, U.S. Navy 2019, USAF 2020c). Furthermore, these analyses have indicated that adverse effects to special status species and/or sensitive habitats in the BOA are unlikely for these types of flight tests (USAF 2020e, USAF 2013a, U.S. Navy 2017, U.S. Navy 2019, USAF 2020c). As for other flight test programs, appropriate mitigation measures have been developed to avoid or minimize the potential impacts to any rare, sensitive, or special status species or protected habitats due to proposed GBSD flight testing.

A full analysis of GBSD flight test impacts to biological resources in the BOA has been conducted, and test activities in the BOA would not significantly impact biological resources. While some common marine wildlife might be exposed to loud sounds, proposed activities would not change species abundance or distribution in the ROI. No special-status marine wildlife are expected to be adversely affected by proposed activities. Special-status marine wildlife might be startled by elevated noise levels in the BOA, but no injury or long-term effects are expected. The USAF has determined that the Proposed Action would have no effect on ESA-listed species and would not result in any mortality or harassment (as defined for military readiness activities) of marine mammals protected under MMPA. The Proposed Action is not expected to have adverse effects on protected habitats (i.e., designated critical habitat, essential fish habitat, or other marine protected areas) and impacts would be less than significant.

4.3 Cumulative Impacts

Cumulative impacts are defined by the Council on Environmental Quality in 40 CFR 1508.7 as "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." The cumulative impacts could occur as a result of multiple projects occurring simultaneously within the same vicinity. Thus, each resource is analyzed in terms of its ability to accommodate additional effects of the Proposed Action in combination with past, present, or reasonably foreseeable future projects within this timeframe.

4.3.1 Hill Air Force Base

Table 4-30 summarizes past, present, and reasonably foreseeable future actions within the vicinity of the project area that could interact with the implementation of the Proposed Action.

Table 4-30. HAFB Projects			
Action (include Project Number if available)		**Description of Project**	**Status**
1.	Ongoing Enhanced Use Lease (EUL) project	Lease approximately 550 acres of USAF-owned property to a private developer. The proposed action would adversely impact the NRHP-eligible HAFB Railroad, but would be mitigated through a 2014 MOA. (2008 EA, 2016 SEA)	Past
2.	Temporary Facility and Mission Integration Facility (MIF) for the Ground Based Strategic Deterrent (GBSD) Program	Provide a temporary facility and construct a permanent MIF for the GBSD program located on HAFB, Utah. The GBSD program proposes the construction of a 13,006 ft^2 multi-level MIF to provide long-term accommodations for approximately 700 personnel performing weapon system engineering, analysis, testing, and sustainment support. [2019, CATEX completed]	Present
3.	GBSD Software Sustainment Center (SMAC)	Construct a 17,214 ft^2 building between 2020 and 2021.	Future
4.	Composite AC Antenna Calibration Facility (KRSM163015)	Construct a 6,441 ft^2 building between 2020 and 2021.	Future
5.	F-35A Canopy Repair Facility (KRSM163013)	Construct a 6,968 ft^2 building between 2020 and 2021.	Future
6.	UTTR Range Operations Center	Construct a 5,887 ft^2 building between 2020 and 2021.	Future
7.	4-Bed Level I Confinement Facility	Construct a 325 ft^2 building between 2020 and 2021.	Future
8.	Joint Advanced Tactical Missile Storage Facility	Construct a 1,115 ft^2 building between 2020 and 2021.	Future
9.	F-16 Emergency Power Unit Overhaul Facility (KRSM073013)	Construct a 3,343 ft^2 building after 2021.	Future
10.	Combat Arms Training and Maintenance (CATM) Facility (KRSM1083070)	Construct a 3,345 ft^2 building after 2021.	Future
11.	F-35 Maintenance Facility, Phase 1 (KRSM163011)	Construct a 20,695 ft^2 building after 2021.	Future
12.	F-35 Composite Repair & Training Fac, Phase 1 (KRSM163012)	Construct a 20,089 ft^2 building after 2021.	Future
13.	Consolidated Transportation Facility (KRSM053010)	Construct a 6,086 ft^2 building after 2021.	Future
14.	Taxiway "B" On East Side of Runway from B680 to the North (KRSM113006)	Construct a 48,118 ft^2 building after 2021.	Future
15.	Secure Core Software Facility, Phase 1 (KRSM123010)	Construct a 6,726 ft^2 building after 2021.	Future
16.	Non-Secure Software Engineering Dev Fac (KRSM063009)	Construct a 3,549 ft^2 building after 2021.	Future
17.	Install New PCC Apron (Hot Pad Eight) (KRSM043031)	Construct a 45,533 ft^2 building after 2021.	Future

Table 4-30. HAFB Projects (Continued)			
Action (include Project Number if available)		Description of Project	Status
18.	Air Traffic Control Tower (KRSM163018)	Construct an 805 ft² building after 2021.	Future
19.	Consolidated Training Facility, Phase 1 (KRSM073022)	Construct a 2,126 ft² building after 2021.	Future
20.	729 ACS AGE/HVAC Maintenance Facility (KRSM123012)	Construct a 3,102 ft² building after 2021.	Future
21.	Consolidate Missile Storage. Facilities, Phase 2 (KRSM023002B)	Construct a 2,356 ft² building after 2021.	Future
22.	649 MUNS Shipping and Receiving Facility (KRSM183004)	Construct a 2,090 ft² building after 2021.	Future
23.	649 MUNS Shipping and Receiving Facility (KRSM153004)	Construct a 2,007 ft² building after 2021	Future
24.	Consolidated 75 ABW Warehouse, Phase 1 (KRSM043019)	Construct a 7,432 ft² building after 2021	Future
25.	649 MUNS Consolidated Admin/Training Fac (KRSM033003)	Construct a 2,050 ft² building after 2021.	Future
26.	Secure Core Software Facility, Phase 2 (KRSM123016)	Construct a 6,7263 ft² building after 2021.	Future
27.	Secure Core Software Facility, Phase 3 (KRSM123017)	Construct a 6,726 ft² building after 2021.	Future
28.	Enlisted Dining Facility (KRSM073003)	Construct a 3,343 ft² building after 2021.	Future
29.	New South Gate Facility (KRSM183005)	Construct a 416 ft² building after 2021.	Future
30.	Consolidated AFTC-SMO Administration Facility (KRSM153008)	Construct a 5,574 ft² building after 2021.	Future
31.	AFTC Munitions Operating Location Facility (KRSM163019)	Construct a 1,721 ft² building after 2021.	Future
32.	Joint Advanced Tactical Missile Storage Facility (KRSM183001)	Construct a 1,115 ft² building after 2021.	Future
33.	TX-38 MX Facility (KRSM183007)	Construct a 28,115 ft² building after 2021.	Future

Source: HAFB 2019c (MILCON List)

Air Quality and Climate Change – HAFB

Construction activities (including construction personnel) from the Proposed Action at HAFB would produce minor amounts of (1) fugitive dust emission (PM_{10}/$PM_{2.5}$) resulting from soil disturbance and (2) emissions die to the use of fuel-powered equipment. Proposed construction activities would implement the air quality minimization measures identified in **Section 4.2.1.1.3** to minimize fugitive dust emissions are considered part of the Proposed Action. The minor levels of emissions from proposed construction activities in combination with emissions from

existing and future cumulative projects would not exceed a NAAQS. Emission from construction would occur over a 3-year period.

The operation of the GBSD facilities would result in long-term new operations and increased personnel. The proposed operational activities would generate air emissions from (1) staff commuting activities and (2) standby generators (including fuel tanks and boilers). The emissions are anticipated to disperse through the air and be further reduce by the implementation of minimization measures identified in **Section 4.2.1.1.3**. Generators would adhere to permitting requirements. Additionally, planned traffic flow improvements by HAFB would likely decrease vehicle emission levels due to reduced traffic congestion, which would be a long-term beneficial cumulative impact to air quality.

The potential effects of GHG emissions from the Proposed Action by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact.

Climate Change – HAFB

The magnitude of climate change beyond the next few decades will depend primarily on the amount of GHGs (especially carbon dioxide [CO2]) emitted globally. The potential effects of GHG emissions generated by the Proposed Action (45,443 tpy) are by nature global. Given the global nature of climate change and the current state of science, it is not useful at this time to attempt to link the emissions qualified for local actions to any specific climatological change or resulting environmental impact. Therefore, the quantitative analysis of CO_2e emissions in this EA/OEA is for disclosing the local net effects of the proposed actions and for its potential usefulness in making reasoned choices among alternatives.

Cultural Resources – HAFB

No significant long-term cumulative impacts to cultural resources are anticipated from the Proposed Action. Approximately 10 percent of HAFB has been previously surveyed for archaeological resources. Previously identified NRHP-eligible archaeological sites at HAFB have been documented and are managed in compliance with the HAFB ICRMP and all applicable cultural resource laws and regulations. The Proposed Action is in an area of heavy soil disturbance with a very low potential for intact archaeological deposits. Implementation of the Proposed Action would have no impact on archaeological resources unless an unanticipated discovery is made during construction. In that event, standard operating procedures in the HAFB ICRMP would be followed.

Cumulative impacts to architectural resources at HAFB are anticipated to be minimal to negligible. The Ogden Air Materiel Historic District, which includes seven individually eligible buildings, is the only architectural resource potentially impacted by the Proposed Action. No future actions are currently planned to alter or demolish any of the seven NRHP-eligible

buildings. Past, present, and future actions within or in the vicinity of the historic district may alter the district's setting through new construction, but likely in a manner that keeps with the historic and current military-industrial character of the district.

Hazardous Material and Waste – HAFB

Any hazardous material and waste would be properly managed in accordance with federal, state, and local regulations. No unmitigable human or environmental health risks are anticipated from pre-test preparation and support for the Proposed Action at HAFB. Therefore, no significant cumulative impacts from the management of hazardous materials and waste are anticipated.

Health and Safety – HAFB

No adverse cumulative impacts on health and safety would be expected from the Proposed Action when combined with other cumulative projects at HAFB. Adherence to established safety procedures and regulations for all project construction and operations would continue, reducing or eliminating health and safety impacts on contractors, military personnel, and the general public.

Infrastructure – HAFB

The Proposed Action when combined with other projects at HAFB could have short-term, adverse cumulative impacts on electrical power, natural gas, potable water, and wastewater management systems during site preparation and construction due to temporary service interruptions. The construction contractor would coordinate any utilities needed to conduct site preparation and construction activities. While there is currently infrastructure and utility capacity for growth at HAFB, increases in structures (square footage) and potential personnel increases associated with the cumulative projects could result in long-term, minor adverse cumulative impacts on the wastewater management system.

Soil disturbance and increases in impervious surface associated with the Proposed Action and cumulative projects could result in short- and long-term, minor, adverse cumulative impacts on the installation stormwater drainage system during construction and site preparation and operations and maintenance. Construction and site preparation activities would be authorized by the CGP, and new development and stormwater infrastructure would be designed to comply with the installation's MS4 permit requirements, and applicable federal, state, and local regulations, which would minimize cumulative impacts.

Solid waste generated during site preparation and construction activities, and operation and maintenance, for the Proposed Action and other projects could result in short- and long-term, minor, adverse cumulative impacts on solid waste management. The implementation of future projects (see **Table 4-30**) would develop approximately 287,500 ft^2 of buildings and likely require personnel increases that would generate construction and demolition debris and solid waste, respectively. Recycling during site preparation and construction, and operation and

maintenance, would reduce the amount of solid waste that would be disposed at the HAFB landfill or Davis Landfill.

Noise – HAFB

Any noise increase during construction activities would be temporary and localized to the immediate vicinity of the construction project during construction hours. Noise levels would decrease as activities are completed. No substantial cumulative long-term noise effects are anticipated from the operational activities.

Socioeconomics – HAFB

The Proposed Action at HAFB would contribute to positive impacts on socioeconomic conditions resulting from construction of past, present, and reasonably foreseeable future projects by bringing new workers to the area who would make purchases at local businesses. Cumulative expenditures by construction workforces would benefit local accommodation, food, and retail industries in Davis and Weber Counties, as well as local fiscal benefits from associated sales tax revenues. There is sufficient local lodging to accommodate the collective increase of temporary workers throughout the proposed construction stages of the Proposed Action, and past, present, and reasonably foreseeable future projects. Construction of the Proposed Action would last for approximately 2 years.

Transportation/Traffic – HAFB

Long-term, minor, adverse cumulative impacts on transportation/traffic would result from the Proposed Action at HAFB. The impacts on transportation/traffic would result from combination of the Proposed Action with those projects that would require construction or the addition of personnel or residents to the region. On-installation traffic would be most noticeable at the access control points, and the additional vehicles would exacerbate peak hour congestion.

As noted in **Section 4.2.1.7**, WFRC is responsible for maintaining the regional travel demand model including household and employment growth projections. When the concept report was completed in 2016, WFRC assumed an increase of 2,030 jobs in TAZ 327. Thus WFRC and UDOT are accounting for an increase in employment on HAFB in long-range transportation planning and future planned road improvements. It is unlikely the 820 additional personnel associated with the Proposed Action and the additional personnel from the reasonably foreseeable projects would exceed the 2,030 jobs and associated traffic levels anticipated by the WFRC. Therefore, the cumulative impacts on transportation/traffic would be minor.

Water – HAFB

Routine operations and maintenance would occur at HAFB in upkeep of the GBSD Test Program facilities. HAFB would adhere to all established permits, standard operating procedures, and regulations to maintain water quality health for all projects and operations.

4.3.2 Vandenberg Air Force Base

Table 4-31 summarizes past, present, and reasonably foreseeable future actions within the vicinity of the project area that could interact with the implementation of the Proposed Action.

Table 4-31. VAFB Projects

Action (include Project Number if available)		Description of Project	Status
1.	Construct FamCamp Lot, Bldg 6015 (XUMU171123B)	Construct a 31,930 ft^2 building in 2018. Construct 14 new full hook-up pull through sites.	Past
2.	Add UPS Room to Bldg 6523 [XUMU111289C]	Construct a new UPS room and install a new 225 KVA UPS backup system in support of Building 6525 C Section SMF Critical Computer Lab. [720 ft^2, 2018]	Past
3.	Repair/Replace Roof and Wall Siding [XUMU141053B]	Replace entire facility roofing and exterior wall siding. Entire facility roofing and exterior wood siding have rotted/deteriorated. [7,473 ft^2, 2020]	Present
4.	Slurry Taurus Road [XUMU131153A]	Repair failed pavement sections, sweep existing pavement and provide a Caltrans type 2 slurry on Taurus Road and a double seal coat on the adjacent driveways [3,927,718 yd^2, 2020]	Present
5.	MQ-9 Beddown EIS	The purpose of the beddown would be to fulfill the MQ-9 Wing operational requirements while enhancing recruiting for and developing and retaining high quality Airmen, enabling the development of successful leaders, and eliminating obstacles to mission accomplishment. The beddown location would take care of our Airmen while ensuring MQ-9 operational personnel have the capability to accomplish primary functions associated with operating and maintaining an MQ-9 Wing.	Future
6.	Dunes Golf Course	There is a proposal to replace the closed 250-acre Marshallian Golf Course with the 1,268 acre Dunes Golf Course.	Future
7.	Consolidate ICBM Maintenance Training, Bldg 8235 [XUMU113001]	Construct new ICBM maintenance training facility to be located in the open lot adjacent to existing building 8250. The facility would accommodate approximately 325 employees, along with 250 students, 100 distinguished visitors and 75 full-time permanent party members annually. The facility would need to be approximately 55,625 ft^2 total and comprised of the following: Office area: 24 rooms at 10,751 total SF. [64,144 ft^2, 2021]	Future

Table 4-31. VAFB Projects (Continued)			
Action (include Project Number if available)		Description of Project	Status
8.	Construct Office Facility, UAS Testing, near 1610 [XUMU141146C]	Construct permanent facility, approximately 24' x 65' to support X-37B mission. New facility should be sited on existing concrete pad adject to Fac. 1604. Facility will be tied to existing utilities and will need one unisex bathroom and a breakroom. [1,560 ft^2, 2021]	Future
9.	Install Traffic Calming at Utah Gate [XUMU071216C]	Install manually operated pop-up bollards to replace concrete barriers. Construct 12? long by 4? high asphalt speed tables across all lanes of traffic prior to the gate and between the gate and barrier. [500 yd^2, 2021]	Future
10.		Western Range Processing Facility	Future
11.	AF Space command HQ	VAFB is one of the five installations in the United States under consideration to become U.S. Space Force Headquarters. Space Force HQ would accommodate approximately 1.870 personnel with approximately 1,000,000 ft^2 of office/administrations space and privately owned vehicle parking.	Future
12.		Joint Flight Campaign	Future

Source: VAFB 2019a (MILCON List)

Air Quality – VAFB

Construction activities (including construction personnel) from the Proposed Action at VAFB would produce minor amounts of (1) fugitive dust emission (PM_{10}/$PM_{2.5}$) resulting from soil disturbance and (2) emissions die to the use of fuel-powered equipment. Proposed construction activities would implement the air quality minimization measures identified in **Section 4.2.2.1.4** to minimize fugitive dust emissions. The minor levels of emissions from proposed construction activities in combination with emissions from existing and future cumulative projects would not exceed a NAAQS. Emission from construction would occur over a 3-year period.

The proposed Minuteman III and GBSD flight tests at VAFB would continue to be conducted in a manner similar to current flight tests. The projected increase in launch activity at VAFB has the potential for additive, cumulative air quality impacts during the 6-year period that includes both flight test programs. However, launch vehicle exhaust products, and other launch operation emissions, do not accumulate because winds quickly and effectively disperse them between missions. In terms of upper atmospheric effects, emissions released into the upper atmosphere would add to the overall global loading of chlorine and other gases that contribute to long-term ozone depletion. However, the amount of emissions released from rocket motors is negligible compared to losses of ozone from other global sources. Because the emissions would represent an extremely small percentage of total loading, they should not significantly contribute to the cumulative impact on stratospheric ozone.

The operation of the GBSD facilities would result in long-term new operations and increased personnel. The proposed operational activities would generate air emissions from (1) staff commuting activities and (2) standby generators (including fuel tanks). The emissions are anticipated to disperse through the air and be further reduce by the implementation of minimization measures identified in **Section 4.2.2.1.4**. Generators would adhere to permitting requirements. Additionally, planned traffic flow improvements by VAFB would likely decrease vehicle emission levels due to reduced traffic congestion, which would be a long-term beneficial cumulative impact to air quality.

The potential effects of GHG emissions from the Proposed Action by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact.

Airspace – VAFB

Negligible adverse cumulative impacts on airspace are expected as a result of the Proposed Action at VAFB in conjunction with other ongoing and future projects within the ROI. No individual projects have been identified that would result in greater than negligible cumulative effects on airspace or airspace management. All new GBSD facilities and facility modifications would be constructed in accordance with FAA regulations in 14 CFR Part 77, *Safe, Efficient Use, and Preservation of Navigable Airspace*, so as not to create any obstructions to air navigation, or adversely affect navigational and communication facilities and equipment and the proposed Air Traffic Control Tower would increase visibility on the airfield. Prior to each launch mission conducted at VAFB, a NOTAM would be published to divert commercial and private aircraft from any hazard areas along the flight path. Flight tests conducted under the Proposed Action, when combined with other launch activities, would not require any changes to current airspace restrictions.

Biological Resources – VAFB

Implementation of the Proposed Action at VAFB would result in moderate cumulative impacts on some of the most rare and sensitive biological resources. GBSD Test Program construction would have less than significant impacts on biological resources. For rare and sensitive habitats such as vernal pool and maritime chapparal habitats and for rare species such as ESA-listed species, the additive effects of all construction at VAFB have the potential to cause adverse impacts to species and habitats. The GBSD Test Program and other programs coordinate with VAFB 30 SW Natural Resource Management to minimize the potential impacts of each program and to manage biological resources long-term on VAFB under their installation INRMP (USAF 2011b). The USAF has many conservation, monitoring, and management programs in place for biological resources to minimize cumulative impacts to biological resources.

Test program launches also have the potential to have additive effects on sensitive species such as hauled-out pinnipeds and nesting plovers and terns. However, the USAF has

monitoring programs and procedures in place to avoid any cumulative impacts of launch activities on sensitive species at VAFB and to coordinate with the USFWS and NMFS to limit potential cumulative impacts launch activities.

Based on the robust and active management of natural resources by the USAF on VAFB, implementation of the Proposed Action would not result in significant cumulative impacts on biological resources at VAFB.

Climate Change – VAFB

The magnitude of climate change beyond the next few decades will depend primarily on the amount of GHGs (especially carbon dioxide [CO_2]) emitted globally. The potential effects of GHG emissions generated by the Proposed Action are by nature global. Given the global nature of climate change and the current state of science, it is not useful at this time to attempt to link the emissions qualified for local actions to any specific climatological change or resulting environmental impact. Therefore, the quantitative analysis of CO_2e emissions in this EA/OEA (9,289.4 tpy) is for disclosing the local net effects of the proposed actions and for its potential usefulness in making reasoned choices among alternatives.

Coastal Zone – VAFB

Implementing the Proposed Action at VAFB is not expected to result in significant cumulative impacts on Coastal Zone Management. VAFB contains over 42 miles of coastline consisting of a variety of natural communities, resources, and recreation areas. USAF has taken many steps to protect and maintain coastal resources in collaboration with Federal, state, and local agencies. This includes funding research of marine mammals and other wildlife on the installation, enforcing limited access to key wildlife areas, and minimizing the closure of public beaches.

Depending on the launch rates, launch sites, and flight trajectories, each launch from VAFB may require the closure of public beach areas. For example, Point Sal State Beach is closed on average 12 times a year (Ornelaz 2009). Although the number of beach closures could increase slightly from the additional GBSD flight tests, the increase in closures would be minimal, short term, and have no major effect on local recreation.

VAFB personnel regularly consult with the CCC prior to implementing new projects that might affect the policies of the California Coastal Act of 1972.

Cultural Resources – VAFB

No significant cumulative impacts to cultural resources are anticipated from the Proposed Action. More than 90 percent of VAFB has been surveyed for cultural resources and more than 2,500 cultural resources have been documented at VAFB, including 2,200 known archaeological sites. Known NRHP-eligible archaeological sites at VAFB are documented and managed to ensure compliance with all applicable cultural resource laws and regulations.

Adverse effects on archaeological resources from individual actions or projects are typically mitigated through data recovery that often increases academic knowledge of prehistoric land uses and occupations at VAFB. Unanticipated discoveries found during future construction would trigger implementation of standard operating procedures in the VAFB ICRMP to ensure compliance with all applicable cultural resource laws and regulations.

Within the APE for the GBSD Test Program, the construction of LF-04 and LF-26 in the early 1960s resulted in unmitigated adverse effects to NRHP-eligible archaeological sites CA-SBA-512 and CA-SBA-760/-761/-1748, respectively. At LF-04, the 77-foot deep silo facility and associated infrastructure intruded into portions of CA-SBA-512 (identified as the historical Chumash village site of Lospe) containing dense archaeological midden deposits and possibly human burials. The subsequent establishment and ongoing maintenance of the fire break around LF-04 has caused further adverse impacts to the same section of the village site. Portions of CA-SBA-512 outside the immediate extent of disturbance for LF-04, both inside and outside the fire break, are assumed to retain their integrity. At LF-26, construction of the 87-foot deep silo facility and associated infrastructure, as well as extensive earthmoving operations in surrounding portions of the marine terrace for stormwater control and for the establishment and subsequent rerouting of the fire break, have resulted in the loss of integrity of a large part of CA-SBA-760/-761/-1748. Of the more than 15 acres covered by the site, only three discrete locations, each no more than 60 feet in diameter, have been determined to retain sufficient integrity to convey the site's NRHP eligibility.

The San Antonio Terrace Archaeological District, which includes CA-SBA-512 and other archaeological resources in the APE for the proposed GBSD facilities, has been the location of three major undertakings since its designation in 1987: Missile X, Peacekeeper, and Small ICBM. Impacts to archaeological resources resulting from these projects were resolved through data recovery. Minor impacts to the San Antonio Terrace Archaeological District and other archaeological resources have also resulted from the installation and maintenance of both buried and overhead utilities, mostly along road corridors that predate military use and federal ownership. The nature of the Proposed Action is such that reuse of Minuteman facilities for GBSD would substantially reduce the likelihood of foreseeable future undertakings that may impact archaeological resources in the vicinity of these facilities as the continued use for test launches would render the area unsuitable for further installation development. At CA-SBA-512, CA-SBA-760/-761/-1748, and other archaeological resources in the APE on the marine terrace along Point Sal Road, impacts from ongoing coastal erosion are expected to continue and will likely increase in the foreseeable future.

Although adverse effects to one or more NRHP-eligible architectural resources at VAFB are anticipated from implementation of the Proposed Action, no significant cumulative impacts on architectural resources are anticipated. VAFB has a plethora of exceptional architectural resources associated with high technology Cold War programs. Although each resource is

typically associated with a single or handful of significant programs, the overall Cold War history at VAFB is well-documented and visible throughout the installation.

Specific to the resources impacted by the Proposed Action, MAF-D0, LF-04, and LF-26 are associated with the USAF's Minuteman testing program. LF-04 is associated with Minuteman I, II, and III. MAF-D0 and LF-26 are associated with Minuteman II and III. Any alterations of these resources since original construction have been in continuance of the property's historic function and to adapt the resource for continued use with subsequent Minuteman programs. Additional NRHP-eligible resources at VAFB also tell the story of the Minuteman testing program at VAFB and would not be impacted by the Proposed Action or any other currently planned future actions. While one or more architectural resources associated with the Minuteman testing program at VAFB would be adversely affected, the mitigation of those adverse effects under Section 106 would also contribute to the public knowledge and appreciation of the significance of the program. Given the exceptional significance of the Minuteman program, it is probable that its successor program also might achieve historical significance prior to the typical 50 years of age threshold for NRHP eligibility. If this occurs, the resources associated with the GBSD program would be managed in compliance with Section 106.

Geology and Soils – VAFB

Cumulative, short-term, moderate to adverse impacts would result from construction activities. Operation of the GBSD facilities would not contribute to cumulative impacts on or from geologic hazards.

Hazardous Material and Waste – VAFB

A small increase in wastes would occur from the additional flight tests at VAFB. Any hazardous material and waste would be properly managed in accordance with federal, state, and local regulations. No unmitigable human or environmental health risks are anticipated from pre-test preparation and support for the Proposed Action at VAFB. Therefore, no significant cumulative impacts from the management of hazardous materials and waste are anticipated.

Health and Safety – VAFB

No adverse cumulative impacts on health and safety would be expected from the Proposed Action when combined with other projects at VAFB. Public health and safety would continue to be ensured through the establishment of launch hazardous areas and debris impacts corridors; beach and access road closures (as necessary); evacuation of offshore oil rigs (as necessary); coordination and monitoring of train traffic passing through the installation; and publishing NTMs and NOTAMS. Adherence to established safety procedures and regulations for construction, flight test activities, and operations would continue, reducing or eliminating health and safety impacts on contractors, military personnel, and the general public.

Infrastructure – VAFB

The Proposed Action when combined with other projects at VAFB could have short-term, adverse cumulative impacts on electrical power, natural gas, potable water, and wastewater management systems during site preparation and construction due to temporary service interruptions. The construction contractor would coordinate any utilities needed to conduct site preparation and construction activities. While the electrical power, natural gas, and wastewater management utility systems have capacity for growth at VAFB, potential personnel increases associated with the cumulative projects could result in long-term, minor, adverse cumulative impacts on the potable water system.

Soil disturbance and increases in impervious surface associated with the Proposed Action and cumulative projects could result in short- and long-term, minor adverse cumulative impacts on the installation stormwater drainage system during site preparation and construction, and from operations and maintenance. Construction and site preparation activities would be authorized by the CGP, and new development and stormwater infrastructure would be designed to comply with applicable federal, state, and local regulations, which would minimize cumulative impacts.

Solid waste generated during site preparation and construction activities, and operation and maintenance of the Proposed Action with other projects could result in short- and long-term, minor, adverse cumulative impacts on solid waste management. Future cumulative projects (see **Table 4-31**) would construct, renovate, or repair approximately 158,000 ft^2 of buildings and other infrastructure; install or repair approximately 1,900,000 ft^2 of pavement; demolish approximately 78,500 ft^2 of buildings and pavement; and likely require personnel increases that would generate construction and demolition debris and solid waste, respectively. Recycling during site preparation and construction, and operation and maintenance, would reduce the amount of solid waste that would be disposed at the Santa Maria Regional Landfill or Tajiguas Sanitary Landfill.

Noise – VAFB

There would be a short-term elevation in the noise level during test launch activities. Noise levels are anticipated to return to normal ambient levels 30 seconds after each launch. The projected increase in launch activity at VAFB has the potential for cumulative impacts to the noise environment. However, in spite of the increase in launches from Vandenberg, the increase in the number of launches would not have any noticeable impact on cumulative noise levels.

Socioeconomics/Environmental Justice – VAFB

Short-term positive cumulative impacts from the Proposed Action at VAFB, in conjunction with past, present, and reasonably foreseeable future projects in the ROI, would be similar to the positive cumulative impacts described above for HAFB. In the long term, however, there could be potentially significant adverse cumulative impacts on housing availability in the municipalities surrounding VAFB. Current housing availability at the installation and surrounding cities may not

be sufficient to accommodate the additional personnel anticipated under the Proposed Action including the additional personnel anticipated from past, present, and future actions. Although new residential developments are proposed in the ROI, it is unlikely that this rate of development would keep pace with forecasted population changes and household growth. Therefore, long-term, potentially significant adverse cumulative impacts would occur on housing demand.

Housing shortages from the collective increase in new residents from the Proposed Action, and past, present, and reasonably foreseeable future projects, may drive personnel to seek housing options in neighboring municipalities, such as northern Santa Barbara County or southern San Luis Obispo County. Housing constraints due to low supply are present in these communities as well. Therefore, there may be a potentially significant adverse cumulative impact on environmental justice communities from increased competition for housing. Low-income populations may face disproportionate impacts from cumulative adverse effects on housing demand. Mitigation measures, such as increasing housing production and relevant public and private services on or near the base, would minimize the Proposed Action's adverse contribution to cumulative impacts (USAF 2019c).

Transportation/Traffic – VAFB

Long-term, negligible, adverse cumulative impacts on transportation/traffic would result from the Proposed Action at VAFB. The impacts on transportation/traffic would result from the combination of the Proposed Action with those projects that would require construction or the addition of personnel or residents to the region. On-installation traffic would be most noticeable at the access control points, and the additional vehicles would exacerbate peak hour congestion.

As noted in **Section 4.2.2.11**, the roadways in the vicinity of VAFB are currently well below their maximum capacity. It is unlikely the 260 additional personnel associated with the Proposed Action at VAFB and additional personnel from the reasonably foreseeable projects would increase traffic levels beyond roadway capacity. Therefore, the cumulative impacts on transportation/traffic would be negligible.

Water – VAFB

Through implementation of a Spill Prevention, Control and Countermeasures Plan, a project-specific SWPPP, and applicable BMPs, potential impacts on groundwater resources would be negligible.

4.3.3 Dugway Proving Ground

Air Quality and Climate Change – DPG

The operation of the GBSD facilities would result in long-term new operations and temporary increased personnel. The proposed operational activities would generate air emissions from (1) staff commuting activities and (2) standby generators (including fuel tanks). The emissions are anticipated to disperse through the air. Generators would adhere to permitting requirements. Additionally, planned air quality management by DPG would likely decrease emission levels, which would be a long-term beneficial cumulative impact to air quality.

The potential effects of GHG emissions from the Proposed Action by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact.

Biological Resources – DPG

No significant cumulative impacts to biological resources are anticipated from implementation of the Proposed Action. The Proposed Action would have no significant impacts on biological resources at DPG under any of the three alternatives and no additive or interactive effects with other actions at DPG which would significantly contribute to cumulative impacts have been identified.

Climate Change – DPG

The magnitude of climate change beyond the next few decades will depend primarily on the amount of GHGs (especially carbon dioxide [CO2]) emitted globally. The potential effects of GHG emissions generated by the Proposed Action are by nature global. Given the global nature of climate change and the current state of science, it is not useful at this time to attempt to link the emissions qualified for local actions to any specific climatological change or resulting environmental impact. Therefore, the quantitative analysis of CO_2e emissions in this EA/OEA (910.3 tpy) is for disclosing the local net effects of the proposed actions and for its potential usefulness in making reasoned choices among alternatives.

Cultural Resources – DPG

No significant cumulative impacts to cultural resources are anticipated from implementation of the Proposed Action. Use of the PSSTF would be similar to other training and operational uses at DPG not associated with GBSD. Cultural resources in the vicinity of the PSSTF site are well-understood through previous surveys and cultural resources across DPG will continue to be managed in accordance with federal law and U.S. Army regulations.

Geology and Soil – DPG

Short-term, minor adverse impacts would result from site preparation and construction activities. Operation of the PSSTF would not contribute to cumulative impacts on or from geologic hazards.

Hazardous Material and Waste – DPG

Any hazardous material and waste would be properly managed in accordance with federal, state, and local regulations. No unmitigable human or environmental health risks are anticipated from the Proposed Action at DPG. Therefore, no significant cumulative impacts from the management of hazardous materials and waste are anticipated.

Health and Safety – DPG

No adverse cumulative impacts on health and safety would be expected from the Proposed Action when combined with other cumulative projects at DPG. Adherence to established safety procedures and regulations for all project construction and operations on the range would continue, reducing or eliminating health and safety impacts on contractors, military personnel, and the general public.

Infrastructure – DPG

The Proposed Action when combined with other projects at DPG could have short-term, adverse cumulative impacts on the electrical power system during site preparation and construction due to temporary service interruptions. The construction contractor would coordinate any utilities needed to conduct site preparation and construction activities. There would be no long-term cumulative impacts on electrical power because the system has capacity for growth.

Solid waste generated during site preparation and construction activities, and operation and maintenance of the Proposed Action with other projects also could result in short- and long-term, minor, adverse cumulative impacts on solid waste management. The Proposed Action and other projects would generate construction and demolition debris, and likely require personnel increases that would generate solid waste. Recycling during site preparation and construction, and operation and maintenance, would reduce the amount of solid waste that would be disposed at the English Village Landfill.

Noise – DPG

No substantial cumulative long-term noise effects are anticipated from the operational activities

Water – DPG

Short-term, minor adverse impacts would result from site preparation and construction activities. By following established BMPs and permits, operation of the PSSTF would not contribute to cumulative impacts on water resources.

4.3.4 Downrange Test and Support Locations

4.3.4.1 United States Army Garrison–Kwajalein Atoll

Airspace – USAG-KA

No significant cumulative impacts to airspace are anticipated from implementation of the Proposed Action when combined with other ongoing and future projects at USAG-KA. All flight tests would be conducted in accordance with established navigation and airspace safety policies and procedures. Prior to each flight test mission conducted at USAG-KA, a NOTAM would be published to divert commercial and private aircraft from any hazard areas along the missile flight path. The flight tests would be infrequent and short-term events, after which the airspace is returned to the control of the Oakland ARTCC.

Air Quality – USAG-KA

No exceedances of air quality standards are expected, and no new permanent stationary sources of emissions or changes to air emission permits are required. It is anticipated that the emissions from flight testing activities would be minor and temporary and the trade winds would rapidly dissipate any airborne particles.

Biological Resources – USAG-KA

Implementation of the Proposed Action at USAG-KA is not expected to result in significant cumulative impacts on biological resources. It is possible that testing activities at USAG-KA/RTS could have additive effects on biological resources including long-term addition of man-made objects to the ocean, cumulative amounts of hazardous materials in the habitats at Illeginni Islet, or increased frequency of disturbance events. While these cumulative impacts are possible, a number of protective measures are in place under the UES which includes development of a DEP for actions that might have adverse effects and procedures to monitor and mitigate impacts of testing activities at USAG-KA controlled islets and in RMI territorial waters. These measures include biennial monitoring of biological resources at Illeginni Islet and Gagan Islet. Considering the protective measures in place to detect and respond to any long-term or cumulative impacts to biological resources at USAG-KA, cumulative impacts resulting from implementation of the Proposed Action would not be significant.

Cultural Resources – USAG-KA

No significant cumulative impacts to cultural resources are anticipated from implementation of the Proposed Action when combined with other ongoing and future projects. Just as for the proposed GBSD test RV impacts in the vicinity of Illeginni Islet, other future flight test activities in the area are not expected to adversely affect the Cold-War era historic structures on the eastern side of the islet. Additionally, there are no substantive archaeological resources on the islet.

Health and Safety – USAG-KA

No significant cumulative impacts on health and safety would be expected from the Proposed Action when combined with other projects at USAG-KA. The ongoing Minuteman III and new GBSD flight tests would not occur at the same time, nor would they occur when other flight test programs are scheduled. Adherence to strict range safety standards and procedures would serve to keep safety related risks within acceptable levels for both workers and the public.

Conducting GBSD test RV impacts in the vicinity of Illeginni Islet, where land impacts might occur, could introduce additional contaminants (beryllium and DU), similar to those from prior Minuteman III flight tests. However, previous monitoring efforts on the islet have shown such air contaminant levels to be at or near background levels, even after years of prior Minuteman III RV testing in the area. Following each land impact conducted at Illeginni Islet, test support personnel entering the impact site would wear proper personal protective equipment, as necessary, to implement appropriate post-test clean-up operations. Thus, potential risks to workers and other personnel visiting the islet for other purposes would be minimal.

Hazardous Materials and Waste – USAG-KA

No significant cumulative impacts on hazardous material and waste management would be expected as a result of the Proposed Action when combined with other projects at USAG-KA. This Proposed Action would not cause new waste streams to be introduced at USAG-KA, nor would USAG-KA's capacity to handle potential hazardous materials and waste be diminished. The ongoing Minuteman III and new GBSD flight tests would not occur at the same time, nor would they occur when other flight test programs are scheduled. Minuteman III RVs would not impact land, and up to three land impacts may occur from the GBSD RV tests. Adherence to the DEP, which conforms to current UES and KEEP standards and procedures, would minimize local risks to human health and the environment from potential hazardous material and waste releases. Tungsten has been detected in levels above the drinking water standard at Illeginni Islet, however since tungsten is not a contaminant of concern in both the Minuteman III and GBSD weapon system, and since there are no direct pathways to public drinking water sources, the cumulative impact risks are not elevated as a result of this Proposed Action. Previous environmental monitoring on Illeginni Islet have shown low levels of Be and DU in soil locally, but similar fight tests have not resulted in regulatory standard exceedances. Detections of Be and DU may increase minutely, however, it is not expected that these detections would reach the regulatory standard. Any releases of hazardous or non-hazardous waste during site preparation activity at Illeginni Islet would be cleaned up per current UES and KEEP regulations.

Noise – USAG-KA

Because the sonic boom footprints normally do not overlap any communities and because of range evacuation procedures during such flight tests, no residents or personnel are expected to be subjected to significant noise-related impacts.

4.3.4.2 Broad Ocean Areas

Air Quality and Climate Change – BOA

Launch vehicle exhaust products, and other launch operation emissions, are not anticipated to accumulate due to winds disperse them between flight tests. Upper atmospheric effects, emissions released may add to the overall global loading of chlorine and other gases that contribute to long-term ozone depletion. However, the amount of emissions released from rocket motors is negligible compared to losses of ozone from other global sources. Because the emissions would represent an extremely small percentage of total loading, they should not significantly contribute to the cumulative impact on stratospheric ozone.

Airspace – BOA

Flightpath coordination with the FAA will continue, therefore continuation of flight test in the BOA would not result in any cumulative impacts on airspace management.

Biological Resources – BOA

No significant cumulative impacts to biological resource in the BOA are anticipated from implementation of the Proposed Action. The Proposed Action would have no significant impacts on biological resources in the BOA and no additive or interactive effects with other actions have been identified which would significantly contribute to cumulative impacts.

Health and Safety – BOA

Impacts on general health and safety are expected to be minor with no increase in cumulative impacts. Risk to personnel from flight operations would be minimized using safety procedures.

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