Draft

Environmental Impact Statement for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base, Guam

Department of the Air Force

June 2024

PRIVACY ADVISORY

This Draft Environmental Impact Statement (EIS) has been provided for public comment in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality NEPA Implementing Regulations (Title 40 Code of Federal Regulations [CFR] Parts 1500–1508), and Environmental Impact Analysis Process (EIAP) (32 CFR Part 989). The EIAP provides an opportunity for public input on United States Department of the Air Force (DAF) decision making, allows the public to offer input on alternative ways for the DAF to accomplish what it is proposing, and solicits comments on DAF's analysis of environmental effects.

Public input allows the DAF to make better-informed decisions. Letters or other written or verbal comments provided may be published in this EIS. Providing personal information is voluntary. Private addresses will be compiled to develop a stakeholder inventory. However, only the names of the individuals making comments and their specific comments will be disclosed. Personal information, home addresses, telephone numbers, and email addresses will not be published in this EIS.

Section 508 of the Rehabilitation Act of 1973

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Information regarding the Draft EIS is available on the project website at
www.AAFBInfraAndF15EIS.com

Comments on the Draft EIS can be submitted at that website or sent via email to:
afcec.aafb.infrasandf-15eis@us.af.mil
or via postal mail to:
HQ AFCEC/CIE
Attn: Mr. David Martin
Bldg. 171, 2261 Hughes Ave., Ste. 155
JBSA Lackland AFB, TX 78236-9853

ABBREVIATIONS AND ACRONYMS

36 WG	36th Wing
ACM	asbestos-containing material
ACS	American Community Survey
AD	*Anno Domini*
ADT	Average Daily Traffic
AFB	Air Force Base
AFFF	Aqueous Film Forming Foam
AFPD	Air Force Policy Directive
AGL	above ground level
AICUZ	Air Installations Compatible Use Zones
ANSI	American National Standards Institute
APE	Area of Potential Effect
API	American Petroleum Institute
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
ASME	American Society of Mechanical Engineers
ATSDR	Agency for Toxic Substances and Disease Registry
ASA	Acoustical Society of America
BC	Before Christ
BSP	Bureau of Statistics and Plans
BTS	brown treesnake
C&D	construction and demolition
CAA	Clean Air Act
CARES Act	Coronavirus Aid, Relief, and Economic Security Act
CATM	Combat Arms Training and Maintenance
CEJST	Climate and Economic Justice Screening Tool
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
Ch	Chamorro
CNMI	Commonwealth of the Northern Mariana Islands
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COC	community of comparison
COVID-19	Coronavirus
CT	census tract
CWA	Clean Water Act
CZ	Clear Zone
CZMA	Coastal Zone Management Act
DAF	Department of the Air Force
DAFI	Department of the Air Force Instruction
DAFMAN	Department of the Air Force Manual
dB	decibel
dBA	A-weighted decibel
DESR	Defense Explosives Safety Regulation
DFSP	Defense Fuel Support Point
DNL	day-night sound level
DoD	Department of Defense
DoDI	Department of Defense Instruction
DON	Department of the Navy
E	Endangered
ECM	earth covered magazine
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FEP	Fishery Ecosystem Plan
FPPA	Farmland Protection Policy Act
ft^2	square foot
FY	Fiscal Year
GCA	Guam Code Annotated
GCMP	Guam Coastal Management Program
GDLM	Guam Department of Land Management
GDoE	Guam Department of Education
GDP	Gross Domestic Product
GDPR	Guam Department of Parks and Recreation
GDPW	Guam Department of Public Works
GEPA	Guam Environmental Protection Agency
GEOID	geographic identifier
GHG	greenhouse gas
GIP	gross island product
GPA	Guam Power Authority
gpd	gallons per day
GPL	Guam Public Law
GRTA	Guam Regional Transit Authority

GVB	Guam Visitors Bureau
GWA	Guam Waterworks Authority
HAPC	habitat areas of particular concern
HQ	Headquarters
ICRMP	Integrated Cultural Resources Management Plan
IDP	Installation Development Plan
IMPLAN	Impact Analysis for Planning
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
IT/COMM	information technology/communications
JP-8	Jet Propellant 8
JRM	Joint Region Marianas
kV	kilovolt
LBP	lead-based paint
L_{eq}	equivalent sound level
$L_{eq}(24)$	average sound level over a 24-hour period
L_{max}	maximum sound level
LOS	Level of Service
m^3	cubic meter
MBTA	Migratory Bird Treaty Act
MEC	munitions and explosives of concern
mgd	million gallons per day
MIRC	Mariana Islands Range Complex
MITT	Mariana Islands Training and Testing
MMRP	Military Munitions Response Program
MMT	million metric ton
MSA	Munitions Storage Area
MW	megawatt
MUS	management unit species
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NCN	no common name
NEPA	National Environmental Policy Act
NGLA	Northern Guam Lens Aquifer
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O_3	ozone
OSHA	Occupational Safety and Health Administration
OWS	oil/water separator
PA	Preliminary Assessment
PACAF	Pacific Air Forces
PCB	polychlorinated biphenyls
pCi/L	picocuries per liter
PFAS	polyfluoroalkyl substances
PHL	Potential for Hearing Loss
PL	Public Law
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
ppb	parts per billion
ppm	parts per million
PPE	personal protective equipment
PSD	Prevention of Significant Deterioration
PUA	Pandemic Unemployment Assistance Program
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	region of influence
RSAF	Republic of Singapore Air Force
SATCOM	satellite communications
SCC	social cost of carbon
SDWA	Safe Drinking Water Act
SDZ	Surface Danger Zone
SEL	Sound Exposure Level
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
T	Threatened
TBD	to be determined
THAAD	Terminal High Altitude Area Defense
tpy	ton per year
U.S.	United States

UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
V/C	volume to capacity
VOC	volatile organic compound
WPRFMC	Western Pacific Regional Fisheries Management Council
WWTP	Wastewater Treatment Plant

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Draft Environmental Impact Statement
for F-15 Beddown and Infrastructure Upgrades at
Andersen Air Force Base, Guam

Responsible Agency: Department of the Air Force (DAF)

Cooperating Agency: Department of the Navy

Report Designation: Draft Environmental Impact Statement (EIS)

Abstract: This Draft EIS addresses DAF's proposal to beddown up to 12 F-15 aircraft of the Republic of Singapore Air Force and to construct infrastructure upgrades at Andersen Air Force Base (AFB), Guam. Proposed new infrastructure includes a new aircraft parking apron and associated buildings and utilities on the northern side of the existing runway, and new munitions storage earth-covered magazines in Munitions Storage Area-1. Use of this infrastructure would be consistent with existing installation operations once construction is completed. The purpose of the Proposed Action is to provide critical infrastructure that enhances United States (U.S.) posture west of the International Date Line. Additionally, the purpose of the Proposed Action is to beddown and operate Republic of Singapore Air Force fighter aircraft at Andersen AFB to support training requirements. The Proposed Action is needed to enhance DAF's capability to support U.S. and partner nation forces within the Indo-Pacific region, and strengthen the U.S.'s ability to respond regionally and worldwide through construction of infrastructure upgrades and increased support of fighter aircraft, in alignment with evolving DAF and DoD strategies and initiatives for the region. The topics considered in this EIS include air quality, biological resources, cultural resources, environmental justice, geology and soils, health and safety, hazardous materials and wastes, infrastructure and utilities, land use, noise, recreation, socioeconomics and environmental justice, transportation, and water resources. The EIS for this Proposed Action is prepared pursuant to the National Environmental Policy Act (NEPA); regulations implementing NEPA (Title 40 Code of Federal Regulations [CFR] 1500–1508); and DAF's implementing regulation for NEPA, the *Environmental Impact Analysis Process* (32 CFR 989, as amended). The DAF is preparing the EIS to assess the potential environmental consequences associated with implementation of the Proposed Action and No Action Alternative.

Comments: Comments on this Draft EIS are requested by July 26, 2024.

For further information contact: HQ AFCEC/CIE (Attn: Mr. David Martin, Bldg. 171, 2261 Hughes Ave., Ste. 155, JBSA Lackland AFB, TX 78236-9853 (U.S. POSTAL SERVICES DELIVERY)

Or

HQ AFCEC/CIE (Attn: Mr. David Martin), 3515 S. General McMullen, Bldg. 171, San Antonio, TX 78226-1710 (COURIER DELIVERY – FEDEX, UPS, DHL)

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ENVIRONMENTAL IMPACT STATEMENT FOR F-15 BEDDOWN AND INFRASTRUCTURE UPGRADES AT ANDERSEN AIR FORCE BASE, GUAM

HEADQUARTERS PACIFIC AIR FORCES

JOINT BASE PEARL HARBOR-HICKAM, HAWAIʻI

JUNE 2024

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Table of Contents

Figures

Tables

Appendices

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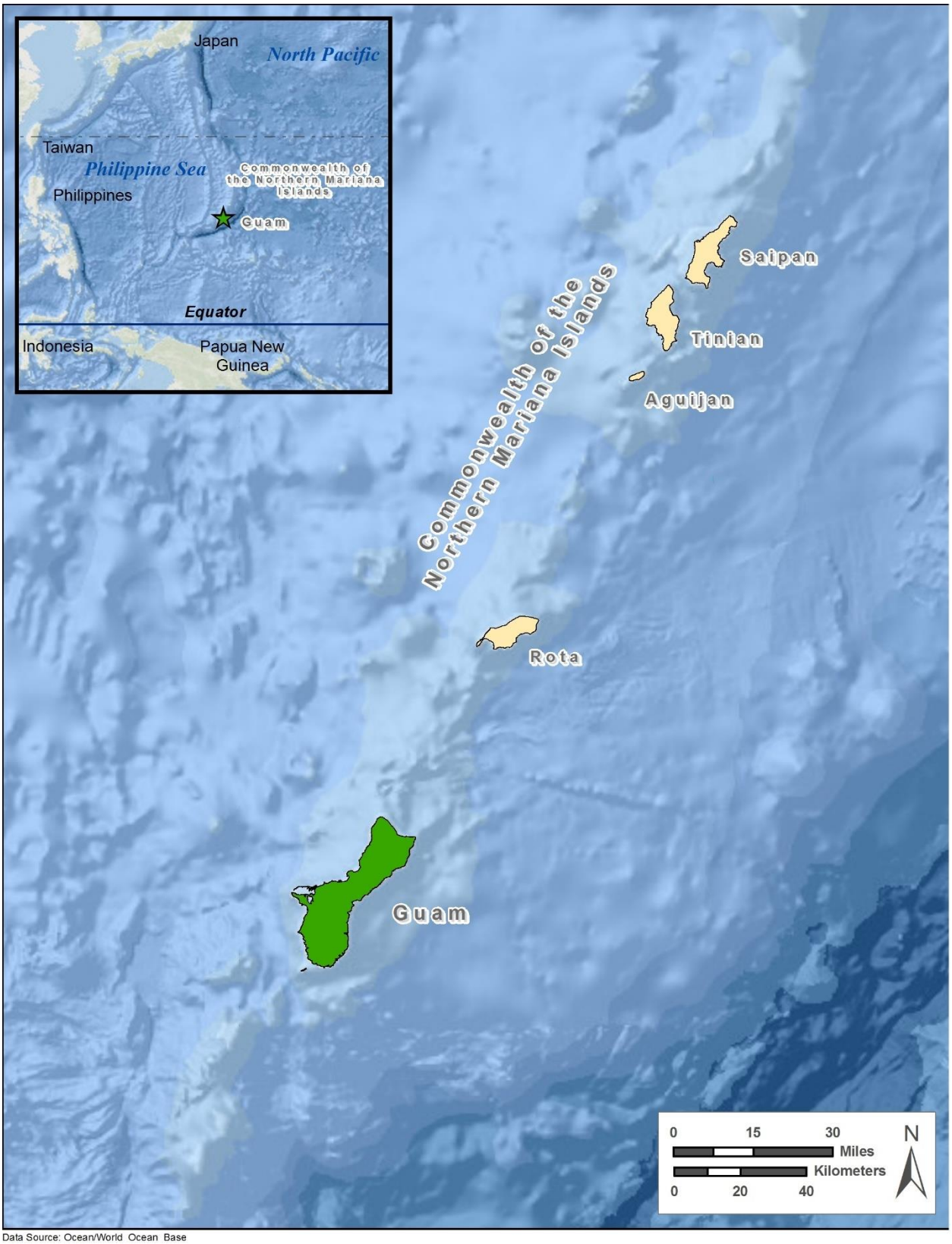
1. Purpose of and Need for the Proposed Action

1.1 Introduction

The Department of the Air Force (DAF) prepared this Environmental Impact Statement (EIS) for the proposal to construct infrastructure upgrades and to beddown and support the mission requirements of up to 12 F-15 fighter aircraft at Andersen Air Force Base (AFB), Guam. The use of this infrastructure would be consistent with the types of operations currently occurring on the installation. This Draft EIS analyzes the potential for significant environmental impacts associated with the Proposed Action and the No Action Alternative.

The environmental documentation process associated with preparing this EIS is carried out in compliance with the National Environmental Policy Act (NEPA); regulations implementing NEPA (Title 40 Code of Federal Regulations [CFR] 1500–1508); and DAF's implementing regulation for NEPA, the *Environmental Impact Analysis Process* (EIAP; 32 CFR 989, as amended).

Andersen AFB is the most forward United States (U.S.) sovereign AFB in the Pacific, located on the island of Guam. Guam is a U.S. territory and part of the Mariana Islands Archipelago, which straddles the Pacific Ocean and the Philippine Sea (see **Figure 1-1**). Andersen AFB is located on the northern end of Guam, approximately 4 miles northeast of the village of Yigo. Andersen AFB airfield has two parallel runways, each approximately 11,000 feet long. To the northwest of the airfield operations area is Munitions Storage Area (MSA)-1, which provides land for current and projected ordnance storage requirements on Guam. Explosive Safety Quantity Distance (ESQD) arcs from the existing storage magazines cover much of the central portion of the installation. Proposed infrastructure upgrades on Andersen AFB would occur adjacent to the airfield operations area and within MSA-1 (see **Figure 1-2**).



Data Source: Ocean/World Ocean Base

Figure 1-1. Guam Location Map

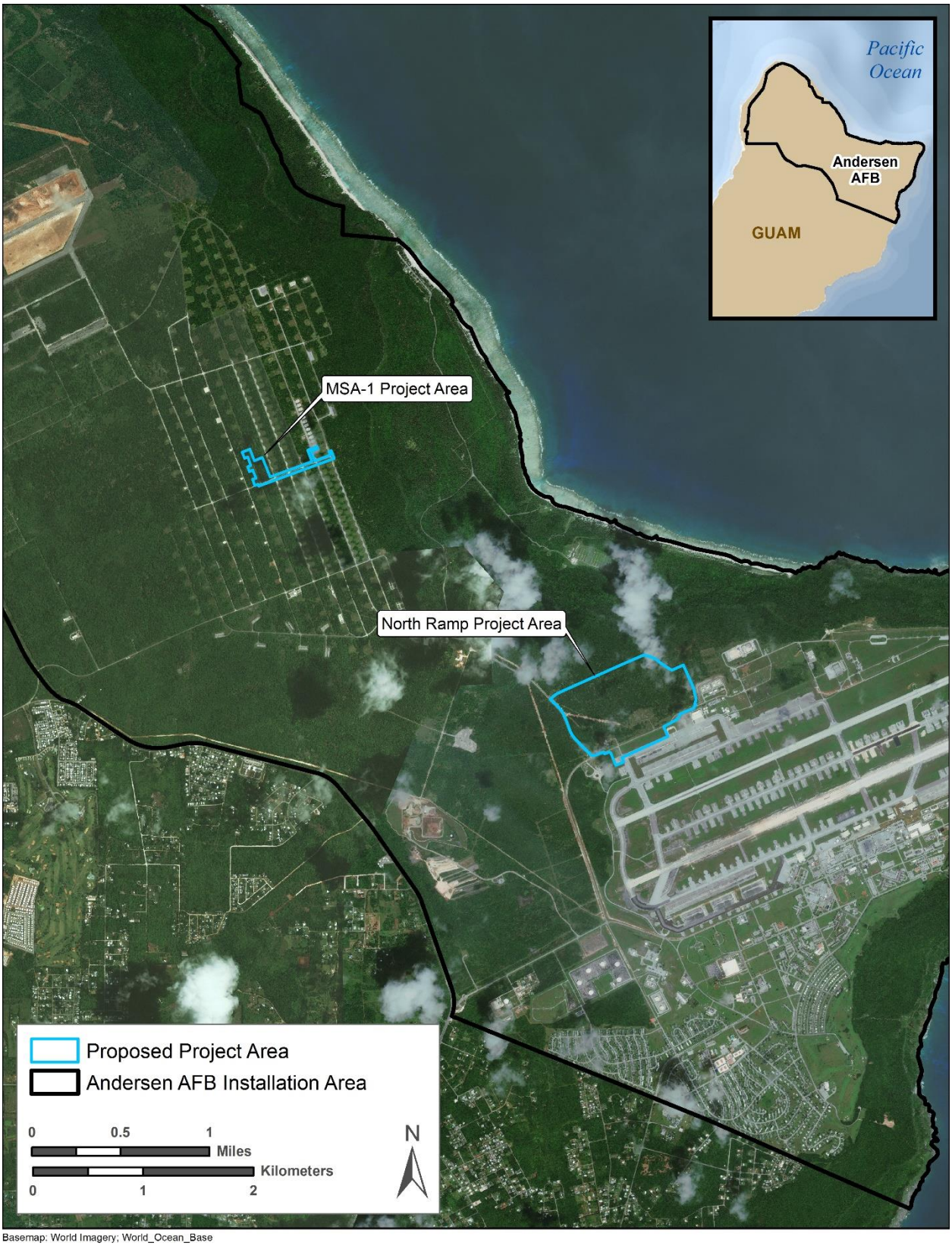


Figure 1-2. Andersen AFB Location Map

1.2 Background

Andersen AFB falls under the installation management authority of Joint Region Marianas (JRM), which supports all Department of Defense (DoD) components and tenants on Guam and in the Commonwealth of the Northern Mariana Islands (CNMI). The Commander of JRM is U.S. Indo-Pacific Command's Senior Military Official and has delegated authority to act on their behalf in this region. The Department of the Navy (DON) retains responsibility to ensure environmental compliance for activities on JRM installations. The DAF host unit at Andersen AFB is the 36th Wing (36 WG), which is assigned to Pacific Air Forces (PACAF), a DAF component major command headquartered at Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i.

The proposed F-15 beddown and mission support, and infrastructure upgrades at Andersen AFB would be conducted in alignment with evolving DAF and DoD strategies and initiatives for the Indo-Pacific region to modernize and strengthen DoD's presence, as well as improve logistics and maintenance capabilities, and would allow the DAF and DoD to maintain agile defense capabilities within the region. In accordance with its responsibilities mandated by Title 10 U.S. Code (USC) 8062 to ensure readiness, the DAF proposes to augment and adapt its forward presence capabilities in alignment with DoD initiatives for deterrence and stabilization in the Indo-Pacific region.

1.3 Purpose of Action

The purpose of the Proposed Action is to provide critical infrastructure that enhances U.S. posture west of the International Date Line. Additionally, the purpose of the Proposed Action is to beddown and operate Republic of Singapore Air Force (RSAF) fighter aircraft at Andersen AFB to support training requirements.

1.4 Need for Action

The Proposed Action is needed to enhance DAF's capability to support U.S. and partner nation forces within the Indo-Pacific region and strengthen the U.S.'s ability to respond regionally and worldwide, through construction of infrastructure upgrades and increased support of fighter aircraft, in alignment with evolving DAF and DoD strategies and initiatives for the region. Increasing and improving airfield and munitions infrastructure would address capability gaps and allow for greater efficiencies and agility in the way ground operations are conducted.

1.5 Federal Permits, Licenses, and Other Authorizations

According to Council on Environmental Quality (CEQ) NEPA regulations, a draft EIS will list all federal permits, licenses, and other authorizations that must be obtained in implementing the proposal. **Table 1-1** presents a summary of federal permits, licenses, or other authorizations applicable to the Proposed Action.

Table 1-1. Summary of Applicable Federal Permits, Licenses, and Consultations

Requirement	Agency	Status of Requirement
CWA (33 USC 1344 et seq.) and implementing regulations	USEPA/ GEPA	A storm water general permit and NPDES permit for construction that disturbs greater than 1 acre of land would be required. A Section 401 certificate under the CWA Section 401 Water Quality Certification Program would be required.
CZMA Consistency Determination	GCMP	The DAF prepared a Negative Determination and submitted it for GCMP review.
ESA, Section 7, Consultation for Federally Listed Species	USFWS	The DAF is consulting with USFWS and will obtain a Biological Opinion before issuing a Record of Decision
NHPA, Section 106 (36 CFR 800)	Guam SHPO	The DAF is coordinating with the Guam SHPO and will comply with the applicable requirements of the JRM Programmatic Agreement (2008).
Compliance with Magnuson-Stevens Act of 1996 (Public Law 104-297)	NOAA Fisheries	The DAF analyzed impacts on EFH, resulting in no adverse effects on EFH. This finding was transmitted to NOAA Fisheries for review along with this Draft EIS.

Key: CWA = Clean Water Act; CZMA = Coastal Zone Management Act; EFH = Essential Fish Habitat; ESA = Endangered Species Act; GCMP = Guam Coastal Management Program; GEPA = Guam Environmental Protection Agency; NHPA = National Historic Preservation Act; NOAA = National Oceanic and Atmospheric Administration; NPDES = National Pollutant ischarge Elimination System; SHPO = State Historic Preservation Officer; USEPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service

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2. Description of the Proposed Action and Alternatives

2.1 Proposed Action

The DAF proposes to beddown and support the mission requirements of up to 12 RSAF F-15 fighter aircraft, and construct infrastructure upgrades at Andersen AFB, Guam, in support of DAF and DoD strategies and initiatives for the Indo-Pacific. Once construction is completed, the use of this infrastructure would be consistent with the types of operations currently occurring on the installation. The proposed infrastructure would have multiple uses, and could support both the F-15 beddown and other DAF, service component, and partner nation aircraft or missions operating from Andersen AFB now, or in the future. The infrastructure would provide options for parking, storing, maintaining, refueling, loading, and unloading the F-15s and other aircraft on the installation, as well as storing munitions, which would improve upon current strategic capabilities and posture with regard to ground maneuverability. The F-15 beddown and proposed infrastructure each have standalone value for supporting the defense of U.S. interests in the Indo-Pacific region, in accordance with the Pacific Deterrence Initiative and as described in Purpose and Need for the Proposed Action (see **Sections 1.3** and **1.4**).

2.1.1 F-15 Beddown

The Proposed Action includes the beddown of up to 12 RSAF F-15 fighter aircraft at Andersen AFB, and would include airfield operations, supporting aircraft operations, and personnel to support the F-15 squadron's mission requirements. The F-15 beddown is anticipated to begin in 2029 and would not be wholly dependent upon completion of the infrastructure upgrade construction. Key elements associated with the F-15 beddown under the Proposed Action with the potential to affect environmental resources at and surrounding Andersen AFB include:

- Beddown up to 12 F-15 fighter aircraft with anticipated arrival in 2029
- Conduct F-15 aircraft operations (i.e., flight operations that include a takeoff and landing) from Andersen AFB, to include hosting periodic, temporary aircraft in support of the training mission requirements for the F-15s
- Increase personnel at the installation to support mission requirements

The following sections identify the specific beddown requirements under the Proposed Action.

2.1.1.1 F-15 and Supporting Aircraft Operations

Throughout this EIS, three phrases are used to describe aircraft operations: sortie, closed pattern, and airfield operation. A sortie consists of a single military aircraft flight from takeoff through landing, as does a closed pattern. An airfield operation represents the single movement or individual portion of a flight in the installation airfield airspace environment, such as a departure or an arrival. As an example, on a typical training mission, an aircraft makes an initial takeoff at the airfield and flies to special use airspace to practice different types of flight maneuvers, then returns to the airfield; this generates one sortie and two airfield operations.

Similarly, an aircraft could make an initial takeoff at an airfield, then immediately return to the airfield and approach for landing; this generates one closed pattern and two airfield operations.

Airfield Flight Operations. F-15 aircrews would complete flight operations to maintain proficiency in the aircraft. Flight training provides basic and continuation aircrew training needs. The beddown of up to 12 F-15s at Andersen AFB would include an increase in total airfield operations, sorties, and closed patterns, as shown in **Table 2-1**. It is assumed that approximately 10 percent of total airfield operations and sorties would be conducted during the environmental night, from 10 p.m. until 7 a.m. Additionally, it is estimated that each sortie would be approximately 2 hours, resulting in approximately 3,600 flight hours per year for all based F-15s.

Table 2-1. Current and Proposed Annual Airfield Operations

Aircraft	Takeoffs[a]	Landings[a]	Closed Pattern Operations[b]	Total Operations[c]
Total Baseline Operations[d]	7,475	7,475	4,390	19,340
Proposed Action Operations	—	—	—	—
12 Based RSAF F-15s	1,800	1,800	1,320	4,920
12 Rotational Fighters (F-15s and F16s)	576	576	64	1,216
1 Rotational Tankers/Refueler	20	20	16	56
1 Rotational Early Warning Aircraft	12	12	8	32
Total Baseline and Proposed Action	**9,883**	**9,883**	**5,798**	**25,564**
Percent Change	32.2	32.2	32.1	32.2

Source: Andersen AFB 2021a, 2021b
[a] Departures and arrivals based on flight plans submitted in 2021.
[b] Each touch-and-go includes 2 closed pattern operations (1 landing and 1 takeoff). Total Touch-and-Go operations assumed to be the Total Airfield operations minus all arrivals and departures accounted for in submitted flight plans.
[c] Total overall operations based on Andersen AFB (2021b) data and tower counts.
[d] Current Andersen AFB aircraft operations before the proposed F-15 beddown.

In accordance with the proposed F-15 mission, Andersen AFB would also support periodic, temporary training events with the based RSAF F-15s, which would include hosting additional, non-permanent aircraft at Andersen AFB. Each training event would include an additional 12 F-15s (i.e., total of 24 F-15s per training event), 1 tanker/refueling aircraft (e.g., KC-135s, KC-46s, A-330s), and 1 early warning aircraft (e.g., G-550). It is anticipated that training events with these additional aircraft would begin in 2030, after the F-15 beddown action is complete, and would occur for 4 weeks per event, twice per year. **Table 2-1** provides total proposed annual airfield operations by each type of support aircraft during training events.

The number of baseline airfield operations was generated from Andersen AFB 2021 Flight Plan Data and Andersen AFB 2021 Annual Air Operations Data from Tower Counts (Andersen AFB 2021a, 2021b). Fluctuations in baseline operational tempo can vary between aircraft types and from year to year because of unit deployments, funding levels, and other factors; therefore, a reduction or increase in number of aircraft does not necessarily translate to a reduction or increase in flight operations, respectively.

Training Flight Operations. Aircraft operating from Andersen AFB currently conduct training operations in existing special use airspace. No aspect of the Proposed Action would alter the structure or overall nature or use of the local or remote airspace units, or the type, frequency, or location of munitions expenditures. The proposed F-15 mission at Andersen AFB would use the existing fighter flight tracks; no new airspace is proposed and no changes to the manner in which the existing airspace is used would occur. Rather, changes to the aircraft inventory at Andersen AFB would only result in less than significant modifications to the amount of activity within the airspace. This EIS addresses only the ground movements as well as immediate approaches and departures at the airfield (e.g., take-offs, landings) during training exercises and military operations. All F-15 training flight, supporting aircraft flight operations, and munitions expenditures would occur within the Mariana Islands Range Complex (MIRC). Actual air readiness and air logistics training (i.e., above 10,000 feet) are addressed by authorizations associated with the MIRC in the MIRC Record of Decision (ROD) (DON 2010a), Mariana Islands Training and Testing (MITT) ROD (DON 2015), and MITT supplemental ROD (DON 2020a). This EIS does not propose or analyze increased air operations beyond what is addressed by the MITT ROD or MITT supplemental ROD. The Proposed Action does not create a need to alter the existing airspace within the region.

2.1.1.2 F-15 Support Personnel

F-15 Personnel. Beddown of the F-15s would require additional personnel to operate and maintain the aircraft, and to provide necessary support services. Approximately 205 personnel would be required, which would include DAF and/or partner nation personnel (officer, enlisted, civilian) and contractor support. Personnel would be accompanied by approximately 35 family members and dependents. Therefore, the total Andersen AFB personnel and dependent population would increase by approximately 3 percent. The personnel increase is expected to occur concurrent with the basing of aircraft. It is assumed that all personnel would reside in off-installation housing on Guam. See **Table 2-4** in **Section 2.1.4** for a complete summary of anticipated personnel increases under the Proposed Action, to include the projected personnel increase necessary to support the F-15 beddown.

Periodic, Temporary Support Personnel. During periodic, temporary training events with the based F-15s, additional aircraft would be hosted at Andersen AFB in support of the F-15 training mission. These training events would include an increase in DAF and/or partner nation personnel (officer, enlisted, civilian) and contractor support required to operate and maintain the support aircraft. During each four-week training event, which would occur twice per year, approximately 200 personnel would be required for the duration of the event. It is assumed that support personnel would not be accompanied by dependents, and would be housed in off-installation housing on Guam. See **Table 2-4** in **Section 2.1.4** for a complete summary of anticipated personnel increases under the Proposed Action, to include from hosting periodic, temporary support aircraft.

2.1.2 Infrastructure Construction

Infrastructure upgrades would occur adjacent to the existing airfield operations area and within MSA-1, totaling approximately 209 acres (see **Figure 1-2**). Infrastructure upgrades adjacent to the existing airfield operations area would occur in a location that this Draft EIS refers to as the

"North Ramp" project area. **Sections 2.1.2.1** and **2.1.2.2** present a description of the activities associated with the Proposed Action for both construction and operations at the North Ramp and MSA-1, respectively. The construction of all proposed projects would conform to Unified Facilities Criteria (UFC) standards and other applicable federal or other established criteria.

The DAF proposes to construct or install the following infrastructure at the North Ramp:

- Airfield pavements
- Aircraft hangar (maintenance hangar with squadron operations; aircraft maintenance unit; administrative spaces; aircraft support maintenance shops; warehouse area; petroleum, oil, and lubricants storage; and equipment shed)
- Flightline maintenance facility and utility building
- Jet fuel receipt, storage, and distribution system extension
- Fencing and utilities extension
- Roadways, parking, and walkways
- Stormwater management infrastructure

The DAF proposes to construct or install the following infrastructure within MSA-1:

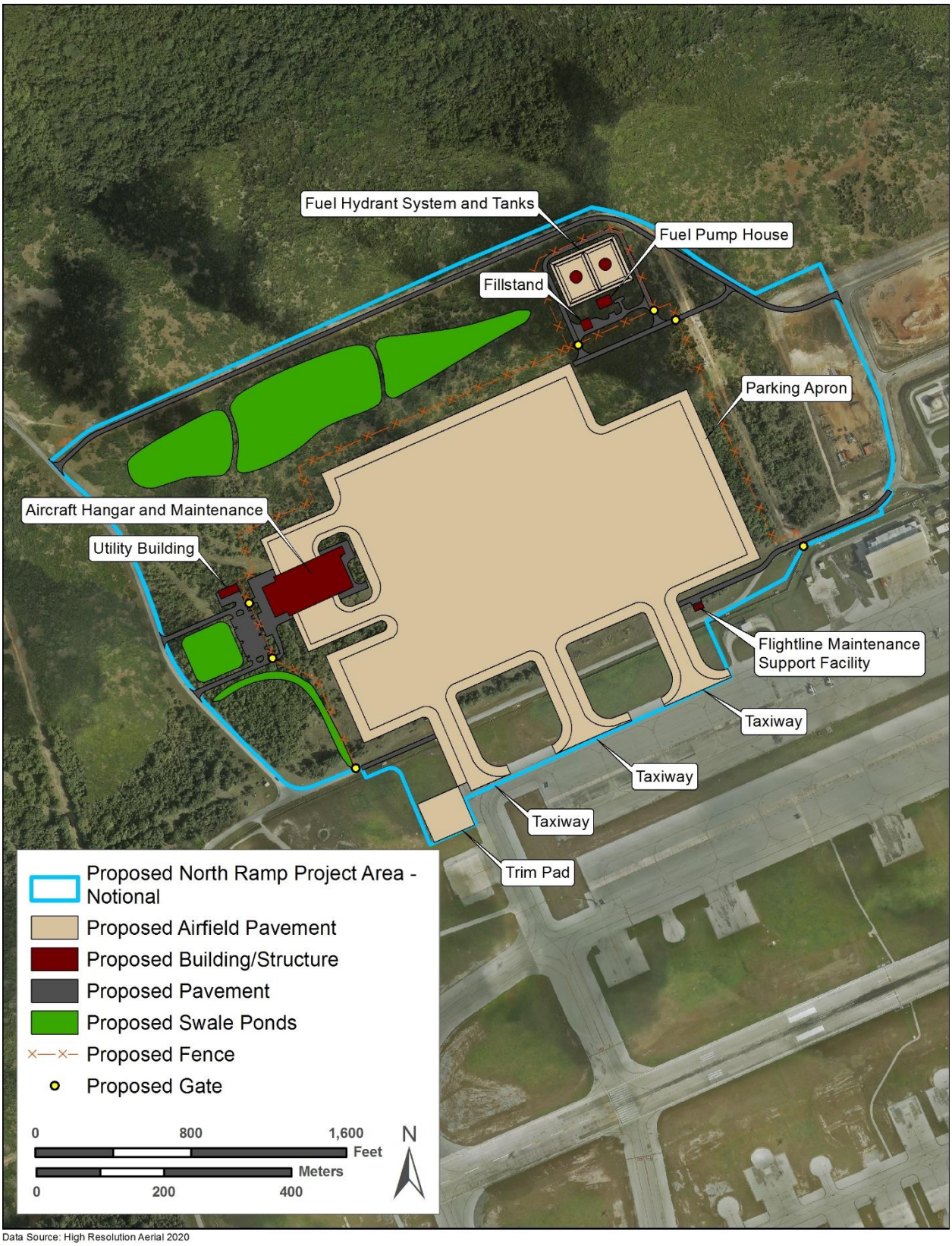
- Three earth covered magazines (ECMs) (an ECM is a secure structure used to safely store explosives, fuel, or volatile chemicals)
- Pavements, including access road improvements
- Stormwater management infrastructure
- Temporary infrastructure to support construction
- In-ground utility lines to support the proposed ECMs

Depending on the scale of the proposed facility, this Draft EIS provides infrastructure sizes either in acres or square feet to provide the most relatable context for the reader.

2.1.2.1 North Ramp

The DAF used bomber aircraft to develop size and space requirements for facilities and infrastructure at the North Ramp because it is the largest and heaviest aircraft type typically operating from Andersen AFB. By designing for the largest and heaviest aircraft, the proposed facilities have multiple utilities and would generally be able to support other smaller or lighter aircraft types, such as F-15s, within the DAF, other service components, or international partner fleets that operate from Andersen AFB.

Construction at the North Ramp would occur over approximately 3 to 7 years, and is estimated to begin in 2025. The North Ramp project area would require approximately 192 acres for construction (see **Figure 2-1**). The North Ramp project area includes the construction footprint of all proposed infrastructure, land to be used during construction as a laydown area, land to support a concrete batch plant during construction, and vegetated areas that would be permanently maintained after completion of construction. The actual construction footprint or location of infrastructure proposed within the project area could change from the notional layout provided in **Figure 2-1** based on engineering- or design-limiting factors as the planning process progresses and the site layout is finalized.



Data Source: High Resolution Aerial 2020

Figure 2-1. Proposed North Ramp Infrastructure Upgrades – Notional

Site preparations for construction would include demolition of Buildings 2550, 2551, and 2552 as well as clearing and grading. Due to the existing slope, grade, and topography of the proposed North Ramp project area, the DAF would clear surface vegetation, fill, and grade the entire 192-acre project area within the site layout boundary shown in **Figure 2-1**. Grading would create slopes of approximately 1.5 percent to no more than 10 percent across the entire North Ramp project area. Due to the existing topography of the North Ramp project area, it is estimated that preparation of the site could require approximately 35 feet of fill in some locations, and may require in excess of 1,000,000 cubic meters of fill across the site. It is assumed that fill material would be obtained from higher elevations within the North Ramp project area and from fill suppliers on Guam, such as the Smith Bridge quarry in Yigo.

Construction of infrastructure upgrades at the North Ramp project area would disturb approximately 192 acres, and would include the development of approximately 96 acres of facilities and infrastructure. Of this acreage, approximately 80 acres would be paved surfaces, 16 acres would be stormwater management infrastructure, and the remaining 96 acres would be revegetated and maintained. **Table 2-2** provides a summary of the proposed infrastructure upgrades at the North Ramp.

Table 2-2. Facilities and Infrastructure Projects within the North Ramp Project Area

Project	Size[a] (acres)
Airfield pavements (parking apron, taxiways, trim pad)	68.00
Aircraft hangar and maintenance facility	2.00
Flightline maintenance facility	0.05
Utility building	0.10
Jet fuel receipt, storage, and distribution system	4.00
Fencing and utilities extensions	N/A[b]
Roadways and parking	6.00
Stormwater management infrastructure	16.00
Total Acreage	**96.15**

Key: N/A = not applicable
[a] Size provided is the footprint (i.e., first floor) for the facility.
[b] These extensions would be located within the proposed project footprints, or within areas that would be revegetated and maintained.

2.1.2.1.1 Airfield Pavements

Parking Apron and Taxiways. The parking apron would provide paved areas for aircraft parking, servicing, loading and unloading, and fueling. The apron would afford the maximum parking capacity for bomber aircraft, using the minimum amount of paving required. The total area of the proposed new apron and taxiways is approximately 67 acres. The parking apron and taxiways would be constructed of up to 18 inches of portland cement concrete on a 10-inch compacted drainage layer overlying a 6-inch separation layer and a compacted subgrade. The aircraft apron shoulder would be constructed of asphalt, and the finished shoulder would have an overall thickness of approximately 10 inches, including an aggregate base.

2.1.2.1.2 Aircraft Hangar and Maintenance Facility

The aircraft hangar and maintenance facility would provide a place to store aircraft during surge operations, inclement weather, contingency operations, and aircraft maintenance as well as provide space for administrative activities. Specifically, the proposed facility design includes three maintenance bays; a squadron operations facility; an aircraft maintenance unit; aircraft support shops (e.g., for wheels, tires, engines, batteries); a petroleum, oil, and lubricants storage area; floor drains connected to a 5,000-gallon storage tank to collect maintenance related fluids; warehouse space; office space; and an equipment shed. The aircraft hangar would be equipped with a fire suppression system. The proposed aircraft hangar and maintenance facility comprises approximately 2 acres.

2.1.2.1.3 Flightline Maintenance and Utility Facilities

Flightline Maintenance Support Facility. The flightline maintenance support facility would provide a day-use facility for the maintenance support squadron on an as-needed basis. The facility would also include storage space for tools and maintenance equipment. Due to the distance of the proposed parking apron to existing support facilities at the airfield along the southern flightline, this proposed facility location would minimize transit time for aircraft parked at the new hangar in need of operations support. The proposed facility would comprise approximately 0.05 acre, or approximately 2,200 square feet.

Utility Building. The utility building would support the entire North Ramp development, and would house water pumps, electrical, telecommunications systems, and a stand-by generator. A diesel fire water pump for fire protection would also be located at the utility building, along with an approximately 200-gallon diesel storage tank. Water storage tanks would also be located adjacent to the utility building. The proposed facility would comprise approximately 0.10 acre, or approximately 4,400 square feet.

2.1.2.1.4 Jet Fuel Receipt, Storage, and Distribution System Extension

The proposed jet fuel receipt, storage, and distribution system at the North Ramp would be an extension of the existing Andersen AFB fuel system. The upgrades would include a hydrant fueling system and valve pits, pumphouse, truck fillstands, fuel storage tanks, tie-in to existing fuel transfer line, and a new transfer line. The fuel receipt, storage, and distribution system would be equipped with a fuel leak detection system and emergency power-down stations, which would shut down all fueling pumps on the hydrant system when tripped.

The DAF proposes to integrate the North Ramp hydrant fueling system into the existing fueling system and include loop piping, hydrant pits, low point drains and high point vent pits, and an isolation pit. The hydrant fueling system is needed to deliver clean, dry fuel (i.e., fuel that does not contain solid particulates or free water) to the fueling points in the aircraft parking apron. The hydrant system would be constructed of stainless steel and connect via fuel transfer lines to the pumphouse, which would house approximately five fuel pumps, and associated control and mechanical rooms. Fuel transfer lines would also connect the pumphouse to the fuel storage tanks. Approximately 20,000 barrels (approximately 840,000 gallons) of fuel storage is proposed as part of the fuel system. Two truck fuel stands would be located adjacent to the pump house and fuel tanks, with convenient access to the airfield refueling aprons and proposed access roads. The hydrant system would connect to the existing fuel transfer line at an existing

pumphouse located within the southeastern corner of the project area, via a new fuel transfer pipeline. The transfer line would be equipped with a cathodic protection system with block and bleed valves. All above-ground components of the fuel system would have enhanced corrosion control treatments due to the highly corrosive, chloride moisture condensing climate of Andersen AFB.

Final design of the jet fuel receipt, storage, and distribution system extension would adhere to specifications in the American Society of Mechanical Engineers (ASME) Standard B31.3, *Process Piping*, and B31.4, *Transportation Systems for Liquids and Slurries*. The pumphouse, truck fillstands, and fuel storage tank components of the jet fuel system would comprise approximately 4 acres. The hydrant system fueling loop would be installed within the proposed parking apron pavements, and the proposed fuel transfer pipeline would be installed underground within the North Ramp project area. Therefore, the fuel system lines are not anticipated to require additional pavements or impervious surfaces within the project area.

2.1.2.1.5 Fencing and Utilities Extension

Fencing would be installed around the parking apron and fuel system infrastructure, and would include two gates within the southeastern and southwestern corners of the project area. Utilities would also be installed either above or below ground within the project area, and would include electricity, communication, water, and sewer lines to assist in the operation of the proposed infrastructure. Utilities would tie into existing utility lines on Andersen AFB, and would also use the utility corridor for electricity, communication, water, and sanitary sewer that currently exists around the northern and eastern perimeter of the project area. Prior to installing new fencing, a portion of the existing airfield fence would be removed to allow for access between the existing taxilanes and new taxiways. The ground disturbance for fencing and utilities installation would be considered part of the project area site preparation, clearing, and grading effort.

2.1.2.1.6 Roadways and Parking

The DAF would relocate the existing airfield perimeter roadway outside the proposed airfield perimeter fence, and would modify the existing airfield perimeter road to provide access to the North Ramp and existing Air Combat Element infrastructure. Additional roadways could be constructed within the project area to provide access to individual facilities. Pedestrian walkways and vehicle parking would also be constructed at proposed buildings. An existing access road within the southwestern corner of the project area and a portion of the existing Marianas Boulevard, which is east of the proposed gate within the southwestern corner of the project area, would be demolished. These roadway demolitions would be considered part of the project area site preparation, clearing, and grading effort. All proposed new roadways, parking, and pedestrian walkway pavements would total approximately 6 acres.

2.1.2.1.7 Stormwater Management Infrastructure

The DAF would construct box culverts within the North Ramp project area as well as sand filters, and stormwater infiltration swales and basins along the northern and western boundaries of the project area to redirect and capture stormwater runoff from the proposed parking apron and other North Ramp paved surfaces. Hotspot runoff would be conveyed via impervious geosynthetic clay-lined channels to one of three sand filters designated on site, which each include a corresponding pretreatment basin and detention pond. The pretreatment basins would

serve as fuel spill containment and allow settling for larger particles and debris before allowing the water to discharge. The site drainage would include injection wells to help manage the stormwater runoff. Stormwater features, including sand filters, swales, and basins, would comprise approximately 16 acres of the North Ramp project area.

2.1.2.1.8 Construction Personnel and Materials

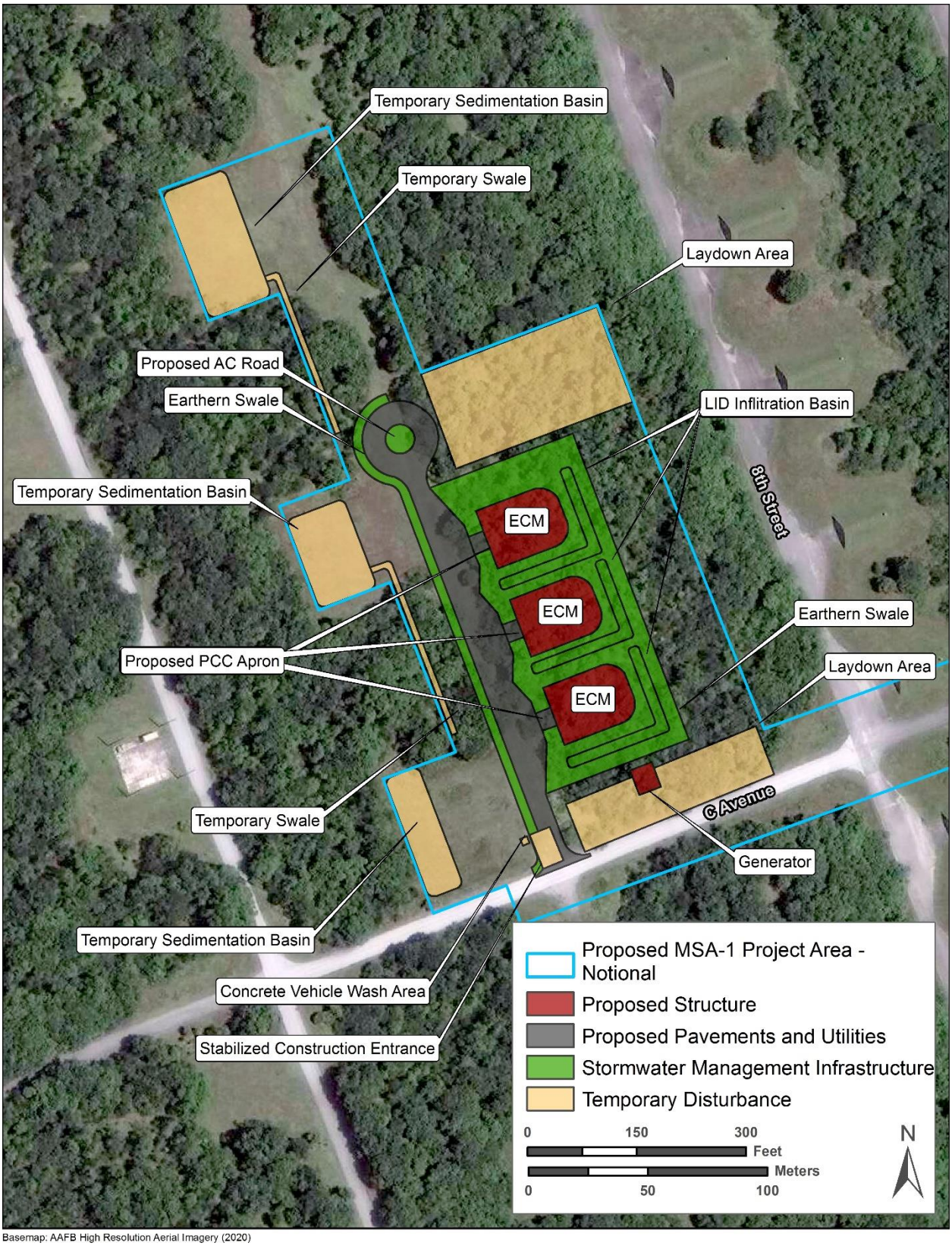
Approximately 500 construction workers would be required to construct the infrastructure upgrades proposed at the North Ramp during the construction period. This analysis anticipates that the infrastructure would be constructed sequentially, meaning that personnel support would not increase and decrease but would remain consistent across the construction period. As the construction workforce on Guam has grown to support ongoing military and other construction projects, it is possible that as those projects near completion, a portion of this on-island workforce would be available to support the North Ramp construction projects once initiated. It is assumed that construction workers could be from Guam, foreign workers already located on Guam, or foreign workers that relocate to Guam to support Proposed Action construction. All DAF construction personnel and its contractors would be subject to applicable Guam, DoD, and federal regulations while on or off duty.

During the site preparation phase of construction, fill material would be delivered from fill suppliers on Guam, such as the Smith Bridge quarry in Yigo, to the North Ramp project site. It is estimated that approximately 100,000 deliveries of fill material by construction vehicles such as dump trucks would be required for potentially in excess of 1,000,000 cubic yards of material. Fill material deliveries would cease once the site preparation phase of construction is completed.

It is assumed that construction workers would commute daily to the project area in personal or construction vehicles, with two workers per vehicle. In addition to worker travel, construction activities would generate additional traffic to and from Andersen AFB resulting from delivery of materials as well as other miscellaneous trips by inspectors, project managers, and other personnel visiting the site multiple times per day. The number of trips associated with deliveries and miscellaneous trips is estimated to be one round trip for every 25 workers on site. Therefore, it is estimated that a total of 270 construction-associated vehicles would enter and exit Andersen AFB each day throughout the duration of construction, in addition to the fill material deliveries that would occur only during the site preparation phase of construction. To support concrete requirements, the DAF would use an on-site concrete batch plant, or existing concrete batch plants either on- or off-installation, and transport concrete to the construction site. If an on-site concrete batch plant is used, a lined concrete vehicle wash area, with a protective berm to prevent the discharge of concrete waste pollutants to stormwater, would be included.

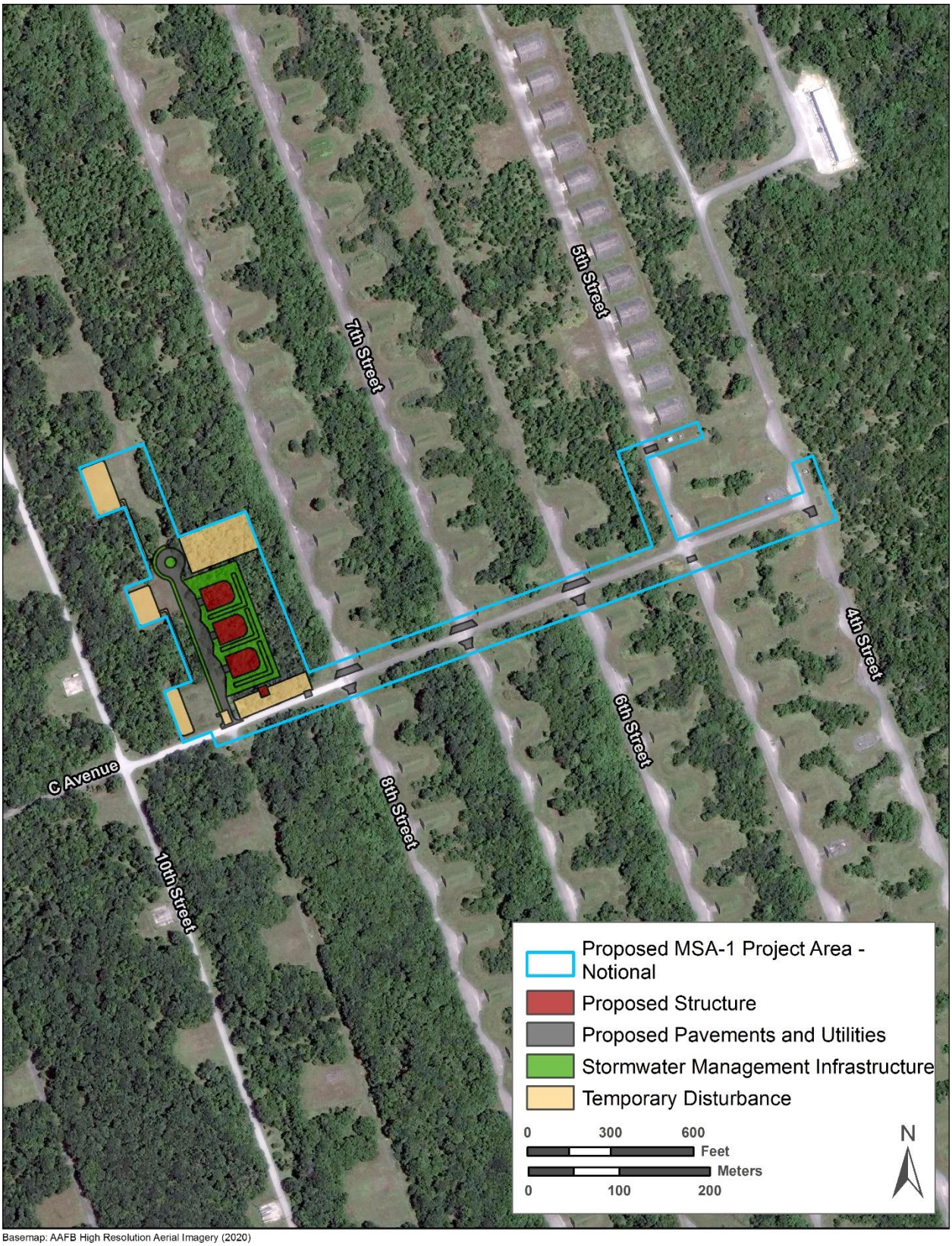
2.1.2.2 Munitions Storage Area 1

Infrastructure upgrades within MSA-1 would improve utilities connections and provide supplemental munitions storage capacity for partner nation aircraft at Andersen AFB. Construction within MSA-1 would be expected to occur over approximately 2 years and coincide with North Ramp construction. All proposed MSA-1 facilities would require approximately 17 acres, and the remainder of this Draft EIS refers to this area as the MSA-1 project area (see **Figure 2-2** and **Figure 2-3**).



Basemap: AAFB High Resolution Aerial Imagery (2020)

Figure 2-2. Proposed MSA-1 Infrastructure Upgrades (Detail) – Notional



Basemap: AAFB High Resolution Aerial Imagery (2020)

Figure 2-3. Proposed MSA-1 Infrastructure Upgrades – Notional

The MSA-1 project area includes the construction footprint of all proposed infrastructure, land to be used during construction as laydown area, and vegetated areas that would be permanently maintained after completion of construction. The actual construction footprint or location of infrastructure proposed within the project area could change from the notional layout provided in **Figure 2-2** based on engineering- or design-limiting factors as the planning process progresses and the site layout is finalized. Prior to construction, contractors would clear surface vegetation and "grub" (i.e., remove roots remaining in the soil) the project area. It is not anticipated that the MSA-1 project area would need substantial grading or fill material.

2.1.2.2.1 MSA-1 Construction Summary

Construction of infrastructure upgrades within the MSA-1 project area would disturb approximately 17 acres, and would include the development of approximately 5.8 acres (253,000 square feet) of facilities and infrastructure, including temporary disturbance. Of this total acreage, approximately 2 acres (87,000 square feet) would be paved surfaces, 1.5 acres (67,000 square feet) would be stormwater management infrastructure, 2.3 acres (98,000 square feet) would be temporary disturbance to support construction, and the remaining 11.2 acres (165,528 square feet) would be subject to vegetation clearance and regularly maintained. **Table 2-3** provides a summary of the proposed infrastructure upgrades at MSA-1.

Table 2-3. Facilities and Infrastructure Projects within the MSA-1 Project Area

Project	Size[a] (square feet)	Size[a] (acres)
Structure (ECMs)	27,000	0.6
Pavements and utilities	59,000	1.4
Generator	1,000	N/A[b]
Stormwater management infrastructure	67,000	1.5
Temporary disturbance to support construction[c]	98,000	2.3
Total[d]	**253,000**	**5.8**

Key: N/A = not applicable
[a] Size provided is the footprint (i.e., first floor) for the facility.
[b] Size too small to quantify in acres.
[c] Some temporary disturbance (i.e., stabilized construction entrance and temporary laydown yard) would overlap proposed pavements (i.e., access road and generator location); however, temporary disturbance areas are calculated as separate disturbances in this EIS to provide a conservative estimate of disturbance.
[d] Totals may not sum exactly due to rounding.

2.1.2.2.2 Earth-covered Magazines

The DAF would construct three ECMs within MSA-1. ECMs would be constructed as cast-in-place concrete or precast concrete structures that are rated to store munitions, and would be covered with at least 2 feet of earth fill (i.e., soil) that is free of deleterious organic matter, trash, debris, and large or heavy stones. It is assumed that the majority of earth fill would come from borrow areas within the installation boundary. Any planted vegetation to stabilize the fill material would follow Andersen AFB Installation Facilities Standards.

Prior to construction, a geotechnical investigation would be completed for the project area, and a geotechnical engineer would perform a Geotechnical Report and Foundation Design Analysis to inform the foundation and subgrade design for the ECMs. The total footprint of each ECM, to

include earthen cover, would comprise approximately 9,000 square feet, totaling approximately 27,000 square feet for all three ECMs.

2.1.2.2.3 Pavements and Utilities

Approximately 35,000 square feet of pavements would be installed within MSA-1 to allow for access to the proposed ECMs. A paved access way with turnaround would be constructed perpendicular to the existing MSA-1 roadway, and portland cement concrete aprons would be installed at the entrance to each ECM. Approximately 24,000 square feet of existing roadway pavements would be demolished within MSA-1 to allow for installation of electrical and communications lines. It is also possible that electrical and communications lines would be installed underground along existing roadway shoulder utility corridors, and that existing roadway pavements would not need to be demolished and repaved.

2.1.2.2.4 Generator

A stand-by generator would be installed on a paved surface within an enclosure to provide power within MSA-1 in the event of an outage. It is estimated that a 30-kilowatt generator and approximately 1,000 square feet of pavements for generator installation would be required.

2.1.2.2.5 Stormwater Management Infrastructure

Earthen stormwater swales and infiltration basins would be constructed adjacent to the ECMs to capture stormwater runoff from each concrete ECM. Stormwater swales and basins would comprise approximately 1.5 acres of the MSA-1 project area.

2.1.2.2.6 Temporary Disturbance

During construction, approximately 2.3 acres of the MSA-1 project area would be temporarily disturbed. Temporary disturbance would include a stabilized construction entrance at the intersection of the existing MSA-1 roadway and ECM access road, a construction laydown yard(s), a concrete vehicle wash area, three temporary sedimentation basins, and drainage swales. Temporary disturbance would be limited to the MSA-1 project area and is intended to minimize erosion, stormwater runoff, and sedimentation during construction. Upon completion of construction, temporary disturbance areas that have been excavated (e.g., sedimentation basins, drainage swales) would be filled, and all temporary disturbance areas would be revegetated and maintained.

2.1.2.2.7 Construction Personnel and Materials

The infrastructure upgrades proposed within the MSA-1 project area would be constructed concurrently, over 2 years of the North Ramp construction period, and it is not anticipated that additional construction workers beyond those 500 workers would be required. The number of construction-associated vehicles entering and exiting Andersen AFB provided in **Section 2.1.2.1.8** would also be anticipated to support construction within the MSA-1 project area.

2.1.3 Infrastructure Operations

Once construction is complete, the North Ramp project area would be used for aircraft parking, storage, maintenance, refueling, loading, and unloading consistent with existing installation

operations, as described in **Section 2.1**. MSA-1 would be used for munitions storage for aircraft at Andersen AFB, including partner nations and training detachments. **Sections 2.1.3.1** and **2.1.3.2** provide details regarding ground operations for the proposed infrastructure.

2.1.3.1 North Ramp

Once installed, it is not anticipated that the fencing, utilities, roadways, vehicle parking, or stormwater swales and basins would be involved in "active" ground operations, require regular recurring maintenance (e.g., on a weekly basis), be staffed with personnel, nor be operated differently than other similar infrastructure currently on Andersen AFB. Following construction, access to the North Ramp project area from the west on Marianas Boulevard would be gate access only, and general base traffic on Marianas Boulevard would be routed northwestward on 5th Street and around the North Ramp project area rather than through it. However, this updated base traffic pattern would not require "active" management once established. Therefore, discussion in this section focuses on the North Ramp facilities that aircraft and personnel would regularly use. The entire North Ramp project area would be subject to regular vegetation maintenance to prevent overgrowth adjacent to the parking apron and airfield.

The jet fuel receipt, storage, and distribution system extension would be maintained and operated in accordance with UFC 3-460-03, *Petroleum Fuel Systems Maintenance*, and operators would comply with DAF Technical Order 37-1-1, *General Operations and Inspection of Installed Fuel Storage and Dispensing Systems*; Department of the Air Force Instruction (DAFI) 23-201, *Fuels Management*; DAFI 32-1067, *Water and Fuels Systems*; and DAFI 32-7044, *Storage Tank Environmental Compliance*. Maintenance and operation will consider the principles of American Petroleum Institute (API) Standard 570, *Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems*; API Recommended Practice 1173, *Pipeline Safety Management Systems*; API Recommended Practice 1175, *Pipeline Leak Detection-Program Management*; and API Recommended Practice 1130, *Computational Pipeline Monitoring*.

2.1.3.1.1 Operations Personnel

Additional personnel would be required for maintenance of the North Ramp infrastructure. It is estimated that up to five additional personnel would be hired to assist with facility and jet fuel system maintenance. It is assumed that these personnel would be civilians and hired from the local community.

2.1.3.2 Munitions Storage Area

ECMs would be located within MSA-1, adjacent to other existing ECMs. Therefore, use of the proposed ECMs for munitions storage would not require any changes to existing munitions protocols at Andersen AFB and would not require a change in the MSA-1 ESQD arcs. Munitions would be loaded into and out of the ECMs and transported to and from the ECMs using the same routes, processes, and procedures currently used at Andersen AFB. Additionally, it is not anticipated that the pavements or stormwater management infrastructure proposed within the MSA-1 project area would be involved in "active" ground operations, require regular recurring maintenance (e.g., on a weekly basis), be staffed with personnel, nor be operated differently than other similar infrastructure currently on Andersen AFB. To prevent overgrowth within land adjacent to the ECMs, the entire MSA-1 project area would be subject to ongoing regular

vegetation maintenance. No additional personnel would be hired to support MSA-1 infrastructure once it is operational.

2.1.4 Proposed Action Summary

In summary, the Proposed Action includes:

- Beddown of up to 12 RSAF F-15 fighter aircraft with anticipated arrival in 2029, to include F-15 and supporting aircraft airfield operations as well as an increase in installation personnel
- Construction and operation of infrastructure upgrades within the North Ramp project area
- Construction and operation of infrastructure upgrades within the MSA-1 project area

Beddown of the F-15 aircraft and construction of infrastructure upgrades could overlap for up to 3 years. The following subsections summarize and quantify totals, as applicable, for activities under the Proposed Action with the potential to affect environmental resources at and surrounding Andersen AFB.

Summary: Aircraft Airfield Operations. The total number of aircraft operations that could occur under the Proposed Action from the F-15 beddown and support aircraft during training operations is provided in **Table 2-1** in **Section 2.1.1.1**. Total aircraft operations at Andersen AFB are anticipated to increase by 32 percent under the Proposed Action.

Summary: Personnel. Construction of the proposed infrastructure upgrades could occur concurrently with the F-15 beddown and associated training events with support aircraft, and it is possible that construction workers would temporarily relocate from outside Guam. **Table 2-4** provides the total increase in installation-associated personnel that could occur under the Proposed Action from the F-15 beddown and support aircraft during training operations**.** The greatest potential increase in installation personnel would occur after the F-15 beddown was complete, during a training event, and prior to completion of construction of the infrastructure upgrades, during which the total Andersen AFB personnel and dependent population would increase by approximately 11 percent.

Table 2-4. Personnel and Dependent Changes at Andersen AFB under the Proposed Action by Phase

Personnel	Baseline on Installation[a,b]	Infrastructure Construction[a,b]	Infrastructure Construction and F-15 Training[a,b]	F-15 Training[a,b]
Installation-associated Personnel[c]	4,638	+500	+905	+405
Military Dependents and Family Members	3,697	0	+35	+35
Total Installation Personnel and Dependents	**8,335**	**+500**	**+940**	**+440**

[a] Source: Andersen AFB 2020
[b] These columns represent phases of the Proposed Action. Infrastructure construction represents the phase when infrastructure upgrades have begun, but the F-15 beddown has not yet occurred. During construction, it is possible

construction workers would be from off-island. Infrastructure construction and F-15 training phase represents ongoing infrastructure upgrades occurring concurrently with F-15 airfield operations and training events, after the F-15 beddown has occurred. The F-15 training phase represents the completion of infrastructure upgrades and F-15 airfield operations and training events. The F-15 training phase does not include operations personnel for the infrastructure upgrades because it is assumed that these personnel would be from the local community.
[c] Military/civilian installation personnel and contractors, to include military construction contractors

Summary: Construction of Infrastructure Upgrades. Construction of infrastructure upgrades at the North Ramp and MSA-1 project areas would disturb approximately 209 acres, and would include the development of approximately 102 acres of facilities and infrastructure. Of this acreage, approximately 82 acres would be paved surfaces to include facilities; 17.5 acres would be stormwater management infrastructure; 2.3 acres would be temporary disturbance to support construction in MSA-1; and the remaining 107 acres would be subject to vegetation clearance, then revegetated and maintained. **Table 2-5** provides a summary of the proposed infrastructure upgrades under the Proposed Action.

Table 2-5. Facilities and Infrastructure Projects under the Proposed Action

Project	Location	Size[a] (acres)
Airfield pavements (parking apron, taxiways, trim pad)	North Ramp	68.00
Aircraft hangar and maintenance facility	North Ramp	2.00
Flightline maintenance facility	North Ramp	0.05
Utility building	North Ramp	0.10
Jet fuel receipt, storage, and distribution system	North Ramp	4.00
Fencing and utilities extensions[b]	North Ramp	N/A[b]
Roadways and parking	North Ramp	6.00
Stormwater management infrastructure	North Ramp, MSA-1	17.50
ECMs	MSA-1	0.60
Pavements and utilities	MSA-1	1.4
Generator	MSA-1	N/A[c]
Temporary disturbance to support construction	MSA-1	2.30
Total Acreage	**—**	**101.95**

Key: N/A = not applicable
[a] Size provided is the footprint (i.e., first floor) for the facility.
[b] These extensions would be located within the proposed project footprints, or within areas that would be revegetated and maintained.
[c] Size too small to quantify in acres.

Summary: Operation of Infrastructure Upgrades. Once construction is completed, all infrastructure would be used consistent with existing airfield and munitions operations on the installation. Aircraft maintenance, storage, taxiing, idling, fueling, loading and unloading, and engine test runs; operation of the extended jet fuel system; and munitions loading and transport would occur in the same manner as is currently conducted at Andersen AFB. Both the North Ramp and MSA-1 project areas would be subject to regular vegetation maintenance.

2.2 Identification of Alternatives

Prior to initiating the NEPA process, developing the purpose and need, and identifying the Proposed Action, the DAF reviewed requirements for strategic capabilities within the Indo-Pacific region, in accordance with the responsibilities mandated by Title 10 USC 8062 to ensure readiness, and in consideration of the DAF and DoD strategies and initiatives. To identify priority actions that would align with DAF and DoD strategies for the region, the DAF evaluated forward operating locations within the Indo-Pacific, in accordance with the following criteria for each location:

1. Be on U.S. territory to allow implementation of procedures for security protection of forces;
2. Allow all upgraded capabilities to be on one installation;
3. Support aircraft capable of reaching potential areas of conflict in East Asia;
4. Have existing DoD airfield infrastructure (e.g., runways, aircraft parking, associated airfield support systems) that could be expanded upon without interfering with existing operations;
5. Have adequate base operating support and weapon storage areas so these capabilities may provide for operational efficiencies;
6. Be near an airspace training range with live fire Air-to-Air and Air-to-Ground not requiring aerial refueling; and
7. Have base and community service availability to support a recurring rotational increase in population of up to 240 people.

The DAF reviewed these criteria for installations with airfields on the following islands within the PACAF area of responsibility: Iwo To (formerly known as Iwo Jima), Japan; Saipan, CNMI; Diego Garcia, British Indian Ocean Territory; Wake Island, U.S.; Hawai‘i, U.S.; and Guam, U.S. All locations except for Guam (Andersen AFB) failed to meet one or more of the above listed selection standards.

U.S. military and aircraft operations on foreign lands can be subject to political restrictions imposed by the host country or counter to U.S. interests; therefore, it is essential that the U.S. maintain full operational control of strategic military assets on U.S. lands to achieve the necessary national objectives in the Indo-Pacific. Because Iwo To and Diego Garcia are not located on U.S. lands, which could impede U.S. military activity, they were not selected during the strategic review process. Saipan, Wake Island, Hawai‘i, and Guam do not have the same political restrictions as those in Iwo To or Diego Garcia. However, Saipan and Wake Island do not currently regularly support aircraft, do not have existing DoD airfields that could be expanded upon with existing base operating support and weapons storage areas, and do not have base and community service support availability.

Only Hawai‘i and Guam are located on U.S. soil and support existing military aircraft operations, with existing military infrastructure that could be improved or expanded upon, with access to airspace training ranges without aerial refueling, and have community service support availability. However, Hawai‘i’s distance to East Asia means it does not have the same regional and forward presence as Guam, which supports U.S. national interests and maintaining stability in the Indo-Pacific. Additionally, although Hawai‘i has airfield infrastructure that could support

aircraft operations while upgrades are being conducted, the existing commercial aircraft operations at Joint Base Pearl Harbor-Hickam could interfere with the ability to expand the airport infrastructure.

For the reasons listed above, the DAF identified Andersen AFB on Guam for enhanced strategic capabilities, including beddown of up to 12 RSAF F-15 aircraft and upgrade of operationally relevant infrastructure, and dismissed five other potential locations within the PACAF area of responsibility from consideration. The DAF may expressly eliminate alternatives from detailed analysis based on reasonable selection standards (32 CFR 989.8(c)). To be considered reasonable, an alternative must be suitable for decision making, capable of implementation, and able to meet the purpose of and need for the action.

Once Andersen AFB was identified for enhanced strategic capabilities, to include the beddown of up to 12 F-15 aircraft and construction of infrastructure upgrades that would support evolving DoD strategies in the region, the DAF developed additional siting selection standards for the proposed infrastructure upgrade locations and considered siting locations on the base for the proposed upgrades. **Section 2.2.1** provides the selection standards for siting alternatives, and **Section 2.2.2** evaluates siting locations against the selection standards.

2.2.1 Selection Standards for Siting Alternatives

2.2.1.1 Airfield Infrastructure

A viable construction footprint for the airfield infrastructure upgrades on Andersen AFB must:

1. Not result in operational constraints; operational constraints would occur if proposed activities interfered with or limited an ongoing operation, activity, or mission;
2. Provide collocation/consolidation of resources and mission capabilities. The need for collocation of the airfield infrastructure is driven by operational efficiencies that would result from consolidating security requirements (e.g., fencing, security personnel), access infrastructure (e.g., roadways, gates), maintenance and support facilities (e.g., utilities buildings adjacent to utilities infrastructure), and associated safety perimeters and pavements (e.g., apron shoulders). Collocation of all proposed airfield infrastructure would also minimize transit time for aircraft on the parking apron in need of operations or maintenance support;
3. Minimize the potential for environmental impacts;
4. Avoid interference with future planned development;
5. Provide efficient tie-ins to existing utilities; and
6. Be easily accessible (due to topography and relative location to the existing infrastructure).

2.2.1.2 Munitions Storage Infrastructure

A viable alternative for the munitions storage infrastructure on Andersen AFB must:

1. Be sited in accordance with all regulatory requirements and applicable policies to ensure the safe working environment for munitions and other installation personnel; ECM configurations must maintain ESQD setback arcs and prevent unnecessary exposure to habitable spaces;

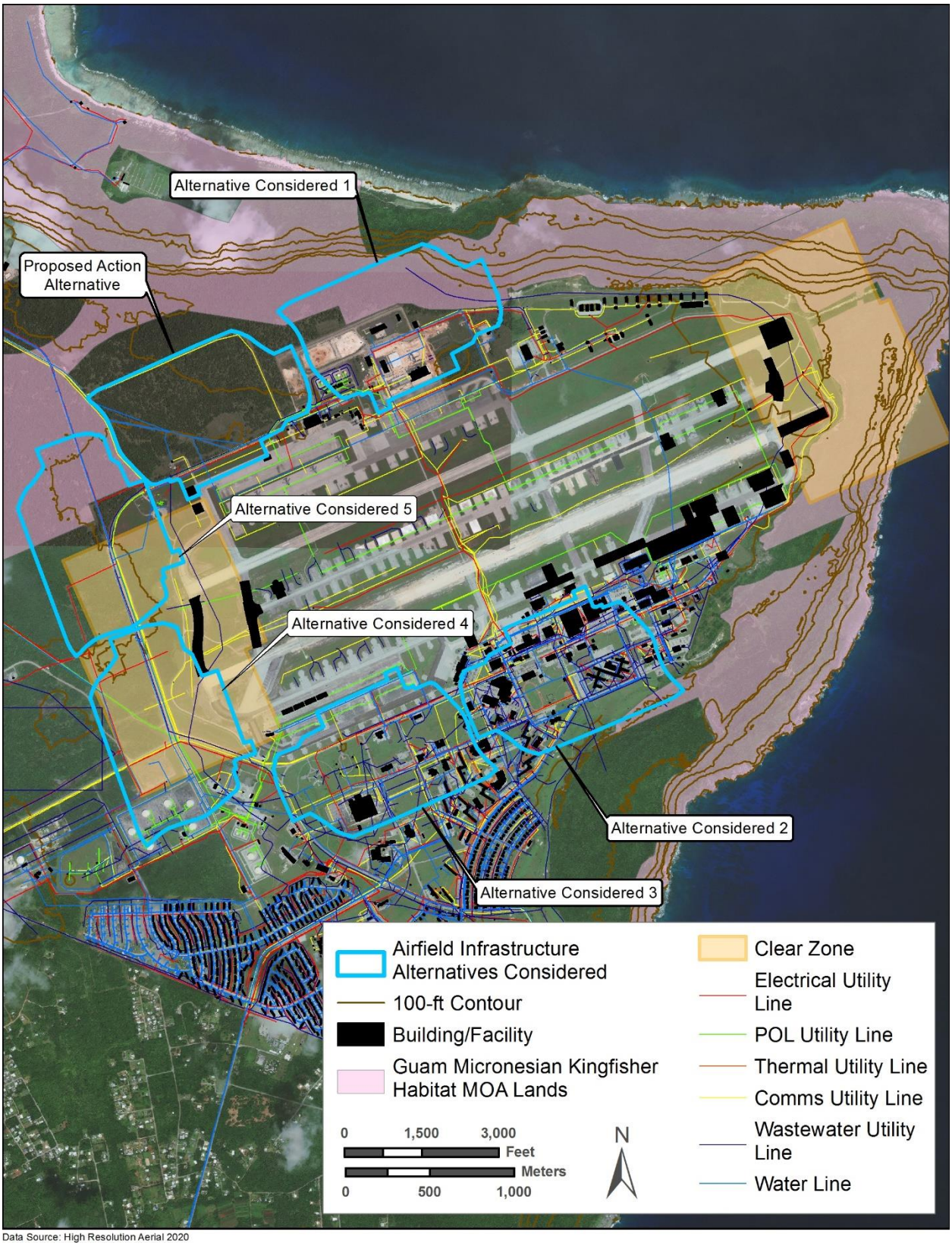
2. Maximize logistical and security operational efficiency through a compact project area footprint;
3. Not result in operational constraints; operational constraints would occur if proposed activities interfered with or limited an ongoing operation, activity, or mission;
4. Provide collocation/consolidation of resources and mission capabilities;
5. Avoid interference with future planned development;
6. Provide efficient tie-ins to existing utilities; and
7. Be easily accessible (due to topography and location relative to existing infrastructure).

2.2.2 Evaluation of Siting Alternatives

2.2.2.1 Airfield Infrastructure

DAF planners considered renovation and replacement of existing facilities, and construction of new airfield infrastructure for the upgrades. For alternatives considered that would require new construction, DAF planners estimated that the proposed airfield infrastructure on Andersen AFB would require approximately 150 to 200 acres. Based on this size, planners developed a footprint in a geographic information system program and reviewed potential construction locations around the airfield. Locations that are not immediately adjacent to the airfield were not considered because they would not meet Selection Standard 2, to provide collocation of resources and mission capabilities; locations not immediately adjacent to the airfield would not allow collocation of aircraft operations activities adjacent to the existing airfield operations area. Similarly, smaller or noncontiguous configurations of the Proposed Action footprint were not considered because they also would not meet Selection Standard 2; reducing the size of the footprint or breaking it into multiple footprints would not allow for all aircraft operations activities (parking, storage, maintenance, refueling, loading and unloading) to be collocated. Lastly, locations surrounding the northeastern end of the airfield were not considered due to the topography, which changes in elevation by approximately 500 feet and would make construction in these locations unfeasible or inaccessible, and would not meet Selection Standard 6. **Figure 2-4** provides the Proposed Action location, construction alternative locations considered around the airfield, and existing built and environmental constraints on Andersen AFB adjacent to the airfield. As shown in **Figure 2-4**, all other 150- to 200-acre locations adjacent to the airfield would: interfere with existing operations; require facilities demolition and relocation; be located adjacent to the shoreline or within areas set aside for the Guam Micronesian kingfisher, increasing environmental impacts; interfere with future development; require longer utilities and fuel transfer line connections; and/or not be easily accessible.

A detailed review of each alternative considered in comparison to the selection standards is provided below.



Data Source: High Resolution Aerial 2020

Figure 2-4. Construction Alternatives Considered for Airfield Infrastructure Upgrades

Renovate or Replace Existing Airfield Infrastructure. The DAF considered renovating, upgrading, or replacing the existing airfield infrastructure to provide improved options for parking, storing, maintaining, refueling, and loading and unloading aircraft. This alternative would provide for collocation as well as consolidation of resources and mission capabilities, minimize the potential for environmental impacts, avoid interference with other future planned development at the airfield or on base, provide connectivity to existing utilities tie-ins, and be easily accessible. However, this alternative would not meet the need for the Proposed Action because it would not improve strategic capabilities or posture with regard to ground maneuverability as it would not provide additional locations for conducting ground operations. Additionally, to renovate or replace the existing aircraft parking, storage, maintenance, refueling, and loading/unloading facilities, aircraft at Andersen AFB would have to be temporarily relocated during construction. No other location exists on Andersen AFB that could safely accommodate a temporary relocation of the aircraft. Relocating these aircraft to a DoD location off Andersen AFB would not meet the mission requirements for these aircraft, and could also interfere with the existing mission at that location. Therefore, renovating or replacing existing airfield infrastructure would not meet the operational constraints selection standard nor meet the need for the Proposed Action.

Construction of New Airfield Infrastructure Upgrade Alternatives:

Alternative Considered 1. Alternative Considered 1 for construction of airfield infrastructure upgrades would interfere with existing and proposed U.S. Marine Corps (USMC) airfield development, and would require demolition or relocation of approximately 2 acres of existing facilities. Alternative Considered 1 would also overlap with land set aside for the Guam Micronesian kingfisher[1], increasing the potential for environmental impacts. Additionally, the northeastern portion of the Alternative Considered 1 project area would be inaccessible, or require significant fill and alteration of topography, as an elevation change of more than 200 feet occurs from the southwestern to northeastern corners of the project area. The project location adjacent to the shoreline would also increase the potential for environmental impacts.

Alternative Considered 2. Alternative Considered 2 for construction of airfield infrastructure upgrades would interfere with existing airfield development, and would require extensive demolition and relocation of approximately 22 acres of existing facilities. Alternative Considered 2 would also partially overlap with land set aside for the Guam Micronesian kingfisher, increasing the potential for environmental impacts.

Alternative Considered 3. Alternative Considered 3 for construction of airfield infrastructure upgrades would not meet the operational constraints nor future development selection standard. Alternative Considered 3 would interfere with existing airfield development, and would require extensive demolition and relocation of approximately 9 acres of existing facilities. Additionally, this location, as outlined in the 2017 Andersen AFB Installation Development Plan (IDP; Andersen AFB 2017), has been identified to support future base development from the present

[1] Under a 2015 Memorandum of Agreement between the U.S. Fish and Wildlife Service (USFWS) and DON to offset impacts from the Guam Military Relocation action, the USFWS identified 5,234 acres of recovery habitat for the kingfisher in northern Guam, predominantly on Andersen AFB.

through 25 years, including but not limited to a commissary, maintenance complex, and civil engineering complex.

Alternative Considered 4. Alternative Considered 4 for construction of airfield infrastructure upgrades would not meet the operational constraints selection standards because it would interfere with existing airfield operations due to its location within the airfield Clear Zone (CZ).

Alternative Considered 5. Alternative Considered 5 for construction of airfield infrastructure upgrades would not meet two of the other selection standards. Alternative Considered 5 would interfere with existing airfield operations due to its location within the airfield CZ. It would also partially overlap with land set aside for the Guam Micronesian kingfisher, increasing the potential for environmental impacts.

Proposed Action. The North Ramp project area under the Proposed Action is a contiguous location adjacent to the airfield, and is capable of meeting the selection standards. The North Ramp project area would:

1. Not interfere with existing operations because it is not currently developed or within an area of the installation with development restrictions;
2. Collocate aircraft operations activities immediately adjacent to the existing airfield operations area in a consolidated footprint;
3. Minimize environmental impacts because it is set back from the shoreline and avoids land on Andersen AFB previously set aside for the Guam Micronesian kingfisher;
4. Not interfere with future planned development at the airfield or elsewhere on-installation;
5. Provide tie-ins to the existing utilities and fuel transfer systems (see **Sections 2.1.2.1.4** and **2.1.2.1.5**); and
6. Be easily accessible due to its topography (e.g., not on a plateau or cliffside), and proximity to the airfield and existing installation roadways.

2.2.2.2 Munitions Storage Infrastructure

In addition to the Proposed Action, the DAF considered locations for the proposed ECMs elsewhere within MSA-1, on Andersen AFB outside the existing MSAs, and within MSA-2. The DAF also considered renovating or replacing existing munitions storage facilities to provide adequate and upgraded storage capabilities.

All undeveloped locations within MSA-1 were considered because MSA-1 is categorized as “operations” land use in the 2017 Andersen AFB IDP and is used exclusively for the receiving, storage, and maintenance of munitions (Andersen AFB 2017). The DAF recognizes that, for safety purposes, munitions operations are restricted to MSAs; therefore, development of munitions infrastructure within MSA-1 will continue in accordance with the land use designation, and as dictated by explosives safety standards and mission needs. Siting within MSAs is unique compared to other DAF installation development processes as it focuses on identifying a location that meets all safety and operations needs. The development of MSA-1 is dictated by explosives safety requirements, in accordance with Department of the Air Force Manual (DAFMAN) 91-201, *Explosives Safety Standards*, which include conducting an explosives siting study, identifying explosives safety arcs from surrounding existing facilities, and identifying proposed explosives storage and operations facilities planned in the future. Additionally, the

DAF conducts development in MSA-1 to consolidate and collocate infrastructure and resources to the extent practicable to maximize operational efficiency and security while operating within the confines of explosives safety requirements. The DAF determined that the Proposed Action location is the only undeveloped location within MSA-1 that meets all selection standards. All other alternative locations considered for proposed munitions storage infrastructure would not meet explosives safety siting requirements, would interfere with existing operations, would not provide collocation of resources and mission capabilities, and/or would not be easily accessible. A review of each alternative considered in comparison to the selection standards is provided below.

Other Locations on Andersen AFB for Munitions Storage Facilities. Other locations on Andersen AFB for munitions storage facilities could include locations outside of MSA-1 or within MSA-2. Locations outside of MSA-1 would not meet the safety siting selection standard because, in accordance with DAFMAN 91-201, *Explosives Safety Standards*, munitions storage facilities can only be constructed within an MSA. MSA-2 is located just north of the airfield and currently contains 18 ECMs. It is a designated MSA, and space exists where the proposed ECMs could be collocated in a compact footprint, with access to existing utilities tie-ins. However, MSA-2 cannot safely and adequately accommodate the three additional proposed ECMs based on the safety arcs from existing surrounding facilities and the planned Standoff Weapons Complex; therefore, it would not meet the safety siting selection standard. Additionally, MSA-2 cannot be expanded to accommodate additional ECMs because it is constrained by topography and the airfield, and safety setbacks and munitions siting criteria prohibit an increase in storage capacity. Therefore, MSA-2 also does not meet the accessibility or operational constraints selection standards.

Renovate, Upgrade, or Replace Existing Munitions Storage Facilities. The DAF considered renovating, upgrading, or replacing the existing ECMs within MSA-1 to provide enhanced munitions storage capabilities. To upgrade or replace any of the existing munitions storage facilities, the munitions in the existing ECM (and possibly surrounding ECMs) would have to be temporarily relocated for safety purposes. No other location exists on Andersen AFB that could safely accommodate a temporary relocation of munitions from the existing ECMs; therefore, this option would not meet the safe siting or operational constraints selection standards if munitions are temporarily stored on Andersen AFB.

Proposed Action. Construction of the proposed ECMs within the MSA-1 project area meets the selection standards. The Proposed Action would:

1. Be sited in accordance with all regulatory requirements and applicable policies to ensure the safe working environment for munitions and other installation personnel; the project area siting would be done in accordance with DAFMAN 91-201, *Explosives Safety Standards*, and supports the Net Explosive Weight requirement;
2. Provide a compact project area footprint adjacent to existing munitions storage infrastructure in MSA-1, increasing logistical and security efficiencies;
3. Not increase the overall explosive CZ and therefore not result in operational constraints; the Proposed Action project area also avoids open areas within MSA-1 that are used for open munitions storage and processing;

4. Be located within MSA-1 and within an area of MSA-1 that provides collocation/ consolidation of resources and mission capabilities that maximizes mission efficiency through proximity to existing resources;
5. Avoid interference with future planned development, particularly planned USMC and DAF ECMs (see **Figure 2-5**); the proposed project location avoids Net Explosive Weight conflicts and restrictions with future development that would be implemented during both ECM construction and operation;
6. Provide efficient tie-ins to existing utilities within MSA-1; and
7. Be easily accessible due to topography and existing MSA-1 roadways.

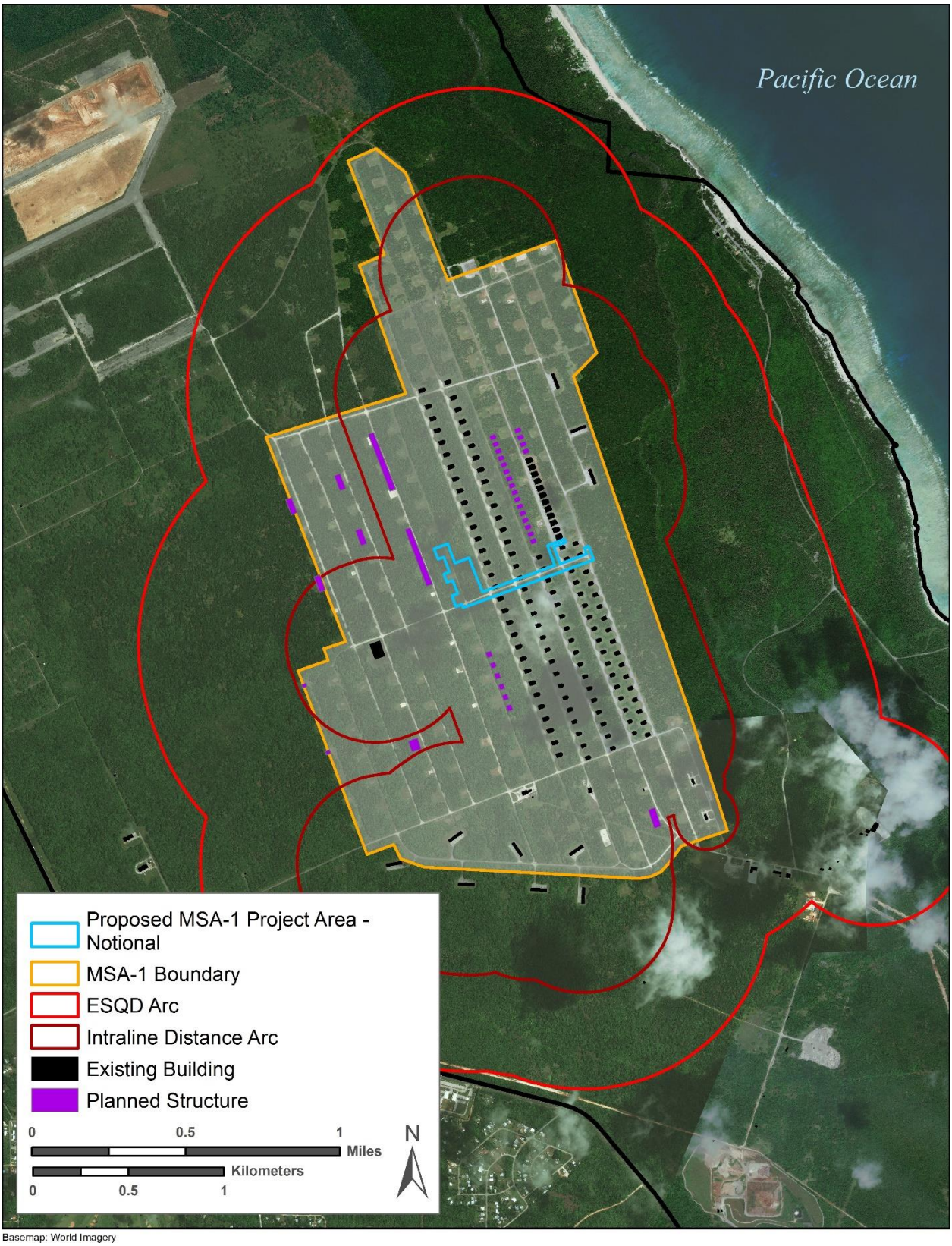


Figure 2-5. Proposed MSA-1 Location and Development Constraints

2.3 Alternatives Carried Forward for Analysis

Based on the alternatives evaluated in **Section 2.2.2**, the DAF has determined that implementing the Proposed Action on Guam, including F-15 beddown and construction of infrastructure upgrades at the North Ramp and MSA-1 project areas, is a reasonable alternative. Only the Proposed Action meets the purpose and need as described in **Sections 1.3** and **1.4**, as well as the selection standards, and is carried forward for analysis.

2.4 No Action Alternative

Section 1502.14(d) of NEPA requires the analysis of a No Action Alternative, which provides a benchmark that enables decision makers to compare the magnitude of the environmental effects to a proposed action and alternatives. No action means that an action would not take place, and the resulting environmental effects from taking no action would be compared with the effects of allowing the proposed activity to go forward.

Under the No Action Alternative for this proposal, the proposed F-15 beddown and infrastructure upgrades, as described in **Section 2.1**, would not occur. Specifically, the DAF would not:

- Beddown up to 12 RSAF F-15 fighter aircraft with anticipated arrival in 2029
- Conduct the proposed permanent RSAF F-15 aircraft operations
- Increase personnel at the installation
- Construct nor install the following infrastructure at the North Ramp:
    - Airfield pavements
    - Aircraft hangar and maintenance facility
    - Flightline maintenance facility and utility building
    - Jet fuel receipt, storage, and distribution system extension
    - Fencing and utilities extension
    - Roadways and parking
    - Stormwater management infrastructure
- Construct nor install the following infrastructure within MSA-1:
    - Three ECMs
    - Pavements
    - Stormwater management infrastructure
    - Temporary infrastructure to support construction

Andersen AFB would continue to host and operate aircraft that have been addressed under previously prepared NEPA documentation, and provide parking, refueling, aircraft maintenance, and air cargo handling from its existing infrastructure; Andersen AFB and the U.S.'s forward presence capabilities would not be augmented nor strengthened. Construction projects would be those typically accomplished for individually programmed facility actions, operations, and maintenance activities, and not specifically mission-related infrastructure to support forces at Andersen AFB.

2.5 Identification of Preferred Alternative

The DAF has identified the Proposed Action as the Preferred Alternative. The Proposed Action would enhance Andersen AFB's capability to support forces within the Indo-Pacific and strengthen the U.S.'s ability to respond regionally and worldwide.

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3. Affected Environment and Environmental Consequences

3.1 Introduction

Chapter 3 describes the environmental resources and conditions most likely to be affected by the Proposed Action, and provides information to serve as a baseline from which to identify and evaluate potential environmental impacts. Baseline conditions represent current conditions. **Chapter 3** also describes the potential environmental impacts of the Proposed Action on the baseline conditions of each environmental resource.

The potential impacts of the Proposed Action and the No Action Alternative that are described in this EIS are assessed in accordance with the DAF EIAP (32 CFR 989), which requires that impacts on resources be analyzed in terms of their context, duration, and intensity. Impacts are discussed in proportion to their significance; issues that are determined not to be significant are discussed at a level necessary to demonstrate why additional study or analysis is not warranted.

Throughout this EIS, as applicable, the area for the Proposed Action locations that could be subject to ground disturbance is referred to as the "project area." The term "project area" encompasses the locations proposed for construction at the North Ramp and in MSA-1 at Andersen AFB. This EIS uses the term region of influence (ROI) to describe the complete geographic scope of potential consequences for the resource area. The ROI for each specific resource is unique to the level of disturbance. For some resources, such as noise, air quality, and socioeconomics, the ROI extends outside the project area and/or outside Andersen AFB. For other resource areas, the ROI is the same as the physical area that would be disturbed by the construction or operation of the proposed infrastructure (i.e., the "project area").

The organization of the Affected Environment and Environmental Consequences subsections in **Chapter 3** is dependent upon the particular ROI for that resource area. For resource areas where impacts are focused on and specific to the project area, the subsections are organized by geographic location on Andersen AFB. For resource areas where impacts could extend beyond the project area, subsections for specific geographic locations may not be applicable. Additionally, resource areas may be further subdivided by resource subcomponents. This approach is intended to provide a logical organization to the content being presented, specific to the resource area.

Based upon the scope of the Proposed Action, resource areas with minimal or no impacts were identified through a preliminary screening process. It was determined that the Proposed Action would not present potential significant environmental impacts on the following resource areas because there would be no potential for impacts nor interaction with reasonably foreseeable actions resulting in impacts. The following describes those resource areas not being carried forward for detailed analysis, along with the rationale for their elimination:

- **Airspace Management.** No new airspace would be designated under the Proposed Action, and no changes would occur regarding the manner in which the existing airspace

is used. As a result, the DAF anticipates no short- nor long-term impacts on airspace management. Therefore, airspace management is not discussed further in this EIS.

- **Visual Resources.** The North Ramp and MSA-1 project areas are in locations on Andersen AFB where the proposed uses are similar to or the same as the existing surrounding uses. Both locations are on an active DAF installation and are not visible or accessible to the general public. Therefore, the DAF does not anticipate impacts on visual resources.
- **Marine Resources.** In the scope of this EIS, marine resources, specifically Essential Fish Habitat (EFH), are assessed per the National Marine Fisheries Service's (NMFS's) request (see comment from NMFS in **Appendix A**) to address potential impacts on nearshore water quality resulting from new stormwater runoff from the project area. This EIS provides an assessment of marine resources for the EFH that may potentially be impacted from stormwater, which could discharge via groundwater infiltration to nearby coastal and marine environments, as described in **Section 3.9**. Stormwater management infrastructure, as described in **Sections 2.1.2.1.7** and **2.1.2.2.5**, would be incorporated into the design of the proposed infrastructure upgrades, and no significant environmental impacts on marine resources would be anticipated. The North Ramp and MSA-1 project areas are on a plateau approximately 500 feet above sea level, and both project areas are more than 0.6 mile from the coast. No project activities would occur near the coast, and lights on the North Ramp apron would not be visible from the shore. Therefore, the DAF only considered impacts on EFH resulting from construction or operation. Except for EFH, impacts on other marine biological resources were considered and dismissed based upon the following potential outcomes:

    - Permanent loss of habitat
    - Temporary loss or modification of habitat that affects a substantial number of species
    - Permanent loss of feeding and breeding areas of a federally listed species
    - Temporary loss or modification of feeding and breeding areas that affects a substantial number of individuals of a species
    - Substantial interference with movement of any resident species that results in the inability of the species to survive

During construction, the DAF would manage stormwater runoff in accordance with a U.S. Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP), to include development of a Stormwater Pollution Prevention Plan (SWPPP), and would install temporary stormwater management infrastructure at the MSA-1 project area (see **Figure 2-2**). The DAF would conduct inspections and maintenance of stormwater management infrastructure in accordance with the DAF Engineering Technical Letter 14-1, *Construction and Operation and Maintenance Guidance for Storm Water Systems*. Post-construction, the DAF would revise the existing Andersen AFB SWPPP, or develop a new SWPPP, which establishes procedures that minimize the potential for stormwater pollution from Andersen AFB activities. Additionally, the proposed infrastructure design includes stormwater management infrastructure (see **Sections 2.1.2.1.7** and **2.1.2.2.5**). Site-specific stormwater management infrastructure, and implementation of the SWPPP(s) would protect nearby coastal or marine environments and related marine biological resources from sedimentation and stormwater runoff during and post-construction. To comply with the

Magnuson-Stevens Fishery Conservation and Management Act, the DAF has determined the Proposed Action will not adversely affect EFH and is providing this determination to the NFMS.

3.2 Criteria for Analysis

Impacts are defined under 40 CFR 1508(g)(3) as changes to the human environment from the proposed action or alternatives that are reasonably foreseeable. Direct impacts are caused by the action and occur at the same time and place, whereas indirect impacts are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. The impacts discussed in this EIS include direct and indirect impacts.

The specific criteria for evaluating the potential impacts of the Proposed Action and No Action Alternative are discussed in **Chapter 3** by resource area. The significance of an action is also measured in terms of its context and intensity. The context and intensity of potential environmental effects are described in terms of duration, the magnitude of the impact, and whether they are adverse or beneficial, and are summarized as follows:

- **Short term or long term.** In general, short-term impacts are those that would occur only with respect to a particular activity, for a finite period, or only during the time required for construction or installation activities. Long-term impacts are those that persist after the project has been constructed and is in operation.
- **Less than significant or significant.** These relative terms are used to characterize the magnitude or intensity of an impact. A less than significant impact is detectable and readily apparent. Significant impacts are those that, in their context and due to their magnitude (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR 1501.3(b)) and, therefore, warrant heightened attention and examination for potential means for mitigation.
- **Adverse or beneficial.** An adverse impact is one having negative or undesirable outcomes on the natural or human-made environment. A beneficial impact is one having positive outcomes on the natural or human-made environment.

3.3 Reasonably Foreseeable Actions and Environmental Trends

This EIS analyzes environmental impacts from the Proposed Action combined with potential cumulative impacts from reasonably foreseeable actions. A cumulative impact is defined under 40 CFR 1508(g)(3) as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal, nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually less than significant but collectively significant actions taking place over a period of time. Past actions are those actions, and their associated impacts, that have shaped the current environmental conditions of the project area. Therefore, the impacts of past actions are now part of the existing environment and are included in the affected environment described in **Sections 3.4** through **3.17**. Reasonably foreseeable actions that could have a causal relationship to the Proposed Action and contribute to cumulative impacts on the human environment are described in **Table 3-1**. The potential impacts of these

actions that are separate from the Proposed Action, when combined with the effects of the Proposed Action discussed in this EIS, are described within the Environmental Consequences analysis for each resource area in **Sections 3.4** through **3.17**. Cumulative impacts discussed in this EIS include direct and indirect cumulative impacts. Environmental trends are discussed within the Affected Environment section for each resource area.

Table 3-1. Reasonably Foreseeable Projects

Project	Location	Project Summary	Timeframe	Relevance to Proposed Action
Munitions Storage Igloos in MSA-1	MSA-1, Andersen AFB	Construction of 48 new Hayman-style ECMs in MSA-1 at Andersen AFB	Ongoing	Construction at Andersen AFB, similar to that of the Proposed Action, adjacent to the MSA-1 project area
Standoff Weapons Complex	MSA-2, Andersen AFB	Construction will include a missile maintenance and assembly complex, two igloos, and a powered trailer maintenance facility; supporting infrastructure will include upgrades to transportation routes, a new airfield entry gate, and upgraded utilities	Ongoing	Construction at Andersen AFB, similar to that of the Proposed Action, within a different project area
Jet Propellant 8 (JP-8) Storage Tanks	North Ramp, Andersen AFB	Proposal to construct 4 cut and cover JP-8 bulk storage tanks with capacities of 5.25 million gallons and the associated operation system to support current operations at Andersen AFB	2026 through 2031	Construction at Andersen AFB, adjacent to the North Ramp project area
LauncherOne Operations	Andersen AFB Airfield and Adjacent Airspace	Virgin Orbit is conducting launch operations from Andersen AFB using its Boeing 747-400 carrier aircraft and LauncherOne rocket, over the Pacific Ocean east of Guam. Includes the Federal Aviation Administration's issuance of temporary airspace.	2021 through 2025	Operations and Andersen AFB airfield and within adjacent airspace.
Terminal High Altitude Area Defense (THAAD) Additional Facilities and Infrastructure	Northwest Field, Andersen AFB	JRM and 94th Army Air and Missile Defense Command proposal to construct additional support facilities and utilities infrastructure at Northwest Field for the THAAD	2023 through 2025	Construction at Andersen AFB

Project	Location	Project Summary	Timeframe	Relevance to Proposed Action
Space Force Projects	Northwest Field, Andersen AFB	U.S. Space Force proposals to expand existing U.S. Space Force facilities at Northwest Field, to include installing additional radomes and constructing support facilities and perimeter fencing	To be determined	Construction at Andersen AFB
Satellite Communications (SATCOM) C4I Facility	Northwest Field, Andersen AFB	Proposal to construct an approximately 3,230-square-foot SATCOM facility at Northwest Field, to add data assurance and protection through redundancy for major satellite and technology server space	Beginning 2022	Construction at Andersen AFB
Beddown of Space Control Squadron	Cantonment, Andersen AFB	Hawaii Air National Guard proposal to construct support facilities and infrastructure within a 10-acre area near the Base Exchange for the 4th or 5th Space Control Squadron Beddown; once operational, would include personnel increase of up to 220 additional personnel	Beginning late 2022 and ongoing	Construction at Andersen AFB, south of the airfield
Base Commissary	Cantonment, Andersen AFB	Proposal to construct a new base commissary of approximately 102,000 square feet on an approximately 16-acre site near the existing base exchange; includes parking and water detention pond	2024–2025	Construction at Andersen AFB, south of the airfield
Medical Clinic Expansion	Cantonment, Andersen AFB	Proposal to construct an addition on the existing medical clinic of approximately 2,200 square feet with approximately 9,250 square feet of disturbance, which includes sidewalks, drainage, and revegetation	2024–2025	Construction at Andersen AFB, south of the airfield
Fencing and Gates	Andersen AFB	Proposal to replace, repair, or install new fencing and gates at various locations across the installation	To be determined	Construction at Andersen AFB

Project	Location	Project Summary	Timeframe	Relevance to Proposed Action
Guam and CNMI Military Relocation	Andersen AFB and other locations on Guam and in CNMI	Joint Guam Program Office proposal to relocate the USMC from Okinawa to Guam, and associated activities; includes family housing and the Live-Fire Training Complex to be located at Andersen AFB	Ongoing	Includes completed and ongoing construction at Andersen AFB
Enhanced Integrated Air and Missile Defense System	Andersen AFB and other locations on Guam	Missile Defense Agency proposal to deploy and operate a comprehensive, persistent, 360-degree Enhanced Integrated Air and Missile Defense system on Guam; includes site preparation, construction, operation, and maintenance; the 360-degree capability would be achieved by distributing/placing missile defense components, including a command and control center, radars, sensors, missile launchers, missile interceptors, and support facilities, at multiple locations around the island; potential for airspace modifications	Beginning 2027	Construction at Andersen AFB, potentially at multiple locations, including within MSA-1 and adjacent to North Ramp project areas; could impact operations
Firefighting Training Facility	USMC Base Camp Blaz	Construction and operation of a firefighter training facility to encompass approximately 8 acres on the former Andersen Softball Field site on Camp Blaz, adjacent to Route 3 and the base security gate	Beginning 2024	Construction adjacent to Andersen AFB
MITT	MITT Study Area	Navy proposal to conduct training and testing activities at sea and on Farallon de Medinilla within the MITT study area; accounts for changes in the types and tempo (i.e., increases or decreases) of activities necessary to meet current and future military readiness requirements beyond 2020	Ongoing	Aircraft using proposed infrastructure upgrades would train in the MITT study area

3.4 Biological Resources

3.4.1 Affected Environment

3.4.1.1 Definition of the Resource

Biological resources discussed in this section include both terrestrial and marine biological resources. Terrestrial biological resources are organized into vegetation communities, wildlife, and special status plant and animal species. While no project alternative includes work within the marine environment, marine resources are considered herein because of potential stormwater runoff associated with new development. Marine biological resources include EFH designated along the northern portion of Guam surrounding the project area. Discussion is focused on those resources that have been documented within the project area or ROI, species with a high potential to occur within the project area or ROI, and species of critical concern that may be subject to impacts from the Proposed Action. Water resources, including wetlands, are discussed in **Section 3.9**.

The following terms are used throughout this section

- **Special status species** include federally protected species listed under Section 7(a)(2) of the Endangered Species Act (ESA; 16 USC 1531 et seq.) and species that are protected by the Government of Guam through the Guam Endangered Species Act (5 Guam Code Annotated [GCA] 63201 et seq.).
- **Critical habitat** is defined for ESA-listed species that occupy specific geographical areas that are essential to the conservation of those species, and may require further management plans and protection. No designated critical habitat occurs within the project area nor on any JRM Area of Responsibility due to implementation of the Integrated Natural Resources Management Plan (INRMP; DON 2019) in accordance with ESA Section 4(a)(3)(B)(i), as described in **Section 3.4.1.2**.
- **Essential Fish Habitat (EFH)** is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC 1802(10)). EFH waters include aquatic areas and their associated physical, chemical, and biological properties that fish use. EFH substrate includes sediment, hard bottom, and structures underlying the waters as well as associated biological communities.
- **Habitat areas of particular concern (HAPC)** are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation (50 CFR 600.805–600.815). No designated HAPCs occur within the ROI for marine biological resources.

3.4.1.2 Regulatory Overview

Biological resources are protected and managed by the following federal and Guam regulations:

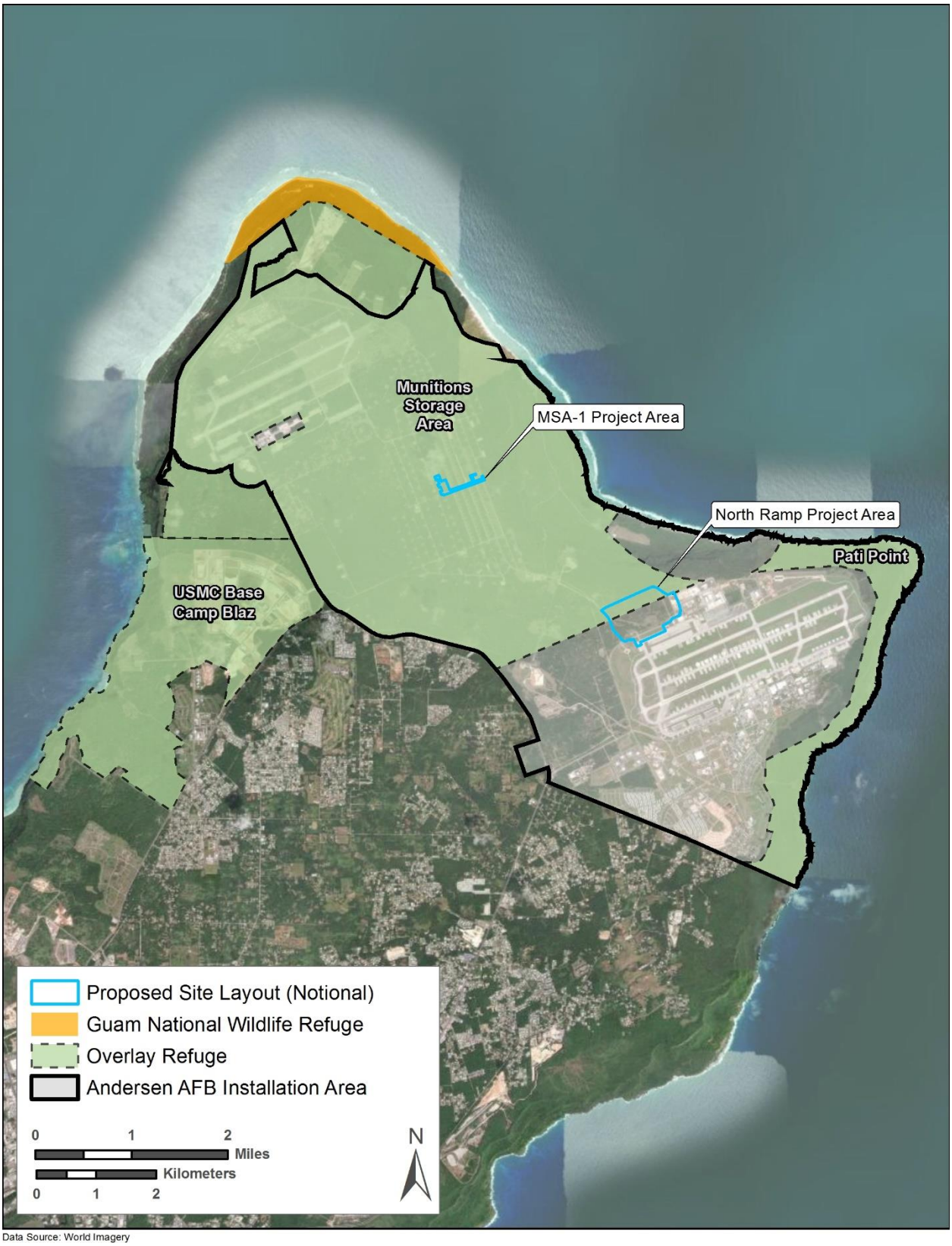
- **Endangered Species Act.** The federal ESA requires that all federal agencies seek to conserve threatened and endangered species, and use their authorities in furtherance of the purposes of the ESA (Section 2(c)). Section 7 consultations with the U.S. Fish and Wildlife Service (USFWS) ensure that “any action authorized, funded, or carried out by such an agency...is not likely to jeopardize the continued existence of any endangered

or threatened species...” (Section 7(a)(2)). Additional information on the ESA is provided in **Section 1.1**.

- **Migratory Bird Treaty Act.** The Migratory Bird Treaty Act (MBTA; 16 USC 703 et seq.) provides the USFWS with regulatory authority to protect migratory birds. The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds and their eggs, parts, and nests.
- **Magnuson-Stevens Fishery Conservation and Management Act.** The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan. Pursuant to this act, federal agencies must consult with NMFS on all actions or proposed actions the agency authorizes, funds, or undertakes that may adversely affect EFH (Magnuson-Stevens Fishery Conservation and Management Act Section 305(b)(2)).
- **Guam Endangered Species Act.** The Government of Guam has the authority to list non-federally protected species as endangered under the Endangered Species Act of Guam (Guam Code Title 5 Chapter 63, Article 2). The Government of Guam maintains a separate listing of locally endangered plant and animal species that includes other species in addition to those protected under the federal ESA.
- **Guam National Wildlife Refuge.** The Guam National Wildlife Refuge (NWR) was established in 1993 by a Memorandum of Understanding between the USFWS, DON, DAF, and Government of Guam (GovGuam et al. 1993). In 1994, Cooperative Agreements were signed to commit the DON, DAF, and USFWS to a coordinated program for the protection of threatened and endangered species as well as other native flora and fauna, maintenance of native ecosystems, and conservation of native biological diversity, consistent with the national defense mission of the DON and DAF (DON and USFWS 1994, DAF and USFWS 1994). Excess military land at Ritidian Point was transferred to USFWS ownership in 1994, under the federal excess property regulations, for inclusion in the Guam NWR, and is designated as the Ritidian Unit (see **Figure 3-1)**.

  The Guam NWR encompasses 22,078 acres and is composed of three units: the Ritidian Unit, the Andersen AFB Overlay Unit, and the Navy Overlay Unit. The Ritidian Unit includes 385 acres of terrestrial lands and 832 acres of submerged lands (USFWS 2009). The Andersen AFB and Navy overlay units are collectively referred to as Overlay Refuge lands. The Andersen AFB Overlay Unit covers approximately 10,159 acres, and the Navy Overlay Unit covers approximately 11,534 acres (see **Figure 3-1**). The MSA-1 project area and a portion of the North Ramp project area overlap Overlay Refuge lands.

  In 2004, the USFWS designated 376 acres of land at the Ritidian Unit as critical habitat for the Guam Micronesian kingfisher (*Todiramphus cinnamominus*), Mariana crow (*Corvus kubaryi*), and Mariana fruit bat (*Pteropus mariannus mariannus*) (USFWS 2004). The Guam NWR Ritidian Unit is the only designated critical habitat on Guam.



Data Source: World Imagery

Figure 3-1. Guam National Wildlife Refuge and Overlay Lands

- **Integrated Natural Resources Management Plan.** The DON, through JRM, prepared and is implementing an INRMP to "maintain long-term ecosystem health and operational requirements of the DoD's mission while minimizing impacts on natural resources at JRM sites" (DON 2019). The INRMP is prepared in compliance with the Sikes Act (16 USC 670a et seq.), as amended, and DoD Instruction (DoDI) 4715.03. Management projects are developed "in cooperation with" stakeholders that include the USFWS; state and territorial fish and wildlife agencies; and the NMFS, when marine resources are involved.

  The most recent INRMP for JRM, which includes Andersen AFB lands, was completed in 2019 (DON 2019). It provided a comprehensive review of all natural resources on JRM lands and the associated management projects to facilitate effective ecosystem management and consolidate results of federal ESA Section 7 consultations and other agreements. Regular meetings with stakeholders are held to review the status of projects and facilitate "adaptive management" with respect to ongoing actions or new scientific data for species or habitats. Annual updates are made to the INRMP as a result of this stakeholder input. A 5-year INRMP review for operation and effect is scheduled to occur in 2024.

3.4.1.3 Region of Influence

The ROI for biological resources for the proposed infrastructure upgrades include:

- The areas physically disturbed by site preparation, construction, and operation within the North Ramp and MSA-1 project areas, totaling approximately 209 acres.
- For plants, a buffer area of 3 meters (10 feet) surrounding the North Ramp and MSA-1 project areas, where ESA-listed plant encompasses the extent of dust disbursement, potential erosion and sedimentation, and edge effects from removal of adjacent vegetation.
- For wildlife, a buffer area of 150 meters (492 feet) surrounding the North Ramp and MSA-1 project areas within which the effects of the action (e.g., elevated noise levels, dust, artificial lighting, habitat fragmentation) have the potential to produce stressors.
- For EFH, although coastal waters are more than 0.6 mile from the North Ramp and MSA-1 project areas, construction and operation of the North Ramp and MSA-1 have the potential to introduce stressors to the marine environment via stormwater runoff.
- An area surrounding the Andersen AFB runway where acoustical events associated with the beddown of new F-15 aircraft may increase in frequency. Acoustical events for this analysis are defined as an aircraft take-off or landing that generates noise in excess of 90 A-weighted decibels (dBA).

3.4.1.4 Existing Conditions

A large number of previous surveys and analyses have been completed as part of ongoing natural resources management at Andersen AFB and in support of the NEPA processes for other proposed actions. The following discussion focuses on the relevant resources and environmental consequences from the Proposed Action. Existing conditions for all Andersen AFB lands and biological resources are described in detail in the 2019 INRMP (DON 2019).

A biological resources survey for this EIS was conducted from July through September 2021, by a team of biologists familiar with the flora and fauna of Guam. The purpose of the surveys was to characterize the current condition of vegetation communities and fauna within the ROI, and document the presence or presumed absence of federally listed species. No marine resources surveys were completed for this EIS because no in-water construction is proposed.

In May 2023, Typhoon Mawar struck Guam causing substantial changes to the forest canopy, including considerable defoliation and an extensive amount of downed vegetation from 140-mile-per-hour winds. A post-typhoon survey conducted from December 2023 through March 2024 confirmed that the forested areas are in post-typhoon recovery, but overall vegetation communities remain unchanged.

Throughout this document, animal species are introduced with the scientific name and subsequently referred to using their English common name, and plants are referred to using their scientific name because many of the plants do not have common names.

3.4.1.4.1 Vegetation

Vegetation on Andersen AFB, located on the northern Guam limestone plateau, has historically been impacted by extensive agricultural and military use, which began in the early 1800s, continued during World War II, and persists today (Mueller-Dombois and Fosberg 1998). Additionally, vegetation in northern Guam has undergone alterations in recent years due to the introduction of invasive plant and animal species, such as feral ungulates that browse on native plant species and scale insects that are causing wide-spread damage to federal ESA-listed plant species (DON 2019).

Vegetation surveys and mapping of Andersen AFB were completed in 2008 and 2015 (e2M 2008, Cardno 2016), and surveys of the project area were also conducted in 2006 as part of the Intelligence, Surveillance, and Reconnaissance and Strike EIS (Parsons 2006). The 2015 study was completed to update and synchronize classifications used to describe vegetation communities for most military lands on Guam, including Andersen AFB (Cardno 2016). The project included standardizing vegetation community and other land use categories based on aerial imagery and previous vegetation mapping. The surveys conducted within the project area for this EIS used the vegetation community categories and mapping from the 2015 vegetation study (Cardno 2016) to summarize the current condition and acres of land cover.

Table 3-2 provides a summary of the vegetation communities within the project area, and also identifies the portion of those communities that are located within the Overlay Refuge lands. **Figure 3-2** shows the locations of the vegetation communities within the project area and on Andersen AFB based on the 2019 INRMP (DON 2019) and confirmed during field surveys in 2021 and resurvey in 2023–2024.

Table 3-2. Vegetation Communities within the Project Area

Vegetation Type/Land Cover	Project Area	Project Area Acres	% of Project Area	% of Project Area Acres on Andersen AFB[a]	Project Area Acres in Andersen AFB Overlay Refuge	% of Project Area Acres in Total Andersen AFB Overlay Refuge[b]
Limestone Degraded Forest	North Ramp	127.2	66.5	3.9	49.1	1.8
Limestone Native Forest	North Ramp	0.4	<1	<0.1	0.4	<0.1
Other Shrub/ Grassland	North Ramp	15.9	8.3	1.8	3.3	0.4
Developed Land	North Ramp	47.9	25.0	1.0	6.6	0.5
Total	North Ramp	191.4	100	1.2	59.4	0.6
Vitex Forest	MSA-1	7.1	42.0	<0.1	7.1	0.4
Developed Land	MSA-1	9.8	57.7	0.2	9.8	0.8
Limestone Degraded Forest	MSA-1	0.1	0.3	<0.1	0.1	0.0
Total	**MSA-1**	**17.0**	**100**	**<0.1**	**17.0**	**0.1**

Source: Cardno 2016
[a] Based on vegetation types on 15,375 acres of Andersen AFB
[b] Based on vegetation types on 10,178 acres of Andersen AFB Unit of Overlay Refuge

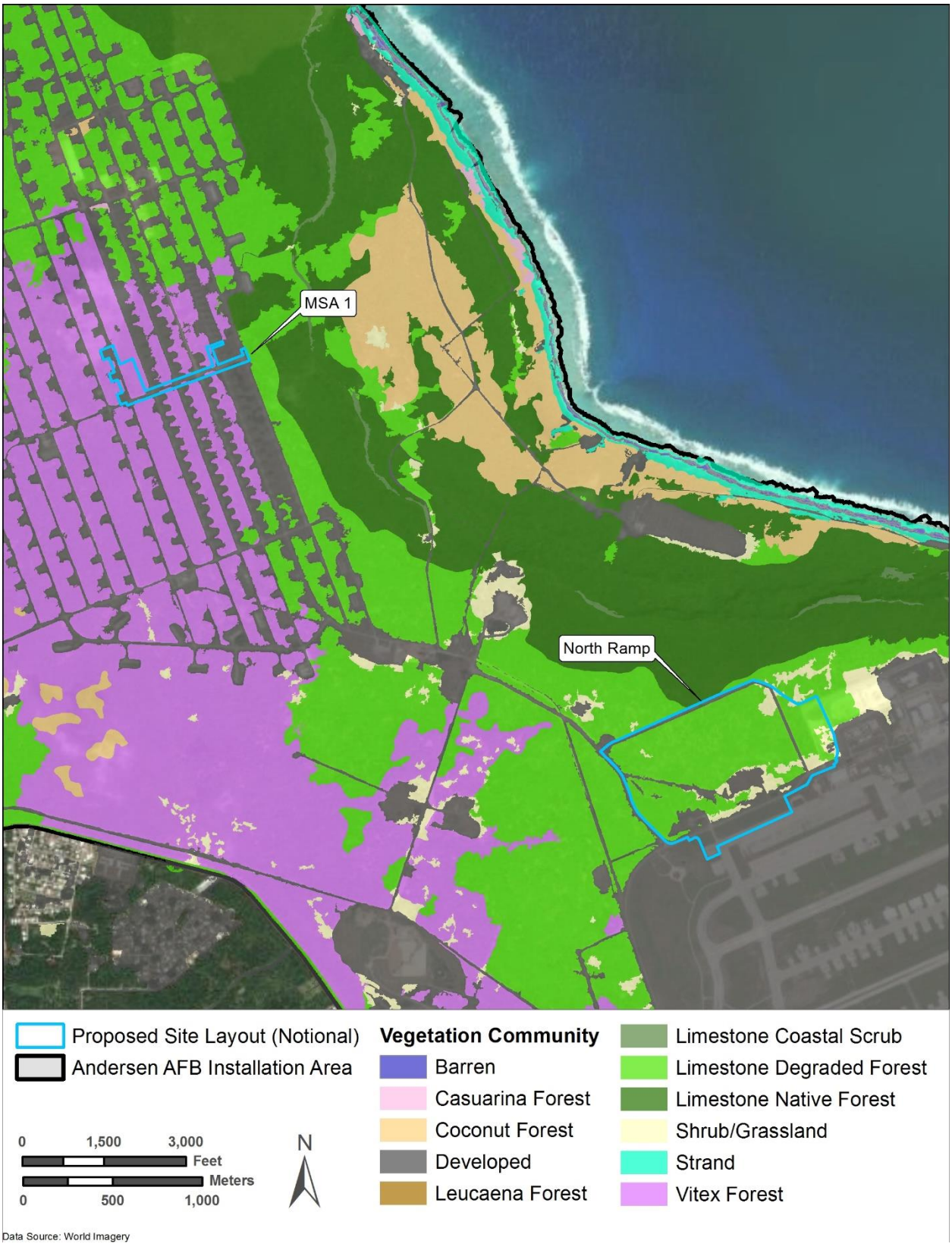


Figure 3-2. Vegetation Communities within the Project Area

Non-native and Invasive Vegetation. Numerous non-native plant species have become established throughout Guam, including Andersen AFB, and are out-competing native plant species. Areas of limestone native and degraded forest on Andersen AFB are becoming dominated by *Vitex parviflora*, a non-native and invasive species. *Vitex parviflora* is a large tree that dominates much of the canopy and out-competes native species that grow in limestone soils. Invasive grasses and vines are also common throughout limestone forests on Guam. Common non-native and invasive plant species recorded during the project area surveys include hairy beggartick (*Bidens pilosa*), Jack-in-the-bush (*Chromolaena odorata*), tangantangan (*Leucaena leucocephala*), climbing hempvine (*Mikania scandens*), corkystem passionflower (*Passiflora suberosa*), coffeeweed (*Senna occidentalis*), and limeberry (*Triphasia trifolia*).

3.4.1.4.2 Wildlife

The following overview of fauna within and near the project area are based on observations during the biological resource surveys completed for this EIS, and previous investigations of wildlife on Andersen AFB. Descriptions of wildlife on Andersen AFB are available in the 2019 INRMP (DON 2019).

Mammals. The only native mammal on Guam is the Mariana fruit bat, which is described under Special Status Species in **Section 3.4.2.1.3**. Three non-native mammals were observed within the project area during surveys completed for this EIS, including Philippine deer (*Rusa marianna*), feral dogs (*Canis lupus familiaris*), and feral cats (*Felis silvestris catus*). Other non-native mammals such as feral pigs (*Sus scrofa*), Polynesian rats (*Rattus exulans*), and musk shrew (*Suncus murinus*) are likely to occur within the project area and throughout Andersen AFB.

Birds. More than 100 species of birds have been documented on Guam, including migrant, wetland, seabird, grassland, and forest birds (Guam DAWR 2006), which includes the more than 20 species recorded on Andersen AFB. Compiled results of avian species observed on Andersen AFB during surveys in 2011 (HDR 2013) and 2013 (JGPO 2015) are provided in **Table 3-3**. Seven bird species were observed within the project area during surveys completed for this EIS, including Micronesian starling (*Aplonis opaca guami*), yellow bittern (*Ixobrychus sinensis*), black drongo (*Dicrurus macrocercus*), black francolin (*Francolinus francolinus*), Eurasian tree sparrow (*Passer montanus*), feral chickens (*Gallus gallus domesticus*), and Island collared dove (*Streptopelia bitorquata*). These seven bird species include one migratory bird and four non-native, non-migratory bird species. Other common bird species such as Pacific golden plover (*Pluvialis fulva*), ruddy turnstone (*Arenaria interpres*), and wood sandpiper (*Tringa glareola*) are likely to occur.

Table 3-3. Bird Species Previously Recorded on Andersen AFB

Common Name/ Chamorro Name	Scientific Name	Residence Status[a]				MBTA Listed?
		Common	Resident	Breeding	Native/ Introduced[b]	
Micronesian starling/Sali	*Aplonis opaca*	No	Yes	Yes	Native	No
Yellow bittern/Kakkak	*Ixobrychus sinesis*	Yes	Yes	Yes	–	Yes
Ruddy turnstone/Dulili	*Arenaria interpres*	Yes	No	No	–	Yes
Tattler spp.	*Tringa* spp.	Yes	No	No	–	Yes
Wood sandpiper/Dulili	*Tringa glareola*	Yes	No	No	–	Yes
Sharp-tailed sandpiper/ Dulili	*Calidris acuminata*	Yes	No	No	–	Yes
Pacific golden plover/Dulili	*Pluvialis fulva*	Yes	No	No	–	Yes
White tern/Chunge	*Gygis candida*	Yes	Yes	Yes	–	Yes
Feral chicken	*Gallus gallus domesticus*	Yes	Yes	Yes	–	No
Eastern cattle heron/ Chuchuko	*Bubulcus coromandus*	Yes	No	No	–	Yes
Pacific reef heron, reef egret/Chuchuko atilong	*Egretta sacra*	Yes	Yes	Yes	Native	Yes
Little egret/Chuchuko	*Egretta garzetta*	No	No	No	–	Yes
Whimbrel/Kalalang	*Numenius phaeopus*	No	No	No	–	Yes
Black-winged stilt	*Himantopus*	No	No	No	–	Yes
Ruff	*Calidris pugnax*	No	No	No	–	Yes
Island collared dove/ Palumat	*Streptopelia bitorquata*	Yes	Yes	Yes	Introduced	No
Mariana fruit dove	*Ptilinopus roseicapilla*	No	No	No	Native	Yes
White-throated ground dove	*Gallicolumba xanthonura*	No	No	No	Native	Yes
Black drongo/Salin Taiwan	*Dicrurus macrocercus*	Yes	Yes	Yes	Introduced	No
Black noddy/Fahang Dikike'	*Anous minutus*	Yes	Yes	Yes	–	Yes
Brown noddy/Fahang Dankolo	*Anous stolidus*	Yes	Yes	Yes	–	Yes
Eurasian tree sparrow/ Gagapale	*Passer montanus*	Yes	Yes	Yes	Introduced	No
Great frigate bird/Payaya	*Fregata minor*	No	Yes	No	–	Yes
Black francolin	*Francolinus*	Yes	Yes	Yes	Introduced	No
Brown noddy/Fahang Dankolo	*Anous stolidus*	Yes	Yes	Yes	–	Yes

Source: HDR 2013, JGPO 2015
[a] Indicates if the species meets the identified residence status
[b] "–" indicates not indicated

Reptiles and Amphibians. A total of 13 reptile and amphibian species have been recorded on Andersen AFB during previous surveys, including 6 native species (DON 2019). Past surveys within the North Ramp project area located several small reptiles and a single amphibian species, including the native Pacific blue-tailed skink (*Emoia caeruleocauda*); non-native house geckos (*Hemidactylus frenatus*); non-native curious skinks (*Carlia ailanpalai*); and Brahminy blind snake (*Ramphotyphlops braminus*), an introduced species (DAF 2006). Surveys in 2016 of an area overlapping and adjacent to the proposed MSA-1 project area also recorded native mutilating gecko (*Gehyra mutilata*) and native mourning gecko (*Lepidodactylus lugubrus*) (DAF 2020a). One amphibian, cane toad (*Rhinella marina*), and five reptile species were observed within the project area during surveys completed for this EIS, including snake-eyed skink (*Cryptoblepharus poecilioplеurus*), Pacific blue-tailed skink, house gecko, mourning gecko, and curious skink.

Invertebrates. Invertebrates documented on Andersen AFB include native, non-native and invasive, and special status species, such as the federal ESA-listed Mariana eight-spot butterfly (*Hypolimnas octocula marianensis*) and Guam tree snail (*Partula radiolata*). Previous surveys within the North Ramp and MSA-1 project areas did not record any occurrence of the Mariana eight-spot butterfly or their host plants, *Procris pedunculata* and *Elatostema calcareum*, nor Guam tree snails.

In the North Ramp project area, butterflies previously observed included common species such as blue-banded king crow (*Euploea eunice hobsonii*), common swallowtail (*Papilio xuthus*), and monarch (*Danaus archippus*) (DAF 2006). Previous surveys adjacent to the MSA-1 project area recorded signs of non-native tree snails such as the Asian land snail (*Satsuma* spp.), tropical American lined tree snail (*Drymaeus multilineatus*), giant African snail (*Achatina fulica*), and the invasive predator rosy wolf snail (*Euglandina rosea*). The non-native black citrus swallowtail (*Papilio polytes*) and common eggfly (*Hypolimnas bolina*) were commonly recorded as well (DAF 2020a). Invertebrates recorded during surveys completed for this EIS included three native arthropods—coconut crab (*Birgus latro*), forest hermit crab (*Coenobita spinosus*), and Guam long-legged land crab (*Discoplax michalis*)—and more than 20 non-native insects and arachnids.

Non-native and Invasive Wildlife. The introduction of predators and other invasive species have played a key part in the decline and extirpation of many of Guam's native species (Guam DAWR 2006). In the limestone forest habitats of Andersen AFB, feral ungulates such as feral pigs and Philippine deer, are known to cause extensive habitat damage by rooting and digging, creating browse lines that impair regeneration of native plants, and promoting proliferation of browse-resistant plant species. Introduced birds such as black drongo (*Dicrurus macrocercus*), Eurasian tree sparrow (*Passer montanus*), black francolin (*Francolinus francolinus*), and island collared dove (*Streptopelia bitorquata*) pose a risk to native bird species because of their potential to displace or compete with native species or transmit diseases. Recent introduction of highly invasive invertebrates such as little fire ant (*Wasmannia auropunctata*) and greater banded hornet (*Vespa tropica*) also represent serious threats to native invertebrate and vertebrate species, and insects such as the coconut rhinoceros beetle (*Oryctes rhinoceros*) have caused widespread degradation to native plant species.

The brown treesnake (BTS) (*Boiga irregularis*) is an introduced species that has caused the decline of many of Guam's native species. The BTS was introduced to Guam in the mid-1900s. Since its introduction, the BTS has had a devastating effect on Guam's native fauna, causing widespread ecological impacts at multiple levels. Encountering few predators, competitors, or pathogens, as well as a super-abundance of prey unaccustomed to a predatory snake, the BTS spread across the entire island in approximately 20 years and caused the extinction or extirpation of 13 of the 21 native breeding birds. The BTS also preys on Guam's native reptile species and is believed to prey upon non-volant young Mariana fruit bats left at the roost site; however, there are few records of this occurring (Wiles 1987), and the extent to which this predator has affected fruit bat abundance on Guam is unclear (NAVFAC Marianas 2017). The loss of pollinating and seed-spreading bird and fruit bat species is negatively affecting forest regeneration and future forest structure on Guam; programs have been instituted to control and attempt to eradicate the BTS[2] (DON 2019).

3.4.1.4.3 Special Status Species

A total of 25 federally threatened and endangered terrestrial species that are not considered extirpated are known, or have the potential, to occur on Guam, including 1 mammal species, 2 bird species, 3 reptile species, 4 invertebrate species, and 15 plant species. A total of 20 species are listed under the Guam ESA, including 1 mammal species, 4 bird species, 9 reptile species, 3 invertebrate species, and 3 plant species. Overall, 11 species are both federal and Guam ESA-listed. Terrestrial species with the potential to occur on Guam, and that are listed as threatened or endangered by the USFWS or the Government of Guam, are discussed in detail in the 2019 INRMP (DON 2019).

The surveys completed for this EIS confirmed the presence of seven special status species (five plants, one mammal, and one bird) within the survey area, including *Cycas micronesica*, *Tabernaemontana rotensis*, *Bulbophyllum guamense*, *Dendrobium guamense*, *Tuberolabium guamense*, Mariana fruit bat (*Pteropus mariannus mariannus*), and Micronesian starling (*Aplonis opaca guami*). Of those special status species, the Micronesian starling is a Guam ESA endangered species, but is not federally listed. Based on previous surveys, surveys completed for this EIS, review of the 2019 INRMP, and analysis of existing vegetation communities and habitat, 21 special status species have the potential to occur on Andersen AFB. Of those 21 species, 4 are not likely to occur within the project area or ROI due to lack of habitat, no previously recorded observations on Andersen AFB, or extirpation. The federally listed species that are known to occur within the project area or ROI are discussed in the Biological Assessment for the Proposed Action, which was provided to the USFWS in April 2024, thereby initiating formal consultation under Section 7 of the ESA. **Table 3-4** and the following discussion summarize species that the DAF determined would potentially be affected by the Proposed Action. A summary of the Section 7 consultation actions is provided in **Appendix B**.

[2] Many projects and research addressing control and suppression of the BTS have either been completed or are underway on JRM-administered lands on Guam. The Armed Forces Pest Management Board coordinates DoD activities to prevent and control the spread of invasive species, including the BTS, on, to, or from military bases. The DON and DAF, as well as other federal, state, territorial, and commonwealth agencies, actively participate in the Brown Treesnake Control and Eradication Committee, established by U.S. Congress under the Brown Treesnake Control and Eradication Act of 2004.

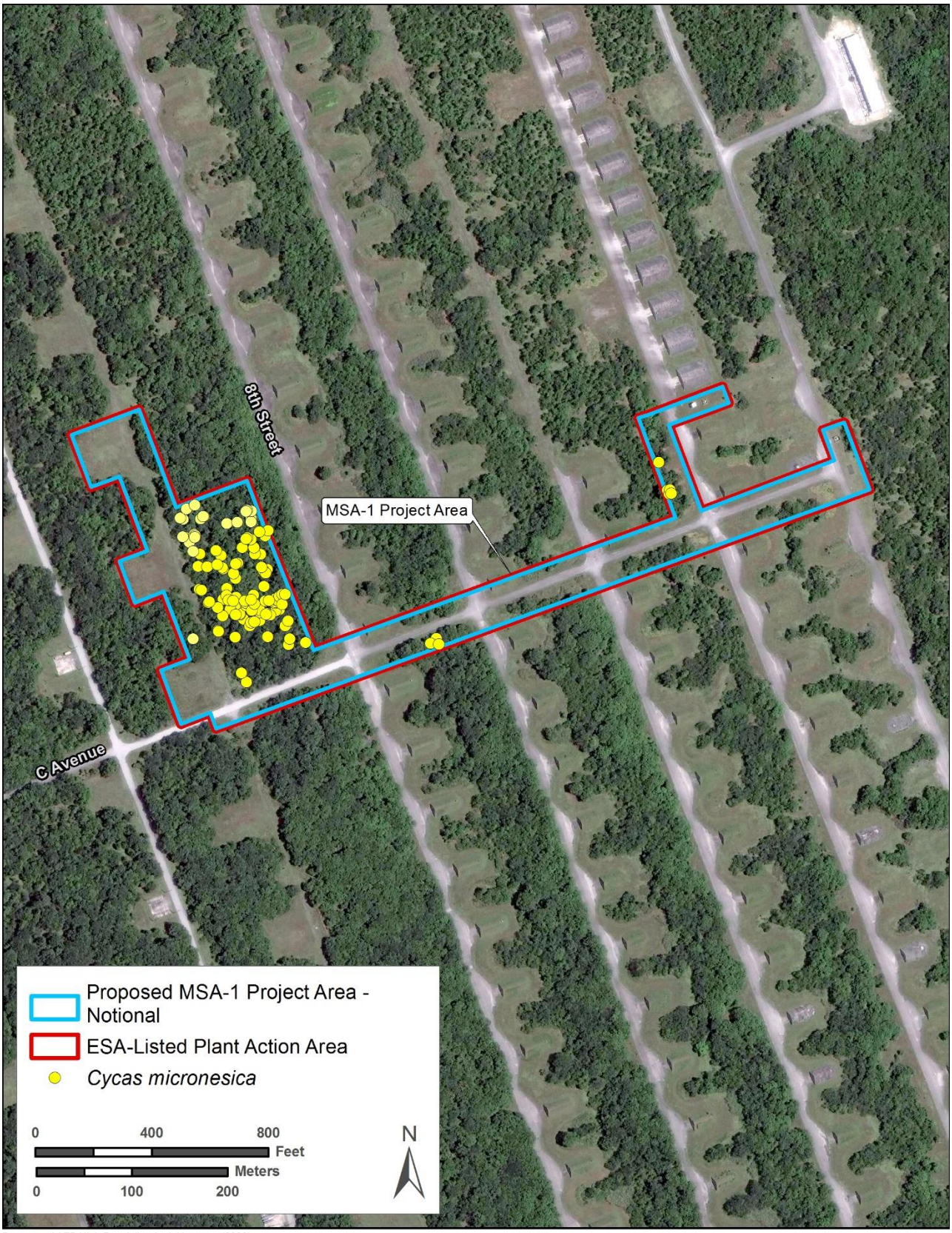
Table 3-4. Special Status Species Observed within the North Ramp and MSA-1 Construction Footprints

Common Name	Scientific Name	Listing Status: USFWS/ Guam	Required Habitat	Number of Observations
PLANTS	—	—	—	—
Fadang [Ch]	*Cycas micronesica*	T / –	Occurs on most habitat on island, mainly in closed, shaded limestone forest; occurs least on savanna habitat	439
Siboyas halumtano [Ch]	*Bulbophyllum guamense*	T / –	Occurs commonly in moist, humid forested habitat; usually observed on tree trunks and branches	1
NCN	*Dendrobium guamense*	T / –	Occurs commonly in moist, humid forested habitat; usually observed on tree trunks and branches	2
NCN	*Tuberolabium guamense*	T / –	Occurs commonly in moist, humid forested habitat; usually observed on tree trunks and branches	100
NCN	*Tabernaemontana rotensis*	T / –	Occurs in limestone forests along cliff line; edge species that now grows along roadsides and disturbed areas	99
BIRDS	—	—	—	—
Såli [Ch]; Micronesian Starling	*Aplonis opaca guami*	– / E	Occurs in limestone cliff faces to forested mountain tops and on atolls	1
MAMMALS	—	—	—	—
Fanihi [Ch] ; Mariana Fruit Bat	*Pteropus mariannus*	T / E	Roosts and forages in limestone native and degraded forests	Multiple

Notes: – = Not listed; Ch = Chamorro name, E = Endangered; NCN = no common name, T = Threatened

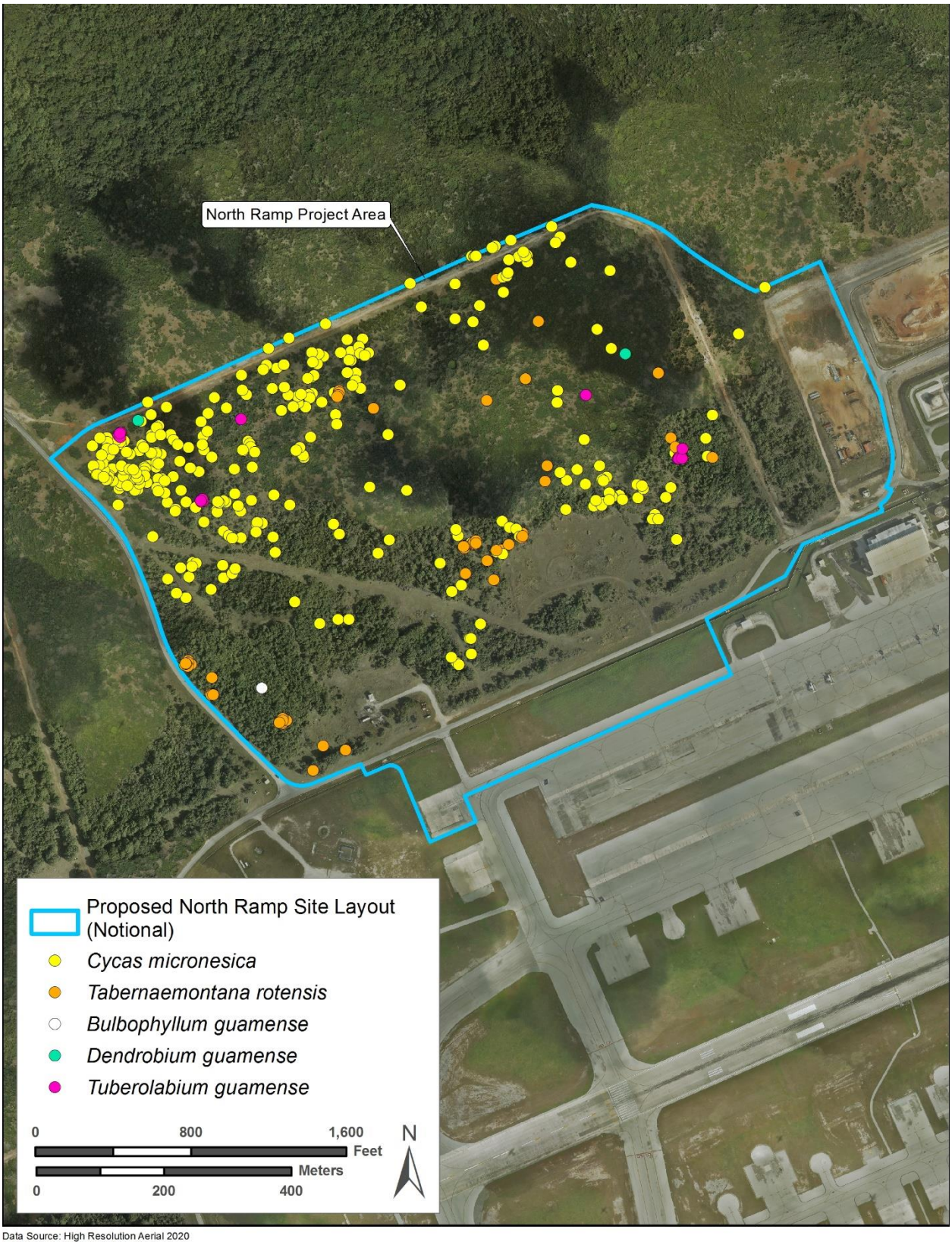
Special Status Plants. Of the 13 federal ESA-listed plant species that have the potential to occur on Andersen AFB, 8 have known occurrences, including *Bulbophylum guamense*, *Cycas micronesica*, *Dendrobium guamense*, *Eugenia bryanii*, *Heritiera longipetiolata*, *Serianthes nelsonii*, *Tabernaemontana rotensis*, and *Tuberolabium guamense* (DON 2019). Previous surveys of the North Ramp project area and lands adjacent to the MSA-1 project area recorded *Cycas micronesica* and *Tabernaemontana rotensis* (DAF 2006, 2020a). The surveys of the project area recorded *Cycas micronesica*, *Tabernaemontana rotensis*, *Bulbophylum guamense, Dendrobium guamense*, and *Tuberolabium guamense.* **Figure 3-3** and **Figure 3-4** provides the location of special status plants that have been recorded during surveys within the North Ramp and MSA-1 project area, respectively. Descriptions of special status plants on Andersen AFB are derived from the 2019 INRMP (DON 2019):

- ***Cycas micronesica*.** Commonly known as "fadang" in Chamorro or cycad, the *Cycas micronesica* is a stout-trunked tree in the cycad family found on the islands of Guam, Rota, and Pagan in the Mariana Islands and on Palau. As of 2020, it was estimated that 344,000 individuals were on Guam. This estimate was determined by applying the 8.1 percent average annual rate of decline to the 2012 cycad population on Guam (USFWS 2020a).
- ***Tabernaemontana rotensis*.** This is a small- to medium-sized tree in the dogbane family endemic to Guam and Rota. Threats to this species include habitat loss, agricultural destruction, urban development, invasive plants and animals, extreme weather events, fires, and a lack of avian seed dispersers (USFWS 2015, 2017). When listed as threatened in 2015, *Tabernaemontana rotensis* was known from 6 occurrences, totaling approximately 21,000 individuals, the majority of which occurred on Andersen AFB (USFWS 2015). As of 2020, there were approximately 15,332 naturally occurring *Tabernaemontana rotensis* individuals on Guam (USFWS 2020b).
- **Orchids.** Three ESA-listed threatened epiphytic orchids are found on tree branches of both native and non-native host trees in the limestone forests. The three species include *Bulbophyllum guamense*, *Tuberolabium guamense*, and *Dendrobium guamense*. During surveys conducted between October 2019 and April 2022, 7,434 individuals of *Bulbophyllum guamense,* 57,962 individuals of *Tuberolabium guamense*, and 4,113 individuals of *Dendrobium guamense* were observed on Guam (NAVFAC Marianas 2022).



Basemap: AAFB High Resolution Aerial Imagery (2020)

Figure 3-3. Special Status Plants Recorded within the MSA-1 Project Area



Data Source: High Resolution Aerial 2020

Figure 3-4. Special Status Plants Recorded within the North Ramp Project Area

Special Status Wildlife. Of the eight federal ESA-listed wildlife species that have the potential to occur on Andersen AFB, three terrestrial species have known occurrences, including Mariana fruit bat (*Pteropus mariannus mariannus*), Guam tree snail (*Partula radiolata*), and Mariana eight-spot butterfly (*Hypolimnas octocula marianensis*) (DON 2019). Previous surveys of the North Ramp project area and lands adjacent to the MSA-1 project area recorded only the Mariana fruit bat (DAF 2006). Surveys for both project areas for this EIS recorded only Mariana fruit bats and no host plants for Mariana eight-spot butterfly were observed. **Figure 3-5** provides the location of special status wildlife sign and historical observations that were recorded within the project area. Descriptions of special status wildlife on Andersen AFB are derived from the 2019 INRMP (DON 2019).

- **Mariana Fruit Bat (*Pteropus mariannus*).** The Mariana fruit bat roosts and forages primarily in native and limestone forest, and occasionally forages within agricultural forests. Currently, the majority of fruit bats on Guam form a population on Andersen AFB. Some scattered individuals are occasionally observed throughout the rest of Guam. Beginning in 2014, the collaborative fruit bat monitoring project between the University of Guam and Andersen AFB began using base-wide counts to estimate fruit bat populations. Andersen AFB is implementing the 2017 *Mariana Fruit Bat Management Plan for Andersen Air Force Base, Guam* (NAVFAC Marianas 2017), which includes base-wide annual bat population assessments to locate colonies and assess flight paths; quarterly Pati Point monitoring; and pre-construction surveys to determine presence/absence of individuals. Base-wide surveys conducted between 2017 and 2022 recorded the following population sizes for the entire installation (University of Guam 2023):

    - **2017:** 32 bats recorded; estimated population size of 57 to 68 individuals
    - **2018:** 32 bats recorded; estimated population size of 57 to 76 individuals
    - **2019:** 46 bats recorded; estimated population size of 85 to 99 individuals
    - **2020:** 33 bats recorded; estimated population size of 69 to 92 individuals
    - **2021:** 64 bats recorded; estimated population size of 108 to 126 individuals
    - **2022:** 68 bats recorded; estimated population size of 115 to 137 individuals

- In 2020, an aggregation area (roost area) was identified approximately 800 feet from the northern perimeter of the North Ramp construction footprint (**Figure 3-5**). Since the roost site was discovered, subsequently referred to as the Station 67 roost area, it has been subject to more frequent monitoring and is still active at the time of this publication (Andersen AFB 2024a). Routine monitoring began at Station 67 in October 2020, with multiple bat surveys conducted each month. Between October 2020 and August 2023, more than 75 monitoring events have recorded nearly 6,500 bat detections that averaged approximately 85 bats, with the highest number of bat detections on a single day in February 2022 with 698 bats observed. Since regular monitoring at the Station 67 roost began, a seasonal period of increased bat numbers has been observed, typically between November and February.

Basemap: AAFB High Resolution Aerial Imagery (2020)

Figure 3-5 Special Status Wildlife Recorded within the North Ramp Project Area

- Mating bats were acoustically documented in June and November 2023; in February 2024, mating bats and bat pups, estimated to be between 1 and 2 months of age, were documented via a spotting scope and long-range telephoto lens from a safe vantage point that would not accidentally flush bats (Mildenstein 2024). Bats from this roosting area have been observed foraging within the North Ramp project area, and more than 25 incidental observations of the Mariana fruit bat occurred within the project area during the 2021 pedestrian survey, including bat sign (droppings) and odors (**Figure 3-5**).
- Existing noise from different aircraft range from 89 and 104 dBA for take-offs, and 64 to 89 dBA for landings at the Station 67 roost area.

3.4.1.4.4 Essential Fish Habitat

Under the Magnuson-Stevens Fishery Conservation and Management Act, the U.S. has exclusive fishery management authority over all fishery resources found within its Exclusive Economic Zone (EEZ). The EEZ extends from the seaward boundary of each coastal state, including any Commonwealth, territory, or possession of the U.S., to a distance of 200 nautical miles from the baseline from which the breadth of the territorial sea of the U.S. is measured (50 CFR 600.10). In the Pacific Islands, EFH has been designated for federally managed species, referred to as management unit species (MUS), that are cooperatively managed by NMFS and the Western Pacific Regional Fisheries Management Council (WPRFMC). MUS in the Pacific Islands are fully described in the WPRFMC's Fishery Ecosystem Plans (FEPs) and include bottomfish, crustaceans, coral reef ecosystems, precious coral, and pelagic fish species caught in quantities sufficient to warrant management or monitoring by NMFS and the WPRFMC (NMFS 2023). Three MUS are likely to be present at, near to, or dependent upon the ROI: Mariana Archipelago bottomfish MUS, Mariana Archipelago pelagic MUS, and Mariana Archipelago coral reef ecosystems.

The project is within the boundaries of the following FEPs: (1) *Fishery Ecosystem Plan for the Mariana Archipelago* (WPRFMC 2009a), and (2) *Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region* (WPRFMC 2009b). The Mariana Archipelago FEP boundary includes all waters and associated marine resources within the EEZ surrounding the CNMI and Territory of Guam (WPRFMC 2009a). Although overlap exists between the Mariana Archipelago and Pacific Pelagic FEP boundaries, the Mariana Archipelago FEP specifically manages demersal resources and habitats associated with the federal waters of the Mariana Archipelago (WPRFMC 2009a). The Pacific Pelagic FEP boundary encompasses all areas of pelagic fishing operations within the EEZ or high seas for any domestic vessels that: (1) fish for, possess, or transship Pacific Pelagic MUS within the EEZ waters of the Western Pacific Region; or (2) land Pacific Pelagic MUS within the states, territories, commonwealths, or unincorporated U.S. Island possessions of the Western Pacific Region (WPRFMC 2009b).

EFH has been designated within the ROI for the various MUS and life stages, including eggs, larvae, juveniles, and adult bottomfish and Pacific pelagic species as well as all life stages of coral reef fauna and flora that comprise Mariana Islands coral reef ecosystems (**Table 3-5**; NMFS 2024). In the absence of detailed survey data, it is assumed that all life stages of some species from each of three MUS (Mariana Archipelago bottomfish MUS, Mariana Archipelago pelagic MUS, and Mariana Archipelago coral reef ecosystems) could occur within the ROI for EFH.

Table 3-5. Essential Fish Habitat within the Region of Influence

Management Unit Species	Species Complexes	Description of EFH	HAPC
Pelagic	• Temperate species • Tropical species • Sharks • Squids	Eggs and larvae: the water column down to a depth of 200 meters (100 fathoms) from the shoreline to the outer limit of the EEZ Juveniles and adults: the water column down to a depth of 1,000 meters (500 fathoms) from the shoreline to the outer limit of the EEZ	No HAPC located within ROI for EFH
Bottomfish	• Shallow-water species (0–50 fathoms) • Deep-water species (50–200 fathoms)	Eggs and larvae: the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 400 meters (200 fathoms) Juveniles and adults: the water column and all bottom habitat extending from the shoreline to a depth of 400 meters (200 fathoms), encompassing steep drop-offs and high-relief habitats that bottomfish use throughout the Western Pacific Region	No HAPC located within ROI for EFH
Coral Reef Ecosystems	All currently or potentially harvested coral reef taxa[a]	Includes the water column and all benthic substrate to a depth of 50 fathoms from the shoreline to the outer limit of the EEZ	No HAPC located within ROI for EFH

Source: WPRFMC 2009a, 2009b.
Note: 1 fathom = 6 feet. Units provided in this table are reported as presented in applicable FEPs (see Table 25 in WPRFMC 2009a and Table 14 in WPRFMC 2009b).
[a] Currently harvested coral reef taxa include a variety of species assemblages (e.g., fishes, sharks, octopuses, eels, turban shells) that are currently being harvested in state and federal waters, and for which some fishery information is available, and species that are likely to be targeted in the near future based on historical catch data. Potentially harvested coral reef taxa include "literally thousands of species encompassing almost all coral reef fauna and flora" (WPRFMC 2009a).

In addition to EFH, the WPRFMC has designated HAPCs within EFH for all MUS. HAPCs are specific areas that are considered essential to the life cycle of MUS based on one or more of the following criteria: (1) the ecological function provided by the habitat is important; (2) the habitat is sensitive to human-induced environmental degradation; (3) development activities are, or will be, stressing to the habitat type; or (4) the habitat type is rare (WPRFMC 2009a, 2009b).

For Pacific pelagic species, HAPC is designated as the water column down to 1,000 meters that occurs above all seamounts (i.e., undersea mountains) and banks within the EEZ shallower than 2,000 meters (WPRFMC 2009b) and is therefore not within the ROI for EFH. The WPRFMC designated all slopes and escarpments between 40 and 280 meters as HAPC for bottomfish based on the known distribution and habitat requirements of adults (WPRFMC 2009a); these areas are not present within the ROI for EFH.

One coral reef ecosystem HAPC has been designated within the CNMI, and five have been designated on Guam (see Table 26 in WPRFMC 2009a). No HAPC areas that occur near Guam are present within the ROI for EFH.

3.4.2 Environmental Consequences

Environmental consequences addressed in this section include the potential impacts of the Proposed Action and No Action Alternative on terrestrial biological resources. Impacts would be associated with proposed construction (e.g., ground-disturbing activities) and operations (e.g., aircraft idling and taxiing, maintenance activities, traffic, munitions storage), or would be caused by or result from project activities later in time (e.g., increased likelihood of non-native, invasive species moving into the area after disturbance).

ESA Consultation. As a requirement under the ESA, federal agencies must ensure that their actions do not jeopardize the existence of any threatened or endangered species, nor adversely modify critical habitat. Additionally, the ESA prohibits the "taking" of threatened or endangered animals. Section 7 of the ESA establishes a consultation process with USFWS for listed species to evaluate effects of federal projects on protected species.

To comply with Section 7 of the ESA, the DAF prepared a Biological Assessment to evaluate the effects of the Proposed Action on federally listed threatened and endangered species and designated critical habitat. The DAF is identifying specific conservation measures in consultation with the USFWS under Section 7 of the ESA. Agreed upon conservation measures will be included in **Appendix B** of the Final EIS.

3.4.2.1 Proposed Action

3.4.2.1.1 F-15 Beddown

Short and long-term, less than significant, adverse impacts on wildlife and special status species, and no anticipated impacts on EFH, may occur from the beddown and operations of F-15 fighter aircraft. Impacts on wildlife and special status species that have been recorded within and around the project areas would be anticipated from a potential increase of approximately 32 percent in aircraft operations above what these species have historically been exposed to. Operational activities would not increase the level of noise species are exposed to, only the frequency of noise events. Species that are not habituated may experiences distress, and temporarily or permanently relocate to adjacent habitat. Additionally, bats roosting during the day may flush in response to aircraft related noise. Impacts from aircraft operations under the F-15 beddown are addressed in **Section 3.4.2.1.2** as part of the operation of the North Ramp. Impacts on noise from aircraft operations are provided in **Section 3.11.2**.

3.4.2.1.2 North Ramp

Construction

Vegetation. Long-term, less than significant, adverse impacts on vegetation from physical disturbance and mortality are expected from the North Ramp construction as a result of the removal of all *in situ* plants within the North Ramp project footprint. A total of approximately 192 acres would be disturbed, 96 acres would be permanently disturbed and the remaining 96 acres would be revegetated and maintained, and construction would cause a substantial reduction in native vegetation for the cleared area.

Long-term, less than significant, adverse impacts on vegetation may occur from habitat loss and habitat modification and fragmentation for vegetation surrounding the ROI. Seed and pollen

sources for native species within the project area will be removed, which could lower the potential for recruitment of native species in the remaining forested areas within the ROI.

Wildlife. Short- and long-term, less than significant, adverse impacts on wildlife would occur from habitat loss from North Ramp construction. While construction is ongoing (short term) and following construction completion (long term), this area of limestone degraded and Vitex Forest will no longer be suitable habitat for foraging, nesting, breeding, or roosting; however, there is suitable adjacent habitat to which wildlife is expected to relocate, either temporarily or permanently. Displacement of wildlife into surrounding limestone native forest and limestone degraded forest habitat could create additional competition for food resources within those areas. Short-term, less than significant, adverse impacts would also occur from avoidance of construction-related noise, lighting, and dust emissions. Ground activities and noise from vehicles and heavy equipment could flush foraging or resting native birds and fruit bats, as well as displace feral ungulates and other non-native and invasive wildlife species, could be dispersed from the project area, creating higher browsing pressure on native plant species within other areas of Andersen AFB.

Special Status Species. There would be long-term, significant, adverse impacts on special status species from construction activities associated with the North Ramp project footprint and habitat loss. *Cycas micronesica, Tabernaemontana rotensis, Tuberolabium guamense, Bulbophyllum guamense*, and *Dendrobium guamense* occur within the project area and would be subject to removal as part of site clearing. The Mariana fruit bat has not been documented roosting within the project area; however, the Station 67 roost area is approximately 800 feet from the northern edge of the project site, and solitary bats could be flushed from day roosts within the project footprint. Fruit bats would likely disperse to other limestone forest areas on northern Guam. Long-term impacts would also occur from *in situ* special status species removed from the project area which would no longer provide seed or pollen sources.

Similar to wildlife discussed in the wildlife section above, short-term, less than significant, adverse impacts from noise, lighting, and dust emissions would occur during active construction activities.

Short-term, less than significant, adverse impacts on the Mariana fruit bat would occur from attenuated noise rerouting traffic from Marianas Boulevard and the proposed road that could range between 61.9 and 43.4 dBA. This level of noise would be barely audible and may solicit minor behavioral responses in roosting bats, such as head turns or other minor body movements.

Specific conservation measures to mitigate significant adverse impacts on special status species will be identified by the DAF in consultation with the USFWS under Section 7 of the ESA and will be outlined in the Biological Opinion issued by the USFWS. A summary of the biological resources consultation actions and resource reports in support of this EIS is provided in **Appendix B**, which will be updated as consultations and reports are updated and completed throughout the EIS process.

Essential Fish Habitat. Without appropriate design for stormwater treatment, short- and long-term impacts on EFH could result from North Ramp construction, primarily from site preparation

(e.g., vegetation clearing, grading, filling) and increased impervious surfaces that would generate additional stormwater runoff. However, construction of stormwater management infrastructure, as described in **Section 2.1.2.1.7**, would manage stormwater runoff from the North Ramp and effectively treat stormwater to avoid adverse effects on EFH. See **Section 3.10.2.1.2** for additional information.

As described in further detail in **Section 3.9.1.4**, subsurface geology beneath most of Andersen AFB consists of limestone bedrock that is highly permeable. Water generally percolates downward into the porous limestone prior to discharge into nearby coastal waters surrounding Andersen AFB. Although coastal waters are more than 0.6 mile from the North Ramp project area, the high permeability of the limestone underlying Andersen AFB and surface water runoff generated during construction may contain elevated sediment concentrations from excavation or trenching. If not managed properly, disturbed soils and sediments could be washed into nearby sinkholes or depressions, and could enter groundwater or surface waters during storm events and reduce water quality. This may result in this degraded water discharging into nearby coastal waters, which could potentially affect EFH. The DAF would adhere to a SWPPP prepared in accordance with the USEPA NPDES CGP for construction stormwater management and erosion control, as described in **Section 3.9.1.2**, to protect coastal water quality and EFH resources. As discussed in **Section 2.1.2.1.8**, the concrete vehicle wash area for the temporary on-site concrete batch plant would be lined and include a protective berm to prevent the entry of stormwater runoff into subsurface areas.

A reduction in vegetation and increase in impervious surface could alter hydraulic patterns. Vegetation clearing, soil compaction, and impervious surfaces would reduce infiltration and percolation of surface water to groundwater, and depressions may form that could serve to pond stormwater, increasing stormwater volume and velocity. An increase in stormwater volume and velocity could increase discharges into adjacent coastal waters where EFH resources reside.

During construction, EFH resources also could be affected in the unlikely event of accidental spills or leaks of fuel, lubricants, or other chemicals from construction equipment. The DAF would amend the Andersen AFB Spill Prevention, Control, and Countermeasures (SPCC) Plan or develop a site-specific SPCC Plan, as required by Section 311(j)(1)(C) of the Clean Water Act (CWA; as amended by the Oil Pollution Act of 1990), 40 CFR 112, *Oil Pollution Prevention*, and DAFI 32-7044, *Storage Tank Environmental Compliance*, to manage spills or leaks of hazardous materials or wastes, which would protect EFH species within nearby coastal waters.

Operations

Vegetation. No impacts on vegetation would occur as a result of North Ramp operations because the constructed infrastructure would be maintained landscaped areas.

Wildlife. Long-term, less than significant, adverse impacts from avoidance of operation-related noise, lighting, and dust emissions are expected for wildlife. Ground activities and noise from vehicles and heavy equipment may temporarily flush foraging or resting native birds, as well as displace feral ungulates and other non-native and invasive wildlife species. Long-term, less than significant, adverse impacts on wildlife could occur from noise associated with aircraft ground activities and operational vehicle traffic.

An increase of up to 32 percent in the frequency of aircraft operations would occur, some aircraft ground activities (e.g., idling, taxiing, maintenance) and associated noise could be relocated to the North Ramp. Existing noise from different aircraft ranges from 89 and 104 dBA for take-offs, and 64 to 89 dBA for landing at approximately 800 feet from the northernmost portion of North Ramp and decreases the further out wildlife range. The dBA noise levels would not increase, only the frequency of exposure would increase; therefore, long-term, less than significant, adverse impacts on the noise environment would be expected under the operations from the North Ramp (see **Section 3.11.2**). There would also be low levels of noise, less than what would be associated with aircraft, that would occur from maintenance activities, the reroute of vehicle traffic onto 5th Street, and traffic on the proposed road along the northern perimeter of the North Ramp. Wild animals are expected to either avoid or habituate to high-impact noise (Pepper et al. 2003)

Special Status Species. Long-term, less than significant, adverse impacts on the Mariana fruit bat could occur from noise generated from operations conducted on the North Ramp associated with flight aircraft operations and ground activities on the North Ramp and operational vehicle traffic (see **Section 3.11.2).** Noise levels at the Station 67 roost area would range from 89 to 104 dBA for take-offs and 64 to 89 dBA for landing. Noise levels from idling and taxiing would be expected to be lower for quieter aircraft as well as for aircraft not operating at the edge of and perpendicular to the North Ramp boundary.

Short-term, less than significant, adverse impacts on the Mariana fruit bat would occur from attenuated noise traffic from Marianas Boulevard and the proposed road that could range between 43.4 and 61.0 dBA This level of noise would be barely audible and may solicit minor behavioral responses in roosting bats, such as head turns or other minor body movements.

In 2012, bat individuals were observed flushing from roost locations in response to aircraft overflights with noise levels above 90 dBA (SWCA 2012). During the study, flushing associated with overflights was infrequent, and each involved a single fruit bat. In the 8 colonies that flushing was observed, 8 of the 15 bats (or 53 percent) took flight when exposed to aircraft overflight noise between 90 and 125 dBA. Five of these eight bats resumed roosting activities, and the remaining three bats left the immediate area of the roost. Bat detections on Andersen AFB are not abnormally distributed (University of Guam 2023), indicating that bats have not differentially selected roosting sites that might provide relief from aircraft noise. As noted in the wildlife section above, wildlife would be expected to either avoid or habituate to high-impact noise; therefore, certain levels of noise may be tolerated in exchange for high-quality roosting sites that provide weather and hunting protection as well as are close to food (SWCA 2012).

Ernest Valdez noted that bat colonies that had less hunting pressure appeared to not be as disturbed by human scent, presence, or noise as bat colonies that experience hunting pressure (e.g., Rota). On occasions where fruit bats were accidentally flushed, they frequently returned to their original roost (USGS 2010). Since Mariana fruit bats rely on vision and smell to locate food sources and avoid obstacles, not laryngeal echolocation (Almeida et al. 2014), noise from construction and aircraft does not appear to have a negative effect on Mariana fruit bats. Additionally, Tarnovsky et al. (2022) documented that fruit bats are exposed to social calls at levels that exceed approximately 100 decibels (dB) sound pressure level approximately every 5

minutes. This accounts for more than 100,000 recurrent exposures per year and does not appear to impact behavior (Tarnovsky et al. 2022). Additionally, the Station 67 roost is located at the top of the cliff line, approximately 2,500 feet from the Combat Arms Training and Maintenance (CATM) Range. The CATM Range supports training with pistols, rifles, machine guns up to 7.62 millimeters, inert mortars up to 60 millimeters, and M203 40-millimeter grenade launchers using inert training projectiles (DON 2010b).

Based on previous surveys and general research on Mariana fruit bats, noise related to existing aircraft operations and munitions at the CATM Range does not deter continued bat presence at the Station 67 roost. Instead, roost selection is focused on food availability, site security, and protection from poaching. These short- and long-term impacts on Mariana fruit bats are considered less than significant.

Specific conservation measures for special status species will be identified by the DAF in consultation with the USFWS under Section 7 of the ESA and will be outlined in the Biological Opinion issued by the USFWS. **Appendix B** will be updated as consultations and reports are updated and completed throughout the EIS process.

Essential Fish Habitat. Increased stormwater runoff rates from an increase in impervious surfaces could affect groundwater and surface water at the North Ramp, which could result in long-term, less than significant, adverse impacts on EFH resources; however, as described in **Section 2.1.2.1.7**, stormwater flow (via detention) quantity and quality would be managed through the use of sand filters, infiltration swales, and basins. The DAF would construct stormwater infiltration swales and basins along the northern and western boundaries of the project area to redirect and capture stormwater runoff from the proposed parking apron and other North Ramp paved surfaces. The drainage design would meet the requirements of the 2006 *CNMI and Guam Stormwater Management Manual* (CNMI BECQ and GEPA 2006) and the low-impact development requirements specified in UFC 3-210-10, *Low Impact Development*, which includes the requirement to maintain pre-development hydrology.

As described in **Section 2.1.2.1.7**, the site drainage would include injection wells to help drain the pond within the allotted timeframe and meet recharge volume requirements, minimizing the effects on water quality in designated EFH. Hotspot runoff would be conveyed via impervious, geosynthetic clay-lined channels to one of three sand filters designated on site, which each include a corresponding pretreatment basin and detention pond. The pretreatment basins would serve as fuel spill containment and allow settling for larger particles and debris before allowing the water to discharge. Stormwater swales and basins would comprise approximately 16 acres of the North Ramp project area.

As previously stated, the North Ramp is more than 0.6 mile from the coast. Due to the distance from the project site, it is unlikely that any substantial amount of stormwater would reach coastal or marine environments with the construction of stormwater management infrastructure. During design of the stormwater treatment facilities, the DAF coordinated with the Guam Environmental Protection Agency (GEPA) and Naval Facilities Engineering Command Marianas to discuss the North Ramp drainage concept. The DAF would comply with the requirements of the *CNMI and Guam Stormwater Management Manual* (CNMI BECQ and GEPA 2006). The stormwater management infrastructure is designed to reduce or eliminate potential runoff to surface waters,

including coastal and marine environments designated as EFH surrounding the project area. The facility stormwater design is a result of this ongoing coordination effort and also incorporates input from regional water quality agencies (NAVFAC PAC 2023). See **Section 3.10.2.1.2** for additional information.

EFH also could be affected in the unlikely event of accidental spills, or leaks of fuel, lubricants, or other chemicals from equipment or infrastructure, if these hazardous materials enter groundwater or surface water before discharging into nearby coastal waters where EFH resources reside. Though groundwater in the Northern Guam Lens Aquifer (NGLA) underlying the project area flows toward the ocean and discharges from the NGLA as diffuse seepage near the coastline, the DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan. Therefore, impacts on EFH resources from accidental spills or leak during operations are not anticipated.

Although stormwater runoff rates are expected to increase from the Proposed Action, adverse impacts on EFH resources would not be expected from construction and operation of the proposed stormwater management infrastructure (including revegetation). With the incorporation of long-term stormwater management infrastructure, the project would not adversely affect EFH.

3.4.2.1.3 MSA-1

Construction

Vegetation. Impacts on vegetation from MSA-1 construction would be similar to North Ramp vegetation impacts; however, impacts would be less intense because the MSA-1 project footprint is smaller.

Wildlife. Impacts on wildlife from MSA-1 construction would be similar to North Ramp wildlife impacts; however, impacts would be less intense because the MSA-1 project footprint is smaller.

Special Status Species. Impacts on special status species from MSA-1 construction would be similar to North Ramp special status species impacts; however, impacts would be less intense because the MSA-1 project footprint is smaller. The DAF would follow the conservation measures outlined in the Biological Opinion issued by USFWS. A summary of the biological resources consultation actions and resource reports is provided in **Appendix B**.

Essential Fish Habitat. Impacts would be similar to those described in **Section 3.4.2.1.2** for North Ramp construction; however, impacts would be minimal when compared to the North Ramp project due to a smaller area of disturbance. Construction of temporary sedimentation basins and drainage swales stormwater management infrastructure, as described in **Section 2.1.2.2.6**, would manage stormwater runoff from the MSA-1 project area and effectively treat stormwater to avoid adverse effects on EFH during construction.

Operations

Vegetation. No impacts on vegetation would occur as a result of the MSA-1 operations because the constructed infrastructure would be a maintained, landscaped area.

Wildlife. Short-term, less than significant, adverse impacts would occur on wildlife from MSA-1 operations. It is anticipated that the use of the proposed ECMs within MSA-1 would not require any changes to existing munitions protocols at Andersen AFB and would not require a change in the MSA-1 ESQD arcs.

Special Status Species. Impacts on special status species from MSA-1 operations would be similar to wildlife impacts.

The DAF would follow the conservation measures outlined in the Biological Opinion issued by USFWS. A summary of the biological resources consultation actions and resource reports is provided in **Appendix B**.

Essential Fish Habitat. Impacts would be similar to those described in **Section 3.4.2.1.2** for North Ramp operations; however, impacts would be minimal when compared to the North Ramp project due to a smaller area of disturbance and the absence of activities associated with aircraft operations.

Although stormwater runoff rates are expected to increase, adverse impacts would be avoided from implementation of the proposed stormwater management infrastructure, identified in **Section 2.1.2.2.5**, and revegetation of disturbed areas. With the incorporation of long-term stormwater management infrastructure, the project would not adversely affect EFH.

3.4.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not beddown F-15 fighter aircraft or implement the infrastructure upgrades within the North Ramp or MSA-1 project areas, and the existing conditions discussed in **Section 3.4.1.4** would remain unchanged. No impacts on biological resources would be expected to occur due to the No Action Alternative.

3.4.3 Cumulative Impacts

Reasonably foreseeable actions would result in adverse cumulative impacts from the additive effects of removing forested habitat, fragmentation of remaining habitat, and impacts on food sources for wildlife, and increased stormwater runoff. Some vegetation that may provide suitable trees for the recovery and protection of listed species would be removed within each of these areas. **Table 3-6** summarizes amounts of forest habitats that would be removed or altered on Andersen AFB as part of their respective Proposed Actions.

The estimated total vegetation removed from all projects known to date, including the Proposed Action, would be approximately 545 acres. Removal of this amount of vegetation would not be expected to jeopardize the recovery and continued existence of listed species.

Depending on the construction phasing, construction of the Jet Propellant 8 (JP-8) Storage Tanks project could result in adverse cumulative impacts on Mariana fruit bat and other wildlife from avoidance of construction-related noise, lighting, and dust emissions within the area west of the North Ramp.

Table 3-6. Acres of Vegetated Habitat to be Removed from Reasonably Foreseeable Actions

Project	Acres of Vegetated Habitat on Andersen AFB to be Removed for the Reasonably Foreseeable Action	% of Vegetated Acres on Andersen AFB[a]
Munitions Storage Igloos in MSA-1 (USFWS 2020c)	31.1	0.3
Standoff Weapons Complex	N/A[b]	N/A[b]
JP-8 Storage Tanks	20	0.2
THAAD ADP (DON 2020b)	11.5	0.1
Space Force Projects	N/A[c]	N/A[c]
SATCOM C4I Facility	N/A[b]	N/A[b]
Beddown of Space Control Squadron	10 or less	0.1
Base Commissary	16 or less	0.2
Medical Clinic Expansion	N/A[b]	N/A[b]
Fencing and Gates	N/A[c]	N/A[c]
Guam and CNMI Military Relocation[d] (JGPO 2015)	248.13	2.4
Enhanced Integrated Air and Missile Defense System	N/A[c]	N/A[c]
Firefighting Training Facility	8	0.1
MITT	N/A[b]	N/A[b]

Notes: JP-8 = Jet Propellant 8; N/A = not applicable; SATCOM = Satellite Communications; THAAD = Terminal High Altitude Area Defense
[a] Total vegetated acres on Andersen AFB documented as 10,454 acres
[b] Project would not include notable vegetation clearance and/or be constructed adjacent to existing facilities footprints or within existing easements at Andersen AFB
[c] Design details and all vegetation clearance information is not yet available for this project
[d] Forest to be cleared on Andersen AFB for family housing and live-fire training range complex

Noise from the construction of the munitions storage igloos in MSA-1 and JP-8 storage tanks west of the North Ramp project area would be in addition to that from the construction and operational activities at the North Ramp and MSA-1 outlined under the Proposed Action. Although noise levels would be higher in the adjacent forest of the ROI during construction, combined noise levels would not be sufficient to jeopardize the recovery and continued existence of listed species. During heavy periods of construction, equipment noise would be primarily confined to areas within and adjacent to the sites, and construction noise would be audible, but not loud, at the nearby roost site. These effects would be less than significant. Little to no noise would be associated with the operation of the storage igloos and storage tanks; therefore, less than significant cumulative adverse effects would occur after the end of the construction phase. This assessment and determination will be confirmed during Section 7 consultation.

Project-specific conservation measures are incorporated into the JRM INRMP during annual updates, and revisions to the JRM INRMP are reviewed by all regulatory stakeholders to ensure

that conservation measures are working in concert and support recovery actions of various USFWS recovery plans for listed species.

3.4.4 Mitigations

Mitigations and conservation measures will be outlined in the Biological Opinion (see a summary of the Section 7 consultation in **Appendix B**). Conservation measures to offset impacts on special status species from the Proposed Action are being developed in consultation with the USFWS under Section 7 of the ESA.

3.5 Cultural Resources

3.5.1 Affected Environment

3.5.1.1 Definition of the Resource

Cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. These include archaeological resources (prehistoric and historic), historic architectural or engineering resources, and traditional resources. Archaeological resources comprise areas where human activity has measurably altered the earth, or where deposits of physical remains are found (e.g., projectile points and bottles) but standing structures do not remain. Architectural resources include standing buildings, structures (e.g., bridges, dams), landscapes, and districts composed of one or more of these resource types (NPS 1997). Resources of traditional, religious, or cultural significance can include archaeological resources, sacred sites, structures, districts, prominent topographic features, habitat, plants, animals, or minerals considered essential for the preservation of traditional culture.

The term “historic property” refers specifically to a cultural resource that has been listed in or determined to be eligible for inclusion in the National Register of Historic Places (NRHP). Historic properties are generally 50 years of age or older, meet one or more significance criteria, and retain sufficient integrity to convey their significance. Resources constructed more recently may meet a criteria consideration for designation if they are of exceptional importance or have the potential to gain significance in the future. Traditional resources that are identified by Native American tribes or other groups and are eligible for listing in the NRHP are sometimes referred to as Traditional Cultural Properties. Cultural resources under NEPA typically include historic properties, but may also include sites or resources that meet other local, state, or territorial registration requirements, or have been identified as significant by a community or cultural group.

Section 106 Consultation. In addition to NEPA, the DAF must meet its obligations under Section 106 of the National Historic Preservation Act (NHPA). The NHPA provides a framework for determining the relative importance of various types of cultural resources and assessing how federal actions may affect historic properties. Section 106 of the NHPA (36 CFR 800, Subpart B) requires the DAF to consider the effects of the Proposed Action (or undertaking under NHPA) on historic properties. Pursuant to 36 CFR 800, Subpart B, and in coordination with the Guam State Historic Preservation Officer (SHPO) and other consulting parties, Andersen AFB is responsible for defining the Area of Potential Effect (APE), determining

whether any historic properties are located within the APE, and assessing whether the Proposed Action would adversely affect those historic properties. An adverse effect is any action that might directly or indirectly change the characteristics that make the historic property eligible for listing in the NRHP, as defined by the NHPA. If an adverse effect is identified, the federal agency (DAF) must develop measures to avoid, minimize, or mitigate the adverse impacts of the Proposed Action. Section 106 consultation will be accomplished using the processes within the existing 2008 JRM Programmatic Agreement.

3.5.1.2 Regulatory Overview

Federal laws and Executive Orders (EOs) that pertain to cultural resources management include the NHPA (1966, as amended) and its implementing regulations at 36 CFR 800, Archeological and Historic Preservation Act (1974), and Archaeological Resources Protection Act (1979). Additional information on the NHPA is included in **Section 1.1**. Andersen AFB is also required to comply with DAF regulations and instructions, including the *Integrated Cultural Resources Management Plan* (ICRMP) for Andersen AFB, JRM (SEARCH and Cardno TEC 2015) and DAFMAN 32-7003, *Environmental Conservation*. While the Native American Graves Protection and Repatriation Act (NAGPRA) (1990) does not apply to U.S. territories, the Andersen AFB ICRMP includes a standard operating procedure for Inadvertent Discovery of Human Remains that closely aligns with NAGPRA.

The cultural resources investigation conducted in June 2021 for this Proposed Action followed the guidelines established by Title 21 GCA Chapter 76, as amended in 2010, and Guam Public Laws (GPL) 20-151 and 89-24, to the extent that they are applicable to projects on federal lands or with federal funding and contractors. Title 21 GCA Chapter 76 established public policy to engage in a comprehensive program of historic preservation that is undertaken at all levels of government; promote the use and conservation of historic, archaeological, architectural, and cultural heritage resources to Guam residents and visitors; and establish the Guam Register of Historic Places. GPL 20-151 formally established the Guam SHPO and established Guam SHPO's authority for preservation review of all government permits and licenses. GPL 20-151 also established the Guam Historic Preservation Review Board, which serves as the review board for purposes of the NHPA, conducts hearings regarding the NRHP, and advises the Guam SHPO on preservation grants.

3.5.1.3 Region of Influence

The ROI for cultural resources is the area where the Proposed Action has the potential to impact cultural resources. Under Section 106 of the NHPA, federal agencies must consider the effect of their undertakings on historic properties within "the geographic area or areas within which an Undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d)). Under Section 106, the federal agency evaluates the NRHP eligibility of resources within the proposed undertaking's APE, and assesses the possible effects of the proposed undertaking on historic properties in consultation with the SHPO and other parties.

The ROI for potential impacts on cultural resources for this analysis aligns with the project areas shown in **Figure 2-1** and **Figure 2-2,** which are the same boundaries as the APE developed for compliance with Section 106 of the NHPA. The APE includes the two discontiguous "sub"

project areas: the North Ramp APE (approximately 192 acres) and the MSA-1 APE (approximately 17 acres).

3.5.1.4 Existing Conditions

Cultural Setting. The earliest known archaeological sites on Guam are the Ritidian and Mangilao sites. Ritidian, at the north end of the island, shows evidence of a possible stilt structure along a lagoon and two associated caves that date from 1500 to 1100 Before Christ (BC). Mangilao is a small village site on a small embayment on the east-central coast of Guam that dates from 1681 to 1198 BC. During this early period, settlement was limited to coastal areas, and the inhabitants' diet focused on marine resources. At both sites, ceramic artifacts were the most common contents of the archaeological assemblages. Other artifacts include basalt and chert lithic (stone) tools, bone and shell tools, and decorative items made from shells. Several points of origin for these early settlers have been proposed based upon archaeological, biological, and linguistic evidence, as well as voyaging simulation modeling. Linguistic evidence indicates a possible origin in the Philippines, while DNA evidence indicates a possible origin on Sulawesi and the Maluku Islands of Indonesia, southwest of Guam. Computer modeling of wind and ocean currents, combined with the knowledge of ancient sailing craft suggests possible origin points in the Maluku, northern New Guinea, Palau, Yap, and/or the Bismarck Islands. The earliest period of human habitation on Guam is classified as the Pre-Latte Period, which is followed by the Transitional Period and Latte Period (Tomonari-Tuggle et al. 2018).

Table 3-7 summarizes the historic context periods for Guam, in accordance with the Guam SHPO's established periods.

Table 3-7. Guam SHPO Historic Context Periods

Date Range	Period Name	Description
1500 – 1000 BC	Early Pre-Latte Period	The artifact assemblage consists of common shell tools/ ornaments, chert tools, and ceramic artifacts. The ceramic technology consists largely of thin-walled vessels, dominated by rounded jars and bowls with thin or parallel rims and calcareous temper. Major pottery types include Marianas Red, Achugao, and Sant Roque incised. Settlements are concentrated on the coast, and subsistence activities are focused on the procurement of marine resources.
1000 – 500 BC	Middle Pre-Latte Period	Ceramic artifacts display slightly thicker walls than the Early Pre-Latte Period. Marianas Red pottery remains common. Pottery displays more prominent impressed designs, with a lime filling. Subsistence strategies retain a marine focus, but there is more evidence for the inclusion of inland resources.
500 BC – AD 500	Late Pre-Latte Period	Ceramic artifacts from this period are dominated by thick-walled, large pans and bowls with Type A (unthickened) rims. Temper is mostly mixed sand. Some vessels have mat impressions or Ipao Stamped decorations. Settlement remains focused on the coastline, but expansion inland along river valleys occurs during this period.

Date Range	Period Name	Description
AD 500 – 800	Transitional	Ceramic artifacts move from Type A (unthickened) to Type B (thickened) rim types. Vessel forms transition from flat-bottomed pans to more rounded forms. Pottery uses both calcareous and volcanic temper, and generally lacks decoration. The first identified agricultural fields occur during this period.
AD 800 – 1100	Early-Latte Period	The advent of this period is marked by the appearance of latte structures. Ceramic vessels exhibit increased size and thickened side walls and rims. Shell (Tridacna) adzes increase in frequency, and both slingstones and lusong are introduced in this period.
AD 1100 – 1350	Mid-Latte Period	This period is similar to the Early Latte Period. Although there is a continued emphasis on marine resources, sites from this period are found in many areas of the island's interior.
AD 1350 – 1521	Late-Latte Period	The material culture of this period is similar to the Mid-Latte Period. Ceramics show a tendency toward very thick Type B rims. Latte villages increase in size on both the coasts and favorable inland areas.
AD 1521 – 1668	Pre-Colonial European Trade Period	This period begins with the discovery of the island by Magellan in 1521. Material culture and subsistence strategies are largely the same as the Late-Latte Period, with the addition of some European trade goods and the introduction of new animal species.
AD 1668 – 1700	Spanish Missionization Period/Chamorro Spanish Wars	During this period, the Spanish introduced missionaries to the island with protective military contingents. Attempts to Christianize the Chamorro people and alter their culture led to a series of uprisings that ended with the conquest of the island, which combined with introduced diseases, decimated the Chamorro population. The Spanish practice of reduccion concentrated the remaining Chamorro population into a small number of settlements.
AD 1700 – 1898	Spanish Colonial Period	The Spanish maintained a rigid social system with the population concentrated in a few, large settlements. The traditional subsistence economy of the Chamorro people was changed to provide provisions for the Manila galleons that passed through the area seasonally. The Catholic Church became the most important focus of local life.
AD 1898 – 1941	First American Territorial Period	The U.S. came into possession of Guam following the Spanish-American War. The island was useful as a coaling station and hub for transoceanic communication cables. Later, the island was an important link for the Pan-American trans-Pacific clippers. The U.S. military maintained a minimal presence on the island, and no significant bases or defenses were constructed during this period.
AD 1941 – 1944	World War II – Japanese Military Occupation	The Japanese seized the island on December 10, 1941, when the badly outnumbered U.S. garrison surrendered without a fight. The Japanese began a program of indoctrination to introduce Japanese culture to the Chamorro population.
AD 1944 – 1950	Post-World War II/ Second American Territorial Period	Following the recapture of Guam, the U.S. created a large military base on the island for the Army Air Corps and Navy. Following World War II, the island was administered by the U.S. Navy, with an interim civilian government created in 1949 to facilitate the 1950 transition to a U.S. territory.

Date Range	Period Name	Description
AD 1950 – present	Organic Act/Home Rule/Economic Development Period	Once Guam became a U.S. territory, a civilian government was formed, and all inhabitants of the island were given U.S. citizenship. Guam developed into a tourist destination, as well as continuing to serve as a major U.S. military base.

Key: AD = *Anno Domini*

Previous Cultural Resource Investigations on Andersen AFB. Seventeen cultural resource surveys were previously conducted within 0.25 mile of the two noncontiguous APEs (see **Table 3-8**). Eight previous surveys were conducted within 0.25 mile of the MSA-1 APE, and nine previous surveys occurred within 0.25 mile of the North Ramp APE. Of these previous surveys, four intersect the MSA-1 APE (Mason Architects, Inc. 2004, DeFant and Guerrero 2006, Dixon et al. 2018, Hlatky and Maxwell 2018), and four intersect the North Ramp APE (Yoklavich and Tuggle 2004, DeFant and Guerrero 2006, Grant et al. 2007, Welch 2010).

Table 3-8. Previous Cultural Resource Surveys within 0.25 Mile of the Andersen AFB North Ramp and MSA-1 APEs

Year	Report Name	Author(s)	APE
1983	*Andersen Air Force Base Central Reconnaissance Survey*	Davis, R.	N/A
1993	Small and Developed Parcel Survey Areas" in *The Archaeology of Orote Peninsula: Phase I and Phase II Archaeological Survey of Areas Proposed for Projects to Accommodate Relocation of Navy Activities from the Philippines to Guam, Mariana Islands*	Tuggle, H.	N/A
1996	*The Legacy of Tarague Embayment and its Inhabitants, AAFB, Guam*	Liston, J.	N/A
2003	*Cultural Resources Snake Barrier Concept, Andersen Air Force Base, Guam*	Hunter-Anderson, R., and D.R. Moore	N/A
2004	*Historic Building and Associated Landscape/Viewsheds Inventory and Evaluation for Andersen Air Force Base, Guam*	Mason Architects, Inc.	MSA-1
2004	*Andersen Air Force Base Historic Survey Report*	Yoklavich, A., and D. Tuggle	North Ramp
2006	*Archaeological Survey of Seven Parcels within the Munitions Storage Area, Andersen Air Force Base, Island of Guam*	DeFant, D., and R. Leon Guerrero	MSA-1, North Ramp
2007	*Results of Cultural Resources Inventories for Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability and the Development of Red Horse Squadron, Andersen Air Force Base, Guam*	Grant, M., M. Travisano, S. Wenzlau, and M. Durst	North Ramp
2008	*Cultural Resources Survey for a Perimeter Fence and Portions of the Munitions Storage Area, Andersen Air Force Base, Guam*	Hokanson, J., D. Kilby, M. Church, and R. McCurdy	N/A
2010	*Archaeological Surveys and Cultural Resources Studies on the Island of Guam in 2007 in Support of the Joint Guam Build-up Environmental Impact Statement*	Welch, D.	North Ramp

Year	Report Name	Author(s)	APE
2011	*Cultural Resource Investigations Conducted in the Territory of Guam Supporting the Joint Guam Build-Up Environmental Impact Statement: Final Archaeological Surveys on Guam 2009 at Proposed Utility Sites, Harmon Property, and Andersen AFB*	Dixon B., and S. Walker	N/A
2014	*Historic American Engineering Record for Andersen Air Force Base*	Salo, E., and G. Mohlman	N/A
2014	*Archaeological Survey and Testing for Selected 125 Acres, Andersen Air Force Base Main Operations Area, Guam*	DeFant, D., J. Eakin, and D. Moore	N/A
2014	*Proposed Guam and CNMI Military Relocation 2012 Roadmap Adjustments SEIS, Live-Fire Training Range Complex Range Footprints, Main Cantonment, Utilities, Communications, Well Field Alternatives and Access Route Options*	Dixon, B., T. Rudolph, A. Jalandoni, I. Nelson, M. Hronchich-Conner, S. Leary, R. Schaefer, E. Lash, and M. Todd	N/A
2018	*Cultural Resources Survey within the Munitions Storage Area, Andersen Air Force Base, Yigo, Guam*	Dixon, B., T. Meiser, R. Jones, and I. Nelson	MSA-1
2018	*Historic Inventory of Andersen Air Force Base, Territory of Guam.*	Mohlman, G.	N/A
2018	*Archaeological Survey and Subsurface Testing for Proposed Construction of P-290 Earth Covered Magazines and Ordnance Pads, Andersen Air Force Base, Guam*	Hlatky, N.M., and J.J. Maxwell	MSA-1

Notes: N/A = not applicable

Two cultural resource investigations were conducted in MSA-1 in 2021. A survey was conducted for the P-94 electrical lines project (IA 2021), and data recovery work was planned for Site 66-08-2102 for the P-3105 storage igloos project (NAVFAC Marianas 2021). Both of these projects were consulted on as separate undertakings under Section 106 of the NHPA; they are not part of this Proposed Action nor the Section 106 consultation for this Proposed Action.

Portions of the North Ramp APE have also been the subject of multiple investigations since 2006. A previous EIS addressed construction within the North Ramp project area, and three cultural resources investigations with subsurface testing and one monitoring project occurred in support of that EIS (DAF 2006, DeFant and Leon Guerrero 2006, Grant et al. 2007, Welch 2010). Additionally, an evaluation related to data recovery of a site occurred near but outside the project area. In October 2006, the Guam SHPO concurred that the North Ramp project area addressed in the 2006 EIS could be completely developed; however, only construction of a dirt road and utility corridor has occurred since that consultation was completed (DAF 2006).

Previous cultural resource surveys have documented 33 cultural resources within the APE and within 0.25 mile of the APE. Of these 33 cultural resources, 21 are located directly within the APE, and the boundary of 1 resource (66-07-1064, North Field) is also located within the APE (see **Table 3-9**).

Table 3-9. Previously Recorded Cultural Resources within the Andersen AFB North Ramp and MSA-1 APEs and within 0.25 Mile of the APEs

Site No.	Name/Description	Period	NRHP Eligibility from Previous Investigation	APE
66-03-2102	Ceramic Scatter	Precontact	Eligible	N/A
66-07-0015	Latte Stone	Precontact	Eligible	N/A
66-07-1064	North Field	Second American Administration Territorial	Eligible	N/A[a]
66-07-2109	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2110	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2111	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2112	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2113	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2114	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2115	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2116	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2117	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2118	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2119	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2120	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2121	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2122	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2123	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2124	Bottle Dump	Second American Administration Territorial	Not Eligible	North Ramp
66-07-2125	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2126	Ceramic Scatter	Precontact	Not Eligible	North Ramp
66-07-2127	Artifact Scatter	Precontact	Not Eligible	North Ramp
66-07-2128	North Field Concrete Pads	World War II (unspecified), Second American Administration Territorial	Not Eligible	North Ramp
66-07-2320	Artifact Scatter	Precontact	Eligible	N/A
66-07-2321	Artifact Scatter	Precontact	Eligible	N/A
66-07-2323	Artifact Scatter	Precontact	Eligible	N/A
66-08-2155	Artifact Scatter	Precontact	Eligible	N/A
66-08-2156	Artifact Scatter	Precontact	Eligible	N/A
66-08-2577	Concrete Foundations	Second American Administration Territorial	Not Eligible	N/A

Site No.	Name/Description	Period	NRHP Eligibility from Previous Investigation	APE
66-08-2584	Artifact Scatter	Precontact	Not Eligible	N/A
66-08-2914	Ceramic Scatter; World War II Artifact Scatter	Precontact; World War II (unspecified)	Eligible	N/A
Site 3	Concrete Slab with Three Circular Openings	Second American Administration Territorial	Not Eligible	MSA-1
IO—23	Ground Stone Artifact	Precontact	Not Eligible	MSA-1

Notes: N/A = not applicable
[a] The boundary of this site falls within the APE.

Twenty of the 22 cultural resources within the APE are located within the 192-acre North Ramp APE. The resources are predominately precontact period ceramic and artifact scatters; however, one historical bottle dump and an area containing historical concrete foundations associated with North Field are also within this area. The North Field site boundary is also within the APE, and this site is eligible for inclusion in the NRHP.

The remaining two cultural resources within the APE are within the 17-acre MSA-1 APE. The MSA-1 APE is within a noncontiguous historic district recommended eligible for inclusion in the NRHP.

Architectural Resources. No NRHP-eligible architectural resources are located within the MSA-1 APE. The North Ramp APE contains three architectural resources: Buildings 2550, 2551, and 2552. North Field (66-07-1064) has been identified as a NRHP-eligible historic district and was documented through Historic American Engineering Record documentation in 2014. Buildings 2550, 2551, and 2552 were evaluated in 2018 as not eligible individually for NRHP listing but as contributing elements of the North Field historic district (Mohlman 2018). Additionally, previous and the present archaeological surveys have documented several concrete pads within the North Ramp APE that, in isolation from other extant architectural resources, have been determined not eligible for NRHP listing.

Other Cultural Resources. One cultural resource exists within the North Ramp APE that is not eligible for NRHP listing but does qualify as a cultural resource under NEPA. This resource, which is a possible latte stone that has been painted red, is adjacent to Building 2552 in the southwestern corner of the North Ramp project area. The base historian believes this rock marks the location of a time capsule buried at the site in the late 1960s. If the painted rock is in fact a latte stone, it has been removed from its original archaeological site context and therefore does not retain any historical integrity, significance, nor archaeological data value. Additionally, a commemorative property is not eligible for listing in the NRHP unless it is exceptionally significant due to its design, age, tradition, or symbolic value exclusive of its commemorative intent. If the DAF determines the painted rock may be disturbed by the Proposed Action or may be better preserved through relocation, then the DAF will consult with the base cultural resources manager and base historian to determine the relocation and/or disposition of the cultural resource.

Cultural Resources Recorded during 2021 Investigations. In June 2021, a cultural resources investigation was completed within the APE (i.e., ROI) in support of this EIS and to inform the Section 106 consultation. The survey objectives within the North Ramp APE consisted of re-locating previously recorded cultural resources, systematically testing the precontact period sites for subsurface deposits, and potentially redefining site boundaries based on additional testing. Subsurface testing was conducted on 16 precontact period archaeological sites within the North Ramp APE, initially recorded in 2006. Two historic-age sites dating to the post-World War II period were revisited, and the site boundary of one was expanded to incorporate additional features discovered during the 2021 survey. No subsurface testing was conducted on the historic sites. The survey objectives within the original, 17-acre MSA-1 APE consisted of conducting pedestrian survey and testing to locate previously unrecorded cultural resources. Pedestrian survey in MSA-1 APE located one Latte Period site (Site 66-08-2981) and four isolated finds.

The cultural resources investigations completed in June 2021 identified three sites, with a preliminary recommendation of NRHP-eligible, within the North Ramp APE (Sites 66-07-2113, -2117, and -2118), and identified one site, with a preliminary recommendation of NRHP-eligible, within the MSA-1 APE (Site 66-08-2981). Additionally, human remains were recovered from a single shovel test pit in Site 66-08-2981, within the MSA-1 APE. The Guam SHPO did not concur with DAF's determinations of NRHP ineligibility for 13 archaeological sites within the North Ramp area (66-07-2109, -2114, -2115, -2116, -2119, -2121, -2122, -2123, -2124, -2125, -2126, -2127, and -2128).

Per the request of Guam SHPO, the DAF requested eligibility recommendations from the Keeper of the National Register in accordance with 36 CFR 63. In September 2022, the Keeper made a final determination of not eligible for sites 66-07-2114, -2116, -2119, -2121, -2122, -2123, -2124, -2126, -2127, and -2128 and undetermined due to insufficient information for sites 66-07-2115, and -2125. Additional survey of previously unsurveyed areas within the MSA-1 area and data recovery of NRHP-eligible sites within the North Ramp area will be conducted in accordance with the 2008 JRM Programmatic Agreement.

Site 66-07-2113. Site 66-07-2113 is located within the North Ramp APE and consists of an artifact scatter, a possible agricultural feature containing burned coconut shell, and a surface stain with burned limestone and diffuse charcoal that may represent the debris cleaned out of one or more earth ovens. Subsurface testing of three sites (66-07-2110, -2111, and -2113) resulted in the discovery of artifacts outside the previously defined boundaries and the recommendation of combining the three sites into one, identified as 66-07-2113. The features found at Site 66-07-2113 have the potential to provide additional information important to the archaeology of the northern plateau, and the site is recommended eligible for listing in the NRHP under Criterion D. This recommendation was made in a survey report submitted to the Guam SHPO in October 2021. The Guam SHPO concurred with the eligibility recommendations in a letter dated November 23, 2021. Therefore, Site 66-07-2113 is considered a historic property under Section 106.

Site 66-07-2117. Site 66-07-2117 is located within the North Ramp APE, and consists of an artifact scatter and possible agricultural features containing burned coconut shell. The

archaeological materials found at Site 66-07-2117 have the potential to provide additional information important to the archaeology of the northern plateau, and the site is recommended eligible for listing in the NRHP under Criterion D. This recommendation was made in a survey report submitted to the Guam SHPO in October 2021. The Guam SHPO concurred with the eligibility recommendations in a letter dated November 23, 2021. Therefore, Site 66-07-2117 is considered a historic property under Section 106.

Site 66-07-2118. Site 66-07-2118 is located within the North Ramp APE, and consists of an artifact scatter and possible agricultural features containing burned coconut shell. The archaeological materials found at Site 66-07-2118 have the potential to provide additional information important to the archaeology of the northern plateau, and the site is recommended eligible for listing in the NRHP under Criterion D. This recommendation was made in a survey report submitted to the Guam SHPO in October 2021. The Guam SHPO concurred with the eligibility recommendations in a letter dated November 23, 2021. Therefore, Site 66-07-2118 is considered a historic property under Section 106.

Site 66-08-2981 (Fafalog). Site 66-08-2981 was identified during the 2021 survey within an area of moderately dense limestone forest in a portion of MSA-1 not previously developed. The site boundaries were determined through subsurface testing, which resulted in discovery of numerous surface and subsurface artifacts but no identifiable features. Based on the large number of artifacts discovered and the potential for reconstructable vessels that could provide diagnostic data on the site's use, Site AM-001 is recommended eligible for listing in the NRHP under Criterion D. This recommendation was made in a survey report submitted to the Guam SHPO in October 2021. The Guam SHPO concurred with the eligibility recommendations in a letter dated November 23, 2021. Therefore, Site 66-08-2981 is considered a historic property under Section 106.

Human Remains at MSA-1 Project Area. During the June 2021 cultural resources investigations, a single human deciduous (i.e., primary/baby tooth) molar and a very small, indeterminant fragment of possible human bone were recovered at Site 66-08-2981, within the MSA-1 survey area. These remains are currently in Andersen AFB custody until appropriate action is determined. Because work stopped near the shovel test pit at the time of discovery, not enough information is available to determine if these human remains are from an intact human burial or are scattered human remains.

3.5.2 Environmental Consequences

Effects analysis under Section 106 of the NHPA is limited to cultural resources that meet the NRHP eligibility criteria. To be listed, or considered eligible for listing, in the NRHP, a cultural resource must typically be 50 years of age or older, and must have significant associations with historic themes or events (Criterion A) or historical persons (Criterion B); be significant for its architectural or engineering design or construction type, period, or method (Criterion C); or have the potential to yield important information in prehistory or history (Criterion D). A NRHP-eligible resource must also retain enough of the seven aspects of integrity to be able to convey its historical significance (NPS 1997). Sites or structures that are not considered individually significant may be considered eligible for listing in the NRHP as part of a historic district. According to the NRHP, a historic district possesses a significant concentration, linkage, or

continuity of sites, buildings, structures, or objects that are historically or aesthetically united by plan or physical development.

Impacts on NRHP-listed or eligible properties are those that might directly or indirectly change the characteristics that make the historic property eligible for listing in the NRHP. To be considered eligible for the NRHP, a cultural resource must possess the majority, if not all, of the seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. Integrity is defined as the authenticity of a property's historic identity, as evidenced by the survival of physical characteristics it possessed in the past, and its capacity to convey information about a culture or people, historic patterns, architectural or engineering design, or technology. Location refers to the place where an event occurred or a property was constructed. Design considers elements such as plan, form, and style of a property. Setting is the physical environment of the property. Materials refer to the physical elements used to construct the property. Workmanship refers to the craftsmanship of the creators of a property. Feeling is the property's ability to convey its historic time and place. Association refers to the link between the property and a historic event or person.

Impact analysis under NEPA may include cultural resources that have not been evaluated or do not meet NRHP criteria but may be significant to communities; Tribes; or other ethnic, cultural, or religious groups for traditional, religious, or cultural purposes. Impacts on cultural resources can occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; or neglecting the resource to the extent that it deteriorates or is destroyed.

Examples of adverse effects on cultural resources under Section 106 can include:

- Physically altering, damaging, or destroying all or part of a resource;
- Altering characteristics of the surrounding environment that contribute to the resource's significance;
- Introducing visual or audible elements that are out of character with the property or that alter its setting;
- Neglecting the resource to the extent that it deteriorates or is destroyed; or
- The sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.

Adverse effects determined under Section 106 may or may not be considered significant impacts under NEPA, and considerations include the type, duration, and severity of the impacts as well as mitigation measures developed through Section 106 consultation.

Section 106 Consultation. In 2020, at the beginning of the EIS process, the DAF initiated Section 106 consultation with the Guam SHPO. After the strategic pause between 2022 and 2023, the DAF determined that Section 106 compliance could be accomplished following the processes within the existing 2008 JRM Programmatic Agreement. Prior to additional surveys, construction, or data recovery of NRHP-eligible sites within the North Ramp area, the DAF will submit archaeological work plans to the Guam SHPO for survey and/or data recovery of areas

within the APE in compliance with Stipulation VII.B.1(a) and VII.B.1(b) of the 2008 JRM Programmatic Agreement (see **Appendix C** for a summary of compliance actions and cultural resources reports).

3.5.2.1 Proposed Action

3.5.2.1.1 F-15 Beddown

Potential impacts on cultural resources as a result of the beddown of up to 12 F-15 fighter aircraft would be limited to atmospheric effects (i.e., noise, vibration) from overflights. Noise from low-level aircraft overflights can cause buildings under their flight path to vibrate, which the occupants experience as shaking of the structure and rattling of the windows. A noise analysis for the F-15 beddown states that based on experimental data and models, an impact noise (i.e., blast noise or sonic boom) above 140 dB is required to generate sufficient energy to damage structures (Bureau of Mines 1980, Siskind 1989). Individual overflights at Andersen AFB are not supersonic, and do not generate sonic booms above 140 dB; therefore, there is no potential to damage structures. Therefore, no short- or long-term impacts on cultural resources would result from the F-15 beddown to include airfield operations, supporting aircraft operations, and personnel to support the F-15 squadron's mission at Andersen AFB.

3.5.2.1.2 North Ramp

Construction

All potential impacts on historic properties within the North Ramp APE would be anticipated to occur during construction. Construction of the proposed infrastructure within the North Ramp project area would have the potential to affect the physical integrity of surface and subsurface cultural resources, which would cause short- and long-term, less than significant, adverse impacts on the sites.

The North Ramp APE overlaps with the NRHP-eligible North Field historic district and three buildings (2550, 2551, and 2552) within the historic district, which would be demolished under the Proposed Action. These three buildings were determined to be contributing elements to the North Field historic district in 2018 (Mohlman 2018). Adverse effects to the North Field historic district were mitigated through the 2012 Historic American Engineering Record documentation of North Field, HAER No. GU-09, which is complete (DON 2012).

Three NRHP-eligible archaeological sites were identified within the North Ramp APE that could be affected by construction of the proposed infrastructure. Construction of the proposed infrastructure would have the potential to affect the physical integrity of these archaeological sites.

Based on the results of the 2021 cultural resources investigations and previous cultural resources work within the North Ramp APE, the DAF determined that the APE has been subjected to multiple subsurface investigations, and the potential is low for unidentified cultural resources to be discovered during construction. In the case of culturally excavated features, there is little possibility of subsurface archaeological materials due to the nature of the residual soils and general lack of deposition of sediments on the northern plateau. However, should

inadvertent discoveries be made, the standard procedures outlined in the ICRMP would be followed.

In the unlikely event of a fuel spill, ground disturbance to repair the proposed fuels infrastructure would be expected to occur within the limits of the project area. However, these operation activities would be unlikely to affect archaeological sites not previously disturbed during construction or subjected to data recovery prior to construction. Additional impacts on known historic properties or buried archaeological sites may occur if soils outside the identified limits of disturbance must be removed due to contamination. In the event of post-review discoveries or unanticipated effects on historic properties, the DAF would comply with 36 CFR 800.13. Impacts would not be expected on traditional hunting areas or fishing grounds.

Although not a NRHP-eligible resource, the painted rock denoting the potential site of a late 1960s buried time capsule may potentially be affected by construction activities. Should the DAF determine the Proposed Action would potentially impact this resource, the base cultural resources manager and base historian would consult on an appropriate relocation or disposition of this resource.

Operations

Operation of the proposed infrastructure is not expected to impact historic properties within the North Ramp APE.

3.5.2.1.3 MSA-1

Construction

Construction of the proposed infrastructure within the MSA-1 project area would have the potential to affect the physical integrity of surface and subsurface cultural resources, which would cause short- and long-term, less than significant, adverse impacts on the sites.

One NRHP-eligible archaeological site, Site 66-08-2981, was identified within the original, 17-acre MSA-1 APE that could be affected by construction of the proposed infrastructure. In the event of post-review discoveries or unanticipated effects on historic properties, the DAF would comply with 36 CFR 800.13.

Operations

Operation activities within the MSA-1 APE are not expected to affect historic properties. The only known historic property within the MSA-1 APE is an archaeological site, and impacts on this site would only be anticipated to occur during construction. No ground disturbance is associated with operation activities. In the event of post-review discoveries or unanticipated effects on historic properties, the DAF would comply with 36 CFR 800.13. Additionally, impacts would not be expected on traditional hunting areas or fishing grounds.

3.5.2.1.4 Cycad Outplanting Areas

As part of mitigation for natural resource compliance, areas within Andersen AFB are presently being identified for the replanting of threatened and endangered cycads. If additional cultural resources investigations are needed within these areas, these will be conducted in accordance with work plans developed under the 2008 JRM Programmatic Agreement.

3.5.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the proposed F-15 beddown and infrastructure upgrades within the North Ramp and MSA-1 project areas, and the existing conditions discussed in **Section 3.5.1.4** would remain unchanged. Therefore, no impacts on cultural resources would occur due to the No Action Alternative.

3.5.3 Cumulative Impacts

The reasonably foreseeable projects listed in **Section 3.3** represent a variety of projects at Andersen AFB that may have the potential to have cumulative impacts on cultural resources. In general, the northern part of Andersen AFB has been the subject of numerous cultural resource studies. Cultural resources that are above ground, built environment, and historic properties are well understood and documented. The North Ramp and 12 acres of the MSA-1 project areas have been surveyed in their entirety for archaeological resources for the Proposed Action, with subsurface testing as part of the 2021 and previous investigations. The potential for undiscovered, subsurface archaeological deposits is low, but not entirely absent. Each of the reasonably foreseeable projects would be or has been analyzed for impacts on cultural resources independently in compliance with applicable federal laws. Additionally, projects that are currently ongoing are being implemented in compliance with federal law, and provide protocols for inadvertent discoveries. Potential cumulative impacts on cultural resources from reasonably foreseeable actions would be avoided, minimized, or mitigated through the Section 106 compliance process.

3.5.4 Mitigations

Mitigation measures for adverse effects on cultural resources would be implemented in accordance with the requirements in the existing 2008 JRM Programmatic Agreement, and will be summarized in **Appendix C** of the Final EIS. Additionally, the DAF would follow GPL 89-24 for the treatment of human remains found in an archaeological context. It states that burials should be left in place and undisturbed to the extent possible. If burials cannot be left undisturbed, then the removal of the burial would be done using archaeological methods and documentation. Removal, examination, and re-interment would be paid for by either the lead government agency or the developer requiring governmental licenses, permits, or assistance. Adverse effects to the North Field historic district were previously mitigated through the 2012 Historic American Engineering Record documentation of North Field, HAER No. GU-09, which is complete (DON 2012).

3.6 Socioeconomics

3.6.1 Affected Environment

3.6.1.1 Definition of the Resource

Socioeconomics is defined as the basic characteristics and resources associated with the human environment, including elements with regional demographics and economic activity. Factors that describe the socioeconomic environment represent a composite of several interrelated and nonrelated characteristics. Factors used as indicators of economic conditions for a geographic area include demographics, housing, income, unemployment rates, and employment data. Changes in demographic and economic conditions are typically accompanied by changes in other community components such as housing availability and the provision of public services. Sociocultural issues, such as quality of life and cultural identity, are also important indicators of the socioeconomic condition of a region.

Population. Population size and demographics identify the population levels and changes to a region. Demographics data can help define a region's characteristics in terms of race, ethnicity, poverty status, and other broad indicators. Economic activity typically includes employment, personal income, and industrial or commercial growth. Data on employment might identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on personal income in a region can be used to compare the "before" and "after" effects of jobs created or lost because of a proposed action.

The geographic area in which most of the socioeconomic effects of a proposed action would occur is defined as the socioeconomic area of impact. The area of impact is considered a primary effect area where a proposed action has impacts on residency distribution of employees and the location of businesses providing goods and services during the implementation of the action. Other socioeconomic factors and trends that are considered include regional economic activity, population, housing, and public services.

The socioeconomic data used for populations and demographics are typically presented at the census-tract level to characterize the socioeconomic conditions of a proposed project area. For this analysis to characterize socioeconomic conditions in the context of regional trends, and because relocating personnel would reside within the local community, a comparison was completed for municipality- (village) and territory-level data.

Sociocultural Matters. Sociocultural matters relate to how factors that unify communities and ways of life can change due to external influences that become involved in culture.

Economic Activity. Economic activity is the production, distribution, and sale of goods and services at all levels of society. Data on employment, personal income, and growth of economic sectors provide baseline and trendline information about the economic health of a region. Data used to assess socioeconomic impacts include the municipality (village) and territory-level results from the 2020 U.S. Census. Data collected from previously published documents issued by federal, territory, and local agencies as well as from state and national databases are also used.

3.6.1.2 Regulatory Overview

No specific federal regulations exist for managing or evaluating socioeconomic impacts. However, socioeconomic sustainability is considered an important factor in federal decisions. The Presidential Memorandum accompanying EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, states, "Each Federal agency shall analyze the environmental effects, including human health, economic and social effects of Federal action, including effects on minority communities and low-income communities, when such analysis is required by NEPA." (42 USC 4321 et seq.). Effects on minority communities and low-income communities is further addressed in the Environmental Justice section (**Section 3.7**).

CEQ regulations implementing NEPA state that the "human environment means comprehensively the natural and physical environment and the relationship of present and future generations of Americans with that environment" and that "effects include ecological (e.g., the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative" (40 CFR 1508.1(m) and 40 CFR 1508.1 (g)(4). Therefore, the socioeconomic assessment for a proposed action also addresses the extent to which proposed modifications within the natural or physical environment could also affect elements of the human economic (e.g., employment, income, revenue) and social conditions (e.g., quality of life).

3.6.1.3 Region of Influence

The socioeconomic ROI for the Proposed Action includes the municipalities of Dededo and Yigo on Guam, which are adjacent to Andersen AFB in northern Guam. Dededo and Yigo, as well as associated communities, are considered a primary effect area because they receive direct and indirect economic impacts, as defined by the Impact Analysis for Planning (IMPLAN) Model, from activities on Andersen AFB due to factors such as residency of construction and installation workers and their dependents, as well as the nearness of businesses providing goods and services during construction and operation of the Proposed Action. Other components include regional economic activity, population, housing, and public services.

3.6.1.4 Existing Conditions

Population. Guam's population is mostly concentrated in the northern part of the island in Yigo and Dededo. Yigo is Guam's largest and most northern municipality, covering approximately 35 square miles, and is where Andersen AFB is located. Covering approximately 30 square miles of northwestern Guam, Dededo is Guam's second largest municipality. **Table 3-10** shows the population trends of Guam, Yigo, and Dededo from 1990 to 2020. The population continued to grow from 1990 to 2010 in both the municipalities of Yigo and Dededo as well as Guam, with a decrease in population from 2010 to 2020 (USCB 2015, 2020a). The Guam population from 1990 to 2000 increased by 16.3 percent, primarily due to the increased occupation of the island by the U.S. military and associated construction personnel at military base.

Table 3-10. Population Trends on Guam and by Municipality (Village)

Geographic Area	1990 Population	2000 Population	2010 Population	2020 Population	% Population Change from 2010–2020
Guam	133,152	154,805	159,358	153,836	-3.5
Dededo	N/A	42,980	44,943	44,908	-0.08
Yigo	N/A	19,474	20,539	19,339	-5.8

Note: N/A = not applicable
Source: USCB 2015, 2020a

The 2024 to 2030 population projections for Guam and the municipalities (villages) of Dededo and Yigo anticipate an increase of a fraction of 1 percent over during the Proposed Action, including the proposed 3- to 7-year construction period (see **Table 3-11**) (Guam BSP 2021). The timeline for the proposed construction and infrastructure upgrades is planned to occur from 2025 to 2032, and the F-15 beddown and associated personnel increase would occur during 2029. The projected population change during this timeline is anticipated to be substantially lower than the increase Guam experienced from 2000 to 2010 that was due to an influx of military-related actions.

Table 3-11. Population Projections for Guam and by Municipality (Village)

Geographic Area	2024	2025	2026	2027	2028	2029	2030	% Population Change 2024–2030
Guam	169,532	169,691	169,805	169,880	169,917	169,910	169,855	0.19
Dededo	47,812	47,857	47,889	47,910	47,921	47,919	47,903	0.19
Yigo	21,850	21,871	21,885	21,895	21,900	21,899	21,892	0.19

Note: Population projections for 2031 were unavailable.
Source: Guam BSP 2021

The population of Guam has a combination of ethnic and racial groups such as Chamorro, Asian, Native Hawaiian and other Pacific Islanders, Hispanic or Latino, White, and African American. As shown in **Table 3-12,** Native Hawaiian and Other Pacific Islanders comprised nearly half of Guam's population, with most of that population identifying as Chamorro. More than one-third of Guam's 2020 population identified as Asian, with most of that population identifying as Filipino. The remaining ethnic and/or race groups for Guam are Black or African American, Hispanic or Latino, and White, with the remainder being of other ethnicity or origin (USCB 2020a).

Of the total population for Guam in 2020, 54,690 (37 percent) persons were born on Guam, and 91,242 (63 percent) persons were born outside Guam. For those born outside Guam, the main reasons identified for moving to Guam were employment (7.3 percent), military (1.9 percent), housing (8.0 percent), family-related (0.4 percent), natural disaster (28.2 percent), school (26.6 percent), or other (27.6 percent) (USCB 2020b).

Table 3-12. Ethnicity and Race Populations on Guam, 2020

Ethnic Origin or Race	Population	% of Total Population
One Race	**138,395**	**90.0**
Native Hawaiian and Other Pacific Islander	*70,809*	*46.0*
Carolinian	92	0.1
Chamorro	50,420	32.8
Chuukese	10,274	6.7
Guamanian	63	0.0
Kosraean	456	0.3
Marshallese	180	0.1
Native Hawaiian	126	0.1
Palauan	2,149	1.4
Pohnpeian	2,096	1.4
Yapese	1,533	1.0
Other Native Hawaiian and Other Pacific Islander	3,420	2.2
Asian	*54,586*	*35.5*
Chinese (except Taiwanese)	1,999	1.3
Filipino	44,793	29.1
Japanese	2,108	1.4
Korean	3,438	2.2
Taiwanese	227	0.1
Thai	138	0.1
Vietnamese	283	0.2
Other Asian	1,600	1.0
Black or African American	*1,340*	*0.9*
American Indian and Alaska Native	*214*	*0.1*
White	*10,491*	*6.8*
Other Ethnicity or Origin	*955*	*0.6*
Two or More Races	**15,441**	**10.0**
Total Population	**153,836**	**100**
Hispanic or Latino Origin	**4,522**	**2.9**
Mexican	*955*	*1.1*
All other Hispanic or Latino	*2,782*	*1.8*
Not Hispanic or Latino	**149,314**	**97.1**
Total Population	**153,836**	**100**

Source: USCB 2020a

Military populations can affect the structure and growth of municipalities (villages) on Guam. Dededo and Yigo cover U.S. military-owned land, and have a higher number of U.S. military

residents relative to other municipalities. Guam's total active-duty U.S. military population has remained relatively constant from 2014 to 2020, as shown in **Table 3-13** (Guam BSP 2021).

Table 3-13. Active Duty Military Population on Guam, 2014–2020

U.S. Military Branch	2014	2015	2016	2017	2019	2020
Air Force	2,074	2,074	1,852	2,091	2,108	2089
Army	257	253	240	39	183	189
Coast Guard	206	184	195	183	0	0
Marine Corps	16	21	28	18	43	115
Navy	3,453	3,583	3,257	3,354	3,801	3824
Total Active Duty	**6,006**	**6,115**	**5,572**	**5,685**	**6,140**	**6,217**

Source: Guam BSP 2021

Housing. Table 3-14 shows housing characteristics for the island of Guam and the two northern municipalities (villages) of Dededo and Yigo in 2020. The 2020 U.S. Census indicated a 2 percent increase in housing units on Guam from 2010. Of the 44 percent owner-occupied housing units on Guam, approximately 40 percent were located in Dededo and Yigo.

Table 3-14. Housing Characteristics for Guam, Dededo, and Yigo in 2020

Geographic Area	Total Number Housing Units	Number Occupied Housing Units	Number Vacant Units	Number Part-Time Units[a]	Median Value (Owner-Occupied)	Median Gross Rent	Median Household Income
Guam	51,555	43,381	8,174	202	$277,750	$1,057	$58,260
Dededo	13,651	11,576	2,075	33	$250,924	$941	$52,891
Yigo	6,360	4,891	1,469	49	$258,171	$996	$57,519

Source: USCB 2020b
[a] The number of housing units that are used seasonally, recreationally, or only occasionally

On Guam, the median value of owner-occupied housing varies throughout each municipality (village). As reported in the 2020 U.S. Census, median values for housing ranged from as low as $245,122 in Merizo municipality (southern tip of Guam) to a high of $391,509 in Piti municipality (western coast of Guam). The median household income on Guam in 2020 was $58,260, compared to $50,607 in 2010. Median household incomes ranged from a low of $51,446 in Mongmong-Toto-Maite municipality (central Guam) to a high of $80,682 in Talofofo municipality (southern Guam) (USCB 2020a).

The ROI population below the poverty level decreased in 2020 from 2010, with 35,848 persons (22.5 percent) in 2010 and 29,408 persons (20.2 percent) in 2020. In the more populated municipalities (villages) in 2020, poverty rates ranged from a low of 261 persons (0.1 percent) in Piti to a high of 9,829 persons (22.4 percent) in Dededo (USCB 2020a).

According to the Guam Multiple Listing Service, 260 single-family homes as well as 180 condominiums and townhouses were listed for sale on the island in January 2024 (Guam Association of Realtors 2024). The median asking price for single-family homes was

approximately $540,000, while the median price for condominiums/townhouses was approximately $355,000. A total of 407 single-family homes, condominiums, townhouses, and apartments were also listed for rent in the Guam Multiple Listing Service. Monthly rents ranged from $750 to $10,000 for condominiums, townhouses, and apartments, and $1,300 to $9,800 for single-family homes.

Guam Economy. The primary sources of funds that support Guam's economy are federal expenditures, construction capital investment, and tourism. From 2021 to 2023, Guam experienced economic rebound and partial recovery from the shutdown necessitated by the 2020 Coronavirus (COVID-19) pandemic. Guam's economy is expected to continue expanding and recovering throughout 2024.

Federal government expenditures now represent the largest single source of funds flowing to Guam, as the pandemic spurred a reduction in tourism and an increase in federal expenditures. Approximately $1.9 billion in federal funds were used for Guam in Fiscal Year (FY) 2019, peaking at $5.2 billion in 2021, and decreasing to $2.5 billion in 2023 (31.2 percent higher than 2019). To give perspective to the federal expenditures as a component of the economy, the total value of sales or revenue reported on Guam in the 2017 Economic Census was $8.47 billion, and the Gross Domestic Product (GDP) in 2022 was $6.1 billion (Guam BLS 2023).

A large part of Guam's economy is connected to international tourism. Pre-pandemic, tourism expenditures represent the largest single source of funds into Guam. Reduction in tourism, due to the pandemic, was caused by travel avoidance because of concerns for safety for both personal and business travel (Guam BLS 2023). Total Coronavirus Aid, Relief, and Economic Security Act (or CARES Act) and COVID-19 Programs encumbered or expended $1.1 billion on Guam as of December 2020. The total relief from these programs was measurably less than the loss of tourism revenue (note, this is further supported by a reduction in tax receipts in various categories). Tourism expenditures impact revenue and employment primarily in tourism-support industries, including transportation, services, retail trade, and indirect economy-wide effects (Guam BLS 2023).

The U.S. Bureau of Transportation Statistics reported a 78 percent decline in international passengers and a 54 percent decline in domestic passengers in 2020, suggesting a substantial reduction in domestic travel for safety concerns due to the COVID-19 pandemic (note, this does not include international travel and quarantine restrictions). The international restrictions caused a greater decline (Guam BLS 2023). Guam Visitors Bureau (GVB) statistics showed that visitor arrivals were down 95 percent from 2019 to 2021. Despite limited tourist arrivals, hotel occupancy was on Guam considerably higher due to U.S. military personnel exercises and hotel rooms used for quarantine facilities.

By 2023, yearly flight arrivals into Guam were up 726 percent from 2021, from 79,389 to 655,970 arrivals, but still only 39.4 percent of what they were in 2019 (1,664,934) (GVB 2023). Tourism is forecasted to continue to increase into 2024.

Construction projects on Guam continued to move forward despite the COVID-19 pandemic; in 2022, construction activity was substantial. Construction employment increased from 7,860 in 2020 to 10,710 in 2022; H2-B workers increased from 1,527 in 2020 to 3,433 in 2022; and gross

receipt taxes paid for construction increased by 38 percent, from $48.2 million in 2020 to $67.0 million in 2022. Construction is projected to continue increasing substantially into 2024. Construction work is supported by private, Government of Guam, and federal projects already contracted. Construction work is expected to increase with the demand backlog and recent federal legislation to permit expanded H-2B worker capacity to meet more demand. The number of H-2B workers has continued to increase, and more workers have been approved for entry into Guam. By June 2023, the number of H-2B worker in the production workers category was 4,351; in October 2023, the total number of H-2B workers on Guam surpassed 5,000 workers.

While the total value of building permits for civilian projects and DoD construction contracts dropped in 2020 to approximately half of that in 2019, high levels of previously permitted and contracted projects were underway in 2021. Building permits for civilian construction remained substantial, at more than $305 million in 2020 and rose to $1.3 billion in 2022. Federal appropriations for U.S. military construction projects are a strong indicator of future construction, and these appropriations have increased each year, from $248.7 million in FY 2017 to $523 million in FY 2023. U.S. military projects scheduled for award currently under construction exceed $2 billion with over $1 billion remaining to be completed (Guam BLS 2023). Guam's location in the Pacific will continue to provide an advantage for defense and support the long-term tourism expansion trend.

Construction activity on Guam is expected to increase in 2024 to meet the development and construction demand. Coinciding with these increased construction contracts has been a steady increase in the required construction labor and workforce. High levels of previously permitted and contracted projects are underway. Building permits and DoD construction contracts are solid indicators of plans backed by financial commitments to commence construction in the near term (Guam BSP 2021).

Andersen AFB is also a major contributor to Guam's economy through direct U.S. military and civilian employment, the subsequent creation of indirect employment, and the purchase of goods and services from local businesses.

Employment. Table 3-15 shows the industry employment composition of Guam's economy between 2018 and 2021. The construction, private sector, and trade industries showed the greatest increase over the period; other employment sectors generally experienced small increases or decreases in total employment.

Table 3-15. Guam Civilian Employees by Industry based on Payrolls, 2018–2021

Industry	2018	2019	2020	2021
Private Sector	49,200	50,500	51,600	44,400
Agriculture	320	330	210	300
Construction	5,800	6,200	7,850	8,590
Manufacturing	1,480	1,450	1,450	1,460
Transportation	4,590	4,650	4,480	3,540
Trade	15,020	16,500	16,410	13,420
Finance, Insurance, and Real Estate	2,550	2,660	2,660	2,440

Industry	2018	2019	2020	2021
Services	19,160	18,890	18,540	14,650
Public Sector	15,700	15,410	16,130	15,670
Federal Government	3,950	3,860	3,890	3,920
Government of Guam	11,750	11,550	12,240	11,750
All Industries	**65,000**	**63,510**	**135,460**	**120,140**

Source: Guam BSP 2021
Note: Data were pulled from March of each year. Data is still labeled as preliminary at this time. Data in this table include full- and part-time employees who worked during, or received pay for any part of, the pay period, which included the 12th day of the survey months. Proprietors, self-employed unpaid family workers, domestic servants, and military personnel are excluded.

Table 3-16 shows employment by occupation, mean hourly rate, annual mean wage, and the percent change in employment for each occupation over that period for Guam in 2021 and 2022. As measured by the U.S. Bureau of Labor Statistics, Guam added 1,080 jobs (58,390 to 59,470), an increase of 1.8 percent, from 2021 to 2022. More jobs were held in Office and Administrative Support occupations than any other occupation in 2021 and 2022. Common jobs under this category include clerks, executive secretaries, and administrative assistants; customer service representatives; and various clerking positions. The number of jobs within the several occupational categories decreased in 2022, including jobs in business and financial (-6.5 percent); computer and mathematical (-8.9 percent); educational instruction and library (-22.9 percent); arts, design, entertainment, sports, and media (-4.4 percent); farming, fishery, and forestry (-33.3 percent); healthcare practitioners and technical (-3.9 percent), and transportation and material moving (-20.9 percent). Jobs in protective services increased by more than 20 percent in 2022. Employment in construction increased from 5,790 in 2021 to 6,310 in 2022 (U.S. BLS 2021, 2022).

As measured by the U.S. Bureau of Labor Statistics, the annual mean wage for Guam jobs increased by $1,970 (from $39,720 to $41,690), an increase of 5.0 percent, from 2021 to 2022. The highest annual mean wage in 2022 was noted for legal, management, and healthcare practitioners and technical. The annual mean salaries in occupations increased in 2019, except for computer and mathematical (-1.5 percent); life, physical, and social services (-5.6 percent); farming, fishing, and forestry (-3.8 percent); and protective services (-10.0 percent), which decreased. Annual mean wages in sales and related occupations grew by less than 1 percent.

Immigration law regarding special requirements for admission, extension, and maintenance of foreign nationals in the U.S. (8 CFR 214.2(h)) grants certain conditions under which temporary employees may come to the U.S. for temporary work through the H-1B and H-2B programs, particularly if U.S. citizens cannot be found to skillfully perform the work. H-2B workers are issued 1-year permits, renewable up to 3 years. In October 2023, the number of H-2B workers on Guam, across all work categories, surpassed the 5,000-worker mark. The number of H-2B workers could continue to incline up to 7,000 by 2024. H-2B workers are permitted to perform non-agricultural services, including private and civilian sector construction projects (U.S. BLS 2022).

Table 3-16. Guam Employment by Occupation, 2021 and 2022

Occupation Title	Employment (number of people) 2021	Mean Hourly Wage 2021	Annual Mean Wage 2021	Employment (number of people) 2022	Mean Hourly Wage 2022	Annual Mean Wage 2022	Annual Mean Wage % Change from 2021–2022	Employment % Change from 2021–2022
Management	4,890	$36.05	$74,990	5,240	$40.58	$84,410	12.6	7.2
Business and Financial Operations	2,920	$26.95	$56,060	2,730	$27.96	$58,170	3.8	-6.5
Computer and Mathematical	740	$24.96	$51,920	770	$24.59	$51,150	-1.5	4.0
Architecture and Engineering	950	$31.31	$65,120	970	$32.10	$66,770	2.5	2.1
Life, Physical, and Social Science	580	$29.12	$60,570	670	$27.48	$57,160	-5.6	1.6
Community and Social Service	800	$22.10	$45,970	730	$23.06	$47,960	4.3	-8.9
Legal	320	$38.25	$79,560	340	$38.58	$80,250	0.9	6.3
Education Instruction and Library	4,500	$22.44	$46,680	3,470	$24.06	$50,010	7.1	-22.9
Arts, Design, Entertainment, Sports, and Media	450	$17.51	$36,410	430	$20.44	$42,520	16.8	-4.4
Healthcare Practitioners and Technical	2,060	$32.50	$67,600	1,980	$36.77	$76,490	13.2	-3.9
Healthcare Support	1,130	$13.31	$27,670	1,140	$14.37	$29,880	8.0	0.9
Protective Service	2,450	$19.18	$39,900	3,300	$17.10	$35,570	-10.9	34.7
Food Preparation and Serving	5,580	$10.58	$22,000	5,830	$10.74	$22,330	1.5	4.9

Occupation Title	Employment (number of people) 2021	Mean Hourly Wage 2021	Annual Mean Wage 2021	Employment (number of people) 2022	Mean Hourly Wage 2022	Annual Mean Wage 2022	Annual Mean Wage % Change from 2021–2022	Employment % Change from 2021–2022
Building and Grounds Cleaning and Maintenance	2,170	$10.99	$22,850	2,260	$11.08	$23,040	0.8	4.1
Personal Care and Service	770	$10.72	$22,310	780	$11.11	$23,110	3.6	1.3
Sales and Related Occupations	4,750	$12.42	$25,830	4,760	$12.87	$26,780	3.7	0.2
Office and Administrative	8,030	$15.54	$32,320	8,140	$15.99	$33,260	2.9	1.4
Farming, Fishing, and Forestry	60	$17.18	$35,740	40	$16.53	$34,390	-3.8	-33.3
Construction and Extraction	5,790	$17.05	$35,460	6,310	$17.45	$36,300	2.4	9.0
Installation, Maintenance, and Repair	3,180	$17.87	$37,170	3,360	$18.73	$38,950	4.8	5.7
Production	1,510	$14.31	$32,980	1,530	$16.63	$34,590	4.9	1.3
Transportation and Material Moving	4,780	$14.96	$31,120	4,680	$17.03	$35,430	13.8	-20.9
All Occupations	**58,390**	**$19.10**	**$39,720**	**59,470**	**$20.05**	**$41,690**	**5.0**	**1.8**

Source: U.S. BLS 2021, 2022

Notes: Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers. Annual wages were calculated by multiplying the hourly mean wage by a ”year-round, full-time” hours figure of 2,080 hours. The Occupational Employment and Wage Estimates data is a cooperative effort between U.S. Bureau of Labor and Statistics and the State Workforce Agencies, who collect survey responses by internet or other electronic means, mail, email, telephone, or personal visit. The survey data does not clarify whether survey responses included or excluded military personnel.

According to the U.S. Bureau of Labor Statistics (2022), the construction and extraction occupation increased in employees by 9 percent from 2021 to 2022, and the mean wage increased by 2.4 percent, from $35,460 in 2021 to $36,300 in 2022. As of May 2022, data for construction and extraction occupations for Guam accounted for 6,310 construction and extraction employees with a mean hourly wage at $17.45, and the annual mean wage at $36,300 (U.S. BLS 2022). As of June 2023, 9,010 workers were in the production worker category (i.e., construction), 4,351 persons were H-2B employed, and 4,659 were U.S. citizens workers. (Guam DOL n.d.)

Unemployment. Table 3-17 shows Guam's civilian labor force numbers between 2013 and 2019. Since 2013, the unemployment rate has decreased, while the civilian labor force has increased. Guam's unemployment rate in 2019 (4.3 percent) was slightly higher than the national rate of 3.5 percent. In 2020, the COVID-19 pandemic had a large impact on all employment sectors. The Guam unemployment rate increased from 3.6 percent in September 2019 to 19.4 percent in December 2020. In September 2022, unemployment dropped to 4.4 percent. (Guam BLS 2023).

Table 3-17. Guam Employment Trends, 2012–2019

Year	Noninstitutional Civilians 16 Years and Older	Civilian Labor Force (Total)	Civilian Labor Force Employed	Unemployed Number	Unemployed (%)
2013	121,120	73,170	63,440	9,730	13.3
2014	121,370	72,070	66,720	5,350	7.4
2015	121,160	70,420	65,580	4,840	6.9
2016	121,770	69,400	66,600	2,800	4.0
2017	122,380	72,510	69,360	3,150	4.3
2018	122,720	71,060	67,960	3,100	4.4
2019	123,060	73,360	70,240	3,120	4.3
2020	123,560	74,640	61,750	12,890	17.3
2021	123,830	76,690	64,030	12,660	16.5

Source: Guam BSP 2021

Before the COVID-19 pandemic, Guam did not have an unemployment program. The CARES Act (H.R. 748) included an expansion and reform of unemployment insurance programs with existing systems and a new Pandemic Unemployment Assistance Program (PUA) in territories without unemployment insurance, like Guam. Unemployment benefits were made available to eligible Guam residents who were furloughed, laid-off, or received a reduction in hours because of the COVID-19 pandemic. The PUA provided up to $345 to eligible individuals through December 2020, and Federal Pandemic Unemployment Compensation Programs provided an additional $600 starting from April 2020 through the end of July 2020 (San Nicolas 2021).

Public Services. Primary and secondary education for Guam's civilian residents is provided through the Guam Department of Education (GDoE), as well as several private schools on Guam, which also provide primary and secondary education. The GDoE serves approximately 4,000 employees and 30,000 school children. The GDoE is a single, unified school district

consisting of kindergarten through 12th grade. The district serves 26 elementary schools, 8 middle schools, 6 high schools, and 1 alternative school. In the 2019–2020 school year, GDoE employed 7,755 teachers and staff (GDoE 2024).

The University of Guam and Guam Community College offer public higher education services on Guam. Pacific Islands University offers private higher education services on Guam.

Health services involve the preservation of health and the prevention, treatment, and management of illness through the professions of medicine, dentistry, nursing, and allied health. Human Services can incorporate a range of agencies and services, including support of low-income, specially identified, or at-risk populations. As of 2021, three hospitals operate on Guam: two civilian hospitals (Guam Memorial Hospital Authority and Guam Regional Medical City), and one naval hospital located on Guam Naval Base. There are 34 pharmacies and 92 clinics on the island (Guam BSP 2021). Since 1988, Guam has been considered a medically underserved area, demonstrating the island's difficulty in meeting its health care needs. Guam's remote location reduces access to specialized care and makes recruiting specialists from the U.S. mainland difficult (JGPO 2015).

Public safety services include protection from and prevention of events that could endanger the public, including crime and disasters (natural and human-made). Government agencies on Guam involved in law and traffic enforcement; fire prevention and suppression; emergency medical response; safety inspections; and civil and criminal litigation, justice, and corrections are all considered public safety agencies. Public services staffing included approximately 212 full-time sworn firefighters, emergency medical dispatch, and administrative staff in the Guam Fire Department in 2021, as well as 359 sworn officers and civilian employees in the Guam Police Department in 2019 (GFD 2021, GPD 2019). In 2020, 221 full-time staff were employed by the Guam Department of Corrections (GDC 2020).

Sociocultural Matters. Sociocultural matters relate to the ability of Guam to support the Proposed Action, including how the island's general tranquility, family and community relations, cultural identity, infrastructure, social services, and standards of living could be affected. Quality of life relates to a person's overall well-being and includes many of the resource areas (e.g., air quality, noise, recreation, health and safety) discussed in this EIS.

The U.S. citizen population of Guam is primarily of Chamorro cultural descent, who were the first known cultural group to inhabit the island. Even though Guam has been occupied by several western nations throughout history, the Chamorros have a long and rich cultural history on the island that continues to exist today. Chamorro life revolves around family and clans. Past labor shortages and the Compact of Free Association have resulted in increases in Filipinos and non-Chamorro Micronesians within the population. The U.S. military also continues to increase non-Chamorro populations coming to Guam. These changes in the population demographic could contribute to minoritization of the Chamorro political and cultural representation on the island.

3.6.2 Environmental Consequences

Impacts on socioeconomics from the Proposed Action would be considered significant if they resulted in:

- A substantial change in the local or regional population, housing, and/or public services (health, police, fire)
- A substantial change in social conditions from the demands of additional population/population shifts
- A substantial change in the local or regional economy, employment, or spending of earnings patterns

The methodology for assessing socioeconomic impacts varies for the different sub-resources and is summarized for each. The IMPLAN Model was used in combination with input provided by the DoD and U.S. Census Bureau (USCB) for the measurement of economic impacts related to both construction (relatively short term) and operational (relatively long term) phases of the Proposed Action. The IMPLAN Model is used to assess the direct and indirect impacts (as defined by the model) of economic activities on local and regional economies. IMPLAN contains a detailed database that makes it possible to estimate the direct jobs and incomes associated with any given dollar amount of vendor purchases. Using the most current and best available data, the IMPLAN Model generates various outputs such as labor income and employment, and provides specific detail on the nature of those outputs by identifying whether the model-estimated impacts are direct, indirect, or induced by an action.

Because no economic model is specifically made for Guam, the IMPLAN Model was fitted with 2018 Guam data, and was modified to use factors gathered in published data and resources to represent the Guam economy. The analysis includes broad estimates of Government of Guam tax revenues, which stem from economic modeling results of value added and labor income. Civilian labor income estimates and U.S. military pay serve as the tax base for income tax revenue analysis. All reported dollar values were adjusted to 2023, as appropriate, to account for inflation. As of March 2023, IMPLAN no longer provided economic data for Guam. Additionally, the job multiplier used for Andersen AFB's most recent Economic Impact Analysis report is not yet readily available. Therefore, a surrogate multiplier and related assumptions were used from a similar IMPLAN analysis of impacts from USMC Base Hawaii on its neighboring communities. See **Appendix E** for details on the IMPLAN model and analysis.

A housing demand and supply analysis was conducted to assess whether demand within Guam's private-sector housing market would be affected by any in-migrating civilian populations during construction of the Proposed Action, or by the proposed personnel increases associated with the F-15 beddown of the Proposed Action, exclusive of active-duty U.S. military and other dependents as well as foreign national construction workers granted H-2B visas. Civilian housing demand impacts are based on population impacts. The total population impacts are divided by an estimated (based on U.S. Census data) number of persons per household, providing the estimated number of new housing units required.

The IMPLAN Model was used to measure and project the economic impacts of the Proposed Action. IMPLAN estimated several forms of economic impacts, including job creation, labor

force income, and gross island product (GIP) (i.e., the total impact of project-related spending on the economy). For the area where economic impacts would occur, impacts were estimated from three stages of spending (i.e., direct, indirect, or induced):

- **Direct impacts** account for the effects of construction spending within the construction sector that remain on the island.
- **Indirect impacts** represent the number of ancillary employees on Guam that would be involved in providing goods and services because of project-related construction spending per year.
- **Induced impacts** are those impacts associated with the increase in household spending that occur because of the direct and indirect jobs created by construction-related spending for the project.

The sum values of all three stages of spending would comprise the estimated total economic impact of the project.

The estimated economic impacts of the project on job creation, income, and GIP are summarized in **Table 3-18**. The greatest potential increase in installation personnel would occur after the F-15 beddown was complete, during a training event, and prior to completion of construction of the infrastructure upgrades, during which the total Andersen AFB personnel and dependent population would increase by approximately 11 percent. The impact analysis for each component of the Proposed Action is outlined in the following text.

Table 3-18. Summary of Estimated Economic Impacts on Jobs, Income, and GIP

Economic Impacts	Annual[a]	Total 5-Year[b]	Guam Resident Contribution to Total[c]	Foreign Worker Contribution to Total[d]
Job Creation (Number)	—	—	—	—
Direct	500	2,500	750	1,750
Indirect	286	1,432	429	1,002
Induced	106	529	159	370
Total	**892**	**4,460**	**1,338**	**3,122**
Labor Force Income ($, 2023)	—	—	—	—
Direct	$23.2	$115.8	$34.7	$81.1
Indirect	$12.9	$64.5	$19.3	$45.1
Induced	$4.0	$19.8	$5.9	$13.8
Total	**$40.0**	**$200.1**	**$60.0**	**$140.0**
GIP ($, 2023)	—	—	—	—
Direct	$40.9	$204.7	$61.4	$143.3
Indirect	$22.6	$112.9	$33.9	$79.0
Induced	$8.8	$43.9	$13.2	$30.7
Total	**$72.3**	**$361.4**	**$108.4**	**$253.0**

[a] This column assumes a 5 year-construction period and represents the economic impacts per each year of construction.
[b] This column represents the total economic impacts over a 5-year construction period.

[c] It is assumed that 30 percent of the construction workforce would be from Guam. This column represents the economic contribution from the Guam workforce to the total anticipated over the 5-year construction period.
[d] It is assumed that 70 percent of the construction workforce would be composed of foreign workers. This column represents the economic contribution from the foreign workforce to the total anticipated over the 5-year construction period.

3.6.2.1 Proposed Action

3.6.2.1.1 F-15 Beddown

Population. Long-term, less than significant, adverse impacts on the population within the ROI would result from the additional 240 personnel and dependents relocating to Guam to support the Proposed Action. This 4.4 percent increase in installation personnel could increase the 2020 USCB ROI population by 0.4 percent. An increase in population from installation personnel is not considered a direct impact; however, it has the potential to result in indirect, adverse, and beneficial impacts on other socioeconomic factors. Active Duty Military personnel on Guam would increase by 3.0 percent.

Intermittent, less than significant, adverse impacts on the population within the ROI would result from the 200 temporary personnel expected during the periodic temporary planned training exercises. No new permanent jobs would be created from the temporary exercises.

Housing. Long-term, less than significant, adverse impacts on housing would be expected from the long-term increase in Guam's population, which would be housed off-installation. In 2020, there were 3,544 vacant housing units within the ROI, which could adequately support the increase in RSAF and/or partner nation personnel (officer, enlisted, civilian), contractor support, and their dependents.

Short-term, less than significant, adverse impacts on housing would be expected from the 200 temporary periodic support personnel for planned training exercises. It is assumed that support personnel would not be accompanied by dependents, and would be housed in off-installation housing on Guam. The support personnel would use commercial lodging, vacant housing units, and newly constructed or repaired non-hotel housing units available for short term rental. Because it is assumed no permanent population increases would occur and the training exercise would only be twice per year for 4-week periods, no long-term housing would be required.

Guam Economy. Short- and long-term, beneficial impacts on Guam's economy would occur. Employment created by the F-15 beddown would result in wages paid; increases in business sales volume; and an increase in demand for local and regional services, housing, and goods. Such beneficial changes would assist in Guam's economic recovery from COVID-19 pandemic impacts.

Jobs. Long-term, beneficial impacts on jobs in Guam would occur. Under the F-15 beddown, 205 personnel would fill jobs on Andersen AFB. Approximately 205 jobs would be created at the installation and 29 jobs could be created each year by household spending. Total job creation under the Proposed Action F-15 beddown was estimated to be 234 jobs.

Income. Long-term, beneficial impacts on income would occur. Approximately $40 million in direct labor income was projected. Induced annual incomes were estimated at $5.2 million.

There is no indirect effect associated with additional personnel because a military installation does not produce goods or services like other sectors of the economy. Additionally, the effects of personnel are a function of total payroll, regardless of the type of personnel (military vs. civilian). Overall, the total labor impact for the F-15 beddown is estimated at $45.4 million per year.

Gross Island Product. Long-term, beneficial impacts on GIP would occur. The annual direct impact of the F-15 Beddown on the GIP would be $50.9 million. Induced impacts to GIP would be $5.2 million, bringing the total annual impact of the F-15 beddown to over$60 million.

Tourism. Impacts on tourism would be long-term and beneficial. Since the beddown includes personnel from RSAF or other partner nation aircraft personnel, it would be expected that family and friends would occasionally travel to Guam to visit these personnel.

Public Services. Long-term, less than significant, adverse impacts on public services could result from increased demand on local health/medical, law enforcement, firefighting, and emergency services from personnel relocating to Guam to support the Proposed Action. To minimize impacts on medical services on Guam, RSAF personnel would receive general health services at the medical clinic on Andersen AFB. The extent of the impact on public services would be based on the population increase; as only 0.4 percent population increase would be expected within the ROI, impacts on public services would be less than significant.

Sociocultural. Long-term, less than significant, adverse sociocultural impacts could occur because the increase in installation personnel would be composed of persons relocating to Guam, rather than personnel currently on Guam. However, the total Guam population would increase by only 0.2 percent, which would be anticipated to have less than significant impacts on the cultural identity of the community.

3.6.2.1.2 North Ramp

Construction

The socioeconomic impacts of the Proposed Action from infrastructure construction would be island-wide and characterized by an increase in socioeconomic activity during construction, estimated to occur between 2025 and 2032. Based upon DAF review of construction workers on Guam in 2023, it is expected that the required 500 workers per year for the Proposed Action would be composed of workers already present on the island, who would be available to support the Proposed Action at its start in 2025. However, as a conservative review of the impacts, the socioeconomic analysis addresses potential impacts if the Proposed Action required additional construction workers to relocate to Guam.

Population. Short-term, less than significant, adverse impacts on the population within the ROI would result if additional construction workers relocated to Guam to support the Proposed Action. The addition of up to 500 construction workers could increase the 2020 USCB ROI population by 0.7 percent, pending the source of the construction workers. Foreign construction workers, including foreign and H-2B workers, would comply with the requirements of 48 USC 1806(b) for work on Guam. The demand for qualified construction workers and the phased approach for the work would be dependent upon the construction contractor and Andersen AFB.

No new permanent jobs would be created from the proposed infrastructure upgrades; however, some foreign workers could continue to reside on Guam after construction is completed. An increase in population from construction workers is not considered a direct impact; however, it has the potential to result in indirect, adverse, and beneficial impacts on other socioeconomic factors.

Long-term impacts on Guam's population would not be expected from the proposed North Ramp construction because no permanent population increases are proposed. However, some foreign workers could continue to reside on Guam after construction is completed. Any personnel required for maintenance and operations of the proposed infrastructure would be sourced from the current personnel at Andersen AFB or the on-island population.

Housing. Short-term, less than significant, adverse impacts on housing would occur during construction of the proposed infrastructure upgrades if additional construction workers relocated to Guam to support the Proposed Action. In 2020, there were 3,544 vacant housing units on Guam (USCB 2020a), which could support the construction workforce even if the entire workforce were relocated to Guam. The construction contractor would be responsible for providing housing for construction workers (including H-2B workers), and securing the required number of rooms for all workers before construction. The construction contractor would use commercial lodging, vacant housing units, and newly constructed or repaired non-hotel housing units. The ability of Guam's hotel and housing market to provide the necessary number of rooms for sustained periods would decrease the longer construction lasts. Because it is assumed no permanent population increases would occur, no long-term housing would be required.

Guam Economy. Short-term, beneficial impacts on Guam's economy would occur from the proposed infrastructure upgrades. Estimated construction costs are approximately $1 billion, which would be a beneficial impact on Guam's economy. Employment created by construction activities would result in wages paid; increases in business sales volume; and an increase in demand for local and regional services, materials, and supplies. Such beneficial changes would assist in Guam's economic recovery from the impacts of the COVID-19 pandemic.

Long-term, beneficial economic impacts would occur due to construction of the proposed infrastructure upgrades. Local contractors would provide services such as construction equipment/vehicle maintenance, bus transportation for workers, and disposal of solid and/or liquid hazardous wastes from work sites, as needed. Temporary housing (rental homes or apartments, hotel rooms) for relocated construction workers would also contribute to beneficial impacts on the economy. Disruption of traffic along Highway 9 and other connecting roadways near Andersen AFB during construction could cause traffic delays for delivery trucks and persons traveling. Because the various roadways would remain open, no significant impacts on the economy would occur. Due to the existing topography of the North Ramp project area, it is estimated that preparation of the site could require a total of approximately 1,000,000 cubic meters of fill across the site. It is assumed that fill material would be obtained from higher elevations within the North Ramp project area and from fill suppliers on Guam. Fill material on Guam is in short supply and competition for this fill material and would result in short-term adverse and beneficial socioeconomic impacts. Fill suppliers on Guam could increase the cost

for the material as the demand and competition for fill material increases, resulting in adverse impacts on the local construction companies acquiring the fill material. Conversely, an increase in business sales volume would benefit the local suppliers.

Jobs. Short-term, beneficial impacts on jobs would occur. Under the Proposed Action, 500 construction jobs would be created for the duration of the construction period. For the purposes of this analysis, it is assumed the construction period would be an average of 5 years. Over the 5-year timeframe, this would amount to 2,500 job-years. Approximately 30 percent of those employees would be anticipated to come from Guam's resident workforce, and the remaining would be anticipated to come from foreign workers on the island. It is estimated that approximately 286 ancillary employees would be hired because of the Proposed Action; over the 5-year timeframe, this would amount to approximately 1,432 job-years. Guam residents and foreign workers were estimated to comprise approximately 430 and 1,000 ancillary workers, respectively. If the construction timeframe were shorter, such as the lower end projection of 3 years, fewer job-years would be created. Similarly, if the construction timeframe extended to 7 years, additional job-years would be created.

Approximately 106 jobs would be created each year by household spending that originally related to project spending. Total job creation under the Proposed Action was estimated to be 4,460 job-years over 5 years, including an estimated 1,338 job-years for Guam residents and approximately 3,122 from foreign workers.

Income. Short-term, beneficial impacts on income would occur. Approximately $23.2 million in direct employment was projected per year of the average 5-year construction timeframe. Indirect and induced annual incomes were estimated at $12.9 and $4.0 million, respectively, per year. Over the average 5-year construction timeframe, income on Guam would be expected to increase by an estimated $200 million; approximately $60 million of that total would be directly attributable to Guam resident earnings and spending. Income paid to foreign construction workers could amount to approximately $140 million over the 5-year timeframe, if they occupy 70 percent of positions. Foreign worker spending on Guam over that period would likely add approximately $45.1 million (indirect impact) and $13.8 million (induced impact) to incomes in non-construction sector spending across the island.

Gross Island Product. Short-term, beneficial impacts on GIP would occur. GIP is an overall measure of economic impact because it accounts for the net contribution to the economy from spending on all goods and services. GIP for Guam is analogous to GDP, which is measured on a national scale. The total annual economic impact of the Proposed Action construction on the GIP could exceed $72 million, and could amount to nearly $361 million over the 5-year construction timeframe.

Tourism. Impacts on tourism would be short-term, less than significant, and adverse. Wage increases or loss of labor to higher-paying jobs during the construction phase is possible because wages in the construction sector are higher than those in the tourism sector. Impacts on Guam's tourism industry from loss of workforce and/or wage increases are not expected to be substantial, and impacts would be considered less than significant.

Public Services. Short-term, less than significant, adverse impacts on public services could result from increased demand on local health/medical, law enforcement, firefighting, and emergency services if additional construction workers relocated to Guam to support the Proposed Action.

Although laborers from the other Pacific Islands and the continental U.S. are expected to come to Guam for employment, the alignment of the increased labor force needed for the Proposed Action would likely be met with current residents of Guam and foreign workers on H-2B visas.

The construction contractor would be responsible for medical care for construction personnel during peak work periods. Additional police and fire personnel could be required to alleviate the increased demand during the peak construction period if all construction workers were relocated to Guam. The extent of the impact on public services would be based on the population increase and not necessarily the duration over which these increases would need to be sustained. Therefore, the impacts on public services would be less than significant during construction. No long-term impacts from the Proposed Action would occur because no permanent population increases are proposed.

Sociocultural. Short-term, less than significant, adverse sociocultural impacts could occur if the construction workforce were to temporarily relocate to Guam rather than be composed of workers currently on Guam. The magnitude of the impacts could change based on federal, DoD, and local requirements associated with foreign worker visa programs and the ongoing COVID-19 pandemic. If all construction workers were to relocate to Guam, it would increase the ROI population by 0.7 percent, pending the source of the construction workers. This increase could have less than significant impacts on the cultural identity of the community, and would be short term. No long-term sociocultural impacts are anticipated because no new restricted access areas are proposed outside Andersen AFB, and no permanent population increases are proposed.

Operations

Less than significant, beneficial impacts on the local economy are expected from operation of the proposed North Ramp infrastructure. Any parts or services that are needed for periodic maintenance and repair would be minimal. Operation of the extended jet fuel system at the North Ramp would be consistent with its existing operation at Andersen AFB. It is estimated that up to five additional personnel would be hired to assist with facility and jet fuel system maintenance. Five new jobs would be created, and those employees would be anticipated to come from Guam's resident workforce. The creation of these jobs would increase the 2020 USCB Guam employment in Installation, Maintenance, and Repair by 0.2 percent and is considered a benefit, resulting in wages paid.

3.6.2.1.3 MSA-1

Construction

Socioeconomic impacts from the proposed MSA-1 construction are incorporated into the impacts analysis provided in **Section 3.6.2.1.2**, as the estimated number of construction

workers and estimated construction costs analyzed in that section account for the MSA-1 construction.

Operations

Long-term, beneficial impacts on the local economy are expected from operation of the proposed MSA-1 infrastructure. Any parts or services that are needed for periodic maintenance and repair would be minimal. Operation of the new ECMs would be consistent with existing munitions operations at Andersen AFB.

3.6.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the infrastructure upgrades within the North Ramp or MSA-1 project areas, nor beddown 12 RSAF F-15 aircraft or other partner nation aircraft, and the existing conditions discussed in **Section 3.6.1.4** would remain unchanged. Therefore, no impacts on socioeconomics would occur due to the No Action Alternative. Socioeconomic trends discussed in **Section 3.6.1.4** would be expected to continue.

3.6.3 Cumulative Impacts

Reasonably foreseeable construction projects at Andersen AFB are anticipated to contribute to cumulative impacts on socioeconomic conditions at and near Andersen AFB when combined with the Proposed Action. A short-term, less than significant population increase would result from the influx of required construction labor for all reasonably foreseeable actions and potentially the Proposed Action; however, there is also potential for overlap of construction personnel between these projects. In response to any population increase, a short-term housing increase demand would also likely occur from the reasonably foreseeable projects, but the Guam housing market would be able to accommodate the additional construction workers needed to support these projects. The reasonably foreseeable construction projects are anticipated to beneficially contribute to socioeconomic conditions and public services on Guam. Construction projects at Andersen AFB would generate jobs, resulting in beneficial cumulative impacts on the economy. Adverse cumulative impacts on public services, however, could be associated with temporary high numbers of construction workers on the island at one time and the permanent increase in installation personnel. Long-term, adverse cumulative impacts from RSAF personnel as well as Enhanced Integrated Air and Missile Defense personnel and associated dependents would also result in an increased demand on the Guam housing market and an impact on public services such as healthcare due to additional personnel on island.

3.6.4 Mitigations

Mitigation measures have not been identified for socioeconomics and would not be required to reduce impacts to less than significant.

3.7 Environmental Justice

3.7.1 Affected Environment

3.7.1.1 Definition of the Resource

Environmental justice considers minority and low-income populations within the area where potential impacts from a Proposed Action could occur. Potential environmental justice impacts are identified by locating low-income and minority populations in and near the project area as well as calculating their percentage in that area relative to a reference population. The reference population is the smallest jurisdiction for which U.S. Census data are collected that encompasses the footprint of impacts for all resource areas. Such information aids in evaluating whether a proposed action would render vulnerable any of the populations targeted for protection.

According to the CEQ, an area of impact is considered to have a disproportionately high minority population if the percentage of persons characterized as a minority within the area of impact is either greater than 50 percent or meaningfully greater than the reference population (CEQ 1997). This EIS conservatively applies both the 50 percent and the meaningfully greater approaches to identify environmental justice communities within an ROI. A community with a whole point population percentage greater than the “community of comparison” (COC) is considered to be meaningfully greater, and is assessed as a community with environmental justice considerations for the given demographic. These thresholds were also applied to conservatively identify minority, low-income, child, and elderly populations, which are defined as follows:

- **Minority Population:** The CEQ defines a minority individual as a member of the following population groups: Black or African American (not of Hispanic origin); American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; multi-race, which includes one of the aforementioned races; and Hispanic or Latino (CEQ 1997). The USCB considers race and Hispanic or Latino origin (ethnicity) as two separate concepts, and these data are recorded separately. In the Pacific Island areas (e.g., Guam), race and ethnic origin data are collected through one census question and therefore are presented as one subject in the U.S. Census data.
- **Low-income Population:** Low-income populations are classified as those whose income is below the federal poverty threshold according to income data collected in the U.S. Census.
- **Children:** Children are defined as all people 17 years of age and younger.

3.7.1.2 Regulatory Overview

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued on February 11, 1994. This EO and the accompanying Presidential Memorandum, requires each federal agency to follow existing statutes (including NEPA) to identify and address whether their proposed action results in disproportionately high and adverse environmental and health impacts on low-income or minority populations. This EO was created to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and

enforcement of environmental laws, regulations, and policies. The memorandum states, "Each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by NEPA" (42 USC 4321 et seq.). In 2014, the USEPA issued the *Policy on Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples*, which establishes principles to ensure that achieving environmental justice is part of USEPA's work with federally recognized Tribes and Indigenous people within all areas of the U.S. and its territories and possessions, the District of Columbia, Puerto Rico, and the Northern Mariana Islands, as well as others living in Indian country. In accordance with the DAF EIAP at 32 CFR 989.33, *Environmental Justice*, the DAF further implements compliance with EO 12898 and issued supplemental guidance, *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process (EIAP)*, for assessing the environmental effects on populations near a proposed action (DAF 2014).

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 23, 1997), states that each federal agency "shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately impact children; and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." Activities occurring near areas that could have higher concentrations of children during any given time, such as schools and childcare facilities, might further intensify potential impacts on children. To the extent to which children might be impacted, disproportionate impact on children is inherent due to their inherent vulnerabilities.

EO 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* (January 20, 2021), directs agencies to evaluate whether their policies generate racially inequitable results when implemented and to make necessary changes to ensure underserved communities are properly supported, in acknowledgement that this work would require multi-generational commitment and whole-of-government.

EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (January 20, 2021), provides national objectives to improve public health and protect the environment; ensure access to clean air and water; limit exposure to dangerous chemicals and pesticides; hold polluters accountable, including those who disproportionately harm communities of color and low-income communities; reduce greenhouse gas (GHG) emissions; bolster resilience to the impacts of climate change; restore national treasures and monuments; and prioritize both environmental justice and employment. The EO directs federal agencies to review, and take action to address, federal regulations and other actions that conflict with these national objectives.

EO 14008, *Tackling the Climate Crisis at Home and Abroad* (January 27, 2021), amends EO 12898 to create, within the Executive Office of the President, a White House Environmental Justice Interagency Council and called for this council to provide recommendations for further updating EO 12898.

EO 14031, *Advancing Equity, Justice, and Opportunity for Asian Americans, Native Hawaiians, and Pacific Islanders* (May 28, 2021), seeks to eliminate barriers to equity and justice for these populations.

EO 13985, *2022 Department of Defense Equity Action Plan*, includes a strategy to advance equity and rectify past harms resulting from environmental and other impacts from defense activities on ancestral lands.

EO 14091, *Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* (February 16, 2023), builds on EO 13985 by mandating a whole-of-government, multi-generational commitment to extending and strengthening equity-advancing requirements to support underserved community workforces, economy, housing, equity in health (including mental and behavioral health), civil rights, and equal justice under law.

EO 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023), directs all federal agencies to prioritize outreach to communities with environmental justice concerns, which can include all demographics, and possible legacy pollution and systemic treatment. This involves providing and encouraging engagement opportunities for the public to share concerns and participate in decision making such as revising agency procedures, which is especially encouraged for people affected by federal actions. Those who do not normally engage will be notified and provided tools to further assist in the decision-making process.

3.7.1.3 Region of Influence

The ROI for the environmental justice analysis encompasses the municipalities (villages) of Dededo and Yigo, which comprise the northern region Guam and encompass Andersen AFB, where the Proposed Action would occur. To determine the percentage of minority and/or low-income populations within the ROI (Dededo and Yigo), the population demographics of the ROI were compared to those for all of Guam, which is the COC for the purposes of this analysis. **Figure 3-6** shows the census tracts and their block groups that comprise the ROI for this analysis.

Figure 3-6. Census Tracts and Blocks Groups for the Environmental Justice ROI

3.7.1.4 Existing Conditions

Population and demographics data used to determine the presence of communities with environmental justice considerations within the environmental justice ROI were collected from multiple databases and tools. The following lists the data sources typically required to determine existing conditions for minority, low-income, and other vulnerable populations. Rationale explaining how each database and tool was used, or not used depending upon data limitations, is also provided for each data source.

- ***U.S. Census Bureau (USCB) Database.*** Demographics (race, age, and income) data for Guam were retrieved online from the USCB database (www.data.census.gov).

  Use of USCB Census data in this EIS was considerate of the fact that the USCB collects race, ethnicity, and Hispanic data differently on Guam than the U.S. mainland, and it can vary among the Pacific Islands. According to the USCB, "Native Hawaiian and Other Pacific Islander" refers to any of the original people of Guam, Hawai'i, Samoa, or other Pacific Islands. This category includes people who indicated their race or races as Native Hawaiian, Chamorro, Samoan, Carolinian, Chuukese, Tahitian, Mariana Islander, Kosraean, Marshallese, Palauan, Pohnpeian, Yapese, or Other Pacific Islander.

  Additionally, the USCB has warned that the quality of collected data for the 2020 Census on Guam was substantially impacted by the COVID-19 pandemic, which inhibited in-person surveys and resulted in lower-than-normal response rates (USEPA 2024a). Therefore, direct comparisons of 2020 data with previous census reporting is not advised. As of January 2024, the USCB had published social, demographic, and income data for Guam's total population but was still enumerating those data down to the census tract and census blocks.

- ***Climate and Economic Justice Screening Tool (CEJST).*** Per EO 14008, the CEJST was developed to provide a consistent government-wide identification of communities with environmental justice concerns. The CEJST has an interactive map and uses many datasets (including best available 2010 and 2020 Census data) as indicators of burdens in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. The tool uses this information to identify communities that are experiencing these burdens. These are the communities that are disadvantaged because they are overburdened and underserved that would benefit from federally community investment programs (CEQ 2024a, WhiteHouse.gov 2022).

  The CEJST identifies communities using the USCB-assigned geographic identifiers (GEOIDs), or numeric codes that "nest" state, county, tract, and block information for a particular area (USCB 2023). The Proposed Action Area (Andersen AFB) is encompassed almost entirely within two CEJST Tract GEOIDs 66010950100 and 66010950200, with a small portion within GEOID 6610950300. Per the GEOID system, the first two digits of a GEOID identify the State or Territory (Guam is 66), the next three digits identify the County (Guam County is 010), and the next six digits identify the tract (for the tracts encompassing Andersen AFB this is 950100, 950200, and 950300), which

each simplify to “9501” and “9502” and “9503” to correlate with U.S. Census tract numbers.

Considering the USCB and CEJST data and tool limitations, this environmental justice analysis conservatively uses both the 2010 Census data as well as the best available 2020 Census data for race/ethnicity, poverty, and age to determine the presence of communities with environmental justice concerns to be considered in accordance with the environmental justice EOs and related policies. In cases where 2020 Census data are not available for a particular demographic at the tract-level to compare with the COC, the analysis conservatively defers to the 2010 Census as reported by the USCB or in the CEJST data sets. Per USCB guidance (USCB 2023), direct comparisons between the 2010 and 2020 Census datasets are not made in this analysis.

- ***Environmental Justice Screen Tool (EJScreen)***. The USEPA developed EJScreen to support federal agency compliance with EO 12898, and to provide environmental and demographic information down to the community level for any part of the country. This tool uses the most recent data from the American Community Survey (ACS) as well as data on climate change and other health vulnerabilities. The ACS collects demographics data in the years between the decennial census. Similar to CEJST, EJScreen reports help to inform on disproportionality by mapping the locations of vulnerable and overburdened communities that exists within particular areas so planners can identify and work to avoid the potential for disproportionate and adverse effects on those communities. Because the ACS has not been updated to report social or economic demographics data for Guam, EJScreen could not be used to support the analysis (USEPA 2024a).

Table 3-19 presents the percentage of minority, low-income, children, and elderly populations within the ROI and COC (Guam) at the CT level, and for Andersen AFB. **Table 3-19** presents both the 2010 Census data as reported by individuals, and the 2020 Census data as reported by households on race, income, and age. The 2020 Census data for individuals within these demographics are not yet available at the census tract or block level. The tracts with environmental justice concerns are indicated in the table with an asterisk (*).

Table 3-20 shows the 2010 Census race, ethnicity, poverty status, and income data for specific block groups within ROI census tracts. This table further identifies where concentrated minority and low-income populations are located within the tracts shown in **Figure 3-6**, relative to Andersen AFB. Population percentages that were higher for particular environmental justice demographic as compared with the COC (Guam) are indicated with an asterisk (*).

Table 3-19. 2010 and 2020 Census Population Demographics for Census Tracts within the Environmental Justice ROI

Geographic Area	2010 Census Demographics (Percent Individuals)[a]				2020 Census Demographics (Percent Households)[a]			
	Percent Minority	Percent Below Poverty Level[c,d]	Percent Children	Percent Elderly	Percent Minority[d]	Percent Below Poverty Level[c]	Percent Children[d]	Percent Elderly[d]
Guam (COC)[b]	***93.9***	***22.0***	***36.2***	***6.7***	***87***	***17.0***	***27***	***11.0***
Dededo	*96.7*	*24.7*	*37.6*	*7.2*	*94*	*N/A*	*N/A*	*N/A*
CT 9503	64.9	N/A	23.9	3.6	100*	N/A	N/A	N/A
CT 9504.01	98.3*	25[d]*	33.1	7.3[a]*	96*	N/A	N/A	N/A
CT 9504.02	96.8*	27[d]*	38.5	5.0	94*	N/A	N/A	N/A
CT 9507.02	97.0*	28[d]*	37.3	5.6	93*	N/A	N/A	N/A
Yigo	*88.9*	*21.5*	*38.8*	*5.5*	*85*	*N/A*	*N/A*	*N/A*
CT 9501	46.2	24[d]*	36.8	0.8	28	N/A	N/A	N/A
CT 9502	48.7	19	41.8	0.6	39	N/A	N/A	N/A
CT 9505.01	97.2*	38[d]*	41.1	4.2	93*	N/A	N/A	N/A
CT 9505.02	97.3*	24[d]*	34.3	6.7	92*	N/A	N/A	N/A
CT 9558	94.8*	18	33.6	6.6	89*	N/A	N/A	N/A
CT 9563	96.3*	22	35.6	6.5	89*	N/A	N/A	N/A
Andersen AFB[e]	***47.1***	***8.8***	***39.0***	***0.7***	***N/A***	***N/A***	***N/A***	***N/A***

Sources: First Responder Network Authority 2017; USCB 2010a, 2010b, 2010c, 2015, 2020a, 2020c, 2020d; CEQ 2024a
Key: CT = Census Tract; N/A = not available
[a] An asterisk (*) indicates that the tract is identified as a community with environmental justice concerns. These determinations were made for data reported for individuals in the 2010 Census as well as for households in the 2020 Census.
[b] The total population for Guam in the 2010 Census was 154,805 and in the 2020 Census was 153,898.
[c] Poverty and age population percentages were not available at the tract level for either the 2010 or 2020 Census datasets.
[d] Percent households living at or below 100 percent of the federal poverty level in 2009 incorporated into the 2010 demographics as reported in the CEJST dataset (CEQ 2024a). Percent minority household populations for 2020 census tracts as reported in the CEJST (CEQ 2024a) and used as guided by CEQ (CEQ 2024b). Low-income, child, and elderly populations were not available at the tract level for the 2020 Census or the CEJST.
[e] Andersen AFB is encompassed by CTs 9501, 9502, and part of 9503 as shown in **Figure 3-6**. The 2020 Census did not include data for Andersen AFB in association with the minority, income, child, or elderly population survey results for Guam tracts.

Table 3-20. 2010 U.S. Census Race and Ethnicity and Income Demographics for Census Block Groups within the Environmental Justice ROI

ROI		Race and Ethnicity[a,b]							Income
Geographic Area	Block Group	Percent Asian	Percent Black or African American	Percent Native Hawaiian or Other Pacific Islander	Percent White	Percent Hispanic or Latino	Percent Other Race	Percent Multiple Races	Percent Residents Below Poverty Level[a,c]
Guam (COC)	**—**	***32***	***1***	***49***	***7***	***1***	***2***	***0.4***	***22.5***
Dededo Census Tracts within the ROI									
CT 9503	1	0	0	50*	50	0	0	0	100*
CT 9503	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9503	3	0	0	60*	0	0	0	40*	100*
CT 9503	4	20	24*	9	34	1	0	12*	5.0
CT 9503	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9503	6	0	56*	0	44	0	0	0	0
CT 9503	7	25	11*	5	40	10*	2	7*	13.7
CT 9503	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9503	9	0	0	78*	0	0	22*	0	50.0*
CT 9504.01	1	71	0	20	1	0	0	7*	22
CT 9504.01	2	76	0	17	1	0	0	5*	17.9
CT 9504.01	3	66	1	26	2	0	0	6*	24.0*
CT 9504.01	4	57	0	33	2	0	0	7*	24.3*
CT 9504.01	5	51	0	35	3	0	0	10*	35.5*
CT 9504.01	6	46	0	45	1	0	0	7*	30.0*
CT 9504.02	1	67	0	25	1	0	0	7*	18.7
CT 9504.02	2	44	1	41	3	0	0	10*	29.8*
CT 9504.02	3	32	1	52*	5	1	0	9*	31.3*

ROI		Race and Ethnicity[a,b]							Income
Geographic Area	**Block Group**	**Percent Asian**	**Percent Black or African American**	**Percent Native Hawaiian or Other Pacific Islander**	**Percent White**	**Percent Hispanic or Latino**	**Percent Other Race**	**Percent Multiple Races**	**Percent Residents Below Poverty Level[a,c]**
CT 9507.02	1	25	0	65*	2	0	0	7*	35.4*
CT 9507.02	2	30	0	55*	4	1	0	10*	29.3*
CT 9507.02	3	50	1	35	5	0	0	8*	21.1
CT 9507.02	4	36	0	53	5	0	0	8*	32.2*
CT 9507.02	5	42	1	43	1	0	0	13*	18.2
Yigo Census Tracts within the ROI									
CT 9501	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9501	2	6	18*	1	59	11*	2	5*	0.0
CT 9501	3	13	7*	7	56	5*	1	10*	7.3
CT 9501	4	15	10*	6	53	8*	1	7*	5.8
CT 9501	5	14	8*	6	51	9*	0	11*	11.5
CT 9502	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9502	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9502	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9502	4	10	9*	11	49*	7*	0	13*	11.7
CT 9502	5	5	3*	9	63*	6*	2	13*	13.2
CT9505.01	1	19	0	67*	3	0	0	11*	34.0*
CT9505.01	2	33*	0	59*	2	0	0	5*	43.7*
CT 9505.02	1	55*	0	38	1	0	1	5*	29.6*
CT 9505.02	2	47*	0	40	4	1	0	9*	23.0*
CT 9505.02	3	51*	0	37	1	1	0	9*	23.8*
CT 9505.02	4	59*	0	32	3	0	0	6*	19.2
CT 9505.02	5	35*	0	53*	4	0	0	8*	27.9*

ROI		Race and Ethnicity[a,b]							Income
Geographic Area	Block Group	Percent Asian	Percent Black or African American	Percent Native Hawaiian or Other Pacific Islander	Percent White	Percent Hispanic or Latino	Percent Other Race	Percent Multiple Races	Percent Residents Below Poverty Level[a,c]
CT 9558	1	47*	1	43	3	0	0	7*	29.5*
CT 9558	2	50*	0	41	2	0	0	7*	35.6*
CT 9558	3	50*	1	36	5	0	0	7*	8.1
CT 9558	4	39*	1	39	10*	1	1	10*	8.0
CT 9558	5	53*	2*	34	5	0	0	7*	21.8
CT 9558	6	33*	1	53*	2	0	1	10*	18.7
CT 9558	7	39*	1	47	3	0	0	11*	22.3
CT 9558	8	57*	1	31	3	0	0	9*	20.4
CT 9558	9	54*	2*	24	11*	0	0	8*	14.2
CT 9563	1	11	0	63*	7*	0	0	19*	51.9*
CT 9563	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT 9563	3	100*	0	0	0	0	0	0	9.7
CT 9563	4	34*	1	50*	4	0	1	10	12.7
CT 9563	5	26	0	59*	3	1	0	11*	36.9*

Sources: First Responder Network Authority 2017; USCB 2010a, 2010b, 2010c
Key: CT = Census Tract; N/A = Not Available
[a] An asterisk (*) indicates the associated block is determined to be a community of environmental justice concerns.
[b] Data are based on 2010 USCB population reports. Guam's population in 2010 was reported at 154,805 individuals. Totals may not add up to 100% due to rounding.
[c] USCB did not distinguish between race and ethnicity.
[d] Environmental justice community with a population at or greater than 50% or a population percentage that is meaningfully greater than the COC.

Minority Communities. In 2010, Guam's population totaled 159,358 individuals living on the island, and approximately 94 percent were identified as minority (USCB 2015). Approximately 15,000 people (9 percent) of Guam's population in 2010 reported as being two or more ethnic origins or races. Guam's largest ethnic or racial group in 2010 was Native Hawaiian and Other Pacific Islander, representing nearly half (49.3 percent) of the island's population (78,582 persons). Chamorros were the largest Native Hawaiian and Other Pacific Islander group (59,381 persons or 37.3 percent) (USCB 2010a). The other minority populations present included Asian (32.2 percent) and Black or African American (1.0 percent). Individuals identifying as white comprise slightly more than 7 percent of Guam's population (USCB 2010a). All ROI census tracts, except those that encompass the installation, had minority population percentages (ranging between 96.8 to 97.3 percent) that were higher than the 2010 COC population (Guam, 93 percent) (see **Table 3-20**). The 2010-reported minority populations on Andersen AFB were approximately half of the COC minority and low-income populations.

In 2020, the population was reported to be 153,836 and approximately 87 percent were identified as minority (USCB 2020b). Guam's largest ethnic or racial group was Native Hawaiian and Other Pacific Islander, as reported by 45 percent of households. The dominant groups represented in this category included Pacific Islander (46 percent) and Chamorro (33 percent). Approximately 39 percent of households reported as Asian, with non-specific Asian (35.5 percent) or Filipino (29 percent) as the dominant groups; 2 percent reported as and Black or African American, 0.6 percent reported as American Indian or Alaska Native, and 1.3 percent reported as some other race. Households identifying as white comprised nearly 13 percent of Guam's total reporting households (USCB 2020b). Based on the 2020 Census, the total minority population percentages (ranging between 89 to 97.5 percent) in most of the ROI census tracts surrounding Andersen AFB were determined to be meaningfully greater than the total minority population percentage of the COC population (Guam, 87.3 percent) (USCB 2020a, 2020b). The 2020 Census did not report on the minority population percentage for Andersen AFB.

Low-Income Communities. In 2010, ROI census tracts 9504.01, 9504.02, 9507.02, 9505.01, 9505.02, 9558, and 9563 had low-income population percentages (ranging between 24 and 38 percent) that were meaningfully greater than the COC population (Guam, 22 percent) (see **Table 3-19**). The percentage of the population living below the federal poverty level was also noticeably higher, specifically within block groups 9503.1 and 9503.3 (100 percent), compared to the COC (22.0 percent). The two block groups (9503.1 and 9503.3) with the highest poverty rates also had the lowest median household income (9503.1 at $11,250 and 9503.3 at $23,750); see **Table 3-20**. The 2010-reported low-income population on Andersen AFB was approximately half of the COC minority and low-income populations.

In 2020, approximately 29,408 people (19 percent) on Guam were reported to be living below the federal poverty line (USCB 2023, Island Business 2024). The 2020 Census reporting on these numbers excluded Andersen AFB and people living in military housing. Census data for households that reported in the 2020 Census indicated that nearly all of the tracts surrounding Andersen AFB (excluding tracts 9501 and 9502 that encompass the installation) had low-income populations that were greater than half of their respective tract populations and were also meaningfully greater minority populations than the COC. The 2020 Census did not report

the minority population percentage for Andersen AFB. The 2020 Census did not report the low-income population percentage for the tracts encompassing Andersen AFB.

Additionally, upon review of the CEJST data for census tracts within the environmental justice ROI, tract 9505.01 (**Figure 3-6**) was determined to be a community that is disadvantaged in the category of workforce development that would benefit from federal investment programs because the estimated tract population in 2020 met more than one of the tool's burden thresholds as well as the associated socioeconomic (low-income) threshold (CEQ 2024a, 2024b). Specifically, tract 9505.01 had 92 percent (greater than 90 percent threshold) unemployment in the available workforce; 36 percent (greater than 10 percent threshold) of the population age 25 and older had less than a high school education; and 93 percent (greater than 90 percent threshold) of people in the tract are in households that were earning at or below the federal poverty level and were therefore considered low-income.

Child and Elderly Populations. In 2010, children and elderly comprised approximately 36 percent and 7 percent (rounded), respectively, of Guam's total population (USCB 2010a, 2010b, 2010c). The 2010 population percentages (ranging between approximately 37 and 42 percent [rounded]) of children was higher in census tracts 9504.02, 9507.02, 9501, 9502, and 9505.01 compared to the COC (approximately 36 percent). Because tracts 9501 and 9502 encompass nearly all of Andersen AFB, the 39 percent child population reported for the installation is assumed to be reflected in the individually reported populations percentages for each tract. The percentage of elderly was higher in tract 9504.01 (7.3 percent) compared to the COC (6.7 percent) (USCB 2010a, 2010b, 2010c).

In 2020, children (up to age 17) and elderly (age 65 and older) individuals comprised nearly 27 percent and 11 percent of Guam's total population, respectively (USCB 2023). Data on child and elderly populations have not yet been reported by the USCB for census tracts.

3.7.2 Environmental Consequences

All environmental resources analyzed in this EIS were considered when determining impacts on communities with environmental justice concerns, children, and the elderly within the ROI. Based on the individual resource analyses and impacts conclusions reached for each resource, the analysis of environmental justice sought to identify those adverse impacts that would also disproportionately and adversely affect communities with environmental justice concerns, children, or elderly within the ROI. Disproportionate impacts on these vulnerable and overburdened communities were considered significant under NEPA if they would: disrupt public services (e.g., emergency and protective services, schools, hospitals, childcare centers) that are geared to support these overburdened and vulnerable communities; reduce environmental quality to affect reduced health or safety; result in a deficit of resources (utilities, drinking water, waste management infrastructure, biological resources used for subsistence) upon which these communities rely; or cause changes in income, availability of housing, or availability of jobs that would further reduce existing socioeconomic conditions.

Because the majority of Guam's population is identified as a minority group, analysis assumes that wherever there would be adverse effects resulting from the Proposed Action, those adverse effects would impact minority populations. However, an impact on a community with

environmental justice concerns under the environmental justice EOs is not solely determined based on whether a minority population or low-income population would be impacted. Rather, such an impact can only be determined if the impact on the minority population is disproportionate to what would be experienced by the general population. In this approach, disproportionality means that the affected minority populations would be affected more strongly than non-minority populations in the general population. The presence of minority and low-income communities with environmental justice concerns within the environmental justice ROI was determined by comparing the census tract population totals and percentages for each demographic with the respective total population percentages in the COC (Guam). The following lists the ROI census tracts with minority and low-income populations that met the 50 percent or meaningfully greater thresholds (defined in **Section 3.7.1**) and were therefore determined to be communities with environmental justice concerns to be appropriately considered in this analysis in accordance with environmental justice EOs and related policies, including NEPA. Census tracts with child and elderly populations greater than the COC are also listed.

- Using best available 2020 Census data as reported by the CEJST (CEQ 2024a), ROI census tracts 9503, 9504.01, 9504.02, 9507.02, 9505.01, 9505.02, 9558, and 9563 were determined to be minority communities with environmental justice concerns
- Deferring to 2010 Census data (USCB 2010a), ROI census tracts 9504.01, 9504.02, 9507.02, 9501, 9505.01, and 9505.02 were determined to be low-income communities with environmental justice concerns
- Deferring to 2010 Census data (USCB 2010b), the census tracts with child populations that were higher than the respective demographics in the COC were: 9504.02, 9501, 9502, 9505.01, and 9505.02
- Deferring to 2010 Census data (USCB 2010c), census tract 9504.01 had a higher elderly population than the COC

Impacts on the identified minority and low-income communities with environmental justice concerns would be disproportionate compared to the general population. Additionally, for all child and elderly populations, disproportionate impacts were assumed to be inherent. The extent to which child and elderly populations would be impacted is disproportionate due to their inherent vulnerabilities. Pursuant to EO 13045, due to age-related physiological differences in types and levels of exposure, the analysis of environmental impacts on children is different from the analysis of environmental impacts on adults (i.e., because children breathe more rapidly than adults and their bodies are not yet fully developed, they have different responses to environmental impacts). Therefore, the evaluation of environmental impacts on these populations is different from the evaluation of environmental impacts on adults and other populations, respectively.

3.7.2.1 Proposed Action

3.7.2.1.1 F-15 Beddown

Long-term, the proposed beddown of up to 12 F-15 aircraft and associated 240 personnel and associated dependents would add stress to the off-installation housing demand on Guam and would add to the local demand for utilities, potable water, and reliance on emergency services. Presence of the additional personnel and family members would also result in increased

spending benefiting the local economy. Existing installation childcare, fitness, medical, and dining facilities and services would support the approximate 3 percent increase in personnel and dependents.

The operation of the additional aircraft would increase the existing 65 dBA Day-night Sound Level (DNL) noise contour over a portion of the communities immediately surrounding Andersen AFB. As shown in **Figure 3-10** and **Table 3-24** (in **Section 3.11.1.4**), the amount of off-base land affected by the expanded noise contour would be approximately 811 acres, which would be an increase of 374 acres. **Section 3.11.2** details that this would include approximately 60 additional homes within the 65 dBA DNL contour. These increases would occur within Census Track 9504.1 Block Group 1, Census Track 9504.02 Block Group 2, Census Track 9505.1 Block Group 2, and Census Track 9505.2 Block Group 5. DoDI 5165.57 *Air Installations Compatible Use Zones* denotes that residences within the 65–70 dBA DNL contour is not a compatible land use; however, local conditions regarding the need for housing may require residential use within these zones, residential use is discouraged in the 65–70 dBA DNL noise contour. The additive noise impacts from these F-15 aircraft operations on Census Tracts 9504.1 Block Group 1, 9504.02 Block Group 2, 9505.1 Block Group 2, and 9505.2 Block Group 5, which would underlie the expanded noise contour, would be long term, adverse, intermittent, of short duration (based upon the duration of flights over the particular area), and less than significant. Anticipated aircraft noise impacts on the remaining ROI census tracts with identified communities with environmental justice concerns and other vulnerable populations would be less than significant because they would be located farther from the flight operations.

3.7.2.1.2 North Ramp

Construction

Potential construction impacts would include temporary noise and traffic levels near work areas, changes in air quality, and increased demand for housing and public services due to a potential short-term population increase relating to the presence of off-island workers hired to support the construction effort at different phases. The proposed construction on Andersen AFB would not be near housing areas, schools, childcare centers, hospitals, or recreational areas to affect communities with environmental justice concerns or other vulnerable populations that would congregate in those places. Impacts on cultural, historical, or archaeological resources that would also affect communities with environmental justice concerns or other vulnerable populations are not likely.

Air pollution emissions during construction activities would not degrade the regional air quality. Construction noise would be temporary and periodic, and localized to the northern part of the island where the North Ramp would be built; this noise would not extend beyond the installation. On the installation, proposed construction and renovation would occur within discrete areas of Andersen AFB in land uses that are functionally related to the airfield and existing MSAs, where access is generally restricted to military and DoD civilian personnel. Temporary, localized increases in air emissions, noise, and traffic associated with construction and renovation may impact surrounding areas and populations during truck transport of materials to and from the installation. Off-installation, short-term, less than significant, truck noise and emissions effects

would be experienced most by residents and businesses along the main roads used to access the installation.

Some economic benefits would occur due to increased employment opportunities within the local community during both construction and operational activities of the Proposed Action. As employment opportunities increase, local members of the community can increase spending, and tax revenue similarly increases. These increases can have beneficial impacts on the local community, including environmental justice populations. Although these impacts would be disproportionately experienced by the identified communities with environmental justice, child, and elderly populations, the impacts would be temporary and less than significant.

It is expected that construction activities required for the Proposed Action would not result in long-term, significant, or disproportionate and adverse health or environmental impacts on minority or low-income populations on Guam. Although impacts would occur because of the Proposed Action, the impacts would be less than significant.

The potential short-term population growth to support the required construction work force could stress some sectors of the Guam economy (e.g., housing, costs of goods and services) that are working on recovering losses due to the recent COVID-19 pandemic. The existing conditions of public health care and social services on Guam are sub-standard and limited within specialty fields. Because of this, population growth that may be associated with the Proposed Action would adversely impact public health care services for low-income people and children of low-income families. Impacts on health services would be less than significant, in the short-term, if the entire construction worker population were to relocate to Guam at the same time; over the long-term, impacts on public health and human service agencies would be less than significant. Access to public health and social services would be additionally strained by an increase in uninsured and underinsured workers coming to Guam. This would be felt more severely by low-income people, who often do not have resources to buffer hard economic times. As Guam's economy continues to recover, the potential for these health and economic impacts on low-income populations would also be reduced. The majority of construction workers would not require relocation; therefore, additional burden on public health services is not anticipated.

Short-term, less than significant, adverse impacts on air quality would be expected under the Proposed Action from increased air emissions during operation of equipment and construction vehicles, earth-moving activities, and construction activities for the Proposed Action. Air emissions from heavy construction equipment and activities would be short term and only last during active construction. Overall, the anticipated less than significant impacts from operational air emissions at the North Ramp would remain below *de minimis* thresholds and would not affect regional air quality such that the identified communities with environmental justice, child, or elderly populations within the ROI would be disproportionately and adversely affected as compared with the general population of Guam.

Operations

While operational noise from aircraft activities at the North Ramp may be disproportionately audible in the distance by communities with environmental concerns as well as child and elderly populations within the areas immediately surrounding Andersen AFB as compared with the

general population of Guam, these noise impacts would be less than significant. No long-term increases in the overall noise environment would be expected with the Proposed Action (see **Section 3.11.2.1** for additional information on operational noise under the Proposed Action).

Few long-term impacts are expected during operation of the proposed infrastructure. Although highly unlikely, the proposed fuel infrastructure could leak, resulting in impacts on health and safety as well as water quality if the leak affects groundwater. As described in **Section 2.1.3.1**, the DAF would comply with DoD and DAF regulations, as well as industry standard procedures, for maintenance and operation of fuel infrastructure.

3.7.2.1.3 MSA-1

Construction

The short-term, less than significant construction impacts resulting from development of the MSA-1 site would be the same as those described for construction of the North Ramp. Air and noise emissions would be localized to the sites where machines are being operated and would not extend to areas off-installation to affect nearby communities. The only off-installation noise and emissions impacts would be from construction vehicles transporting materials through the surrounding communities to and from the installation; these impacts would be less than significant, short-term, and of short duration (lasting the time for the vehicle to pass by).

Operations

Few long-term impacts are expected during operation of the proposed infrastructure. Although highly unlikely, the proposed fuel infrastructure could leak, resulting in impacts on health and safety as well as water quality if the leak affects groundwater. As described in **Section 2.1.3.1**, the DAF would comply with DoD and DAF regulations, as well as industry standard procedures, for maintenance and operation of fuel infrastructure.

3.7.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the infrastructure upgrades within the North Ramp and MSA-1 project areas, and existing conditions discussed in **Section 3.7.1.4** would remain unchanged. Therefore, no environmental justice impacts would occur due to the No Action Alternative.

3.7.3 Cumulative Impacts

Four reasonably foreseeable projects (Guam and CNMI Military Relocation [ongoing], Munitions Storage Igloos in MSA-1 [through 2022], Standoff Weapons Complex construction [ongoing]), and the proposal to make the temporary flight restriction- supporting Terminal High Altitude Area Defense (THAAD) operations a permanent restricted airspace are anticipated to contribute to cumulative and disproportionate impacts on communities with environmental justice, child, and elderly populations at and near Andersen AFB. The accumulated contributions of these projects from increased local spending and construction workforce support would be beneficial to the community economies within the ROI. The extent of cumulative impacts on public services would be dependent upon construction phasing and the corresponding increase or decrease in population. Population impacts on environmental justice communities are considered both

adverse and beneficial because population growth would fuel economic expansion, but sudden population growth could have a negative impact on government services (public services). Each of the reasonably foreseeable projects, in addition to the Proposed Action, would benefit local socioeconomics by providing jobs and facilitating the flow of goods and services, which could result in increased funding for public services and improved care for environmental justice communities. It is possible that a permanent restricted airspace to support THAAD operations would result in changed flight patterns for general aviation, commercial, and private aircraft, resulting in increased overflights of populated areas. Such a change would result in disproportionate, less than significant, and adverse cumulative impacts on communities with environmental justice, child, and elderly populations.

3.7.4 Mitigations

Mitigation measures have not been identified for environmental justice communities on Guam and would not be required to reduce impacts to less than significant.

3.8 Geology and Soils

3.8.1 Affected Environment

3.8.1.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of geology, topography, and physiography; soils; and geologic hazards, where applicable.

Geology is the study of the Earth's composition, which provides information on the structure and configuration of surface and subsurface features. Topography and physiography pertain to the general shape and arrangement of the land surface, including its height and the position of its natural and human-made features. The geology of an area may include bedrock materials, mineral deposits, and fossil remains. Bedrock is relatively hard, consolidated rock beneath surface materials, such as soil or gravel, and can be made of most types of rock (e.g., granite, limestone, sandstone). Some bedrock structures may not be suitable to support infrastructure due to instability, such as heavily fractured bedrock or karst topography.

Soils are the unconsolidated earthen materials overlying bedrock or other parent material. Soils are typically described in terms of their complex type and physical characteristics. Differences among soil types, in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential, affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

Geologic hazards are natural geologic events that can endanger human lives and threaten property. Examples of geologic and related natural hazards include erosion, earthquakes, tsunamis, landslides, ground subsidence, and sinkholes.

3.8.1.2 Regulatory Overview

Farmland, which includes prime farmland, unique farmland, and farmland of statewide or local importance, is protected under the Farmland Protection Policy Act (FPPA) of 1981. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The implementing procedures of the FPPA require federal agencies to evaluate the adverse effects of their activities on prime farmland, and consider alternative actions that could avoid adverse effects.

3.8.1.3 Region of Influence

The ROI for assessing potential impacts on geology and soils consists of the Proposed Action project areas, including construction footprints, land to be used as laydown areas, land to support a concrete batch plant, and vegetated areas that would be permanently maintained after completion of construction.

3.8.1.4 Existing Conditions

The island of Guam is on a volcanic arc adjacent to the Mariana Subduction boundary and comprises a volcanic core partially overlain with limestone (karst). The entire island is a potentially active seismic area.

Andersen AFB is situated on the northern end of the island of Guam on a flat plateau composed of old (Barrigada) and young (Mariana) limestone bedrock. Cavities and sinkholes occur in the porous limestone karst, and rainwater easily percolates through the porous limestone (Andersen AFB 2021c, DON 2019). Observation and evaluation of karst features in support of the project design have identified more than two dozen sinkholes within and around the North Ramp project area, and have determined that tributaries may funnel stormwater from outside the airfield into the large catchment area within the North Ramp. See **Section 3.10.2.1.2** for additional information on stormwater management.

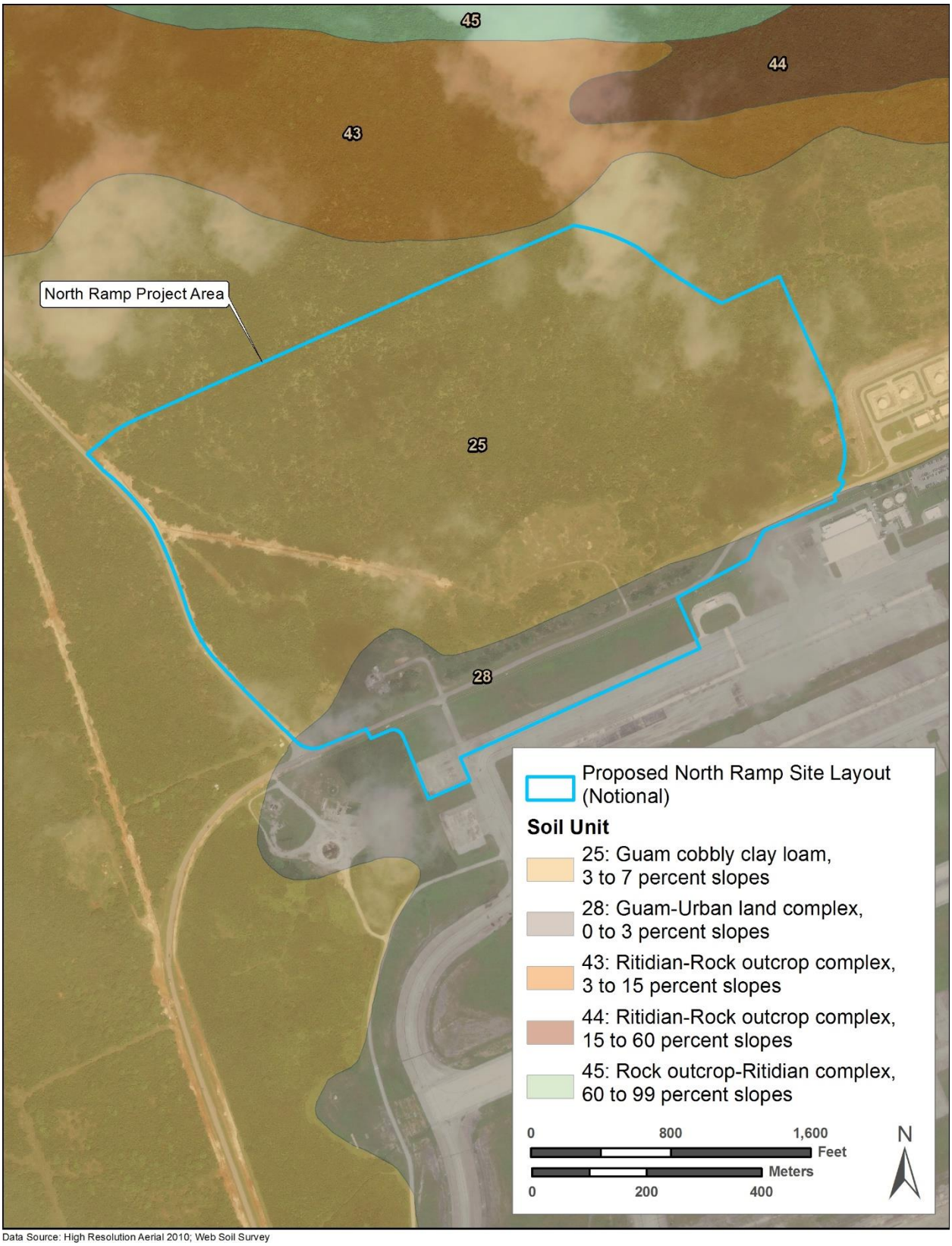
Regional Geology and Geologic Hazards. Most of the northern half of Guam is a relatively flat plateau overlain with Mariana limestone formed from the growth of coral carbonate reefs. The ROI itself is underlain by historical reefs of Mariana limestone (Andersen AFB 2021c, DON 2019). Geologic hazards on Guam include the potential for earthquakes, which can cause liquefaction (i.e., loss of soil cohesiveness and stability in response to earthquake ground motion) and tsunamis; steep slopes, where landslides can occur due to earthquakes or heavy rainfall; and sinkholes associated with the karst topography (Andersen AFB 2021c, DON 2019). No earthquake fault zones occur within Andersen AFB, but minor faults are present approximately 1.8 miles southwest of the North Ramp project area and 1.2 miles north of the MSA-1 project area. The closest liquefaction hazard area to the ROI is along the northern coast, which is approximately 0.7 mile north of the North Ramp project area and 1 mile west of the MSA-1 project area.

Topography. The ROI sits on a near-level plateau that slopes gently downward toward the west. Surface elevations range from approximately 480 to 520 feet above mean sea level (Andersen AFB 2021c).

Soils. The soils mapped within the ROI are relatively uniform, reflecting the consistency of the underlying geology (see **Figure 3-7** and **Figure 3-8**). The soils are dominated by the Guam soil series, taxonomically classified as Lithic Ustorthents. These soils have developed in a relatively warm climate, where moisture is present but limited during certain parts of the year and soils lack horizon development. As shown in **Figure 3-7**, soils at the North Ramp project area consist primarily of Guam cobbly clay loam (3 to 7 percent slopes), which is a shallow (approximately 2 to 10 inches to bedrock) soil developed in residuum derived from limestone. A small, southern portion of the North Ramp project area consists of Guam-Urban land complex (0 to 3 percent slopes), which are composed of a mix of Guam soils and urban land. As shown in **Figure 3-8**, soils at the MSA-1 project area also consist of Guam-Urban land complex (0 to 3 percent slopes) (USDA NRCS 2021).

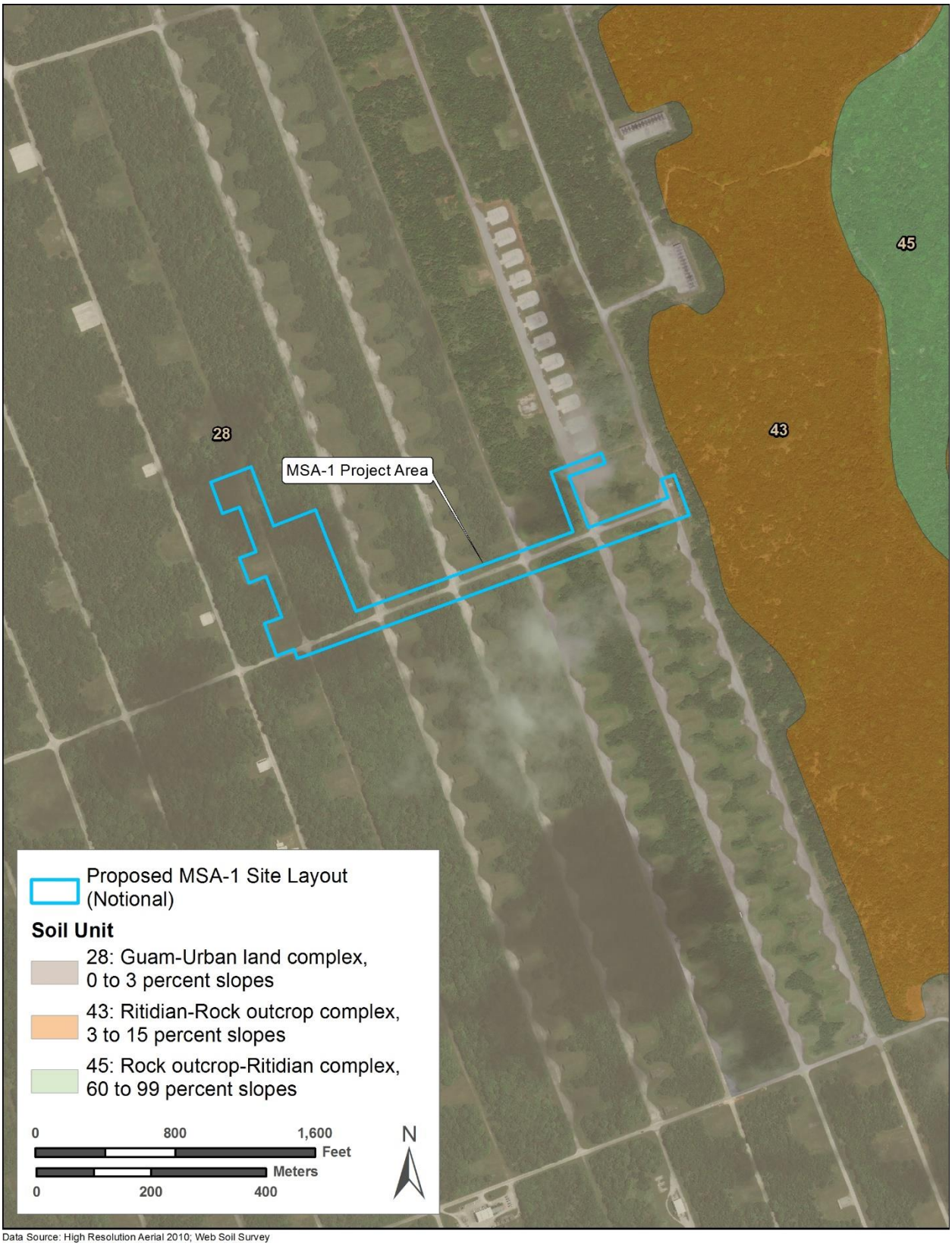
Because these soils are shallow and well drained, Guam soils are considered poorly suited to agriculture, although they can be productive with irrigation. No prime farmland, unique farmland, or farmland of local significance is located within the ROI; therefore, the FPPA does not apply to the Proposed Action (USDA NRCS 2021).

Several factors contribute to the stability of Guam soils, which are evaluated as having an erodibility factor (K) of 0.05 on a scale that extends from 0.02 (least erodible) to 0.69 (highly erodible). Guam soils are situated on low-angle landforms on the surface of the limestone plateau, and the potential for colluvial transport is low. The permeability is moderately rapid, and water capacity is very low. With high permeability, runoff is almost non-existent. Little to no runoff, coupled with the low-angle slopes, results in little opportunity for sediment transport through sheet wash or rill erosion, which are the only transport mechanisms in the absence of surface drainages (Andersen AFB 2021c).



Data Source: High Resolution Aerial 2010; Web Soil Survey

Figure 3-7. Soils within the North Ramp Project Area



Data Source: High Resolution Aerial 2010; Web Soil Survey

Figure 3-8. Soils within the MSA-1 Project Area

3.8.2 Environmental Consequences

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential impacts of an installation development project on geological resources. Impacts on geological resources from the Proposed Action would be considered significant if they would substantially alter the lithology (i.e., the character of a rock formation), stratigraphy (i.e., the layering of sedimentary rocks), and geological structures that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability, or would substantially change the soil composition, structure, or function within the environment.

3.8.2.1 Proposed Action

3.8.2.1.1 F-15 Beddown

No impacts on geology and soils would result from proposed F-15 fighter airfield operations, supporting aircraft operations, and personnel to support the F-15 squadron's mission at Andersen AFB. No ground-disturbing activities would be expected from the aircraft beddown.

3.8.2.1.2 North Ramp

Construction

Regional Geology and Geologic Hazards. The proposed infrastructure upgrades at the North Ramp project area are not expected to change geological features, result in impacts on regional geological features, or cause an existing geologic feature to become unstable. Because the limestone karst underlying Andersen AFB is subject to the formation of sinkholes, known sinkholes within the project footprint are being avoided. Prior to construction, geotechnical investigations would be completed, and a Geotechnical Report and Foundation Design Analysis, which would provide recommendations for site stabilization, would be prepared and implemented. While earthquakes are a risk, no liquefaction hazard areas occur within the project area, and tsunami risk is low due to the elevation of the project area. Therefore, no impacts on regional geology or from geologic hazards are expected. Potential stormwater runoff concerns and management are addressed in **Section 3.10.2.1.2**.

Topography. Long-term, less than significant, adverse impacts on topography would occur as a result of demolition, site preparation (i.e., grading, excavating, recontouring), and construction of infrastructure upgrades at the North Ramp project area. Local topography would be considered during project design, and all guidelines outlined in permits obtained during construction would be followed, reducing the potential for adverse impacts.

Soils. Short-term, less than significant, adverse impacts on soils would occur during construction as vegetation is removed, and soils are disturbed and compacted. Site preparations for construction would include the demolition of Buildings 2550, 2551, and 2552, as well as clearing and grading. Due to the existing topography of the North Ramp project area, it is estimated that preparation of the site could require up to approximately 35 feet of fill on top of the existing land surface in some areas, and a total of approximately 1 million cubic meters of fill across the site, which would result in less than significant impacts. It is assumed that the fill material would be obtained from higher elevations within the North Ramp project area and from

fill suppliers elsewhere on Guam. As noted in **Section 2.1.2**, approximately 192 acres would be disturbed during site preparation and construction, of which approximately 80 acres would become paved surfaces, 16 acres would become stormwater management infrastructure, and the remaining 96 acres would be revegetated and maintained. Erosion and sedimentation potential would be greatest within areas where the soil is temporarily bare. Clearing and grading could increase the risk for erosion, compaction, and soil loss from the physical disturbance caused by construction activities. The DAF would implement the specific erosion and sediment controls identified in the USEPA NPDES CGP to manage stormwater runoff and soil disturbance. The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan, as required by Section 311(j)(1)(C) of the CWA (as amended by the Oil Pollution Act of 1990); 40 CFR 112, *Oil Pollution Prevention*; and DAFI 32-7044, *Storage Tank Environmental Compliance*, to manage accidental release of a hazardous material, including petroleum products. Soil productivity would decline within disturbed areas and be eliminated in those areas within the eventual paved footprint of the proposed infrastructure. Disturbed areas would be revegetated following construction, which would stabilize disturbed soils.

Operations

Long-term, less than significant, adverse impacts would occur in the event of a spill or leak during the operation of fuel infrastructure. The degree impact on soils would depend on the severity of the spill or leak; however, as described in **Section 2.1.2.1.4**, the DAF would comply with DoD and DAF regulations, as well as industry standard procedures, for maintenance and operation of fuel infrastructure, and all fuel infrastructure would be operated consistent with existing fuel infrastructure on Andersen AFB. See **Section 3.10.2.1.2** for additional information on stormwater management. In the event of a spill or leak, jet fuel would impact the surrounding soils. While evaporation would remove some of the fuel from the terrestrial environment, bioremediation and biodegradation could lessen the impacts on soil from potential releases of jet fuel (Karthikeyan et al. 1999).

Additional long-term, less than significant, adverse impacts would be expected from continued vegetation maintenance that would result in soil compaction from foot and vehicle traffic as well as disturbance and erosion.

3.8.2.1.3 MSA-1

Construction

Impacts on geology and soils at the MSA-1 project area would be similar to those described for the North Ramp project area. As noted in **Section 2.1.2**, approximately 17 acres would be disturbed during site preparation and construction, of which approximately 5.8 acres would include development of facilities and infrastructure, 2 acres would be paved surfaces, 1.5 acres would be stormwater management infrastructure, and the remaining 11.2 acres would be subject to vegetation clearance and regularly maintained. All temporary disturbance areas would be filled, revegetated, and maintained.

Operations

Long-term, less than significant, adverse impacts would be expected from continued vegetation maintenance that would result in soil compaction from foot and vehicle traffic as well as disturbance and erosion.

3.8.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the proposed F-15 beddown and infrastructure upgrades within the North Ramp and MSA-1 project areas, and the existing conditions discussed in **Section 3.8.1.4** would remain unchanged. Therefore, no impacts on geology and soils would occur due to the No Action Alternative.

3.8.3 Cumulative Impacts

Short-term, less than significant, adverse cumulative impacts (e.g., soil erosion, sedimentation) on geology and soils resulting from the Proposed Action would be slightly increased when combined with other reasonably foreseeable construction projects proposed for the installation. These impacts would be temporary and not significant. Long-term, less than significant, adverse cumulative impacts on soils could occur in the event of a spill or leak during construction activities or the operation of fuel infrastructure associated with the proposed JP-8 Storage Tanks project. Cumulative impacts would be less than significant because maintenance and operation of the fuel infrastructure would comply with DoD and DAF regulations, as well as industry standard procedures.

3.8.4 Mitigations

Mitigation measures have not been identified for geology and soils, and would not be required to reduce impacts to less than significant.

3.9 Water Resources

3.9.1 Affected Environment

3.9.1.1 Definition of the Resource

Water resources include groundwater, surface water, coastal water, wetlands, floodplains, and their interconnected relationship to the project area. These resources are described in terms of occurrence, distribution, movement, and properties through the processes of precipitation, subsurface flow, evapotranspiration, and surface runoff.

Groundwater is water that collects or flows beneath the Earth's surface within aquifers. On Guam, groundwater forms a lens-shaped freshwater body called the NGLA, floating on denser seawater within the aquifer. The aquifer is replenished from precipitation that percolates through the limestone. Groundwater is described in terms of depth from the surface, aquifer or well capacity, quality, recharge rate, and surrounding geologic formations.

Surface waters include natural, modified, and constructed water confinement and conveyance features. These features are generally classified as streams, springs, lakes, wetlands, natural and artificial impoundments (e.g., ponds), and constructed drainage canals and ditches. Surface

water systems are typically defined in terms of watersheds. A watershed is a land area bounded by topography that drains water to a common destination. On Guam, this destination is eventually coastal waters.

Watersheds divide the landscape into hydrologically defined areas, and serve to drain, capture, filter, and store water as well as determine its subsequent release. Stormwater is surface water generated by precipitation events that may percolate into permeable soils or runoff, which occurs when the stormwater flows across the top of impervious or saturated surficial areas.

Coastal waters are waters that are adjacent to the shorelines that contain a measurable quantity or percentage of seawater, including, but not limited to, sounds, bays, lagoons, bayous, ponds, and estuaries.

Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328). The U.S. Army Corps of Engineers (USACE) defines wetlands as “those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.”

Floodplains are areas of low-level ground present along rivers, stream channels, or coastal waters that are subject to periodic or infrequent inundation from rainfall. Risk of flooding typically depends on local topography, the frequency of precipitation events, and the size of the watershed above the floodplain. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain as an area that has a 1 percent chance of inundation by a flood event in a given year.

3.9.1.2 Regulatory Overview

Groundwater. The Safe Drinking Water Act (SDWA) of 1974 establishes a federal program to monitor and increase the safety of all commercially and publicly supplied drinking water. The 1986 amendments to the SDWA required the USEPA to establish maximum contaminant levels and goals, and best available technology treatment techniques for organic, inorganic, radioactive, and microbial contaminants as well as turbidity in drinking water sources.

Section 1424(e) of the SDWA establishes the Sole Source Aquifer Program. The NGLA was designated as a sole source aquifer under this program in 1978. The USEPA defines a Sole Source Aquifer as one that supplies at least 50 percent of the drinking water consumed within the area overlying the aquifer. These areas tend to have no alternative drinking water sources that could physically, legally, or economically supply those who depend upon the aquifer for drinking water. The GEPA defines the NGLA as “groundwater under direct influence of surface water.” The USEPA has designated the NGLA as a Sole Source Aquifer under the SDWA because it supplies up to 80 percent of the island’s potable water and serves as the primary source of potable water for the island (Martinez 2013).

Surface and Coastal Waters. The CWA (33 USC 1251 et. seq., as amended) establishes federal limits, through the NPDES, on the amounts of specific pollutants that are discharged to waters of the U.S. to restore and maintain the chemical, physical, and biological integrity of the water.

Section 402 of the CWA forbids the discharge of pollutants from a point source into navigable waters without an NPDES permit. The NPDES stormwater program requires construction site operators engaged in clearing, grading, and excavating activities that disturb 1 acre or more to obtain coverage under an NPDES permit for their stormwater discharges. USEPA Region 9 issues NPDES permits on Guam. Construction stormwater discharges are permitted under USEPA's CGP, which requires compliance with effluent limits and development of a site-specific SWPPP. The USEPA published the technology-based *Final Effluent Limitations Guidelines* and the *Construction and Development Rule* to control the discharge of pollutants from construction sites. The *Construction and Development Rule* requires construction site operators to meet erosion and sediment control, pollution prevention, post-construction stormwater management, and stabilization requirements. The USEPA currently regulates large and small (greater than 1 acre) construction activities through the final 2017 CGP, which expired in February 2022 and was replaced by the 2022 CGP. NPDES industrial stormwater permit requirements would be followed as determined by USEPA Region 9. Stormwater management and infrastructure associated with the Proposed Action is described in detail in **Section 3.10**.

Sections 404 and 401 (through water quality certification) of the CWA regulate the discharge of dredged or fill materials into the waters of the U.S. The GEPA is the administrative authority for CWA Section 401 Water Quality Certifications required for validation of NPDES permits on Guam.

Section 303(d) of the CWA requires states to identify and develop a list of impaired water bodies where technology-based and other required controls have not provided attainment of water quality standards. Section 305(b) of the CWA requires states to assess and report the quality of their water bodies. The USEPA approved Guam's 2016 Section 303(d) list on August 10, 2016.

Section 438 of the Energy Independence and Security Act (42 USC 17094) establishes stormwater design requirements for federal construction projects that disturb a footprint greater than 5,000 square feet of land. Under these requirements, and UFC 3-210-10, *Low Impact Development*, pre-development site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow. Additional guidance is provided in USEPA's *Technical Guidance on Implementing the Storm Water Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*.

Wetlands. Section 404 of the CWA authorizes the USACE to issue permits for the discharge of dredged or fill materials into waters of the U.S., including wetlands. Section 401 of the CWA gives the state and regional boards the authority to regulate any proposed federally permitted activity that could result in a discharge to water bodies, including wetlands, through water quality certification.

EO 11990, *Protection of Wetlands*, requires that federal agencies take actions to minimize or avoid the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction within the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland.

Floodplains. EO 11988, *Floodplain Management*, requires federal agencies to determine whether a proposed action would occur within a floodplain. This determination typically involves consultation of FEMA Flood Insurance Rate Maps, which contain enough general information to determine the relationship of the project areas to nearby floodplains. EO 13690, *Federal Flood Risk Management Standard,* amended EO 11988 and established the Federal Flood Risk Management Standard, setting forth a process for further solicitation and consideration of public input, including from governors, mayors, and other stakeholders, prior to implementation of this standard.

3.9.1.3 Region of Influence

The ROI for water resources for the proposed infrastructure upgrades include:

- The area within the proposed limits of construction at the North Ramp and MSA-1 project area
- The extent of the hydrological connections to other water resources (e.g., surface waters that connect to coastal waters) and the use of those water resources (e.g., water consumption from aquifers)

3.9.1.4 Existing Conditions

Groundwater. The NGLA consists of limestone bedrock that underlies the entire northern half of Guam and contains a large and permanent body of fresh groundwater (WERI 2022). Its limestone karst geology is highly susceptible to contamination from surface pollutants. The only source of groundwater is precipitation, which infiltrates to the subsurface and recharges the underlying water table (i.e., the upper surface of the groundwater system). The annual rainfall is approximately 93 inches over 255 rainy days per year, with the rainy period (July to November) contributing approximately 80 percent of the yearly average precipitation (Weather Atlas 2023). A substantial portion of this water is lost to evapotranspiration; some is lost to surface runoff; and the remaining portion is available as “recharge” to groundwater. This recharge is the only source of replenishment to the groundwater system. The average annual recharge rate is estimated at 35 inches per year. The thickness of the groundwater lens is directly related to the recharge and water withdrawal rates (CNMI BECQ and GEPA 2006).

The U.S. Geological Survey estimates the NGLA recharge is 238 million gallons per day (mgd). Approximately 40 mgd is withdrawn from wells, with the DoD accounting for 4 mgd of well withdrawals. Approximately 196 mgd is discharged into the ocean (USGS 2013). The 2.5 to 3.3 mgd of water Andersen AFB withdraws from the aquifer equates to between 6.3 and 8.3 percent of the total daily water withdrawal (ATSDR 2010). No new production wells would be developed as part of the Proposed Action.

Andersen AFB lies on the northern portion of three groundwater subbasins of the NGLA: the Finegayan subbasin under the western third of the installation; the Agafa Gumas subbasin under the central portion of the installation, which includes Northwest Field; and the Andersen subbasin under the eastern portion of the installation, as shown in **Figure 3-9**. Groundwater in each subbasin consists of a basal or parabasal zone. Subsurface freshwater floats above the seawater within the basal zone, while in the parabasal zone, freshwater flows directly on the impermeable volcanic basement rock (DAF 2006).

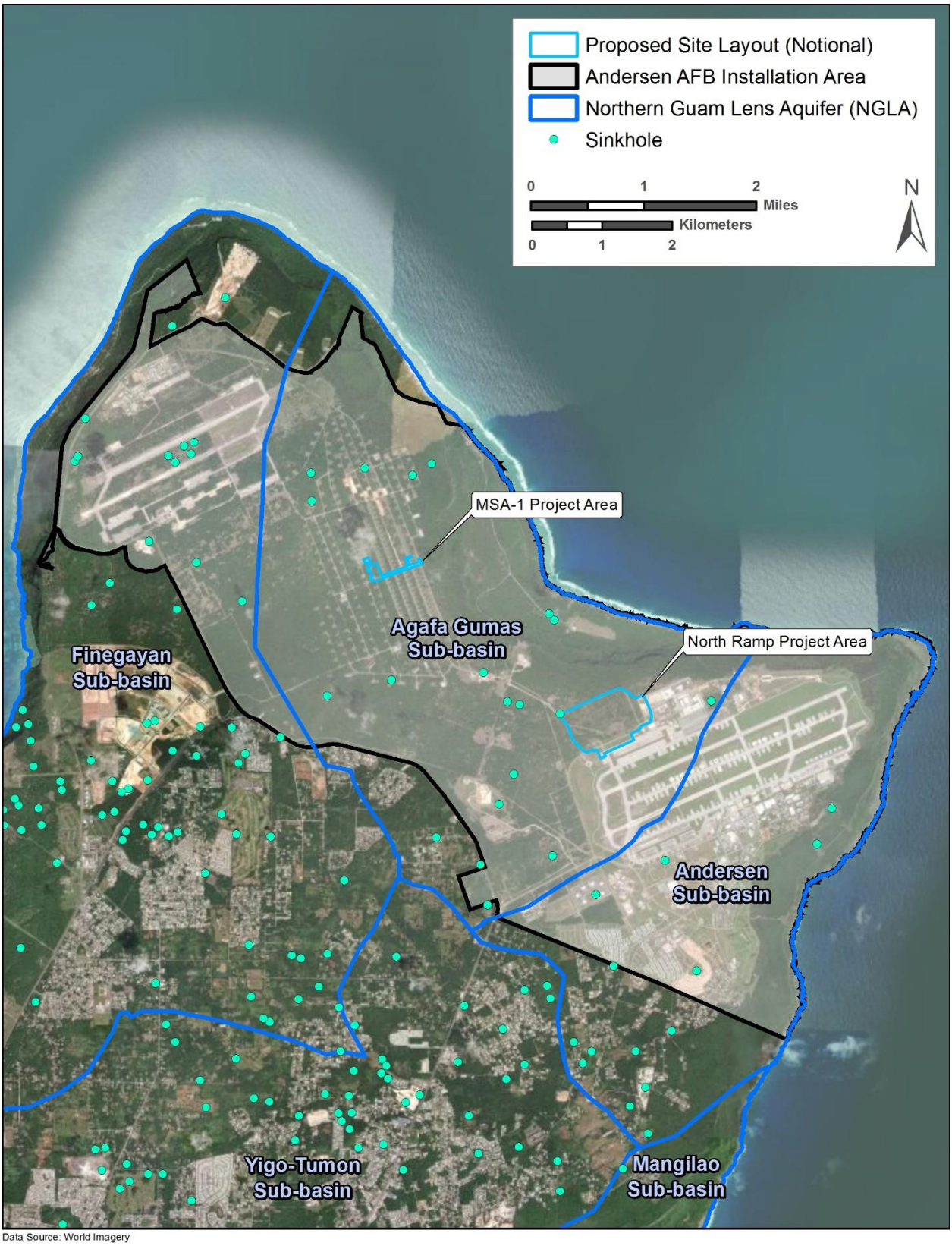


Figure 3-9. Groundwater Resources within the Project Area

More than 100 dry wells were created at Andersen AFB to assist in stormwater recharge into the aquifer. However, this method has the potential to cause groundwater contamination from stormwater runoff. Past activities have not resulted in extensive groundwater contamination due to use of the procedures in the installation's SWPPP.

Parts of Andersen AFB overlie the Groundwater Protection Zone, an area that supplies most of the island's population with drinking water. During Installation Restoration Program (IRP) investigations, groundwater underlying Andersen AFB was found to be contaminated with volatile organic compounds (VOCs). VOCs at levels above the Agency for Toxic Substances and Disease Registry's (ATSDR) health-based comparison values and USEPA's Safe Drinking Water Standards were also found in three base production wells. These VOCs included trichloroethylene and tetrachloroethylene. Other active drinking water base production wells are either upgradient of or some distance away from areas of contamination. The ATSDR evaluated past exposure to contaminants in the affected production wells, and determined that drinking this water would not harm individuals or increase their likelihood of developing adverse health effects (ATSDR 2010). The 2022 Andersen AFB Water Quality Report determined that the water system meets all primary drinking water quality standards and does not exceed any maximum contaminant levels or water quality standards (Andersen AFB 2022).

The ATSDR also concluded the agency does not expect any public health hazards, now or in the future, for individuals drinking water from the Andersen AFB water supply or any other production wells on Guam. Reasons for this include: (1) the military's remediation actions are further reducing contamination at the installation; and (2) the natural groundwater flow patterns dilute certain chemical contaminants to concentrations well below levels of public health concern. Mixing of drinking water in the installation's distribution system further dilutes the levels of any contaminants in the water before the water reaches the taps (ATSDR 2010).

Based on the evaluation of available environmental information, the ATSDR concluded that exposures to contaminants in groundwater, surface soil, and local plants and animals harvested for consumption are below levels that would cause adverse health effects. The ATSDR has categorized the installation as "no apparent public health hazard" because of DAF's education efforts as well as access restrictions and monitoring programs at Andersen AFB; therefore, the possibility of harm is remote.

Surface Water and Coastal Waters. No natural surface waters, such as perennial or intermittent streams or lakes, occur within the ROI or on Andersen AFB because of the high permeability of the limestone bedrock (DON 2019). Drainage throughout most of Andersen AFB is underground, and water generally percolates downward into porous limestone rock. Coastal waters surrounding Andersen AFB serve as the discharge areas for all surface runoff from the installation. While the project area is 0.6 mile from coastal waters, and no surface or coastal waters are present within the project area, groundwater within the NGLA underlying the project area flows toward the ocean and discharges from the NGLA as diffuse seepage near the coastline. EFH concerns from potential seepage are discussed in **Section 3.4**.

Wetlands. No wetlands have been identified on Andersen AFB (DAF 2006, DON 2019). During desktop review of the project area and surveys completed in support of this EIS, no ponds, streams, wetlands, or other water bodies were documented within the project area, and no

drainages or other features that might be regulated under Section 404 of the CWA were identified.

Flood Zones. No FEMA-designated floodplains have been identified on Andersen AFB.

3.9.2 Environmental Consequences

Factors considered in determining whether the Proposed Action would have a significant impact on water resources include the extent or degree to which its implementation would result in one or more of the following situations:

- Degradation of groundwater, surface, or coastal water quality in a manner that would reduce the existing or potential beneficial uses of the water
- Reduction of the availability of, or accessibility to, one or more of the beneficial uses of a water resource
- Alteration of the existing pattern of groundwater or surface water flow or drainage in a manner that would affect the uses of the water within or downgradient from the project area
- Being out of compliance with existing or proposed water quality standards, or with other regulatory requirements related to protecting or managing water resources
- Substantial increase of risks associated with human health or environmental hazards

3.9.2.1 Proposed Action

3.9.2.1.1 F-15 Beddown

No impacts on water resources would result from the beddown down of up to 12 F-15 fighter aircraft to include airfield operations, supporting aircraft operations, and personnel to support the F-15 squadron's mission at Andersen AFB.

3.9.2.1.2 North Ramp

Construction

Groundwater. Short- and long-term, less than significant, adverse impacts on groundwater resources, and consequently potable water sources, could result from construction of the North Ramp facilities and infrastructure. Pollution from stormwater runoff could contribute to groundwater impacts on groundwater resources through percolation. Impacts on groundwater resources could also result from a reduction in groundwater recharge associated with the construction of approximately 80 acres of impervious surfaces and increased evapotranspiration.

The reduction in vegetation and increase in impervious surface associated with construction has the potential to affect overland water flow and recharge of the local aquifer. Clearing vegetation, soil compaction, and impervious surface would reduce infiltration and percolation of water to the groundwater lens by removing vegetation and natural depressions that might serve to pond stormwater and promote recharge to the aquifer. Stormwater management infrastructure would include injection wells to improve water quality and promote groundwater recharge, as identified in **Section 3.10.2.1.2**.

Stormwater generated during construction may contain elevated sediment concentrations from excavation as well as hazardous materials from spills and leaks of lubricants, fuels, or other chemicals. Due to the high permeability of the limestone underlying Andersen AFB, the aquifer could be susceptible to contamination. The DAF would adhere to a SWPPP prepared in accordance with the USEPA NPDES CGP to manage pollutant loading potential to the underlying groundwater subbasins, and would adhere to the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage accidental release of a hazardous materials.

Surface and Coastal Waters. Short-term, less than significant, adverse impacts on surface waters could result from North Ramp construction. Impacts on surface water resources could result from degraded water quality, increased stormwater runoff, and altered hydrologic conditions. Construction activities such as trenching and excavating would displace soils and sediment. If not managed properly, disturbed soils and sediments could be washed into nearby sinkholes or depressions, and could enter groundwater or surface waters during storm events and reduce water quality. The DAF would manage potential temporary increases in erosion and sedimentation by adhering to the provisions in the NPDES CGP. The washout area for an on-site batch plant would be lined with a berm to prevent stormwater runoff from the site. By adhering to the provisions of the NPDES CGP, pollutant loading to runoff would be reduced and potential impacts on nearshore waters would be subsequently decreased.

As previously described for groundwater, clearing and grading would remove vegetation and natural depressions that might serve to pond stormwater, increasing stormwater volume and velocity. Stormwater management infrastructure, including vegetated swales, would protect water quality. Detention/retention ponds downstream of new impervious surfaces would maintain the pre-development flow rates and pre-development hydrology in accordance with Section 438 of the Energy Independence and Security Act and UFC 3-210-10, *Low Impact Development*.

Impacts are not expected on coastal waters from North Ramp construction because the project area is on a plateau approximately 500 feet above sea level and more than 0.6 mile from the coast. Groundwater within the NGLA underlying the project area flows toward the ocean and discharges from the NGLA as diffuse seepage near the coastline; EFH concerns from potential seepage are discussed in **Section 3.4**. **Section 3.10.2.1.2** provides additional detail on stormwater design.

The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage the potential for accidental release of fluids into surface and coastal waters.

Wetlands. No impacts on wetlands would occur as a result of North Ramp construction because no wetlands occur on Andersen AFB.

Floodplains. No impacts on floodplains would occur as a result of North Ramp construction because no designated floodplains occur within the project area.

Operations

Groundwater. Short-term, less than significant, adverse impacts on groundwater resources, and consequently potable water sources, could result from North Ramp operations. Pollution

from stormwater runoff could contribute to groundwater impacts as well as impacts on groundwater resources through percolation. Groundwater could also be affected from accidental spills or leaks of fuel, lubricants, or coolant from equipment or infrastructure. These impacts would be less than significant because the DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage the potential for accidental release of fluids into groundwater. Additionally, as described in **Section 2.1.3.1**, operation and maintenance of the fuel infrastructure would comply with DoD and DAF regulations, as well as industry standard procedures. Therefore, adverse impacts on groundwater quality as a result of an accidental spills or leak during operations are anticipated to be short term and less than significant.

The greatest demand on water flow for North Ramp operations would be the water fire flow for the proposed bulk fuel storage tanks, and the proposed water storage tank would be sized to meet this demand. It is estimated that water requirements for the proposed bulk fuel storage tanks, in the event of the need to activate fire suppression, would require 1,000 gallons per minute of cooling water for a 4-hour duration, which equates to 240,000 gallons. During a fire suppression event, water withdrawal from the NGLA would increase by 0.5 percent, and the resulting withdrawal would be 5.86 percent of the daily water withdrawn from the aquifer. Therefore, adverse impacts on groundwater availability due to the increase in withdrawals usage are anticipated to be short term and less than significant.

Surface and Coastal Waters. No impacts on coastal waters from North Ramp operations are anticipated for the same reasons as described in the construction subsection.

Wetlands. No impacts on wetlands would occur as a result of North Ramp operations because no wetlands occur on Andersen AFB.

Floodplains. No impacts on floodplains would occur as a result of North Ramp operations because no designated floodplains occur within the project area.

3.9.2.1.3 MSA-1

Construction

Groundwater. Impacts would be similar to those described above in **Section 3.9.2.1.2** for North Ramp construction.

Surface and Coastal Waters. Impacts would be similar to those described above in **Section 3.9.2.1.2** for North Ramp construction.

Wetlands. No impacts on wetlands would occur as a result of the construction in MSA-1 because no wetlands occur within the project area or on Andersen AFB.

Floodplains. No impacts on floodplains would occur as a result of the construction in MSA-1 because no designated floodplains occur within the project area.

Operations

Groundwater. Short-term, less than significant, adverse impacts on groundwater resources, and consequently potable water sources, could result from operations in the MSA-1 facilities

and infrastructure. Pollution from stormwater runoff could contribute to groundwater impacts as well as direct impacts on groundwater resources through percolation. Groundwater could also be affected from accidental spills or leaks of fuel, lubricants, or coolant from equipment or infrastructure. These impacts would be less than significant because the DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage the potential for accidental release of fluids into groundwater.

As described in **Section 2.1.3.1**, operation and maintenance of the fuel infrastructure would comply with DoD and DAF regulations, as well as industry standard procedures. Therefore, adverse impacts on groundwater quality as a result of an accidental spill or leak during operations are anticipated to be short term and less than significant.

The greatest demand on water flow for the MSA-1 project area would be the water fire flow for the proposed bulk fuel storage tanks, and the proposed water storage tank would be sized to meet this demand. It is estimated that water requirements for the proposed bulk fuel storage tanks, in the event of the need to activate fire suppression, would require 1,000 gallons per minute of cooling water for a 4-hour duration, which equates to 240,000 gallons. During a fire suppression event, water withdrawal from the NGLA would increase by 0.5 percent, and the resulting withdrawal would be 5.86 percent of the daily water withdrawn from the aquifer. Therefore, adverse impacts on groundwater availability due to the increase in withdrawals during operations are anticipated to be short term and less than significant.

Surface and Coastal Waters. No impacts on coastal waters from the MSA-1 operations are anticipated for the same reasons as described in the construction subsection.

Wetlands. No impacts on wetlands would occur as a result of the MSA-1 operations because no wetlands occur on Andersen AFB.

Floodplains. No impacts on floodplains would occur as a result of the MSA-1 operations because no designated floodplains occur within the project area.

3.9.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the F-15 beddown, infrastructure upgrades within the North Ramp or MSA-1 project areas, and the existing conditions discussed in **Section 3.9.1.4** would remain unchanged. Therefore, no impacts on water resources would occur due to the No Action Alternative. Groundwater quality trends discussed in **Section 3.9.1.4** would be expected to continue.

3.9.3 Cumulative Impacts

Short-term, less than significant, adverse cumulative impacts on water resources resulting from the Proposed Action would be slightly increased when combined with other reasonably foreseeable construction projects proposed for the installation. Reasonably foreseeable construction projects on Andersen AFB, proposed and managed by the DoD, JRM, or Andersen AFB, would be constructed in accordance with applicable permitting requirements. Ongoing and reasonably foreseeable construction projects are required to comply with federal guidance and regulations.

A potable water well field on Andersen AFB, south and southeast of the MSA-1 project area, is proposed for development as a result of the Guam and CNMI Military Relocation. This could result in significant but mitigable, short-term, localized cumulative impacts on the affected basin within the NGLA, but less than significant impacts on the overall NGLA. As identified in the ROD for the Final Supplemental EIS for Guam and CNMI Military Relocation, the DoD will, as appropriate, implement enhanced water conservation measures, improve existing DoD potable water systems to reduce system leaks, adjust pumping rates at DoD wells, and increase use of existing wells and/or surface water from Fena Reservoir to reduce withdrawals from the NGLA (JGPO 2015).

Long-term, less than significant, adverse cumulative impacts on groundwater could occur in the event of a spill or leak during construction activities or the operation of fuel infrastructure associated with the proposed JP-8 Storage Tanks project. Cumulative impacts would be less than significant because monitoring of the fuel infrastructure would prevent significant spills and allow for quick clean-ups, and all fuel infrastructure would be operated consistent with existing fuel infrastructure on Andersen AFB. Additionally, maintenance would occur as appropriate to minimize the potential for spills or leaks.

Therefore, implementation of the Proposed Action in combination with other present and reasonably foreseeable projects would not result in significant cumulative impacts on water resources.

3.9.4 Mitigations

Mitigation measures have not been identified for water resources and would not be required to reduce impacts to less than significant.

3.10 Infrastructure and Utilities

3.10.1 Affected Environment

3.10.1.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly human made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as “urban” or developed. The availability of infrastructure and its capacity for expansion are generally regarded as essential to the economic growth of an area.

The infrastructure and utility components discussed in this section include potable water supply, wastewater treatment and disposal, solid waste management, power, liquid fuel system, information technology/communications (IT/COMM), and stormwater management.

3.10.1.2 Regulatory Overview

Potable Water Supply. Potable water at Andersen AFB is regulated by the GEPA under the Guam Safe Drinking Water Act (GPL 14-90) of 1977 and program regulations at Title 22 of the Guam Administrative Rules and Regulations. The GEPA program implements the federal SDWA, as amended, that establishes standards and treatment requirements for public water

supplies, promotes compliance capacity of public water systems, controls the underground injection of fluids, and protects sources of drinking water. The 1986 amendments to the SDWA required the USEPA to establish maximum contaminant levels and goals, and best available technology treatment techniques for organic, inorganic, radioactive, and microbial contaminants as well as turbidity in drinking water sources. The GEPA has established primary and secondary drinking water regulations.

Section 1424(e) of the SDWA establishes the Sole Source Aquifer Program. The NGLA was designated as a sole source aquifer under this program in 1978. The USEPA defines a sole source aquifer as any groundwater aquifer that supplies at least 50 percent of the drinking water consumed within the area overlying the aquifer, and where no reasonably alternative drinking water sources are present. The Sole Source Aquifer Program allows for USEPA review of federally financed projects to determine whether they have the potential to contaminate a sole source aquifer.

Wastewater Treatment and Disposal. The CWA establishes federal limits, through the NPDES, on the amounts of specific pollutants that can be discharged into surface waters to restore and maintain the chemical, physical, and biological integrity of U.S. waters. The NPDES program regulates the discharge of point sources (i.e., end of pipe discharges, such as wastewater treatment effluent) and non-point sources (i.e., stormwater) of water pollution. In Guam, CWA oversight responsibilities lie with the USEPA Region 9 NPDES Permitting Program. The USEPA reviews and certifies NPDES permit applications and coordinates, drafts, issues, and enforces NPDES permits for stormwater and point source pollution discharges (JGPO 2010).

Solid Waste Management. The management and disposal of non-hazardous solid waste is regulated under Subtitle D of the federal Resource Conservation and Recovery Act (RCRA) of 1976.

RCRA Subtitle D addresses non-hazardous solid wastes, including certain hazardous wastes that are exempted from the Subtitle C regulations such as hazardous wastes from households and conditionally exempt small quantity generators. Subtitle D also includes domestic garbage, non-recycled household appliances, the residue from incinerated automobile tires, refuse such as metal scrap, wall board and empty containers, and sludge from industrial and municipal wastewater and water treatment plants as well as from pollution control facilities (GEPA 2021). Guam mandates for solid waste management are implemented through the Solid Waste Management and Litter Control Act (10 GCA Chapter 51).

Municipal solid waste at Andersen AFB is managed in accordance with guidelines specified in DAFMAN 32-7002, *Environmental Compliance and Pollution Prevention* (February 4, 2020), and the installation's *Solid Waste Management Plan* and recycling program. DAFMAN 32-7002 incorporates by reference the requirements of RCRA Subtitle D and other applicable federal regulations, DAFIs, and DoD Directives. In general, DAFMAN 32-7002 establishes the requirement for installations to have a solid waste management program to incorporate the following: a solid waste management plan; procedures for handling, storing, collecting, and disposing solid waste; record-keeping and reporting; and pollution prevention. On August 24, 1998, Guam applied for a determination of adequacy to the USEPA of its municipal solid waste

landfill permit program under RCRA Section 4005, and was granted full program determination over solid waste landfill permitting in June 2000 (GEPA 2021).

Power. Electric power to Andersen AFB is supplied by the Guam Power Authority (GPA) via off-installation generating plants. The GPA comes under the control of the Consolidated Commission on Utilities for their budgets and rate structure, and USEPA Region 9 and the GEPA for emissions and operating permits. GPA rates are regulated by the Guam Public Utilities Commission. The GPA is subject to all applicable regulatory requirements, such as the Clean Air Act (CAA), CWA, SPCC Compliance, Oil Pollution Prevention Regulation, RCRA, Toxic Substance Control Act, and the Environmental Planning and Community Right-to-Know Act.

Liquid Fuel System. Fuel pipelines are designed and constructed in accordance with all appropriate federal, DoD, and DAF regulations for petroleum fuel pipelines and facilities, including UFC 3-460-01, *Petroleum Fuel Facilities*. As stated in UFC 3-460-01, Section 2-13.1, it is the firm policy of the DoD to design and construct fueling facilities in a manner that will prevent damage to the environment caused by accidental discharge of fuels, their vapors, or residues. UFC 3-460-01 incorporates regulations of the Occupational Safety and Health Administration (OSHA) for safety standards (29 CFR 1910); the USEPA for air quality, oil pollution prevention, and storage tanks (40 CFR 63, 112, 280, and 281); and the Department of Transportation, Pipeline, and Hazardous Materials Safety Administration concerning pipeline transportation of hazardous liquids (49 CFR 195).

Fuel pipelines and facilities are also designed and constructed in accordance with seismic and tropical requirements, including those for seismic and wind loads outlined in American Society of Civil Engineers Standard 7-10, *Minimum Design Loads for Buildings and Other Structures;* UFC 3-310-04, S*eismic Design for Buildings*; UFC 3-301-01, *Structural Engineering*; and UFC 3-440-05N, *Tropical Engineering*.

IT/COMM. The DoD UFC and *Unified Facilities Guide Specifications* provide overall direction for planning, design, construction, operation, and maintenance of real property facilities. Additional design criteria are found in the Andersen AFB *Installation Facilities Standards* (June 1, 2020).

Stormwater Management. Design of site drainage is required to meet the requirements of the 2006 *CNMI and Guam Stormwater Management Manual* (CNMI BECQ and GEPA 2006) as well as the low-impact development requirements specified in UFC 3-210-10, *Low Impact Development.* UFC 3-210-10 includes the requirement to maintain pre-development hydrology in accordance with Section 438 of the Energy Independence and Security Act. Pre-development hydrology is defined as the pre-project hydrologic conditions of temperature, rate, volume, and duration of stormwater flow from the project site. Use and design of underground injection wells must comply with Guam Underground Injection Control Regulations at Title 22, Guam Administrative Rules and Regulations, Division 2, Chapter 9, which enforce the Guam SDWA (GPL 14-90) of 1977.

3.10.1.3 Region of Influence

The ROI for infrastructure and utilities includes the North Ramp and MSA-1 project areas, and regional utility systems that support military and civilian populations. Consideration of

infrastructure and utilities must include both local and regional effects because changes in physical utility components and resource utilization are interrelated, and have potential implications for both on- and off-installation contexts.

3.10.1.4 Existing Conditions

Potable Water Supply – Regional. Guam Waterworks Authority (GWA) provides potable water service for the majority of Guam's population of approximately 165,000 residents. Water is obtained from 120 groundwater wells within the NGLA, with the primary source being deep wells in the northern and central portions of the island. The NGLA currently serves as the drinking water source for approximately 80 percent of the population of Guam, and still has considerable potential for development (Martinez 2013).

The distribution system includes 586 miles of transmission lines, with 26 storage tanks providing 30.2 million gallons of capacity, designed to accommodate fluctuations in daily flow, provide fire flow storage, and other emergency demands (GWA 2018).

Potable Water Supply – Andersen AFB. Andersen AFB provides drinking water, which is derived from the NGLA, to all installation housing and facilities. Groundwater is pumped into the water distribution system from 13 wells, with 5 wells located on-installation (including Andersen Northwest Field and Andersen Main Base) and 8 wells located on Andersen South (36 OMRS 2021). Collectively, the five on-installation wells supply approximately 1,100 gallons per minute, distributed through 700,000 feet of water lines (JGPO 2010). Three on-installation water tanks provide a total storage capacity of 0.55 million gallons. Off-installation (Andersen South) water supply and transmission infrastructure includes treatment facilities and three storage tanks, with a total of 2.73 million gallons of storage capacity. Water supplied from off-installation sources is stored, disinfected, and fluoridated before being pumping to the main installation at Andersen AFB.

Several existing water lines must be displaced within the North Ramp project area to accommodate the proposed improvements. An 8-inch water main line crosses the project area. An existing 2-inch water service lateral to the existing storage buildings branches off the main water line crossing the project area. An 8-inch water main also branches off the lines crossing the project area, and provides water service to the existing North Ramp transient aircraft parking aprons and the fire training area (NAVFAC PAC 2021). Total groundwater production estimated from the NLGA is 44 mgd, composed of a withdrawal of approximately 39 mgd by GWA, 4 mgd from DoD sources, and less than 1 mgd from private sources. The actual consumption of groundwater from the aquifer is in the range of 30 mgd, with the gap in production and consumption due primarily to system loss through leakage (WERI 2022).

In 2020, the water supply system met all primary drinking water quality standards of the GEPA, with no exceedances of any maximum contaminant level or any other water quality standard.

Wastewater Treatment and Disposal. Wastewater generated on Andersen AFB is collected and pumped off-installation to the GWA Northern District Wastewater Treatment Plan (WWTP) for treatment and disposal. The facility collects and treats wastewater for approximately 76,000 people from the regions of Dededo, Latte Heights, Perez Acres, Ypaopao, and Marianas Terrace; the Yigo Collector System; and other unincorporated subdivisions throughout the Yigo

and Dededo municipalities. The service area also includes U.S. military facilities (DAF and Navy) within the areas of Dededo and Harmon Annex as well as Andersen AFB.

The Northern District WWTP has a design capacity of 12.0 mgd, with a peak hourly design flow of 28.6 mgd. The WWTP provides chemically enhanced primary treatment and ultimate effluent disposal via ocean outfall. Based on a capacity evaluation of the WWTP following primary treatment upgrades in 2012, the effective ability of the WWTP was found to be approximately 9.0 mgd. Based on 2017 records, the average daily flow treated through the WWTP was 6.04 mgd, with a maximum daily flow of 8.1 mgd (USEPA 2019).

Planning and design work are underway for improvements and conversion of the Northern District WWTP to a facility that provides secondary wastewater treatment, for a design capacity flow of 12 mgd. These improvements will allow the GWA to meet the discharge requirements of their 2019 NPDES permit and comply with the ROD for the Final Supplemental EIS for Guam and CNMI Military Relocation (GWA 2015).

The existing Andersen AFB wastewater collection system consists of a network of gravity sewers totaling 38 miles, with four major pump stations and force mains. The system collects wastewater generated by the industrial and residential areas on-installation, and discharges wastewater off-installation into the GWA sewage collection system at a sewer manhole located near the Andersen AFB Main Gate (JGPO 2015).

Solid Waste Management. Non-hazardous solid waste generated on Andersen AFB is collected and sorted at an on-installation transfer center for ultimate transport and disposal at the Layon Landfill owned by the Guam Solid Waste Authority. The Layon Landfill was opened in September 2011 and, with a design capacity of 15.8 million cubic yards of storage (GEPA 2009a), is predicted to have adequate capacity to accommodate Guam municipal solid waste for the next 30 to 50 years.

Construction and demolition (C&D) waste from Andersen AFB activities continues to be disposed at the Andersen AFB permitted hardfill for C&D waste. No capacity concerns have been identified for the current landfill operations.

Electrical Power – Regional System. GPA provides all electrical power used on-island by both civilians and the DoD, including Andersen AFB. The GPA system includes a total of 525 megawatts (MW) of gross generation capacity, feeding 175 miles of transmission lines and 646 miles of primary distribution lines. GPA owns and operates 28 substations throughout the island. The existing power generation facilities use “heavy fuel” (i.e., residential fuel oil #6 and diesel). GPA is advancing on construction of a new 198-MW combined cycle combustion turbine power plant using ultra-low-sulfur diesel fuel, resulting in more efficient and dependable power generation with reduced emissions. GPA also has approximately 120 MW of new utility-scale solar photovoltaic renewable power projects under design and construction.

Electrical Power – Andersen AFB. DoD agencies own some off-installation transmission lines and lease these to GPA, which operates and maintains them. The DoD also owns and operates substations and distribution lines serving military installations (JGPO 2015).

The capacity of the installation main substation has been upgraded. Distribution lines are currently being installed, and are planned to provide power to new projects that are either under construction or are in the design or planning stages. Therefore, the on-installation distribution system is currently, or soon will be, operating with excess capacity. The estimated excess capacity of the main substation is approximately 4 MW over the combined present and estimated future loads. In cases of local or island-wide power outages, the installation has dedicated emergency (standby) generators to maintain power to critical facilities (JGPO 2015).

All electrical utility lines within the MSA-1 project area are underground. In 2008, an underground primary electrical feeder was installed to serve the first 12 ECMs in Phase 1 as well as future ECMs. This feeder extends from the east on the northern side of 4th Street to a four-way, pad-mounted, 15-kilovolt (kV) switch near the intersection of 4th Street and C Avenue. From this switch, a radial feeder is extended to a new pad-mounted transformer located on the eastern side of ECM 8418. This transformer has a 13.8-kV primary distribution feeder and a 480Y/277V secondary distribution feeder. A standby generator is located in a building near the transformer (DAF 2020a).

Liquid Fuel System. Aviation fuel is transported to Andersen AFB via pipeline from the Naval Defense Fuel Support Point (DFSP) Guam facility at the Navy port facility at Apra Harbor. A new 15.7-mile pipeline from the DFSP was completed in 2018, effectively doubling pipeline throughput to Andersen AFB to more than 4 mgd. Fuel storage capacity is approximately 66 million gallons (Andersen AFB 2018).

IT/COMM. The existing communications infrastructure at Andersen AFB includes existing DoD and commercial telecommunication duct banks, manholes/handholes, and connection buildings. The IT/COMM systems typically consist of cables within buried conduit, encased in concrete, running between manholes/handholes (JGPO 2015). An underground communications ductbank with 100-pair copper and 48-strand fiber optic cabling was installed to serve the first 12 ECMs within the MSA-1 project area as well as future ECMs (DAF 2020a).

Stormwater Management. Stormwater at Andersen AFB is managed in accordance with the installation's SWPPP, which establishes procedures that minimize the potential for stormwater pollution from Andersen AFB activities, including construction. It is estimated that there are approximately 578 acres of impervious cover on the installation: 302 acres from airfield pavements, 115 acres from buildings, and 161 acres from roadways and parking lots. Andersen AFB is relatively flat, and heavy precipitation generally flows by sheets into swales, then into sinkholes or other depressions, where it percolates into the ground or is channeled into stormwater wells (DAF 2006). No stormwater management practices are currently in place at the North Ramp or MSA-1 project areas, although ECMs adjacent to the MSA-1 project area include stormwater infiltration basins between structures.

3.10.2 Environmental Consequences

Impacts on infrastructure are evaluated based on their potential for disruption, excessive use, or improvement of the existing utilities. Impacts might arise from physical changes to utility needs created by either direct or indirect changes related to the Proposed Action. Assessing impacts on utilities entails a determination of utilities that would be used or improved as a result of the

Proposed Action. Effects on infrastructure were assessed to determine if the Proposed Action would result in the following potentially significant impacts:

- Exceedance of the capacity of a utility or infrastructure
- Long-term interruption of a utility or infrastructure
- Violation of a permit condition
- Violation of an approved plan for a utility or infrastructure

3.10.2.1 Proposed Action

3.10.2.1.1 F-15 Beddown

Long-term, less than significant, adverse impacts are expected to occur on Andersen AFB infrastructure and utilities from beddown of the F-15 aircraft to include airfield operations, supporting aircraft operations, and personnel to support the F-15 squadron's mission at Andersen AFB. The anticipated impacts are discussed by project area below in **Sections 3.10.2.1.2** and **3.10.2.1.3**.

3.10.2.1.2 North Ramp

Construction

Potable Water Supply. Short-term, less than significant, adverse impacts on the water supply would be expected from the temporary extension, connection, and use of water lines and worker demand during construction.

During construction, grading and filling of the North Ramp project area could require an estimated 500 gallons/acre/day for dust suppression. Proposed construction use would equate to approximately 96,000 gallons per day (gpd) for dust suppression where grading and filling is needed across the entire project area.

Water to support the anticipated 500 construction workers would be required from GWA and Andersen AFB, including residency demand and construction period demand during active work on the installation, if workers were to relocate to Guam. The ultimate mix of local versus non-local workers would affect construction water demand. The use of local resident workers would not add to overall water demand, while use of foreign construction personnel would increase overall water demand. Typical per capita water demand based on UFC criteria (UFC 3-240-01) ranges from 30 to 100 gpd. Assuming all construction workers are introduced foreign workers and require 100 gpd, the total additional water supply demand would be 50,000 gpd (i.e., 500 workers times 100 gpd).

As a conservative estimate, a total of 146,000 gpd could be required during construction to meet construction worker demands and dust suppression. Based on total water supply production of 44 mgd, this would represent an increase in demand of approximately 0.33 percent on total water supply at Andersen AFB to support construction needs at the North Ramp project area.

An insignificant amount of water also would be needed for washing construction vehicles and equipment, and wetting base and subgrade materials to optimize moisture content for compaction and continuously spraying aggregate stockpiles. No other measurable water use is proposed to support construction.

Wastewater Treatment and Disposal. Short-term, less than significant, adverse impacts on wastewater treatment would be expected from an increase in the generation of wastewater during construction and facility operations at the North Ramp project area.

Based on average daily flow characteristics, the Northern District WWTP currently has approximately 3.0 mgd of capacity (9.0 mgd effective capacity minus 6.04 mgd of average daily treatment flow). Construction stage wastewater treatment demand from the 500 anticipated workers would generate an increase of 50,000 gpd, or approximately 1.6 percent of available treatment capacity. Anticipated Northern District WWTP capacity and treatment upgrades by GWA to meet its 2019 NPDES permit criteria would provide additional capacity to accommodate the construction demand.

Solid Waste. Long-term, less than significant, adverse effects would result from increased C&D debris associated with the Proposed Action. **Table 3-21** provides an estimate of the total amount of C&D debris to be generated from the Proposed Action. Waste would be recycled per the Andersen AFB *Solid Waste Management Plan*; DoD requirements; and EO 13693, *Planning for Federal Sustainability in the Next Decade*. Additionally, in accordance with the DoD *Sustainability Plan* and National Defense Strategy goals (DoD 2021), contractors would be required to divert 60 percent of C&D debris from incineration and landfilling, further reducing the impact of the Proposed Action on solid waste management capacity.

Table 3-21. Estimated Construction and Demolition Debris Generated from Proposed Action

Proposed Improvement	Total Square Footage	Multiplier (pounds/ft^2)	Total Waste Generated	
			Pounds	U.S. Tons
North Ramp Demolition	1,450	158	229,100	115
North Ramp Construction	790,614	4.34	3,431,265	1,715
North Ramp Pavement Construction	31,363,20	1	31,363,20	1,568
MSA-1 Construction	95,000	4.34	412,300	206
MSA-1 Pavement Construction	59,000	1	59,000	29.5
Total	**—**	**—**	**7,267,985**	**3,634**

Source: USEPA 2009
Notes: ft^2 = square foot/feet

Additionally, debris from vegetation clearing for construction would be composted, as practicable, and the DAF or their contractors would obtain all necessary permits for solid waste management and processing, in accordance with DAFMAN 32-7002, *Environmental Compliance and Pollution Prevention* (February 4, 2020). Contractors hired for the various construction projects would be responsible for the removal and disposal of their construction wastes generated on site.

C&D waste from Andersen AFB activities continues to be disposed of at the Andersen AFB permitted hardfill for C&D waste. No capacity concerns have been identified for the current or near future landfill operations.

Electrical Power. Short-term, less than significant, adverse impacts on power supply would be expected during construction from potential disruptions in service. During construction at the North Ramp project area, electrical connections would be required for the proposed Aircraft Hangar and Maintenance Facility, Flightline Maintenance and Utility Facilities, and general connections wherever necessary to support the F-15 beddown and associated actions.

Liquid Fuels. Short-term, less than significant, adverse impacts on liquid fuel supply would be anticipated from construction and connection of the proposed fuel loop pipe and extension to the existing Andersen AFB fuel system. The proposed Jet Fuel Receipt, Storage, and Distribution System would result in short-term disruptions to the existing liquid fuel system during construction. The proposed new fuel transfer pipeline would require integration into the existing liquid fuel system consisting of loop piping, hydrant pits, low point drains, high point vent pits, and an isolation pit. Additional connections would also be required to the existing pumphouse and storage tanks for new fuel transfer lines, as necessary. Prior to finalizing the design for and constructing the fuel infrastructure, the DAF would conduct a geotechnical investigation to classify the subsurface composition and inform the final fuels infrastructure design, and would adhere to specifications in ASME Standards B31.3, *Process Piping*, and B31.4, *Transportation Systems for Liquids and Slurries*. All construction required for the proposed Jet Fuel Receipt, Storage, and Distribution System Extension would adhere to DAF regulations for fuel facilities and associated conditions as described in **Section 2.1.3.1**.

Stormwater Management. Long-term, less than significant, adverse impacts on stormwater are anticipated during construction primarily from site preparation (e.g., vegetation clearing, grading, filling) and increased impervious surfaces, which will generate additional stormwater runoff. During construction, approximately 192 acres would be disturbed at the North Ramp project area. Clearing of vegetation would result in adverse impacts on stormwater management at the North Ramp area due to the lack of water infiltration, percolation, and retention. North Ramp vegetation is composed of dense vegetation, exceptional for water retention. Loss of vegetation and site grading would increase erosion and sedimentation during storm events. Additionally, construction of approximately 96 acres of impervious surface (both paved areas and facilities) would occur under the Proposed Action. Impervious surface cover, similar to vegetation loss, reduces water retention and promotes increased stormwater flow.

The DAF would manage stormwater runoff in accordance with an NPDES CGP, to include development of an SWPPP, which would be prepared in accordance with the CNMI and Guam *Stormwater Management Manuals*, Volumes I and II (CNMI BECQ and GEPA 2006). This SWPPP would include site-specific measures that were developed and coordinated with the GEPA. The measures would be implemented during construction and include silt fencing to intercept sediment-laden runoff from leaving the construction area, berms and swales to divert “clean” or “dirty” runoff to the appropriate areas, and basins or traps for temporary ponding to allow sediment to settle before discharging off site (NAVFAC PAC 2024).

Construction for proposed stormwater management infrastructure includes increased stormwater conveyance from impervious swales via culverts, trench drains, and a subsurface storm sewer system as well as bypass channels to pretreatment and detention basins. Additionally, each detention pond would include injection wells to help manage stormwater

runoff, and allow for each detention pond to drain within the allotted timeframe and meet recharge volume requirements (NAVFAC PAC 2023). The drainage design would meet the requirements of the CNMI and Guam *Storm Drainage Manual*, which requires the storm drainage system be designed for the 25-year, 24-hour storm. The drainage design would meet low-impact development requirements specified in UFC 3-210-10, *Low Impact Development*.

Operations

Potable Water Supply. Long-term, less than significant, adverse impacts on the water supply system would be expected during operation. As noted in **Section 2.1.1.2**, approximately 205 personnel, who would be accompanied by approximately 35 family members and dependents for a total of 240 individuals, would be required for the beddown of the F-15s. The transition of the additional personnel would occur concurrent with the basing of the aircraft, and it is assumed that all personnel would reside in off-installation housing on Guam. Additionally, during periodic planned training exercises, additional F-15s, support aircraft, and approximately 200 associated personnel would be anticipated at Andersen AFB. Assuming an individual requires between 30 to 100 gpd based on UFC criteria, the additional personnel associated with the Proposed Action would require 20,500 gpd on any given day, as a conservative estimate. Potable water supply demands would increase from new permanent personnel and periodic exercises; however, this need would not exceed the potable water supply.

Wastewater Treatment and Disposal. Long-term, less than significant, adverse impacts on wastewater would be expected under the Proposed Action. The proposed increase of approximately 205 permanent personnel required to support this effort would result in less than significant impacts on wastewater treatment. Additionally, during periodic planned training exercises, additional F-15s and approximately 200 associated personnel would be anticipated at Andersen AFB. Each additional person expected at Andersen AFB would increase wastewater treatment demand by approximately 100 gpd. Under the Proposed Action, an increase of approximately 20,500 gpd would be expected to be treatment at the Northern District WWTP. Wastewater treatment and disposal demands would increase from new permanent personnel and periodic exercises; however, this need would not exceed the current wastewater treatment management system.

Solid Waste. Long-term, less than significant**,** adverse impacts on solid waste management at Andersen AFB would be expected under the Proposed Action. In the operational phase, this less than significant increase in solid waste at the North Ramp would not be expected to exceed existing landfill capacity.

Electrical Power. Long-term, less than significant, adverse impacts would be expected during operation from the increased power demand required for the additional 205 personnel associated with the F-15 beddown. The power load increase at the North Ramp is anticipated to support the F-15 beddown and associated actions, and the additional personnel required to support operations. The proposed facilities and infrastructure would result in an increase in electrical demand, especially during periodic training exercises. Although a steady increase in electrical supply is expected, an exceedance in the electrical supply system is not anticipated. The Proposed Action would not exceed the Andersen AFB electrical supply because the system is currently operating with excess capacity and has been recently upgraded.

Liquid Fuels. Long-term, less than significant, adverse impacts on liquid fuel supply at Andersen AFB are expected from the consistent increase in liquid fuel demand required for the based F-15 aircraft. Additionally, increased demand on the liquid fuel system would be expected during periodic training events.

Long-term, beneficial impacts are anticipated on fuel capacity and airfield operations from the addition of approximately 84,000 gallons of new fuel storage to support the F-15 beddown effort.

Stormwater Management. Long-term, less than significant, adverse impacts and beneficial impacts would be expected on stormwater management at the North Ramp due to an increase in impervious surface area. An increase in impervious surfaces could result in increased stormwater runoff rates and increased sedimentation at North Ramp in the long-term for the operation phase. Although stormwater runoff rates are expected to increase, beneficial impacts would be expected from implementation of the proposed stormwater management infrastructure (including revegetation).

The proposed stormwater management infrastructure includes detention ponds sized to the 25-year, 24-hour storm event, and each detention pond would include sand filters and an injection well to help drain the pond within the allotted timeframe and meet recharge volume requirements. Hotspot runoff will be conveyed via impervious, geosynthetic, clay-lined channels to one of three sand filters designated on site, each of which includes a corresponding pretreatment basin and detention pond. The pretreatment basins will serve as fuel spill containment and allow settling for larger particles and debris before allowing the water to discharge off site.

The DAF would conduct inspections and maintenance of stormwater management infrastructure in accordance with the DAF Engineering Technical Letter 14-1, *Construction and Operation and Maintenance Guidance for Storm Water Systems*. Post construction, the DAF would revise the existing Andersen AFB SWPPP or develop a new SWPPP establishing procedures that minimize the potential for stormwater pollution from Andersen AFB activities, which would ultimately reduce potential environmental impacts on biological resources, geology and soils, water resources, and hazardous materials and wastes. Additionally, it would ensure the prevention of infiltration prior to water quality treatment, reducing adverse effects on groundwater and stormwater runoff, and providing increased aquifer recharge to protect the NGLA.

3.10.2.1.3 MSA-1

Construction

Potable Water Supply. Impacts on potable water supply needs for construction at the MSA-1 project area would be similar to those described in **Section 3.10.2.1.2**; however, activities at the MSA-1 project area would have a lesser impact on the potable water supply at Andersen AFB. Construction at MSA-1 would result in a 2.3-acre area of disturbance. Water needed for dust suppression (at approximately 500 gallons/acre/day) would require approximately 1,150 gpd. Dust suppression water for grading and filling at MSA-1 would increase potable water supply needs at Andersen AFB by less than 0.25 percent.

Wastewater Treatment and Disposal. Impacts on wastewater treatment and disposal during construction would be the same as those discussed in **Section 3.10.2.1.2**.

Solid Waste. The amount of solid waste generated from construction at MSA-1 is provided in **Table 3-21**.

Electrical Power. Short-term, less than significant, adverse impacts on power supply would be expected during construction from potential disruptions in service. During construction, electrical connections from the existing Andersen AFB electrical supply system would be required for the proposed ECMs. Additionally, service interruptions to electrical service during connection of the proposed ECMs would be minimized where possible.

Liquid Fuels. No impacts on liquid fuels are expected to occur at MSA-1 under the Proposed Action.

Stormwater Management. Short-term, less than significant, adverse impacts on stormwater management would be expected from site preparation and increased impervious surface cover. Site preparation and impervious surface cover impacts are similar to those described in **Section 3.10.2.1.2**; however, impacts would be minimal when compared to the North Ramp project due to a smaller area of disturbance.

As described in **Section 2.1.2.2.6**, temporary disturbance at the MSA-1 project area would include three temporary sedimentation basins and drainage swales, which would minimize erosion, stormwater runoff, and sedimentation during construction. Upon completion of construction, temporary disturbance areas that have been excavated (e.g., sedimentation basins, drainage swales) would be filled, and all temporary disturbance areas would be revegetated and maintained.

Operations

Potable Water Supply. Impacts on potable water supply at MSA-1 during operations would be less than those discussed in **Section 3.10.2.1.2**.

Wastewater Treatment and Disposal. Impacts on wastewater treatment and disposal at MSA-1 would be less than those discussed in **Section 3.10.2.1.2**.

Solid Waste. Impacts on solid waste management at MSA-1 would be less than those discussed in **Section 3.10.2.1.2**.

Electrical Power. Long-term, less than significant, adverse impacts would be expected during operations from an increased power demand at MSA-1. Operation of the proposed infrastructure at MSA-1 are not anticipated to result in a significant increase in electrical supply needs on the installation.

Liquid Fuels. No impacts on the liquid fuel system would be expected from operation of the new infrastructure at MSA-1.

Stormwater Management. Long-term, less than significant, adverse impacts are expected at MSA-1 during operations from the increase in impervious surface. Permanent earthen

stormwater swales and infiltration basins would be constructed adjacent to the ECMs to capture stormwater runoff from each concrete ECM. Stormwater management infrastructure would be managed as described in **Section 3.10.2.1.2**.

3.10.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the proposed F-15 beddown and infrastructure upgrades within the North Ramp and MSA-1 project areas, and the existing conditions discussed in **Section 3.10.1.4** would remain unchanged. Therefore, no impacts on infrastructure and utilities would occur due to the No Action Alternative. Infrastructure and utility trends discussed in **Section 3.10.1.4** would be expected to continue.

3.10.3 Cumulative Impacts

When combined with the Proposed Action, effects on infrastructure capacity associated with reasonably foreseeable actions near the North Ramp and MSA-1 project areas, primarily the Guam and CNMI Military Relocation, would potentially result in less than significant, adverse, cumulative impacts on infrastructure capacity beyond what is predicted for the Proposed Action alone. Reasonably foreseeable projects would likely be phased to avoid overlapping construction periods with the Proposed Action, when possible. Reasonably foreseeable projects that require additional permanent personnel to be stationed at Andersen AFB would increase water and wastewater demand, electrical power requirements, and solid waste generation. Additive increases in permanent personnel would require detailed planning to ensure sustainable use of the NGLA while also meeting demand, and ensure adequate water and wastewater treatment is available to protect groundwater quality. The construction and connection of the proposed JP-8 Storage Tanks project would have adverse cumulative impacts on the liquid fuel system, but beneficial cumulative impacts on fuel capacity from the addition of new fuel storage.

3.10.4 Mitigations

Mitigation measures have not been identified for infrastructure and utilities, and would not be required to reduce impacts to less than significant.

3.11 Noise

3.11.1 Affected Environment

3.11.1.1 Definition of the Resource

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's quality of life, such as aircraft operations, construction, or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (or dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a

sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighting," measured in dBA, approximates a frequency response, expressing the perception of sound by humans. **Table 3-22** lists sounds encountered in daily life and their sound levels.

Table 3-22. Common Sounds and Their Levels

Outdoor	Sound Level (dBA)	Indoor
Jet flyover at 1,000 feet	100	Rock band
Gas lawnmower at 3 feet	90	Food blender at 3 feet
Downtown (large city)	80	Garbage disposal
Heavy traffic at 150 feet	70	Vacuum cleaner at 10 feet
Normal conversation	60	Normal speech at 3 feet
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room

Source: Harris 1998

The sound pressure level noise metric describes steady noise levels, although very few noises are constant. Therefore, additional noise metrics have been developed to describe noise, such as the following:

- **Equivalent Sound Level (L_{eq}):** L_{eq} is the average sound level in decibels of a given event or period of time.
- **Maximum Sound Level (L_{max}):** L_{max} is the maximum sound level of an acoustic event in decibels (e.g., when an aircraft is directly overhead). Overflights that exceed 75 dBA L_{max} could interfere with speech.
- **Sound Exposure Level (SEL).** SEL is the sound level if the entire overflight was compressed into 1 second and does not represent the actual noise at any given time. Nighttime overflights that exceed 90 dBA SEL could interfere with sleep.
- **Day-night Sound Level (DNL):** DNL is the average sound energy in a 24-hour period, with a penalty added to the nighttime levels. Due to the potential to be particularly intrusive, noise events occurring between 10:00 p.m. and 7:00 a.m. are assessed a 10 dB penalty when calculating DNL. DNL is a useful descriptor for aircraft noise because it: (1) averages ongoing yet intermittent noise, and (2) measures total sound energy over a 24-hour period. DNL provides a measure of the overall acoustical environment, but it does not directly represent the sound level at any given time.

A noise sensitive receptor is any property where frequent exterior human use occurs, and a lowered noise level would be beneficial. Examples of sensitive receptors may include residential homes, hospitals, nursing homes, educational facilities, churches, and libraries.

3.11.1.2 Regulatory Overview

The Noise Control Act of 1972 directs federal agencies to comply with applicable federal, state, and local noise control regulations. The Noise Control Act specifically exempts aircraft operations and military training activities from state and local noise ordinances. No federal, state, nor local noise regulations are directly applicable to the Proposed Action. Guam maintains

a noise abatement policy for new roadways; however, it does not maintain any noise regulations that include strict not-to-exceed levels or specific requirements for noise generating activities, such as construction (GDPW 2009).

To reduce the effects of aircraft operations on the local community, 36 Wing Instruction 13-204, *Airfield Operations Instruction*, identifies avoidance areas where aircraft are directed to avoid overflight at low altitudes. These areas include the Guam Memorial Hospital and U.S. Naval Hospital, where aircraft are directed to avoid overflight below 1,200 feet above mean sea level within a 1-nautical-mile radius. Additionally, flight along Andersen AFB's cliff line is restricted to 1,000 feet above ground level (AGL) or higher to avoid environmentally sensitive areas. Aircraft used during search and rescue missions (i.e., helicopters) are exempt from this avoidance requirement.

3.11.1.3 Region of Influence

The ROI includes the areas surrounding the installation and adjacent to the North Ramp and MSA-1 project areas where aircraft operations or construction from the Proposed Action may be audible. This area would include locations within a few miles from the runways during aircraft operations and 2,500 feet of the proposed site preparation and construction activities. This distance was selected because noise from site preparation and construction activities would not likely exceed 60 dBA beyond this distance (FHWA 2006).

3.11.1.4 Existing Conditions

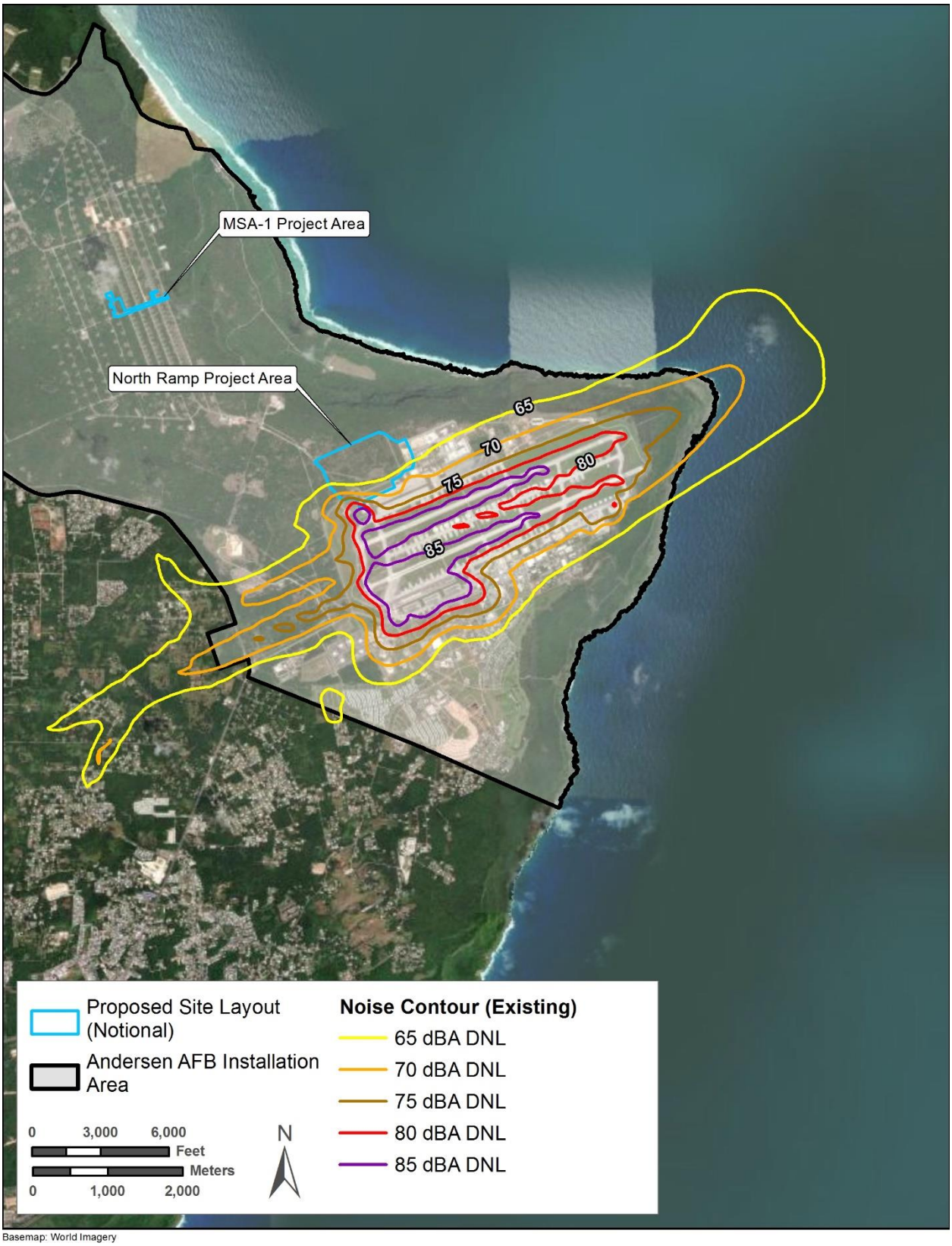
Existing sources of noise within the ROI include military and civilian aircraft overflights, aircraft ground activities, road traffic, and other noises such as lawn maintenance equipment and construction. Background noise levels without aircraft operations (L_{eq} and DNL) were estimated for the surrounding areas using the techniques specified in the *American National Standard Institute – Quantities and Procedures for Description and Measurement of Environmental* Sound *Part 3: Short-term measurements with an observer present*. **Table 3-23** outlines the estimated background noise levels for the land uses surrounding the installation without aircraft noise. Residential land use categories with estimated DNL below 50 dBA only provide an indication of what range of DNL they might span (ANSI 2013).

Table 3-23. Background Noise Levels for Nearby Land Uses

Project Area	Nearest Noise Sensitive Land Use			L_{eq} (dBA)		DNL (dBA)
	Direction	Distance (feet)	General Land Use Category	Daytime	Nighttime	
North Ramp	West	7,700	Quiet Suburban Residential	45–50	40	34
MSA-1	Southwest	9,400	Quiet Suburban Residential	45–50	40	34

Source: ANSI 2013

The primary source of noise at Andersen AFB is aircraft operations. The installation maintains a pair of 12,000-foot runways that support approximately 20,000 aircraft operations each year, the vast majority of which are military tanker/cargo, fighter, bomber, and rotary wing aircraft (Andersen AFB 2013). NOISEMAP Version 7.3 was used to calculate the baseline DNL noise contours at the installation based on aircraft operations in 2021. Although 2021 was during the COVID19 pandemic, operations were comparable to, but 12 percent higher than, the average number of base-wide operations since 2010, and contained representative aircraft activity, including tankers, bombers, and an array of fourth- and fifth-generation fighters. **Figure 3-10** shows the existing DNL noise contours plotted in 5-dB increments, ranging from 65 to 85 dBA DNL. The 65 dBA DNL noise contour, the level below which generally all land uses are compatible, extends approximately 3 miles beyond the installation's western property boundary. It should be emphasized that the area beyond 65 dBA DNL can also experience levels of appreciable noise, depending upon training intensity or weather conditions. Additionally, DNL noise contours may vary from year to year due to fluctuations in operational tempo due to unit deployments, funding levels, and other factors.



Source: DAF 2020b

Figure 3-10. Existing Aircraft Noise Contours for Andersen AFB

Table 3-24 presents the existing land acreage exposed to the 65-dBA DNL or greater. Under the existing conditions, 486 acres off-base on the island and 3,438 acres on-base are within the 65-dBA DNL contour. Based on aerial counts, other than approximately 85 residences (i.e., approximately 292 individuals), no off-base noise sensitive areas are within the existing 65-dBA DNL contour, including schools, churches, or hospitals.

Table 3-24. Area within Existing Noise Contours at Andersen AFB

Noise Contour (dBA DNL)	Existing Conditions – Area Under Contours (Acres)		
	On-base	Off-base	Total
65–70	978	462	1,441
70–75	928	24	952
75–80	622	0	622
80–85	505	0	505
>85	404	0	404
Total	**3,438**	**486**	**3,924**

[a] Acreage off base does not include areas over the water.

Individual Overflight Noise. The sole use of DNL and land use compatibility naturally includes, but does not fully describe, other related effects such as hearing loss, sleep and speech interference, and structural damage. The DAF encourages the inclusion of supplemental noise metrics in the assessment of noise from aircraft (DNWG 2009).

Individual overflights generate distinct acoustical events. These overflights are brief, intermittent, and distributed around the installation. **Table 3-25** outlines the L_{max} and SEL for existing individual take-offs and landings for some of the primary users of Andersen AFB. L_{max} and SEL for individual take-offs and landings were used to assess the potential for disturbance of speech and sleep, to determine if individual acoustic events would be loud enough to damage hearing or structures and to provide the public with a better understanding of the specific effects.

Table 3-25. Sound Levels for Individual Overflights – Existing Aircraft

Altitude (Feet)	During Take-off					During Approach				
	KC-135	C-130	B-52	F-18	F-22	KC-135	C-130	B-52	F-18	F-22
Maximum Sound Level (Lmax) (dBA)										
500	92*	92*	113*	116*	120*	90*	90*	111*	111*	115*
1,000	85*	85*	105*	108*	112*	83*	83*	102*	104*	109*
2,000	78*	77*	96*	100*	105*	76*	75*	92*	96*	103*
5,000	67	66	83*	87*	93*	64	63	74	84*	94*
10,000	56	57	73	77*	83*	54	53	61	73	85*

Altitude (Feet)	During Take-off					During Approach				
	KC-135	C-130	B-52	F-18	F-22	KC-135	C-130	B-52	F-18	F-22
Sound Exposure Level (SEL) (dBA)										
500	96*	97*	119*	123*	124*	96*	95*	115*	115*	111*
1,000	91*	91*	112*	117*	119*	91*	89*	108*	110*	104*
2,000	85	86	105*	111*	113*	85	83	100*	104*	96*
5,000	76	77	94*	101*	104*	76	74	84	94*	84
10,000	68	70	86	92*	95*	68	65	73	85	73

Source: DAF 2020b
Notes: Overflights that exceed 75 dBA Lmax (values followed by an asterisk) could interfere with speech. Nighttime overflights that exceed 90 dBA SEL (values followed by an asterisk) could interfere with sleep.

Speech Interference. In general, individual overflights can interfere with communication on the ground, and in homes, schools, or other buildings directly under their flight path. The disruption of routine activities in the home, such as radio or television listening, telephone use, or family conversation, can give rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. The threshold which aircraft noise begins to interfere with communication is 50 dBA indoors, and speech interference is often described in terms of L_{max} of 75 dBA outdoors to account for 25 dBA of noise attenuation provided by buildings such as houses and schools (DNWG 2009).

Most of the typical aircraft at Andersen AFB are loud enough to have the potential to interfere with speech inside buildings directly underneath when operating between 2,000 and 10,000 feet AGL during both landing and takeoff. There were approximately 7,500 takeoffs and landings to and from the installation in 2021. The majority of overflights west of the installation are arrivals. Individuals within these areas experience a limited number of acoustical events loud enough to interfere with speech. During these events, individuals directly under the flight path pause briefly, and continue speaking after the aircraft has passed.

This assessment examines aircraft operations greater than 50 dBA (indoors) for schools near the installation from 8:00 a.m. to 4:00 p.m. **Table 3-26** outlines the existing number of minutes on average that class time is above 50 dBA and has the potential to be interrupted by aircraft intrusions at the representative schools. The amount of time when aircraft is currently loud enough to interfere with classroom communication is less than 1 minute per day for all representative schools around Andersen AFB, and other schools within the immediate area would likely fall within this range. The amount of time when aircraft currently interfere with classroom communication in schools on-base is approximately 6 minutes per day.

Table 3-26. Speech Interference in Schools – Existing Conditions

School	Time Aircraft Noise is Loud Enough to Interfere with Speech (minutes/day)
Andersen Middle and Elementary School	6.3
Astumbo Middle and Elementary School	0.7
Chief Clifford Brodie Memorial School	0.2
Machananao Elementary School	0.3
Maria A. Ulloa Elementary School	0.3

Source: DAF 2020b
Note: Figures account for aircraft from Andersen AFB only.

Sleep Interference. Sleep interference is another source of annoyance associated with louder low-altitude aircraft overflights. This is especially true due to the intermittent nature of aircraft noise, which can be more disturbing than continuous noises. Sleep disturbance is not just a factor of how loud, but also the duration of each noise event; therefore, sleep disturbance is best reflected with the SEL metric, which captures the total energy (i.e., level and duration) of each noise event. American National Standards Institute (ANSI) and the Acoustical Society of America (ASA) have jointly approved a standard, ANSI/ASA S12.9-2008/Part 6, to predict awakenings associated with outdoor noise events heard in the home. The standard suggests methods for calculating the probability of awakening at least once to the sound from distributions of single noise events. **Table 3-27** outlines the number of events above 90 dB SEL with the probability of a person awakening.

Table 3-27. Probability of Awakening at Least Once from Multiple Events at SEL 90 dB

Number of Events Above 90 dBA SEL	Probability of Awakening at Least Once (percent)	
	Windows Closed	Windows Open
1	1	2
3	4	6
5	7	10
9	12	18
18	22	33
27	32	45

Source: DNWG 2009, ANSI 2008.
Note: Windows closed assumes a 25-dB noise level reduction (NLR) between the outdoors and indoors (e.g., 90 dBA SEL outdoors is 65 dBA SEL indoors) and windows open assumes there is a 15 dB NLR between the outdoors and indoors (e.g., 90 dBA SEL outdoors is 75 dBA SEL indoors).

Most of the typical aircraft at Andersen AFB are loud enough to have the potential to cause sleep awakenings inside buildings directly underneath when operating between 500 and 5,000 feet AGL during landing or 1,000 and 10,000 feet AGL during takeoff. There were 1,064 takeoffs and 978 landings between 10:00 p.m. and 7:00 a.m. in 2021. Individuals on and near the installation experience a limited number of acoustical events at night loud enough to interfere with sleep. The majority of overflights of aircraft immediately west of the installation are

arrivals, and individuals within this area are currently exposed to approximately 1 to 2 overflights above 90 dBA SEL on any given night, having a 1 to 2 percent probability of awakening.

Potential for Hearing Loss. Potential for Hearing Loss (PHL) applies to people living in high noise environments where they can experience long-term (40 years) hearing effects. The threshold for assessing PHL is $L_{eq}(24)$ (i.e., average sound levels over a 24 hour period) greater than 80 dBA. The effect of PHL is denoted by the number of people subject to Noise Induced Potential Hearing Loss within 1-dBA increments above 80 dBA $L_{eq}(24)$ (i.e., 80 to 81 dBA). Currently, no on- or off-base residences or individuals at Andersen AFB are exposed to $L_{eq}(24)$ levels greater than 80 dBA, and no potential for hearing loss occurs. Additionally, OSHA and the DAF have adopted a 140-dB instantaneous noise level threshold for short-term exposure that may induce hearing loss. As individual aircraft overflights at Andersen AFB are not supersonic, and do not generate sonic booms above 140 dB, no individuals are exposed to instantaneous sound levels loud enough to damage hearing.

Damage to Structures. Noise from low-level aircraft overflights can cause buildings under their flight path to vibrate, which the occupants experience as shaking of the structure and rattling of the windows. However, based on experimental data and models, noise and vibrations from subsonic aircraft overflights do not cause structural damage to buildings. An impact noise (e.g., blast noise, sonic boom) above 140 dB is required to generate sufficient energy to damage structures (Bureau of Mines 1980, Siskind 1989). Individual overflights at Andersen AFB are not supersonic, and do not generate sonic booms above 140 dB; therefore, there is no potential to damage to structures.

3.11.2 Environmental Consequences

Noise from the proposed aircraft, and construction and operation of the proposed facilities could result in impacts on the human and natural environment. Changes in noise from the Proposed Action would be considered significant if they would lead to a violation of any federal, state, or local noise ordinance, or substantially increase areas of incompatible land use outside the installation. Impacts from noise on wildlife are discussed in **Section 3.4**.

3.11.2.1 Proposed Action

The Proposed Action would have short- and long-term, less than significant, adverse impacts on the noise environment. Short-term impacts would be due to noise generated by heavy equipment during construction. Long-term impacts would be due to increase in installation-wide aircraft noise from the additional F-15 and rotational aircraft, the relocating of aircraft staging areas and ground activities to the proposed North Ramp, as well as the intermittent use of stand-by generators. The Proposed Action would not lead to a violation of any federal, state, or local noise ordinance, nor substantially increase areas of incompatible land use outside the installation.

Construction

The proposed construction activities would require use of heavy equipment that would generate short-term increases in noise near the proposed North Ramp and MSA-1 project areas. **Table 3-28** and **Figure 3-11** present typical noise levels (dBA at 50 feet) for the main phases of outdoor construction. Individual pieces of heavy equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet (FHWA 2006, USEPA 1971). With multiple items of equipment operating concurrently, noise levels can be relatively high within several hundred feet of active construction sites. In addition to normal construction activities, the concrete batch plant, if on site, would be an ongoing source of noise at the site, but would normally be quieter than other heavy construction activities. Noise sources at the batch plant would include the use of heavy machinery, vehicle noise, the non-emergency generator, and materials loading and off-loading.

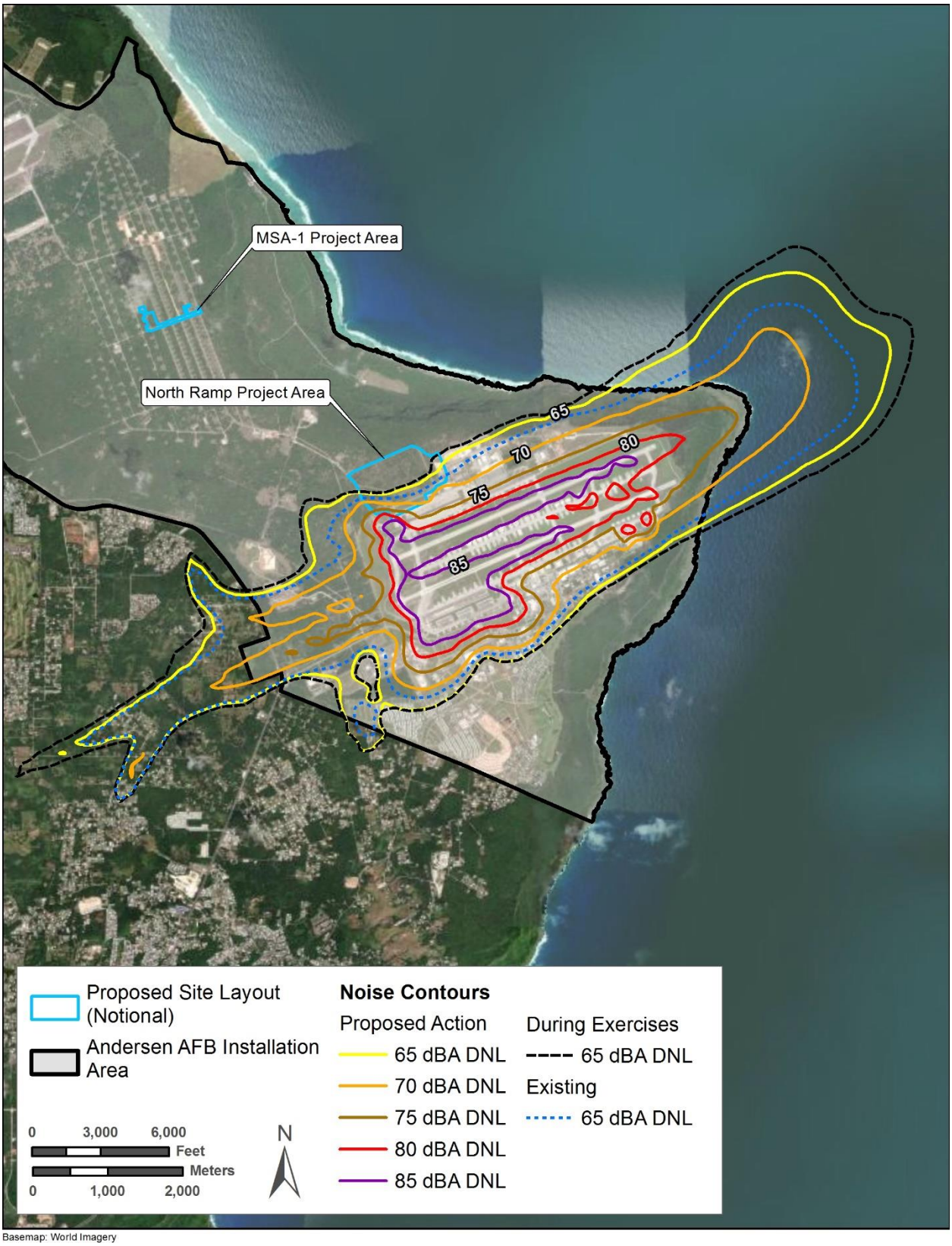
Table 3-28. Noise Levels Associated with Outdoor Construction

Construction Phase	L_{eq} at 50 feet (dBA)
Ground clearing	84
Excavation, grading	89
Foundations	78
Structural	85
Finishing	89

Sources: FHWA 2006, USEPA 1971

Construction noise would be loud (i.e., greater than 85 dBA) on and directly adjacent to the sites, and could potentially be audible for approximately 1.0 to 1.5 miles. However, the forest adjacent to the project areas and topography changes would generally attenuate noise at this distance. Noise beyond 1.0 to 1.5 miles would not be perceptible above background levels.

All construction and demolition activities in support of the Proposed Action would be within the installation's property boundary, collocated with other existing noise-compatible activities, and end with completion of the facility construction and modification phase. The nearest off-base residential areas are approximately 7,700 feet west of the proposed North Ramp project area and 9,400 feet southwest of the MSA-1 project area, and heavy equipment noise would be barely audible at these distances. Construction and demolition activities would be conducted in the context of an active military installation, where aircraft and other types of noise are typical. Some people working near the construction sites may notice or potentially be annoyed by the noise. Given the temporary nature of the proposed construction activities, distance to nearby noise-sensitive areas, and the existing noise environment, these effects would be less than significant.



Source: DAF 2020b

Figure 3-11. Aircraft Noise Contours for Andersen AFB with the Proposed Action

Operations

Increases in installation-wide aircraft noise would occur from the additional F-15s and rotational aircraft, and from incremental changes in the aircraft ground operations and associated noise on the proposed North Ramp. Increases in noise would also occur from vehicle traffic to and from the site, and the addition of back-up generators at the proposed facilities. Increases in aircraft noise, ground operations, vehicle traffic, and generators would be less than significant. No use of weaponry nor demolitions would occur with Proposed Action implementation; therefore, no changes in the existing noise environment associated with these sources would be expected.

The proposed F-15s, rotational aircraft, and associated air operations would increase base-wide aircraft operations by 32 percent, subsequently increasing noise surrounding Andersen AFB. Noise levels on and adjacent to Andersen AFB under the Proposed Action were calculated using NOISEMAP 7.3, which accounts for all aircraft activities, including landings, take-offs, in-flight operations, maintenance activities, and engine run-ups. **Figure 3-11** shows the base-wide DNL noise contours both with and without the proposed operations, including during the 4-week exercises. For comparative purposes, **Figure 3-11** shows the base-wide DNL contours during the proposed 4-week exercises. They highlight that noise would be concentrated during exercises, and less during other periods of the year. They have been provided for reference purposes only, as they do not account for periods of lesser operations between exercises, which is important to land use planning and recommendations.

Table 3-29 presents the land acreage exposed to noise levels greater than 65-dBA DNL with and without the Proposed Action. Under the Proposed Action, 569 acres off-base on the island and 3,862 acres on-base would be within the 65-dBA DNL contour. This would be an increase in approximately 40 homes (i.e., approximately 138 individuals) within the 65-dBA DNL contour, the level normally not recommended for residential land uses (DAF 2015). Other than approximately 135 residences (i.e., approximately 430 individuals), no noise sensitive areas would occur within the 65-dBA DNL contour off-base, including schools, churches, or hospitals, similar to existing conditions. These effects would be less than significant.

Table 3-29. Areas within Noise Contours at Andersen AFB with the Proposed Action

Noise Contour (dBA DNL)	Area Under Contours (Acres)					
	Existing Conditions			Proposed Action		
	On-Base	Off-Base[a]	Total	On-Base	Off-Base[a]	Total
65–70	978	462	1,441	1,082	542	1,623
70–75	928	24	952	992	27	1,020
75–80	622	0	622	681	0	681
80–85	505	0	505	580	0	580
>85	404	0	404	527	0	527
Total	**3,438**	**486**	**3,924**	**3,862**	**569**	**4,431**

Source: DAF 2020b
[a] Acreage off base does not include areas over the water.

Additionally, some idling, taxiing, and maintenance activities and associated noise would be relocated to the North Ramp. Aircraft would not conduct runups on the apron, and aircraft engine power checks and routine maintenance procedures on the trim pad would continue to occur within the same location. These minor changes to the location of on-base noise would not affect the overall noise contours at the installation depicted in **Figure 3-10**. The reasonably expected upper-bound sound levels for aircraft idling and taxiing on the North Ramp (depicted by **Figure 3-10**) represent the loudest aircraft as if it were operating on the edge of and perpendicular to the North Ramp boundary, facing directly away (idle-out) or directly toward (idle-in) the interior of the North Ramp. During the limited time when aircraft would be idling or taxiing on the North Ramp, these activities would be audible, but distant, to sensitive receptors 1 mile or farther to the west and southwest. These noise levels would be relatively quiet and would not be distinguishable from the existing or proposed aircraft operations at Andersen AFB.

Individual Overflight Noise. Table 3-30 outlines the L_{max} and SEL for existing individual take-offs and landings for the primary existing aircraft at Andersen AFB compared to those from the proposed F-15s. L_{max} and SEL for individual take-offs and landings were used to assess the potential for disturbance of speech and sleep in order to determine if individual acoustic events would be loud enough to damage hearing or structures, and to provide the public with a better understanding of the specific effects.

Table 3-30. Sound Levels for Individual Overflights – Proposed Action

Altitude (Feet)	During Take-Off						During Approach					
	KC-135	C-130	B-52	F-18	F-22	F-15	KC-135	C-130	B-52	F-18	F-22	F-15
Maximum Sound Level (Lmax) (dBA)												
500	92*	92*	113*	116*	120*	111*	90*	90*	111*	111*	115*	89*
1,000	85*	85*	105*	108*	112*	104*	83*	83*	102*	104*	109*	82*
5,000	67	66	83*	87*	93*	85*	64	63	74	84*	94*	63
10,000	56	57	73	77*	83*	75*	54	53	61	73	85*	53
Sound Exposure Level (SEL) (dBA)												
500	96*	97*	119*	123*	124*	117*	96*	95*	115*	115*	111*	94*
1,000	91*	91*	112*	117*	119*	112*	91*	89	108*	110*	104*	89
2,000	85	86	105*	111*	113*	106*	85	83	100*	104*	96*	83
5,000	76	77	94*	101*	104*	97*	76	74	84	94*	84	75
10,000	68	70	86	92*	95*	88	68	65	73	85	73	67

Source: DAF 2020b
Notes: Overflights that exceed 75 dBA L_{max} (values followed by an asterisk) could interfere with speech. Nighttime overflights that exceed 90 dBA SEL (values followed by an asterisk) could interfere with sleep.

Speech Interference. The operation of the proposed F-15s would be loud enough to have the potential to interfere with speech inside buildings directly underneath when operating below approximately 2,000 feet AGL during landing or 10,000 feet AGL during takeoff. As shown in **Table 3-28**, this is comparable to other aircraft typically operating at Andersen AFB. The majority of overflights of aircraft, including the F-15, west of the installation are arrivals. Individuals in these areas would experience an approximately 30 percent increase in the number of acoustical events loud enough to interfere with speech when compared to existing

conditions. Annoyance from speech interference is naturally included in the effects of the overall noise environment (i.e., DNL), and compatibility with noise sensitive land uses as discussed above.

Table 3-31 outlines the existing number of minutes on average that class time would be above 50 dBA and have the potential to be interrupted by aircraft intrusions at the representative schools. The amount of time when aircraft would be loud enough to interfere with classroom communication would continue to be less than 1 minute per day for all representative schools around Andersen AFB, and other schools within the immediate area would likely fall within this range. The amount of time when aircraft would interfere with classroom communication would increase to 13 minutes per day for schools on-base.

Table 3-31. Speech Interference in Schools – Proposed Action

School	Time Aircraft Noise is Loud Enough to Interfere with Speech (minutes/day)	
	Existing	Proposed Action
Andersen Middle and Elementary School	6.3	12.6
Astumbo Middle and Elementary School	0.7	0.9
Chief Clifford Brodie Memorial School	0.2	0.4
Machananao Elementary School	0.3	0.7
Maria A. Ulloa Elementary School	0.3	0.5

Source: DAF 2020b
Note: Figures account for aircraft from Andersen AFB only.

Sleep Interference. The proposed F-15s would be loud enough to have the potential to cause sleep awakenings inside buildings directly underneath when operating below approximately 900 feet AGL during landing or approximately 7,500 feet AGL during takeoff. This is comparable to other aircraft typically operating at Andersen AFB. The majority of overflights of aircraft, including the F-15, west and south of the installation are arrivals. An annual increase of approximately 239 takeoffs and 219 landings (i.e., 22 percent) between 10:00 p.m. and 7:00 a.m. would occur with the Proposed Action. Individuals on and near the installation would experience a 22 percent increase in the number of acoustical events at night loud enough to interfere with sleep. The majority of overflights of aircraft west of the installation are arrivals. With the Proposed Action, individuals within these areas would be exposed to an additional overflight above 90 dBA SEL every 2 to 3 days, increasing their probability of awakening by approximately 1 percent on those nights. Annoyance from sleep interference is naturally included in the effects of the overall noise environment (i.e., DNL) and compatibility with noise sensitive land uses as discussed above.

Potential for Hearing Loss. There would continue to be no on- or off-base residences or individuals at Andersen AFB that are exposed to $L_{eq}(24)$ levels greater than 80 dBA, and no potential for hearing loss. As with existing overflights, F-15 operations in and around Andersen AFB would not be supersonic, and would not generate sonic booms above 140 dB, and no individuals would be exposed to instantaneous sound levels loud enough to damage hearing.

Damage to Structures. As with existing overflights at Andersen AFB, F-15 operations would not be supersonic, and would not generate sonic booms above 140 dB; therefore, there would be no potential to damage to structures.

Other Noise. Under the Proposed Action, the reroute of Marianas Boulevard would increase traffic and associated noise on 5th Street, and traffic would occur on the proposed road along the northern perimeter of the North Ramp. These traffic noise levels would be lower than those generated from existing take-offs and landings at the nearby airfield to the sensitive noise receptors located to the west and southwest.

The proposed facilities would include back-up generators that would be used only during power outages and periodic testing. As with aircraft idling and taxiing, noise from back-up generators would be audible, but distant, to nearby sensitive receptors to the west and southwest.

3.11.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not introduce additional F-15s at Andersen AFB or implement the infrastructure upgrades within the North Ramp or MSA-1 project areas. The existing changes discussed in **Section 3.11.1.4** would remain unchanged. Therefore, no impacts on noise would occur due to the No Action Alternative.

3.11.3 Cumulative Impacts

All construction and operation-related noise associated with the Proposed Action would be in addition to those created by other ongoing or reasonably foreseeable actions. No reasonably foreseeable actions have been identified that, when combined with the Proposed Action, would result in significant cumulative impacts.

Noise from construction of the munitions storage igloos in MSA-1 and JP-8 storage tanks west of the North Ramp project area would be in addition to that from construction and operational activities at the North Ramp and MSA-1 project areas outlined under the Proposed Action. Equipment noise would be primarily confined to areas within and adjacent to the sites, and no residences within 400 to 800 feet would experience loud construction noise from the Proposed Action nor other reasonably foreseeable projects. These effects would be less than significant.

Increase in aircraft noise associated with the F-15s would be in addition to any future changes in aircraft operations or aircraft mix; however, none have been specifically identified at this time. Little to no noise associated with the operation of the storage igloos and storage tanks would occur; therefore, less than significant, adverse, cumulative effects would occur after the end of the construction phase. These effects would be less than significant.

3.11.4 Mitigations

Mitigation measures have not been identified for noise and would not be required to reduce impacts to less than significant.

3.12 Air Quality

3.12.1 Affected Environment

3.12.1.1 Definition of the Resource

Air pollution is the presence of one or more contaminants (e.g., dust, fumes, gas, mist, odor, smoke, vapor) in the atmosphere that could cause harm to human, plant, or animal life. As a resource, air quality incorporates several components that describe the levels of overall air pollution within a region, sources of air emissions, and regulations governing air emissions.

3.12.1.2 Regulatory Overview

The USEPA Region 9 and GEPA regulate air quality on Guam. The CAA (42 USC 7401–7671q), as amended, assigns the USEPA responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS; 40 CFR 50) that specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than 10 microns in diameter [PM_{10}] and particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. While each state has the authority to adopt standards stricter than those established under the federal program, the GEPA has accepted the federal standards. Notably, Guam has additional PM_{10} and SO_2 air quality standards that are the continuation of unrevoked federal standards. **Table 3-32** outlines the NAAQS for each criteria pollutant.

Table 3-32. National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
CO	Primary	• 8-hour • 1-hour	• 9 ppm • 35 ppm	Not to be exceeded more than once per year
Lead	Primary and Secondary	Rolling 3-month average	0.15 micrograms/m^3	Not to be exceeded
NO_2	Primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
NO_2	Primary and Secondary	Annual	53 ppb	Annual mean
O_3	Primary and Secondary	8-hour	0.07 ppm	Annual fourth highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$	Primary	Annual	12 micrograms/m^3	Annual mean, averaged over 3 years
$PM_{2.5}$	Secondary	Annual	15 micrograms/m^3	Annual mean, averaged over 3 years

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
PM_{10}	Primary and Secondary	24-hour	35 micrograms/m^3	98th percentile, averaged over 3 years
PM_{10}	Primary and Secondary	24-hour	150 micrograms/m^3	Not to be exceeded more than once per year on average over 3 years
SO_2	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
SO_2	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA 2024c
Notes: m^3 = cubic meter(s); ppb = parts per billion; ppm = parts per million

Other Regulatory Requirements. The Guam Air Pollution Control Regulations outline requirements with which the DAF must comply when constructing new facilities, such as controlling fugitive dust and open burning. All persons responsible for any operation, process, handling, transportation, or storage facility that could result in fugitive dust would take reasonable precautions to prevent such dust from becoming airborne. Reasonable precautions might include using water to control dust from building construction, road grading, or land clearing. Additionally, the Proposed Action would proceed in full compliance with current state air quality regulations using compliant practices and/or products. The Guam Air Pollution Control Regulations requirements include:

- Chapter 1-1130, *Visible Emissions Regulation*
- Chapter 1-1126, *Open Burning*
- Chapter 1-1128, *Control of Fugitive Dust*
- Chapter 1-1128.1, *Construction and Sand Blasting Operations*
- Chapter 1-1128.2, *Grading and Clearing*
- Chapter 1-1128.3, *Roads and Parking Lots*

This list is not comprehensive; the DAF and any contractors would comply with all applicable air pollution control regulations.

3.12.1.3 Region of Influence

The ROI includes the Guam Air Quality Control Region (AQCR 246), which encompasses all of Guam (40 CFR 81.353).

3.12.1.4 Existing Conditions

Federal regulations designate areas in violation of the NAAQS as *nonattainment* and areas with levels below the NAAQS as *attainment*. The USEPA has designated the portions of AQCR 246, where the Proposed Action would be located, as attainment for all criteria pollutants (USEPA 2021). Three areas on Guam near the power plants in Piti, Tanguisson, and Piti-Cabras are designated nonattainment for the SO_2 NAAQS; however, they do not encompass any element of the Proposed Action. As the Proposed Action is entirely within an area that has

been designated attainment for all criteria pollutants, the general conformity regulations do not apply to this action.

As a major source of air emissions, Andersen AFB operates under a Title V air operating permit (FO-001R1), which expires in November 2024. The permit requirements include periodic inventory of all significant stationary sources of air emissions, and monitoring and recordkeeping requirements. Primary stationary sources of air emissions include paint booths, fuel storage tanks, aircraft engine test stands, and electric generators. **Table 3-33** lists Andersen AFB's facility-wide potential to emit from all significant stationary sources. Notably, Guam does not require permitting of mobile source emissions (e.g., aircraft and vehicle operations).

Table 3-33. Potential to Emit for Significant Stationary Sources at Andersen AFB

Pollutant	Potential Emissions (tpy)
CO	184
NO_x	801
VOCs	48
$PM_{10}/PM_{2.5}$	49.6
SO_2	525

Source: GEPA 2009b
Note: NO_x = nitrogen oxide; tpy = ton(s) per year

Climate and GHGs. GHGs (e.g., carbon dioxide, methane, nitrous oxide) are components of the atmosphere that trap heat near the Earth's surface, therefore contributing to the greenhouse effect and climate change. Most GHGs occur naturally in the atmosphere, but increases in their concentration result from human activities, such as the burning of fossil fuels. Global temperatures are expected to continue to rise as human activities continue to add GHGs to the atmosphere. Whether rainfall will increase or decrease remains difficult to project for specific regions (USEPA 2016, IPCC 2014).

EO 14008, *Tackling the Climate Crisis at Home and Abroad*, and EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis,* requires federal agencies to capture the full costs of GHG emissions as accurately as possible, including taking global damages into account. The social cost of carbon (SCC) is an estimate of the monetized damages associated with incremental increases in GHG emissions, such as reduced agricultural productivity, human health effects, property damage from increased flood risk, and the value of ecosystem services. When considering GHG emissions and their significance, agencies should use appropriate tools and methodologies for quantifying GHG emissions and comparing GHG quantities across alternative scenarios. The CEQ guidance specifically requires agencies within the DoD to quantify GHG emissions in NEPA assessments, and review federal actions in the context of future climate scenarios and resiliency.

In January 2023, CEQ published interim guidance titled *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* (88 *Federal Register* 1196, January 9, 2023). The guidance states that "…agencies generally should quantify gross increases or reductions individually by GHG, as well as aggregate in terms of total carbon dioxide (CO_2) equivalence by factoring in each pollutant's global warming potential

(GWP)…" The guidance goes on to state that "…the [agencies] should apply the best available estimates of SC-GHG to the incremental metric ton of each individual GHG emission…" referencing the *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under EO 13990* released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG-SCGHG 2021).

3.12.2 Environmental Consequences

The Proposed Action could result in impacts on air quality and climate change. Effects on air quality would be considered significant if the Proposed Action would: (1) exceed the Prevention of Significant Deterioration (PSD) major source thresholds within the AQCR 246 attainment area. Notably, the PSD major source threshold has been carried forward as a surrogate to determine the level of effects under NEPA.

3.12.2.1 Proposed Action

The Proposed Action would have short- and long-term, less than significant, adverse impacts on air quality. Short-term impacts would be from fugitive dust, engine exhaust from the use of heavy equipment during construction, and concrete batch plant emissions. Long-term impacts would be from the proposed F-15 and rotational aircraft's flight operations, ground equipment, aircraft fueling, additional personnel, and new standby generators at Andersen AFB. The Proposed Action would not exceed the PSD major source thresholds within the AQCR 246 attainment area.

The DAF's Air Conformity Applicability Model was used to estimate the total net emissions from the Proposed Action. Typical construction emissions were estimated for fugitive dust during grading of the 192-acre site, on- and off-road diesel equipment and vehicles, worker trips, architectural coatings, and paving off-gases. These were combined with emissions from a proposed concrete batch plant, including those from materials handling and loading, non-emergency engines, vehicle traffic, storage piles, and solvents used in degreasing. Operational emissions were estimated for changes in aircraft operations, ground equipment, aircraft fueling, personnel, and standby generators for the new facilities. Aircraft emissions were estimated for the proposed airfield operations outlined in **Table 2-1**, including take-offs, landings, and closed patterns. This includes all in-flight activities below a maximum height of 3,000 feet. **Table 3-34** provides the estimated emissions from construction and changes in operations at Andersen AFB. The estimated emissions from the Proposed Action would not exceed the PSD major source thresholds; therefore, the level of effects would be less than significant. **Appendix F** includes detailed emission calculations.

For purposes of analysis, it was assumed that all site grading and construction would be compressed into one 12-month period, and approximately 130,000 cubic yards of concrete would be produced every year at the batch plant. Therefore, regardless of the ultimate implementation schedule, actual annual emissions over the 3- to 7-year construction period would be less than those specified in this EIS. Small changes in facility siting and design, as well as moderate changes in quantity and types of equipment used, would not substantially change these emission estimates, and they would not change the level of effects under NEPA.

Table 3-34. Estimated Emissions for the Proposed Action

Pollutant	Construction Emissions (tpy)	Operational Emissions (tpy)	PSD Major Source Threshold (tpy)	Exceeds Thresholds? (Yes/No)
VOC	27.0	25.5	250	No
NO_x	85.8	50.7	250	No
CO	91.2	76.0	250	No
SO_2	4.4	4.4	250	No
PM_{10}	50.4	3.0	250	No
$PM_{2.5}$	3.9	2.7	250	No
Lead	<0.1	TBD	25	No

Source: DAF 2023
Notes: CO_2e = carbon dioxide equivalent; N/A = not applicable; TBD = to be determined; tpy = ton(s) per year

Permitting. The facilities to support the infrastructure upgrades are in the preliminary design stages. However, some new stationary sources of air emissions may be associated with the Proposed Action, potentially to include two backup generators, aviation fuel tanks, boilers, degreasers, and other vehicle and aircraft maintenance equipment. Any new stationary sources of air emissions would fully comply with GEPA's permitting requirements, including Chapter 1-1130, *Visible Emissions Regulation*; Chapter 1-1126, *Open Burning*; Chapter 1-1128, *Control of Fugitive Dust*; Chapter 1-1128.1, *Construction and Sand Blasting Operations*; Chapter 1-1128.2, *Grading and Clearing*; and Chapter 1-1128.3, *Roads and Parking Lots*. New stationary sources would be added to the installation's Title V air permit, as necessary, and approved by the GEPA.

Permitting scenarios would vary based on the types and sizes of new stationary sources, timing of the projects, and the types of controls ultimately selected. These can differ in specific features from the ones described in this EIS. It is not anticipated that the stationary sources of air emissions at Andersen AFB would exceed the PSD major source thresholds. However, during the final design stage and permitting process either: (1) the actual equipment, controls, or operating limitations would be selected to reduce the potential to emit to less than the PSD major source thresholds; or (2) the permitting process would require detailed dispersion modeling for attainment pollutants to ensure that any new emission sources would not allow for concentrations above the NAAQS. This review process is inherent to federal and state air regulations, and leads to an in-built protection of air quality in attainment areas such as AQCR 246. Therefore, regardless of the ultimate equipment selected or permitting scenario, these impacts would be less than significant.

GHGs. Consistent with EO 14008, EO 13990, and CEQ Guidance, this EIS examines GHGs as a category of air emissions. It also examines potential future climate scenarios to determine whether elements of the Proposed Action would be affected by climate change per the DoD directive in EO 14008 to examine the impacts of climate change on national security. Global and regional climate models have substantial variation in output, and do not have the ability to measure the actual incremental impacts of a project on the environment. For reference purposes, **Table 3-35** provides the statewide and nationwide GHG emissions, those from the

Proposed Action, and the SCC for each. This assessment includes years from 2025 to 2047. Detailed emissions calculations, including all assessed GHGs, are in **Appendix F**.

Table 3-35. Estimated GHG Emissions and Social Cost of Carbon (2025–2047)

Source	Greenhouse Gasses (2025–2047)		Social Cost of Carbon (2025–2047)	
	CO_2e (MMT)[a]	Percent of Total (%)	Dollars ($)	Percent of Total (%)
Guam	2,328,661,133	0.063	283,754,911	0.94
United States	118,762,381,361	0.0012	14,495,684,948	0.018
Proposed Action	1,465,846	—	2,663,555	—

Notes: CO_2e = carbon dioxide equivalent; MMT = million metric ton
[a] CO_2e is the number of metric tons of carbon dioxide emissions with the same global warming potential as 1 metric ton of another GHG (e.g., methane, nitrous oxide). Detailed emissions calculations, including all accessed GHGs, are in **Appendix F**.

Table 3-36 outlines potential climate stressors to Guam and their effects on the Proposed Action. All elements of the Proposed Action, in and of themselves, are only indirectly dependent on any of the elements associated with future climate scenarios (e.g., meteorological changes). At this time, no future climate scenario nor potential climate stressor would have appreciable effects on any element of the Proposed Action.

Table 3-36. Effects of Potential Climate Stressors

Potential Climate Stressor	Effects on the Proposed Action
More frequent and intense heat waves	Less than significant
Increased damages from flooding and typhoons	Less than significant
Changes in precipitation patterns	Less than significant
Reduced availability of fresh water during the dry season	Less than significant
Harm to water resources, agriculture, wildlife, and ecosystems	Less than significant

Source: USEPA 2016

3.12.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not introduce the proposed F-15s and rotational aircraft, or implement the infrastructure upgrades within the North Ramp or MSA-1 project areas, and the existing conditions discussed in **Section 3.12.1.4** would remain unchanged. Therefore, no impacts on air quality would occur due to the No Action Alternative.

3.12.3 Cumulative Impacts

All construction and operation-related emissions associated with the Proposed Action would be in addition to those created by other reasonably foreseeable actions. No reasonably foreseeable actions have been identified that, when combined with the Proposed Action, would result in significant cumulative impacts. When considered in combination with the reasonably foreseeable actions, the Proposed Action would contribute to an increase in total emissions at Andersen AFB, particularly from aircraft operations and construction activities. Because the proposed construction would be temporary and less than significant, cumulative impacts on air

quality from the Proposed Action and reasonably foreseeable actions would also be less than significant.

3.12.4 Mitigations

No mitigation measures have been identified for air quality, and they would not be required to reduce impacts to less than significant.

3.13 Health and Safety

3.13.1 Affected Environment

3.13.1.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious injury, or illness. The elements for an accident-prone environment include the presence of a hazard and an exposed (and potentially susceptible) population at risk of encountering the hazard. The degree of exposure depends primarily on the location of the hazard relative to the exposed population. Hazards relevant to the Proposed Action include construction, mission, and flight activities. Additionally, any facility or human-use area with potential explosive processes creates unsafe environments for nearby populations.

The safety analysis considers any activity, occurrence, or operation that has the potential to affect the well-being, safety, or health of DoD personnel, contractors, or members of the public. Health and safety topics analyzed in this section include natural hazards, installation hazards and mission safety (i.e., military munitions storage, explosives safety areas, and aircraft safety zones), flight safety, community emergency services, and construction safety. Safety areas such as ESQD arcs, Surface Danger Zones (SDZs), CZs, and Accident Potential Zones (APZs) are present at Andersen AFB and are defined as follows:

- **ESQD arcs** are ground areas that represent the prescribed minimum distance between facilities used for storage, handling, and maintenance of explosive material; or soil, equipment, or buildings containing explosive material and specified exposures (e.g., inhabited buildings, public highways, other storage or handling facilities), as defined in DAFMAN 91-201, *Explosives Safety Standards.* ESQD arcs restrict the use of areas and personnel density within the arc, and provide an explosive material safety buffer.
- **SDZs** are two-dimensional features, extending from a live-fire range, that provide containment of projectiles, fragments, debris, surface fires, and other components resulting from the firing, launching, or detonation of weapons systems.
- **CZs** begin immediately beyond each end of a runway and are the areas with the highest potential for aircraft accidents, or mishaps, as defined in DoDI 4165.57, *Air Installations Compatible Use Zones* (AICUZ).
- **APZs** are areas at military airfields that possess a high potential for aircraft accidents, or mishaps, when compared to non-airfield areas, as defined in DoDI 4165.57. Two APZs (APZ I and APZ II) lie immediately beyond each CZ and have increasingly less accident potential as one moves away from the runway, but still enough to warrant safety concerns.

3.13.1.2 Regulatory Overview

Federal regulations have been enacted for the wellbeing of workers and the general population, including the Occupational Safety and Health Act of 1970 (29 USC Chapter 15, Section 651 et seq.), which established laws and regulations to ensure safe working conditions through enforcement of standards and training requirements. This Act is administered by the OSHA, which has developed additional standards to maintain compliance with this act and promote a safe working environment. These standards establish general environmental controls, including the use of personal protective equipment (PPE), when necessary, to protect against hazards, processes, and the environment; provide exposure limits for noise, ionizing and nonionizing radiation, and toxic and hazardous substances; and provide requirements for handling and storing hazardous materials. Contractor safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risk of illness, injury, death, and property damage. DoDI 6055.01, *DoD Safety and Occupation Health Program*; and Air Force Policy Directive (AFPD) 90-8, *Environment, Safety, and Occupational Health management and Risk Management*, set safety and health guidelines in accordance with OSHA standards for DoD employees.

Andersen AFB personnel and contractors are required to follow 36 Wing Instruction 91-202, *Andersen AFB Safety Program*, which implements DoDI 6055.07, *Mishap Notification, Investigation, Reporting, and Record Keeping*; AFPD 91-2, *Safety Programs*; DAFI 91-202, *The US Air Force Mishap Prevention Program*; DAFMAN 91-203, *Air Force Occupation Safety, Fire and Health Standards*; DAFI 91-204, *Safety Investigations and Reports*; DAFI 91-207, *The US Air Force Traffic Safety Program*; DAFI 90-801, *Environment, Safety, and Occupational Health Council (ESOHC)*; and DAFI 90-802, *Risk Management*.

AFPD 91-2 is implemented by DAFMAN 91-203, and establishes safety programs to identify and mitigate hazards as well as guidelines for necessary safety training. DAFMAN 91-203 defines the minimum safety, fire protection, and occupational health standards; assigns responsibilities to individuals or functions to help Commanders manage their safety and health programs to ensure they comply with OSHA and DAF guidance; and applies to all DAF activities.

DAFI 91-207 establishes traffic safety programs and vehicle operator requirements for on-installation traffic and transport activities. Some protections include the use of all vehicle safety features such as seatbelts and lighting/signaling components, use of highly visible clothing, and safe traffic management procedures for construction actions.

DAFI 32-2001, *Fire and Emergency Services Program*, implements AFPD 32-20, *Fire and Emergency Services*, and provides guidance for implementing and maintaining an effective fire prevention program. DAFI 32-2001 establishes responsibilities, procedures, and practices for effective control and elimination of fire hazards.

The Defense Explosives Safety Regulation (DESR) 6055.09 establishes explosives safety standards designed to manage risks associated with DoD-titled ammunition and explosives by providing protection criteria to minimize serious injury, loss of life, and damage to property. The DESR provides guidance on hazard classification, storage of ammunition and associated

components, and compatibility guidelines for use of lands within explosives safety areas. The DESR also defines requirements for siting (i.e., quantity/distance criteria), construction of munitions storage facilities, personnel protection, and firefighting and emergency planning. DAFMAN 91-201, *Explosives Safety Standards*, along with DESR 6055.09, establishes explosives safety criteria; identifies hazards and states safety precautions to follow when working with explosives; provides minimum standoff distances for explosives storage areas; and provides criteria for construction of ECMs.

Additionally, the DAF follows strict guidance for the transport and handling of ordnance to minimize the potential for accidental discharge of munitions. All munitions operations personnel are trained and certified in munitions handling. Munitions are transported and stored in a disarmed state and without fuses to preclude inadvertent explosions. Should an accidental explosion occur, munitions operations personnel and Andersen AFB firefighting personnel are trained and have equipment on site to rapidly respond to the incident, immediately contain the explosion, and control and suppress fires that may occur as a result.

The Federal Aviation Administration (FAA) administers a system of flight rules and regulations, airspace management actions, and Air Traffic Control procedures. The FAA closely coordinates with state aviation and airport planners, military airspace managers, and other entities to determine how airspace can be used safely and effectively. The DAF uses FAA Order JO 7110.65Z, *Air Traffic Control*, and FAA Order JO 7610.4W, *Special Operations*, to establish procedures for flying, airfield, and flightline operations at DAF airfields. Additionally, the DAF, contractors, and other users of Andersen AFB would follow 36 Wing Instruction 13-204, *Airfield Operations Instruction*, which implements AFPD 13-2, *Air Traffic Control, Airfield, Airspace, and Range Management*, and local Andersen AFB policy directives and procedures used in Air Traffic Control, Radar Airfield and Weather Systems, airspace management, emergency management, and airfield management. DAFMAN 11-2F-15V3, F-15, *Operations Procedures*, establishes safe and effective operations procedures for the F-15 aircraft. Per 36 Wing Instruction 13-204, aircraft at Andersen AFB avoid overflight at low altitudes (i.e., below 1,200 feet above mean sea level) within a 1-mile radius of the Guam Memorial Hospital and U.S. Naval Hospital, to reduce the effects of aircraft operations on the local community. Flight along Andersen AFB's cliff line is restricted to 1,000 feet AGL or higher to avoid environmentally sensitive areas.

The regulations and guidance at 14 CFR 91, *FAA General Operating and Flight Rules*, and FAA Handbook 8083.16B, *Instrument Procedures Handbook*, govern aircraft routing, including arrivals and departures. All military aircraft fly in accordance with 14 CFR 91 when flying outside special use airspace, where local flying rules apply.

The primary safety concern regarding military flights is the potential for aircraft mishaps (i.e., crashes or crash landings), including those caused by adverse weather events and wildlife strikes. DAFI 91-202, *The US Air Force Mishap Prevention Program*, establishes mishap prevention program requirements, assigns responsibilities for program elements, and contains program management information. DAFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Program*, provides guidance for reducing the incidents of bird strikes in and around areas where flying operations occur. Restrictions on land uses are intended to protect

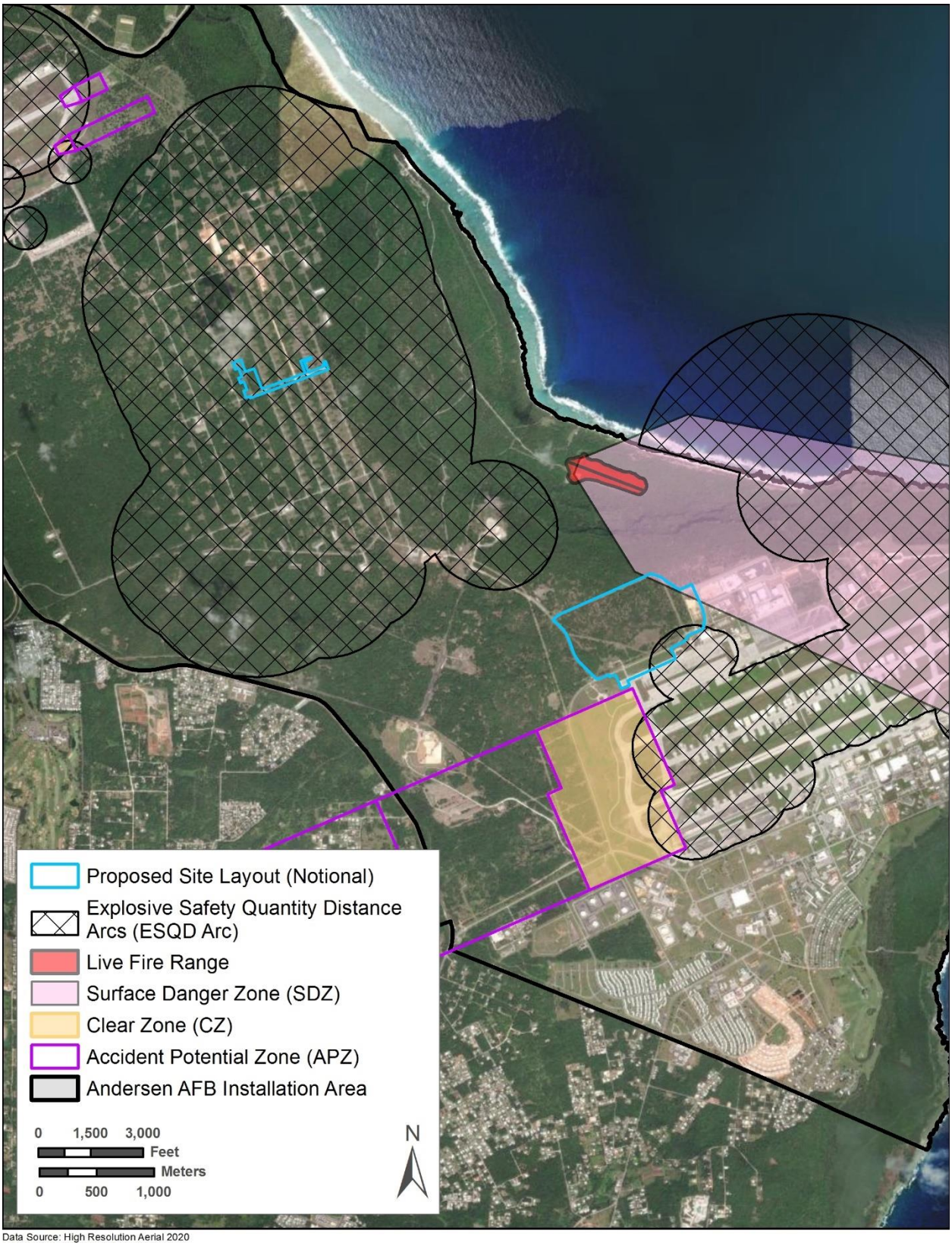
the public from exposure to hazards from potential aircraft mishaps and noise. Per DoDI 4165.57, *Air Installations Compatible Use Zones*, each DAF air installation is required to develop and implement an AICUZ program to protect the public and DAF personnel from hazards related to air operations. The AICUZ program at Andersen AFB identifies CZs and APZs to protect the public from aircraft mishaps and noise contours to protect from aircraft noise.

3.13.1.3 Region of Influence

The ROI for health and safety includes the North Ramp and MSA-1 project areas as well as the Andersen AFB airfield, and airspace where F-15 training flight operations would take place (i.e., the MIRC). Populations of concern that may be exposed to potential hazards include construction crews and facility personnel directly involved with the Proposed Action, operational personnel at Andersen AFB working near the project areas, and off-installation populations adjacent to Andersen AFB.

3.13.1.4 Existing Conditions

Installation Hazards and Mission Safety. Andersen AFB is a secure military installation and access is limited to military personnel, civilian employees, military dependents, and approved visitors. Munitions at Andersen AFB are currently stored in ECMs within MSA-1 and MSA-2. Munitions are handled and stored in accordance with standard protocols and procedures (e.g., DAFMAN 91-201, DESR 6055.09). The types and amounts of explosive material that may be stored within an area are determined by ESQD requirements, and ESQD arcs determine the required minimum safe distance from MSAs to habitable structures. ESQD arcs restrict construction of occupied structures (less than those required for ordnance functions) and all other non-ordnance related activities. Because explosives handling and storage is the primary function of MSA-1, an ESQD arc has been established to encompass the entire area, including the required safety buffer area. The MSA-1 project area is completely within the ESQD arc associated with MSA-1. The North Ramp project area is partially within the ESQD arc associated with munitions handling activities at the airfield (see **Figure 3-12**). Therefore, all construction at the MSA-1 project area and within the portion of the North Ramp project area within the ESQD arc must comply with applicable DoD and DAF standards (e.g., DESR 6055.09, DAFMAN 91-201). All facility construction and land use within ESQD arcs require review for compliance with explosives safety criteria, and must have either an approved explosives safety site plan or an approved explosives safety deviation (DoD 2023). The potential for encountering munitions and explosives of concern (MEC) at the North Ramp and MSA-1 project areas is considered likely. The presence of MEC and its associated hazards are discussed in **Section 3.17**.



Data Source: High Resolution Aerial 2020

Figure 3-12. Andersen AFB Safety Features

SDZs at Andersen AFB are associated with live-fire ranges used for training activities by military personnel. The closest live-fire range to the project areas is approximately 0.5 mile north of the North Ramp project area and approximately 1.5 miles southeast of the MSA-1 project area (see **Figure 3-12**). The SDZ associated with the live-fire range north of the North Ramp project area intersects a small area within the northeastern corner of this project area. No SDZs are within the MSA-1 project area (JGPO 2015).

The primary munitions route for transport and delivery of munitions from MSA-1 to the airfield and the live-fire range north of the North Ramp project area is along 5th Street, which connects MSA-1 to the airfield. Vehicles accessing Andersen AFB via the North Gate also use 5th Street. Marianas Boulevard, which separates the North Ramp project area from the airfield, is used as a secondary munitions route. Munitions are transported several times per week from MSA-1 to the live-fire range and hazardous cargo areas within the airfield (JGPO 2015).

Flight Safety. Each runway end at Andersen AFB has a CZ and two APZs (see **Figure 3-12**). The CZs and APZs associated with the Andersen AFB airfield extend northeastward and southwestward from each end of the runways. No CZs or APZs occur within either of the project areas. The closest aircraft safety zone to the project areas is the CZ associated with the southwestern end of the runway, just south of the North Ramp project area's southern boundary (Andersen AFB 2013).

Police, Fire Protection, and Medical Facilities. The 36th Security Forces Squadron administers security support and the law enforcement presence on Andersen AFB (Andersen AFB 2024b). Andersen AFB fire and emergency services are provided by the 36th Civil Engineer Squadron Fire Department. Installation fire personnel routinely assist the Guam Fire Department during off-installation fires that require additional equipment or assistance (Murphy 2021). The 36th Medical Group provides health services to military personnel and civilians on-installation. Andersen AFB does not offer emergency or urgent care services. Military personnel and civilians on Andersen AFB requiring emergency care are transported to the Guam Regional Medical City hospital or other regional medical facilities outside the installation (Andersen AFB 2024c).

The closest off-installation fire station is the Yigo Fire Station, approximately 3 miles south from the Andersen AFB Main Gate, along Route 1. The closest off-installation police station is the Dededo Precinct, within Dededo, approximately 5.5 miles south of the installation. The closest off-installation medical center, the Guam Regional Medical City hospital, is also in Dededo and offers emergency medical services.

Contractor and Construction Safety. All contractors performing activities are responsible for following ground safety regulations and worker compensation programs, and are required to conduct activities in a manner that does not pose an undue risk to workers or personnel. Industrial hygiene programs address exposure to hazardous material, use of PPE, and availability of Safety Data Sheets. Contractor responsibilities include reviewing potentially hazardous workplace operations; monitoring exposure to workplace chemicals (e.g., asbestos, lead, hazardous materials), physical hazards (e.g., noise propagation, falls), and biological agents (e.g., infectious waste, wildlife, poisonous plants); recommending and evaluating controls (e.g., prevention, administrative, engineering) to ensure personnel are properly

protected or unexposed; and ensuring a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental hazard exposures.

3.13.2 Environmental Consequences

Impacts on health and safety would be considered significant if the Proposed Action would substantially increase risks associated with the safety of the local community, construction personnel, military personnel, or civilians on Andersen AFB, or would introduce new health and safety hazards for which Andersen AFB and the local community are not prepared.

3.13.2.1 Proposed Action

3.13.2.1.1 F-15 Beddown

Long-term, less than significant, adverse impacts on flight safety would occur from an approximately 32 percent increase in total airfield flight operations, including an increase in F-15 operations. The increased operations would result in an increased potential for mishaps; however, the overall potential for mishaps is not expected to be significantly greater than baseline because all flight safety guidelines and regulations currently in place. The greatest potential for a mishap would occur during takeoff and landing operations and the existing AICUZ program minimizes safety concerns, should a mishap occur during those operations. All aircraft operations would continue to be performed in accordance with FAA Order JO 7110.65Z, FAA Order JO 7610.4W, 36 Wing Instruction 13-204, DAFMAN 11-2F-15V3, and FAA Handbook 8083.16B. Aircraft mishaps at Andersen AFB are rare, and RSAF F-15 operations would be similar in nature to those performed with similar fighter aircraft currently operating from Andersen AFB. Therefore, the proposed F-15 operations would not be expected to increase the overall potential occurrence of Class A mishaps. The CZs and APZs at Andersen AFB would remain unchanged. No conflicts with the installation Bird Aircraft Strike Hazard Plan would be anticipated from the Proposed Action.

3.13.2.1.2 North Ramp

Construction

Short-term, less than significant, adverse impacts on health and safety would occur during construction activities for the North Ramp infrastructure. Impacts would result from the exposure of workers to the inherent safety hazards associated with construction. Examples of such safety hazards include slips, trips, and falls; exposure to hot, cold, and wet conditions; natural hazards such as extreme weather events; and fire, mechanical, vision, noise, and respiratory hazards. Increased health and safety hazards for construction workers and site contractors would be dependent on activity levels and types as well as construction times.

The use of large, powerful, noise-generating construction equipment is inherently dangerous. Installation personnel and construction contractors would be required to follow all federal, DoD, DAF, and Andersen AFB regulations listed in **Section 3.13.1.2** to maintain a safe working environment.

The closest housing area on Andersen AFB to the project areas is approximately 1.5 miles south of the North Ramp project area, and is separated by the airfield and facilities within the main cantonment area. Off-installation populations are physically separated from the North

Ramp project area by forested land and the installation fence; therefore, the off-installation population is unlikely to be exposed to health and safety hazards at the North Ramp project area.

The North Ramp project area would not encroach on any CZs or APZs. Portions of the North Ramp project area are within an SDZ associated with the live-fire range 0.5 mile to the north and the ESQD arc associated with hazardous cargo operations at the airfield. Therefore, additional short-term, less than significant, adverse impacts on health and safety would occur due to proximity of munitions operations. All proposed North Ramp infrastructure upgrades and new roadways would be sited in accordance with the quantity/distance protocols in DESR 6055.09. Construction would be coordinated with Andersen AFB range and munitions personnel and would not occur while range and/or munitions activities are occurring.

Short-term, less than significant, adverse impacts on health and safety may result from increased construction traffic and potential slowdowns that may affect emergency services by increasing police and ambulance response times. Construction would not include road work that would prohibit emergency vehicle access to any area on Andersen AFB, and most construction equipment would be kept on site during the construction period; therefore, any traffic increase would negligibly affect emergency services.

Operations

New facilities within the North Ramp would be sited within the context of the airfield, where aircraft operations, refueling activities, and aircraft maintenance occur, and where there are inherent safety risks. The Proposed Action would not change CZs and APZs associated with the runways nor any ESQD arcs associated with hazardous cargo operations at the airfield. The additional approximately five permanent personnel that would be required for maintenance of the proposed facility and jet fuel maintenance system at the North Ramp would not be exposed to new health and safety hazards nor health and safety hazards that have not been previously considered and addressed by Andersen AFB. Additionally, new personnel would be required to adhere to all applicable federal, OSHA, DoD, DAF, and Andersen AFB regulations, as listed in **Section 3.13.1.2**, to maintain an appropriate level of safety. Therefore, no long-term impacts on health and safety would occur.

3.13.2.1.3 MSA-1

Construction

Short-term, less than significant, adverse impacts on health and safety would occur during construction activities for MSA-1 would be similar to those described for North Ramp construction. Construction contractors would adhere to all applicable health and safety regulations, as listed in **Section 3.13.1.2**.

The closest off-installation housing areas are approximately 1.5 miles south of the MSA-1 project area, and 1.5 miles southwest and 1.5 miles south of the North Ramp project area. Off-installation populations are physically separated from the MSA-1 project area by forested land and the installation fence, and are sited outside of the ESQD arc associated with MSA-1.

Therefore, the off installation population is unlikely to be exposed to health and safety hazards at the MSA-1 project area.

The MSA-1 project area is completely within an ESQD arc, and demolition and construction activities would occur within this area. Therefore, construction personnel working within the ESQD arc would be exposed to an increased risk of potential explosions. Coordination between contractor staff and Andersen AFB personnel would be completed prior to and during active construction activities to maintain safety.

As described for North Ramp construction, short-term, less than significant, adverse impacts on health and safety may result from increased construction traffic and potential slowdowns that may affect emergency services. Because MSA-1 is separated from the airfield and cantonment area, construction would not prohibit emergency vehicle access throughout Andersen AFB.

Operations

As stated in **Section 2.1.3.2**, the proposed ECMs within the MSA-1 project area would be adjacent to other existing ECMs. Operation of the proposed ECMs for munitions storage would not require any changes to existing munitions protocols at Andersen AFB, and would not require a change in the MSA-1 ESQD arc. Munitions would be loaded into and out of the ECMs using the same routes, processes, and procedures currently used at Andersen AFB. Therefore, no long-term impacts on health and safety would occur.

3.13.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the Proposed Action, and existing conditions discussed in **Section 3.13.1.4** would remain unchanged. Therefore, no impacts on health and safety would occur.

3.13.3 Cumulative Impacts

The Proposed Action, when combined with reasonably foreseeable actions, would result in short-term, less than significant, adverse, cumulative impacts on safety during concurrent construction activities. Additive construction traffic may cause traffic delays, which could increase response times for emergency services.

Noise from the construction of the munitions storage igloos in MSA-1 and JP-8 storage tanks west of the North Ramp project area would be in addition to that from the construction and operational activities at the North Ramp and MSA-1 outlined under the Proposed Action. On-site personnel, particularly equipment operators, would comply with DAFI 48-127, *Occupational Noise and Hearing Conservation Program*, and wear hearing protection to limit exposure and ensure compliance with federal health and safety regulations. These effects would be less than significant. Little to no noise would be associated with the operation of the storage igloos and storage tanks; therefore, less than significant, adverse, cumulative effects would occur after the end of the construction phase.

Construction crews and operations personnel required for the reasonably foreseeable projects would adhere to site-specific safety plans, which would consider ongoing construction and operations activities at Andersen AFB. Therefore, reasonably foreseeable planned actions,

when combined with the Proposed Action, would not result in significant cumulative impacts on safety.

3.13.4 Mitigations

Mitigation measures have not been identified for health and safety, and would not be required to reduce impacts to less than significant.

3.14 Land Use

3.14.1 Affected Environment

3.14.1.1 Definition of the Resource

Land use refers to real property classifications that indicate either natural conditions or the types of human activity, including land access, occurring on a parcel. In many cases, land use descriptions are codified in master planning and local zoning laws. Land use planning ensures orderly growth and compatible uses among adjacent property parcels or areas. Land uses are regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable, or protect specially designated or sensitive uses. In appropriate cases, the location and extent of a proposed action needs to be evaluated for its potential effects on a site and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is compliance with any applicable land use or zoning regulations. Other relevant factors include matters such as land ownership, existing land use and access at a proposed site, the types of land uses and access on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its permanence. Additionally, for DoD facilities, encroachment refers to the restrictions and responsibilities (i.e., an increase in incompatible land use and development) placed upon the military that negatively affect an installation's ability to train and/or perform its mission.

3.14.1.2 Regulatory Overview

The Proposed Action would occur on federally owned military property. The following applicable federal and DoD policies and plans consider existing state and local land use policies and planning goals:

- Federal Land Policy and Management Act of 1976 (Public Law [PL] 94-579; 43 USC 35) mandates establishment of procedures for managing federal lands.
- UFC 2-100-1, *Installation Master Planning*, provides land use planning, design, construction, sustainment, restoration, and modernization criteria applicable to DoD military departments, defense agencies, and field activities.
- DAFI 32-1015, *Integrated Installation Planning*, establishes a comprehensive and integrated planning framework for development/redevelopment of DAF installations.

The Andersen AFB IDP (Andersen AFB 2017) provides the framework for siting and development to support the 36 WG mission. The DAF plans new facilities that are consistent with existing installation land use plans, goals, and objectives (Andersen AFB 2017).

In addition to land use management policies, DoD encroachment management policies provide guidance for minimizing threats and impediments to mission sustainment, including DoDI 4715.24, *The Readiness and Environmental Protection Integration (REPI) Program and the Encroachment Management*, and DAFI 90-2001, *Mission Sustainment*.

The *North and South Central Guam Land Use Plan* provides guidance for land use planning and zoning under the Guam Zoning Law. Comprehensive land use planning is the responsibility of the Guam Bureau of Statistics and Plans (BSP), while the Guam Department of Land Management (GDLM) manages public lands on the island. Federal lands are not subject to the GDLM's authority, but consistency with surrounding non-federal land uses is an important consideration for land use planning on federal and non-federal lands at Andersen AFB (JGPO 2010).

Federal activity in or affecting a coastal zone requires preparation of a Coastal Zone Management Consistency Determination in accordance with the federal Coastal Zone Management Act (CZMA) of 1972 (PL 92-583, as amended [PL 94-370]). The CZMA was passed to preserve, protect, develop, and restore or enhance, where possible, the nation's natural coastal zone resources. In accordance with the federal CZMA, the Guam BSP regulates land uses on Guam's coastal zone areas under the Guam Coastal Management Program (GCMP). The GCMP is an expression of Guam policy to guide the use, protection, and development of land and ocean resources within the Guam coastal zone. The "coastal zone" of Guam includes all non-federal property on the island, including offshore islands and submerged lands and waters extending seaward to a distance of 3 nautical miles.

The CZMA specifies that lands managed by the federal government are excluded from the coastal zone. However, federal actions on coastal lands may be subject to federal consistency requirements if they potentially generate secondary or spillover impacts that affect the coastal zone, its uses, or resources within the purview of the GCMP. While federal lands are excluded from the coastal zone, federal agency activities, regardless of location, that affect any land or water use or natural resource of the coastal zone must be consistent with the GCMP, Section 307 (c)(1) (Guam BSP 2011).

3.14.1.3 Region of Influence

The ROI for analysis of land use includes the land within the MSA-1 and North Ramp project areas, the land directly adjacent to the project areas, and the coastal zone of the northern half of the island of Guam.

3.14.1.4 Existing Conditions

Andersen AFB includes approximately 15,423 acres on the northern half of the island of Guam (JGPO 2010). The installation is bounded on the north and east by the Pacific Ocean, and on the west by the Philippine Sea. The majority of residents on Guam reside on the northern half of the island. Except for two residential villages, Yigo and Dededo to the south of Andersen AFB, relatively few villages surround the installation. Most of the off-installation land use near Andersen AFB is considered low density, residential, and agricultural (Andersen AFB 2013). Park/open space uses are typical along the coastlines, as well as along Routes 1 and 9. Village centers are located along Route 29 between Routes 15 and 1 (near Yigo village), along Route 9

adjacent to the Andersen AFB boundary, and along Route 3 near the intersection with Route 28 (near Dededo village) (Andersen AFB 2013).

The Andersen AFB IDP identifies 10 land use categories: airfield, administration, community/commercial, housing (unaccompanied), housing (accompanied), industrial, medical, operations, recreation, and open space (Andersen AFB 2017). Three main areas of Andersen AFB are aligned from east to west: the Andersen Main Base to the east, the MSA in the center of the installation, and Northwest Field to the west. The predominant land use at Andersen Main Base (approximately 1,750 acres) is the airfield. The Main Base also contains administrative facilities, headquarters, maintenance facilities, housing, open space, and community support facilities. The development pattern of the Main Base is low density, characterized by individual buildings with substantial setbacks (JGPO 2010). The southeastern portion of the North Ramp project area, which is located on Andersen Main Base, is categorized for operations land use (see **Figure 3-13**). The rest of the North Ramp project area is designated as open space (Andersen AFB 2017). Two parallel runways are aligned in the northeast-southwest direction on Andersen Main Base, which are adjoined by the North and South Ramps.

The MSA-1 project area is contained within the MSA area in the center of the installation, and is also categorized for operations land use (see **Figure 3-13**; Andersen AFB 2017). Explosives handling and storage is the primary function of the MSA. Facilities in the MSA have ESQD arcs in the center of Andersen AFB. The ESQD arcs restrict the construction of inhabited buildings and other non-munitions-related activities (JGPO 2010).

The purpose of the long-standing AICUZ program is to promote compatible land development in areas subject to aircraft noise and accident potential around military airfields. The 2013 *Air Installations Compatible Use Zones Study for Andersen Air Force Base* offers recommended strategies and planning tools that can be applied by local agencies to promote compatible land use development before encroachment becomes a serious concern at Andersen AFB (Andersen AFB 2013). **Section 3.11.1** provides information on the three zones that were developed for the installation's airfield based on crash patterns: the CZ, APZ I, and APZ II (see **Figure 3-12**).

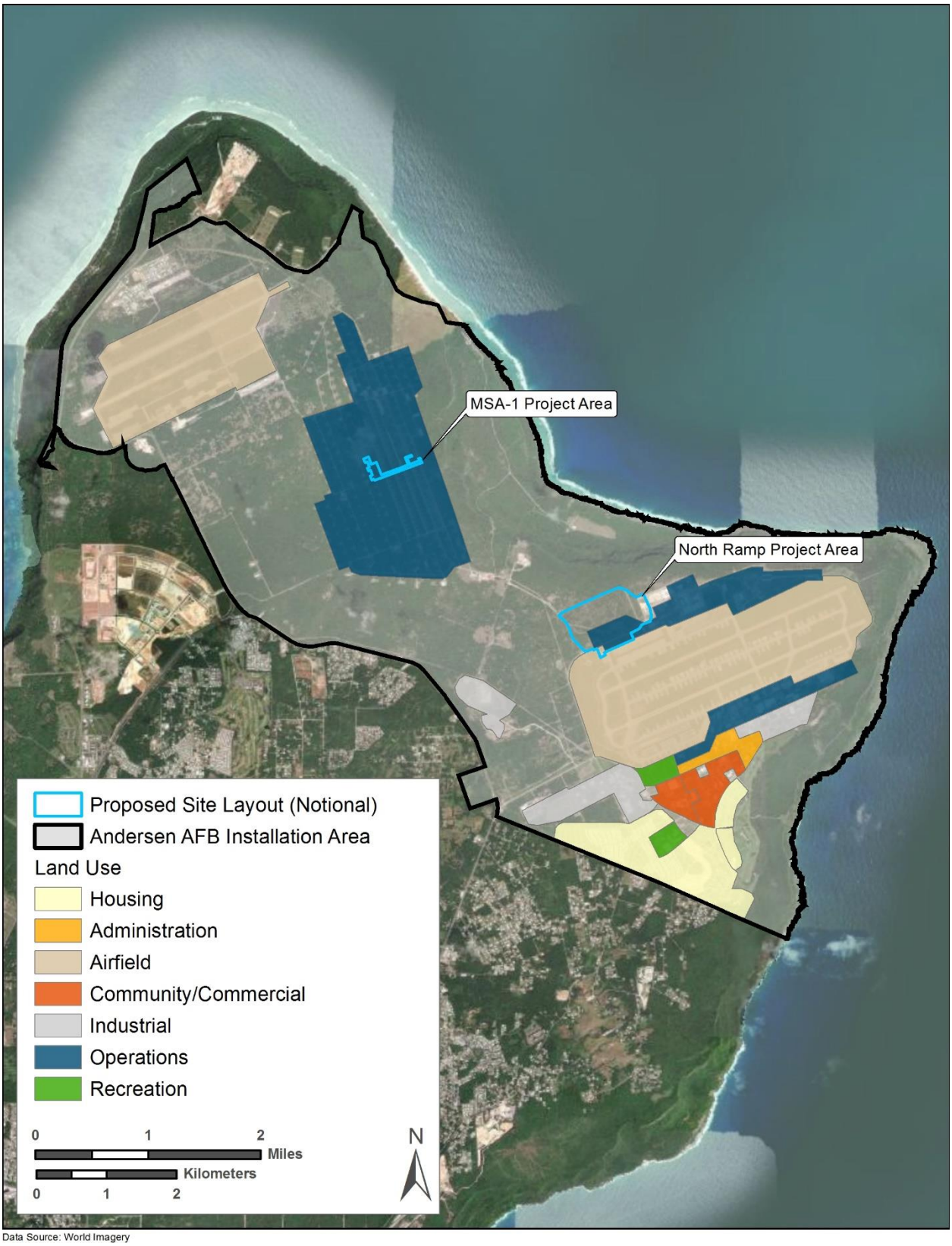


Figure 3-13. Land Use Categories at Andersen AFB

3.14.2 Environmental Consequences

For analyzing potential impacts on land use within the project areas, evaluation criteria are based on existing and future land use, development, and management. The Proposed Action could have a significant impact on land use if it were to:

- Preclude the viability of a land use or the continued use or occupation of the area;
- Be incompatible with adjacent land use to the extent that public health or safety is threatened or the installation's mission is compromised;
- Conflict with planning criteria established to ensure the safety and protection of human life and property; and/or
- Result in noncompliance with laws, regulations, or orders applicable to land use.

3.14.2.1 Proposed Action

Long-term, less than significant, adverse impacts on land use would be expected from the increase in noise associated with the proposed F-15 beddown. The increase in operations and maintenance associated with the beddown of up to 12 F-15s would increase the amount of land within each of the incremental noise contours of 65 dBA and above as shown in **Table 3-23**. To the west of Andersen AFB, the increase of off-base area within the 65–70 dBA contour would increase by 80 acres, and off-base area within the 70–75 dBA contour would increase by 3 acres. The off-base land affected by the enlarged noise contours would include approximately 40 homes within the 65 dBA contour (see **Section 3.11.2** for more detail) and would introduce a land use incompatibility with the existing residential land use. The incompatibility would not be considered significant. The F-15 beddown would be compatible with the existing and future land uses on Andersen AFB. Land uses on-installation would not be required to be modified to address noise impacts. See **Section 3.11.2** for further discussion of noise impacts.

No impacts on land use from the addition of personnel and dependents at Andersen AFB would occur. Personnel and dependents would be housed in existing residential areas off-installation. Existing installation childcare, fitness, medical, and dining facilities and services would support the approximate 3 percent increase in personnel and dependents.

3.14.2.1.1 North Ramp

Construction

Construction would occur entirely within the installation, with no impact on existing nor planned future land use. Construction would not require additional land acquisition nor relocation of existing uses. Nearby land uses would not be greatly altered during construction. Some less than significant impacts on recreational areas may occur during construction (see **Section 3.15.2** for further discussion of impacts on recreation). Noise levels associated with construction would be temporary and would not extend off-installation. No land uses on-installation would be modified to avoid noise impacts. The impacts of construction noise and traffic are addressed in **Sections 3.11.2** and **3.16.2**, respectively.

Operations

No change in land ownership is proposed at Andersen AFB, and no new public access restrictions would be created. The proposed development at the North Ramp project area would occur within the installation boundary and mostly within the existing designated North Ramp area of the installation, which is already categorized for operations land uses. A small portion of the development would expand the North Ramp into undeveloped land currently designated as open space, adjacent to the developed operations area. The proposed development would be compatible with the recommended land use guidelines. The proposed infrastructure upgrades and expansions are consistent with Andersen AFB land use plans.

3.14.2.1.2 MSA-1

Construction

Less than significant impacts on land use would be expected as a result of the Proposed Action. Construction would occur entirely within the installation, with no impact on existing nor planned future land use. Construction would not require additional land acquisition nor relocation of existing uses. Nearby land uses would not be greatly altered during construction. Some less than significant impacts on recreational areas may occur during construction (see **Section 3.15.2** for further discussion of impacts on recreation). Noise levels associated with construction would be temporary and would not extend off-installation. No land uses on-installation would be modified to avoid noise impacts. The impacts of construction noise and traffic are addressed in **Sections 3.11.2** and **3.16.2**, respectively.

Operations

No change in land ownership is proposed at Andersen AFB, and no new public access restrictions would be created. The proposed development and infrastructure upgrades at the MSA-1 project area would occur within the existing MSA area and be consistent with the designated operations land use. The proposed development would be compatible with the recommended land use guidelines. The proposed infrastructure upgrades and expansions are consistent with Andersen AFB land use plans.

Coastal Zone. The DAF reviewed the proposed activities in relation to the GCMP enforceable policies and determined that the Proposed Action would not result in reasonably foreseeable effects on Guam's coastal resources. Rationale for this decision is as follows, and the summary assessment of impacts relative to each enforceable policy is provided in **Appendix D, Table D-1**:

- The proposed federal activity is located entirely within federal property that by definition is excluded from Guam's coastal zone per 15 CFR 923, Section 923.33(a), and would not result in spillover effects extending into Guam's coastal zone per 15 CFR 923, Section 923(b).
- The proposed federal activities at both the North Ramp and the MSA-1 project areas are located on a plateau approximately 500 feet above sea level, and a minimum of approximately 1.55 miles from the nearest coastal zone. None of the proposed federal activities would extend on to adjacent parcels of non-federal property.

- The proposed federal development projects are consistent with existing uses as military mission support, and are entirely within areas on Andersen AFB currently used for airfield operations and munitions storage.
- The proposed activities are similar to previous DAF activities on-installation that have been determined to have no coastal effects.

The DAF has submitted a Negative Determination to the Guam BSP as part of the notification process for the Draft EIS public review period. The DAF is seeking concurrence with the Negative Determination from the Guam BSP. See **Appendix D** for a summary of correspondence between the DAF and Guam BSP regarding the Proposed Action.

3.14.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the F-15 beddown or the infrastructure upgrades within the North Ramp and MSA-1 project areas, and the existing conditions discussed in **Section 3.14.1.4** would remain unchanged. Therefore, no impacts on land use would occur due to the No Action Alternative.

3.14.3 Cumulative Impacts

Long-term, less than significant, adverse impacts on land use would be expected under the Proposed Action due to increases in the noise environment from the F-15 beddown. When combined with the increased operational noise associated with other reasonably foreseeable actions (e.g., Beddown of Space Control Squadron, Guam and CNMI Military Relocation, Enhanced Integrated Air and Missile Defense System, and MITT), less than significant, adverse, cumulative impacts could occur on land use within the ROI.

3.14.4 Mitigations

Mitigation measures have not been identified for land use and would not be required to reduce impacts to less than significant.

3.15 Recreation

3.15.1 Affected Environment

3.15.1.1 Definition of the Resource

Recreation includes areas and infrastructure (recreational resources) designated by federal, state, and local planning entities to offer visitors and residents diverse opportunities to enjoy leisure activities. Recreational resources can range from natural and relatively undisturbed areas to highly developed sites with permanent infrastructure. Recreational resources include any type of outdoor activity in which area residents, visitors, or tourists may participate as well as the areas where these activities would occur, such as open space, parklands, hiking and biking trails, conservation areas, playgrounds, golf courses, campgrounds, scenic overlooks, and marine resources.

3.15.1.2 Regulatory Overview

For recreational resources on Andersen AFB, DAFI 34-110, *Department of the Air Force Morale, Welfare, and Recreation (MWR) Programs and Use Eligibility*, implements AFPD 34-1, *Air Force Services*, and provides guidance for managing DAF outdoor recreation facilities and programs.

Many of Guam's recreational resources are managed by the Guam Department of Parks and Recreation (GDPR), which administers approximately 70 public parks and recreational facilities, including beach parks, community parks, skate parks, historic parks, baseball fields, a baseball stadium, a sports complex, tennis courts, and a public pool. All other community centers and parks fall under the purview of the 19 village mayors on the island, who work closely with the GDPR. The GDPR also operates sports leagues, and provides swimming and tennis lessons, among other activities (JGPO 2015). Guam Code Chapter 77 outlines laws and regulations for parks and recreation on Guam.

3.15.1.3 Region of Influence

The ROI for recreation includes Andersen AFB and the adjacent on- and offshore areas of northern Guam that are used for recreational pursuits.

3.15.1.4 Existing Conditions

Recreational resources on Andersen AFB are subject to the same access requirements as other installation facilities, and are therefore restricted to installation personnel and guests. The exceptions are granting hunting licenses and special access permits to the general public to control feral pig and deer population on-installation (JGPO 2015). Due to the presence of daily operations, recreation generally does not occur within the North Ramp and MSA-1 project areas. On-installation recreation opportunities near the project areas include the Palm Tree Golf Course, Family Dive Center, Andersen AFB pool, and some sports fields and parks at the southeastern end of the installation. The Arc Light Park and Stage, where community events occur; war memorials; and residential parks are located south of the North Ramp. Northwest of the MSA-1 project area is the installation's beach, Tarague Beach, which includes a campground and two pavilions. Personnel and their dependents can rent recreational equipment for use on- and off-installation, including backyard games, sports equipment, beach equipment, bicycles, stand-up paddle boards, kayaks, tents, and firepits.

A number of natural areas, which appeal to hikers and other recreational users, are located on Andersen AFB, including the Pati Point Natural Area, Andersen AFB Marine Resources Preserve, and Pati Point Preserve. Andersen AFB is contiguous with the Government of Guam's Anao Conservation Area to the southeast, along the coastline, an area that protects native limestone forest. To the northwest, Andersen AFB abuts the Ritidian Point Unit of the Guam NWR in the coastal plain. The DAF Refuge Overlay Unit, an allotment of the Guam NWR, overlaps Andersen AFB, and is governed by a cooperative agreement between the DAF and USFWS centered on protecting threatened and endangered species, native ecosystems, and biological diversity while maintaining DAF's national defense mission. Additional high-quality native limestone forest and coastal habitat is included in the Government of Guam's Falcona Beach Conservation Area to the south and southwest, along the coast. The GDPR administers

a number of regional picnic areas, beach parks, historic sites, hiking trails, and scenic overlooks (Andersen AFB 2009). Guam contains an extensive network of hiking trails throughout the island. The closest public trailhead to the North Ramp project area, Anao Cliffs Trailhead, is located southeast of the installation.

In addition to terrestrial recreation, the island, including the installation, is surrounded by the Pacific Ocean, where many marine recreational pursuits are popular, such as swimming, snorkeling, diving, kayaking, and paddleboarding.

3.15.2 Environmental Consequences

For analyzing potential impacts on recreation within the ROI, the evaluation criteria are based upon current recreational uses and resources within the ROI. The Proposed Action could have a significant impact on recreation if it were to preclude the viability of a recreational resource; impede access to recreational resources; substantially reduce recreational opportunities; cause substantial conflicts between recreational users; cause substantial physical deterioration of recreational resources; or result in noncompliance with laws, regulations, or orders applicable to recreation.

3.15.2.1 Proposed Action

3.15.2.1.1 F-15 Beddown

Long-term, less than significant, adverse impacts on recreation would be expected due to increased noise and associated disturbance to recreational activities and increased potential for crowding under the proposed F-15 beddown.

The increase in aircraft operations would result in less than significant increases in the overall noise environment. Increases in noise could disturb local recreationists such as hikers, kayakers, and birders seeking quiet recreational areas and activities. See **Section 3.11.2** for further discussion of noise impacts.

The approximate 3 percent increase in the Andersen AFB personnel and dependents could result in increased demand on recreational activities and areas. Because the increase would be small, no strain nor overcrowding is expected for recreational areas. Therefore, less than significant, adverse impacts would be expected from population changes under the Proposed Action.

3.15.2.1.2 North Ramp

Construction

Short-term, less than significant, adverse impacts on recreation may occur as a result of construction activities associated with the Proposed Action. Due to the scenic nature of the island, the visual landscape is important for many recreational pursuits that occur within the area. The visibility of construction equipment may deter or detract recreational users from facilities near the North Ramp project area. Because the areas surrounding the project areas from which construction equipment would be visible are not designated recreation spots, any impacts on recreation are expected to be less than significant. Additionally, staged construction equipment would not obstruct access to nor prohibit the use of recreational resources.

Noise from construction activities at the North Ramp project area could be audible within 1 to 1.5 miles of the project areas during the construction period. Therefore, potential recreational users of the Refuge Overlay Unit, between the MSA-1 project area and the eastern portion of the installation, and the Tarague Embayment scenic overlook may be impacted by construction noise. Because aircraft training and operations already, and would continue to, occur at the North Ramp project area, and the adjacent forest and changes in topography generally attenuate noise, the addition of the temporary construction noise would have a less than significant effect on recreational users.

Traffic congestion around and on the installation associated with construction material deliveries, worker commutes, and staged construction equipment may also affect recreational users in and around Andersen AFB by causing travel delays. As described in **Section 3.6.2**, up to a 0.4 percent temporary increase in population could occur, pending the source of the construction workers, who could be a combination of Guam locals, foreign workers already located on Guam (supporting other projects), or foreign workers that relocate to Guam to support the North Ramp construction.

Operations

The North Ramp expansion would develop 96 acres of previously undeveloped land adjacent to the current North Ramp, a small portion of which would occur in the Refuge Overlay Unit and would need to be coordinated with the USFWS prior to construction. Because this development would occur adjacent to the North Ramp, and recreation is unlikely to occur within this area, this development would result in a decrease in the amount of open space available to recreational users. Therefore, long-term, less than significant, adverse impacts on recreation may occur.

3.15.2.1.3 MSA-1

Construction

Impacts from construction activities at MSA-1 would be the same as those described for construction at the North Ramp in **Section 3.15.2.1.2**.

Operations

MSA-1 is not open to recreational users; therefore, no impacts on recreation would be expected during operations at the proposed MSA-1 project area.

3.15.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the F-15 beddown or infrastructure upgrades within the North Ramp and MSA-1 project areas, and the existing conditions discussed in **Section 3.15.1.4** would remain unchanged. Therefore, no impacts on recreation would occur due to the No Action Alternative.

3.15.3 Cumulative Impacts

Short-term, less than significant, adverse, cumulative impacts (e.g., visual impediment by construction equipment, traffic delays to recreational access) would be slightly increased if the Proposed Action occurred concurrently with construction and operational activities associated

with the other reasonably foreseeable actions (e.g., Standoff Weapons Complex, Munitions Storage Igloos in MSA-1, Igloo Replacement, JP-8 Storage Tanks, Satellite Communications C4I Facility, Space Force Projects, Base Commissary, Medical Clinic Expansion, Fencing and Gates, Guam and CNMI Military Relocation, Enhanced Integrated Air and Missile Defense System, Firefighting Training Facility). An insignificant increase in population due to potential foreign workers relocating to Guam to support construction may occur under the Proposed Action. The negligible increase in population as a result of the Proposed Action would be temporary; therefore, any subsequent increased demand on recreational resources would cease upon completion of construction activities at the North Ramp and MSA-1 project areas. When combined with the long-term population increase associated with the F-15 beddown under the Proposed Action and the Guam and CNMI Military Relocation, less than significant, adverse, cumulative impacts could occur due to increased demand on, and potential overcrowding of, recreational resources within the ROI.

3.15.4 Mitigations

No mitigation measures have been identified for recreation, and none would be required to reduce impacts to less than significant. As noted, coordination with the USFWS will be completed prior to construction regarding the project presence within the Refuge Overlay Unit.

3.16 Transportation

3.16.1 Affected Environment

3.16.1.1 Definition of the Resource

Transportation is a system or means of transporting people or goods. For the purposes of this analysis, transportation includes roadways (e.g., streets, highways, intersections), public transit, and pedestrian networks. Traffic refers to the movement of vehicles and pedestrians along and adjacent to roadways.

Roadway transportation conditions are evaluated using capacity estimates that depend on several factors, including number of lanes, width of lanes, roadway gradient, obstructions, vehicle volumes, and other physical characteristics. Average Daily Traffic (ADT) is a measure of the average number of vehicles that travel on a roadway segment in a given day and is commonly used to measure traffic conditions. Operation of roadway segments and intersections is expressed using a volume-to-capacity (V/C) ratio, which indicates roadway performance, and Level of Service (LOS), which indicate intersection. A V/C ratio less than 1.00 indicates that the roadway is operating under capacity, while a V/C ratio over 1.00 indicates that the roadway is operating over capacity. LOS, which range from LOS A, or best operating conditions, to LOS F, or worst operating conditions. LOS is an ordinal measure of operational conditions within a traffic stream based on service measures such as speed, travel time, freedom to maneuver, traffic interruptions, delays, and convenience. The *2030 Guam Transportation Plan* (GDPW 2008) recommended that all intersections and roadway segments should operate at LOS E or better during peak traffic periods. For the purposes of this analysis, LOS E conditions or better are considered acceptable. Intersections with a V/C ratio over 1.0 are assigned LOS F.

Guam roadways and intersections are monitored and evaluated by the Guam Department of Public Works (GDPW), which also implements the Guam Transportation Program. The *2030 Guam Transportation Plan* (GDPW 2008) and previous transportation studies, such as those included in the *2010 Guam and CNMI Military Relocation EIS* and the *2015 Guam and CNMI Military Relocation Supplemental EIS* (JGPO 2010, 2015), were used to identify the existing conditions of the roadway network that could be impacted by the Proposed Action. Data for key roadways and intersections near Andersen AFB (i.e., northern Guam) from previous transportation studies are included where available.

3.16.1.2 Regulatory Overview

The GDPW, in cooperation with the Guam Regional Transit Authority (GRTA), Federal Highway Administration, and Federal Transit Administration, prepared the *2030 Guam Transportation Plan* (GDPW 2008) to support Guam's future transportation needs as well as address laws and regulations applicable to transportation planning, such as the Safe, Accountable, Flexible, Efficient Transportation Equity Act, which was replaced by the Moving Ahead for Progress in the 21st Century Act in 2012. The *2030 Guam Transportation Plan* functions as a regional short- and long-term transportation planning document to increase the safety of the transportation system for all motorized and non-motorized users, increase accessibility and mobility of people and freight, and address anticipated increases in regional traffic over time (GDPW 2008).

Regulatory policies and procedures related to the construction, operation, and management of roadways include the Transportation Research Board's *Highway Capacity Manual,* the American Association of State Highway and Transportation Official's *Policy on Geometric Design of Highways and Streets* and *Highway Safety Manual*, and Guam's Standard Plans for road and bridge construction. GPL 29-98 requires the consideration and construction of bicycle and pedestrian paths with all new roadway construction projects.

All major highways and village streets on Guam are under the jurisdiction of the GDPW. The Federal Highway Administration contributes to ongoing improvements to Guam's transportation system through federal-aid roadway projects. The GRTA is responsible for public transportation services on Guam. The roads and pedestrian networks within Andersen AFB are under the jurisdiction of the DAF.

3.16.1.3 Region of Influence

The ROI for transportation includes the regional transportation systems (i.e., road, public transit, pedestrian) near Andersen AFB (i.e., northern Guam) that may be used by military, civilian, and construction personnel to access the installation. The ROI also includes transportation systems adjacent to and near the North Ramp and MSA-1 project areas at Andersen AFB.

3.16.1.4 Existing Conditions

Regional Roadways.

Andersen AFB is bounded by Route 9 and Chalan Chamorri Road to the south, and Route 3A to the west. Routes 1 and 9 are the primary regional roads for direct access to the Main Gate at Andersen AFB (see **Figure 3-14**). These routes also connect to Routes 3 and 29 as well as regional and local roadways (e.g., Routes 15, 16, 28), providing access to surrounding

communities and municipalities (villages). Route 9 is used to access the North Gate, approximately 1.5 miles north of the Main Gate. Route 15 is used to access Santa Rosa Gate, approximately 1.2 miles southeast of the Main Gate. It is estimated that 90 percent of all vehicles on Route 9 enter or exit the Main and North gates, meaning the majority of traffic on Route 9 is associated with Andersen AFB (PACAF 2006).

A traffic operations report was prepared as part of the 2015 *Guam and CNMI Military Relocation Supplemental EIS* that characterized the existing traffic conditions prior to the USMC relocation to Guam and predicted the resulting traffic conditions after the associated military buildup for the year 2030. The estimated traffic conditions presented in the study for 2030 are assumed to represent the existing traffic conditions because they account for the ongoing military buildup but do not include traffic from the Proposed Action.

Existing traffic conditions for key regional roadways and key regional intersections within the ROI are described in **Table 3-37** and **Table 3-38**, respectively. As shown **Table 3-37**, the roadways immediately adjacent to the Andersen AFB Main Gate and North Gate (i.e., portions of Routes 1 and 9) have a V/C ratio below 1.00, meaning traffic on these roadways does not exceed capacity. Many roadways in northern Guam, including roadways used for travel to Andersen AFB such as segments on Route 1, have a V/C ratio greater than 1.00 during AM and PM peak hours, meaning the segments operate beyond their capacity during peak travel times.

Some roadways, including segments of Routes 3, 16, 27A, and 29, have a V/C ratio between 0.90 and 1.00, meaning traffic during peak travel times is close to meeting or exceeding the roadway's capacity. As shown in **Table 3-38**, most intersections near Andersen AFB operate at an acceptable LOS (LOS E or better) at peak travel times, except for the intersections between Routes 15 and 29, Routes 1 and 3, Routes 28 and 27A, Routes 1 and 27, Routes 1 and 26, and Routes 16 and 27, which operate at LOS F during the AM and/or PM peak travel time. LOS conditions within northern Guam have declined over time due to the Guam and CNMI Military Relocation and the growing population on Guam.

Data Source: World Imagery

Figure 3-14. Regional Roadways

Table 3-37. Existing Conditions: Key Regional Roadways

Roadway	Segment	Length (miles)	Cross-Section	2008 ADT[a]	2008 V/C Ratio[a]	2013 V/C Ratio[b]		2030 V/C Ratio[b]	
						AM Peak	PM Peak	AM Peak	PM Peak
Route 1	Andersen AFB to Route 29	2.1	4-Lane Divided	10,001–25,000	0.00–0.80	0.56	0.60	0.71	0.77
Route 1	Route 29 to Route 28	3.6	4-Lane Divided	20,001–50,000	0.00–0.80	1.24	1.12	1.39	1.31
Route 1	Route 28 to Route 3	1.6	6-Lane Divided	20,001–50,000	0.00–0.80	1.00	0.89	1.10	1.07
Route 1	Route 3 to Route 14	1.2	6-Lane Divided	>50,000	0.00–0.80	1.40	1.24	1.58	1.24
Route 3	Route 3A to Route 28	2.7	4-Lane Divided	1,501–10,000	0.00–0.80	1.20	0.95	0.89	0.67
Route 3	Route 28 to Route 1	2.6	4-Lane Divided	10,001–25,000	0.00–0.80	2.04	0.87	0.93	0.43
Route 3A	North of Route 3/Route 9	4.6	2-Lane Undivided	0–1,500	N/A	0.09	0.12	0.21	0.24
Route 9	Route 3A to Andersen AFB North Gate	1.4	2-Lane Undivided	2,700–4,400	0.00–0.80	0.46	0.34	0.53	0.44
Route 9	Andersen AFB North Gate to Main Gate (Route 1)	1.7	2-Lane Undivided	2,700–4,400	0.00–0.80	0.43	0.35	0.41	0.37
Route 15	Andersen AFB to Route 29	2.1	2-Lane Undivided	1,501–10,000	0.00–0.80	0.3	0.55	0.87	0.61
Route 15	Route 29 to Route 26	4.8	2-Lane Undivided	1,501–25,000	0.00–0.80	0.91	0.57	1.09	0.80
Route 16	Route 1 to Route 10A	1.7	4 to 6-Lane Divided	10,001–50,000	N/A	0.83	0.80	0.99	0.98
Route 27	Route 16 to Route 1	1.1	6-Lane Divided	20,001–50,000	N/A	0.57	0.61	0.75	0.85
Route 27A	Route 16 to Route 1	0.8	2-Lane Divided	1,501–10,000	N/A	1.51	1.38	1.63	1.50
Route 27A	Route 1 to Route 28	1.2	2-Lane Divided	1,501–25,000	N/A	0.89	0.66	0.98	0.71
Route 28	Route 1 to Route 3	4.1	2-Lane Undivided	1,501–25,000	0.81–1.15	1.25	0.86	1.16	1.00
Route 29	Route 1 to Route 15	1.3	2-Lane Undivided	1,501–10,000	N/A	0.82	0.51	0.93	0.59

Source: GDPW 2008; JGPO 2010, 2015
Key: N/A = not available
[a] Roadway conditions for 2008 reflect data presented in the *2030 Guam Transportation Plan* (GDPW 2008) and 2010 *Guam and CNMI Military Relocation EIS* (JGPO 2010).
[b] Roadway conditions for 2013 and 2030 reflect data presented in the traffic operations report prepared for the 2015 *Guam and CNMI Military Relocation Supplemental EIS* (JGPO 2015). |Data for 2030 accounts for the USMC relocation from Okinawa, Japan, to USMC Base Camp Blaz, Guam, including any proposed traffic mitigation measures analyzed in the 2015 Supplemental EIS (JGPO 2015). Data for 2030 does not include additional traffic related to the Proposed Action.

Table 3-38. Existing Conditions: Key Regional Intersections

Intersection	Control	2008 LOS[a]		2013 LOS[b]		2030 LOS[b]	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Route 3A and Route 3/Route 9	One-way stop	B	A	B	B	C	B
Route 3 and Route 28	Signalized	C	B	C	B	D	C
Andersen AFB Main Gate and Route 1/Route 9	Signalized	C	D	B	C	B	C
Route 1 and Route 29	Signalized	F	C	D	C	D	C
Route 15 and Route 29	Two-way stop	N/A	N/A	F	C	F	D
Route 1 and Route 3	Signalized	E	E	F	E	F	B
Route 1 and Route 16	Signalized	D	D	C	F	C	E
Route 1 and Route 14	Signalized	C	C	D	D	D	D
Route 16 and Route 27A	Signalized	N/A	N/A	B	C	C	B
Route 1 and Route 27A	Signalized	N/A	N/A	E	D	D	D
Route 28 and Route 27A	All-way stop	N/A	N/A	B	E	B	F[c]
Route 1 and Route 27	Signalized	N/A	N/A	E	D	F[c]	D
Route 1 and Route 26	Signalized	N/A	N/A	C	C	D	F[c]
Route 1 and Route 28	Signalized	N/A	N/A	D	D	E	D
Route 16 and Route 27	Signalized	N/A	N/A	D	E	F[c]	F[c]

Source: GDPW 2008; JGPO 2010, 2015
Key: N/A = not available
[a] Intersection conditions for 2008 reflect data presented in the *2030 Guam Transportation Plan* (GDPW 2008) and *2010 Guam and CNMI Military Relocation EIS* (JGPO 2010).
[b] Intersection conditions for 2013 and 2030 reflect data presented in the traffic operations report prepared for the *2015 Guam and CNMI Military Relocation Supplemental EIS* (JGPO 2015). Data for 2030 accounts for the USMC relocation from Okinawa, Japan, to USMC Base Camp Blaz, Guam, including any proposed traffic mitigation measures analyzed in the 2015 Supplemental EIS (JGPO 2015). Data for 2030 does not include additional traffic related to the Proposed Action.
[c] LOS change from LOS A to LOS E to LOS F attributable to Guam population increase.

Andersen AFB Roadways. All roadways on Andersen AFB are two lanes (one lane in each direction) with additional separate turning lanes at major intersections. All on-installation intersections are controlled by two- or all-way stop signs. Arc Light Boulevard is the primary roadway on Andersen AFB, and provides access to the North Ramp and MSA-1 project areas from the Main Gate (see **Figure 3-15**). Arc Light Boulevard connects the Main Gate with Perimeter Road and Marianas Boulevard, which can be used to reach the airfield and the North Ramp project area; 5th Street intersects Marianas Boulevard at the western corner of the airfield and connects the airfield to MSA-1. Marianas Boulevard has relatively low traffic, with an average of 1,064 daily trips and a capacity of 5,000 daily trips near the proposed North Ramp project area (JGPO 2010). Typically, a two-lane roadway has a capacity of approximately 5,000 vehicles per day. **Table 3-39** describes the conditions of other key roadways on the base.

Table 3-39. 2008 Existing Conditions: Key Andersen AFB Roadways

Roadway	Length (miles)	Cross-Section	Average Daily Traffic Volume	Level of Service
Arc Light Boulevard (Main Gate)	1.0	2-Lane Undivided	14,000–19,000	B
Route 9 (near the North Gate)	N/A	2-Lane Undivided	2,700–4,400	A–C
Santa Rosa Boulevard (Santa Rosa Gate)	0.7	2-Lane Divided	1,501–10,000	A–C
Caroline Avenue	2.0	2-Lane Undivided	0–1,500	A–C

Source: GDPW 2008, JGPO 2010
Notes: N/A = not applicable

The North Gate serves as the commercial gate for the installation and is the primary entrance to MSA-1. Vehicles accessing MSA-1 are screened at this location. The Visitor Control Center also is located at the North Gate. Vehicles accessing MSA-1 enter Andersen AFB through the North Gate and travel approximately 2 miles to the MSA-1 Gate, which is the control point for vehicles accessing MSA-1 at the intersection of 5th Street and B Avenue within the installation. The North Gate consists of two components: (1) an entry control facility at the intersection of Route 9 and the North Gate access road, and (2) a vehicle queuing control facility with truck inspection station within the installation south of the intersection between 5th Street and the North Gate access road (JGPO 2010). MSA-1 also can be accessed from the Main Gate and the cantonment area via Marianas Boulevard and 5th Street.

Data Source: World Imagery

Figure 3-15. Installation Roadways

In 2010, it was determined that an average of 11,000 daily vehicle movements occur at the Main and North Gates, meaning approximately 5,500 vehicles enter and exit the installation daily (JGPO 2010). Vehicle movements at the Main Gate for 2030 were estimated at 750 vehicles entering and 520 vehicles exiting Andersen AFB during the AM peak hour and 870 vehicles entering and 600 vehicles exiting Andersen AFB during the PM peak hour (JGPO 2015). Santa Rosa Gate, approximately 1.1 miles southeast of the Main Gate, is accessed via Route 15, which turns into Santa Rosa Boulevard on-installation. The Santa Rosa Gate is a secondary gate at Andersen AFB that is used to access the installation's housing area. Caroline Avenue connects Santa Rosa Boulevard to Arc Light Boulevard. It is estimated that parking is generally adequate throughout the installation, and the existing transportation system is adequate to meet existing needs (DAF 2007).

Most of the on-installation intersections operate at an acceptable LOS, except for several intersections along Arc Light Boulevard within the main cantonment area (JGPO 2015). Intersections on which installation gates are located operate at LOS C or better (see **Table 3-39**). Peak hour volumes at installation gates are between 6:30 a.m. and 7:30 a.m. for inbound traffic, and between 3:30 p.m. and 4:30 p.m. for outbound traffic (DAF 2007, PACAF 2006). Congestion from traffic entering and exiting the installation is generally low; however, short delays are possible because vehicle queues are formed when vehicle processing capacity at the gates is exceeded (DAF 2020a).

Pedestrian and Bicycle Facilities. No pedestrian or bicycle facilities are near Andersen AFB (GDPW 2008). On the installation, a dedicated pedestrian jogging trail is within Arc Light Memorial Park, between Arc Light Boulevard, Caroline Avenue, and 4th Street. Other pedestrian facilities are sparse throughout the installation, primarily along Chicago Avenue and Bonnis Boulevard and connecting buildings with parking areas and other nearby buildings within the cantonment area. Typically, the outside lane or shoulder along installation roadways, which is generally unpaved, functions as the bicycle lane (JGPO 2015). No pedestrian or bicycle facilities are northwest of the airfield, near MSA-1.

Public Transit. The GRTA operates eight fixed-route bus and shuttle lines and offers paratransit services throughout Guam. The Greyline is the nearest fixed-route bus service to Andersen AFB, with one stop just south of the Main Gate, along Route 1. The Greyline follows a looped route, servicing Dededo, Yigo, and the surrounding areas, and is operated nearly once per hour between 6:00 a.m. and 8:00 p.m. The GRTA also offers a demand-response service that links residential areas with fixed-route services. All GRTA services are offered Monday through Saturday, excluding holidays, and typically run ahead of their anticipated schedules (GDPW 2008, GRTA 2020). Andersen AFB offers an on-installation shuttle service with 16 stops, mainly along Arc Light Boulevard, Chicago Avenue, and 4th Street in the southern portion of the installation. The installation shuttle service runs from 7:00 a.m. through 7:00 p.m., Monday through Friday. No shuttle stops are located at or near the North Ramp or MSA-1 project areas (Lundberg 2010).

3.16.2 Environmental Consequences

Analysis of impacts on transportation considers changes to roadway and intersection performance; capacity of area roadways from proposed increases in construction traffic, travel patterns, and accessibility (i.e., ease of drivers to reach a desired destination); and munitions transport operations associated with the new ECMs. An impact on transportation could be considered significant if the Proposed Action resulted in:

- An increase in traffic volumes or delays to levels that impair a roadway's handling capacity or increase traffic safety hazards;
- Considerable degradation of intersection or roadway performance; and/or
- Substantial and permanent changes to roadway accessibility.

3.16.2.1 Proposed Action

3.16.2.1.1 F-15 Beddown

The Andersen AFB population, including DAF and civilian personnel, and dependents, was estimated to be 8,335 in 2020. In 2029, the F-15 beddown would increase the Andersen AFB population by 240 personnel and dependents, an increase of approximately 3 percent, which would result in long-term, less than significant, adverse impacts on transportation. Personnel would reside in off-installation housing and commute to and from Andersen AFB daily. The additional trips during AM and PM peak traffic periods likely would not cause regional roadways adjacent to Andersen AFB (i.e., Routes 1 and 9) to function beyond their operational capacity. The additional personnel and dependents would be dispersed throughout northern and central Guam, meaning once traffic leaves the immediate vicinity of Andersen AFB (i.e., Routes 1 and 9), it becomes dispersed across other regional and local roadways. Therefore, the impacts from additional commuter traffic would not be concentrated within any one area or on any singular roadway. The additional traffic may slightly affect a roadway's V/C ratio or an intersection's LOS; however, it is not anticipated that the additional traffic would cause any roadway with a V/C ratio below 1.00 to consequently operate with a V/C ratio above 1.00, or cause any intersection operating at an acceptable LOS (i.e., LOS A through E) to consequently operate at LOS F. Once on the installation, the additional traffic would be concentrated at the main gate, the flightline, and the North Ramp area, and would primarily affect Arc Light Boulevard and Marianas Boulevard. Traffic entering and exiting the installation daily would increase by approximately 3.7 percent. It is anticipated gate capacity is sufficient to support the increased demand and any impacts from increased congestion or queues would be minimal.

The periodic increase of approximately 200 support personnel during training events, approximately 4 weeks twice per year starting in 2030, would introduce additional traffic on regional roadways in northern and central Guam. The additional 200 personnel would represent an additional approximately 2 percent increase in the population at Andersen AFB. As with the increase from the permanent personnel and dependents, the support personnel would add additional commute trips to and from the installation, which would be dispersed throughout northern and central Guam when outside the immediate vicinity of Andersen AFB. Additionally, the commutes from support personnel would represent an additional 3.6 percent increase in vehicles entering and exiting the installation daily. However, the additional traffic from support personnel would be temporary and would only occur for a total of 2 months out of the year.

Therefore, the additional long-term, adverse impacts on transportation would be less than significant.

No impacts on pedestrian and bicycle facilities, or on Guam and Andersen AFB public transit would occur from the additional personnel and dependents.

3.16.2.1.2 North Ramp

Construction

Regional Roadways. Short-term, less than significant, adverse impacts on regional roadways would occur from construction at the North Ramp project area. No physical construction would occur beyond the installation perimeter; therefore, impacts on regional roadways would affect only traffic operations.

Additional construction traffic, including daily commutes from construction crews and material hauling, would increase the number of vehicles transiting on regional roadways, such as Routes 1 and 9. As described in **Section 2.1.2.1.8**, 270 construction-associated vehicles would travel to and from the installation daily during the regular work week (i.e., Monday through Friday). In addition, 100,000 deliveries of fill material would be required for site filling and grading. It is estimated site grading would occur in the first year of construction, resulting in approximately 385 additional trips per workday in 2025–2026. Therefore, the total daily trips to and from Andersen AFB for construction at the North Ramp would be approximately 655 trips during 2025–2026 and 270 trips during the remainer of the 3- to 7-year construction period. If the DAF used an off-installation batch plant, the delivery of asphalt and concrete would require further trips by mixer trucks between the batch plant and Andersen AFB, estimated at less than 20 trips per day, during the remainder of the 3- to 7-year construction period.

The approximately 655 trips in 2025–2026 and 290 trips for the remainder of the construction period would introduce additional vehicles on regional roadways. It is assumed construction crews would travel to and from the installation during peak hour volumes (i.e., between 6:30 a.m. and 7:30 a.m. for inbound traffic, and between 3:30 p.m. and 4:30 p.m. for outbound traffic) and other construction vehicles (i.e., from miscellaneous trips, fill delivery, and concrete delivery) would travel to and from the installation at various times throughout the day. Any potential increases in traffic volume associated with the Proposed Action would be temporary.

Additional traffic from construction would be minimal when compared with the ADT of regional roadways, representing an additional 0.6 to 2.9 percent of 2008 ADT volume on Route 1 and 6 to 10 percent of ADT volume on Route 9. Deterioration of roadway surfaces would be minimal. The additional traffic may slightly affect a roadway's V/C ratio or an intersection's LOS; however, it is not anticipated that the additional traffic would cause any roadway with a V/C ratio below 1.00 to consequently operate with a V/C ratio above 1.00, or cause any intersection operating at an acceptable LOS (i.e., LOS A through E) to consequently operate at LOS F. Vehicle traffic from construction crews, delivery of material, and removal of debris would be directed to the North Gate, when possible, to avoid inbound queueing delays on Routes 1 and 9 for military and civilian personnel accessing the installation through the Main Gate. Construction equipment and many of the required construction vehicles would be kept on site for the duration

of construction activities, resulting in few additional trips. Any increases in traffic on regional roadways from construction traffic would cease after the 3- to 7-year construction period.

Construction in 2029 through 2032 would coincide with the F-15 Beddown and the influx of 205 personnel. During this period, additional vehicles traveling to and from the installation could be as high as 495 vehicles, or 695 vehicles when including the additional temporary support personnel. Traffic at the upper-bound volume would be similar to construction traffic during the first year of construction (i.e., 2025–2026). Any potential for additive traffic would occur only during the construction period, resulting in short-term, less than significant, adverse impacts.

Andersen AFB Roadways. Short-term, less than significant, adverse impacts on roadways within Andersen AFB would occur from construction activities associated with the Proposed Action. Prior to construction, an existing access road in the southwestern corner of the project area and a portion of the existing Marianas Boulevard, which is east of the proposed gate within the southwestern corner of the project area, would be demolished. It is anticipated that construction traffic would continue to access the project area via Marianas Boulevard, and that general base traffic would be routed northwest around the North Ramp project area on an existing roadway, 5th Street. Based on the existing volume of traffic on Marianas Boulevard, it is anticipated that up to 1,064 daily trips could be rerouted on 5th Street. This traffic pattern change would be communicated to installation personnel via electronic signs, bulletins, and memorandums to reduce potential delays.

The up to 655 vehicles from construction crews traveling to, from, and within Andersen AFB; delivery of materials to the project areas; and removal of debris from the project areas would cause an increase in on-installation traffic. Construction traffic would comprise a small to moderate percentage of the total on-installation traffic when compared with existing conditions, and would likely be localized to Marianas Boulevard, 5th Street, and the North Gate, avoiding the main cantonment area within the southern portion of the installation.

It is not anticipated that rerouted base or construction traffic would affect the LOS of installation roadways; however, the increases in construction traffic on-installation may increase the rate of deterioration for the select roadways used by construction vehicles. The amount of deterioration is, in part, a function of the materials used to construct the roadway, the amount of vehicular traffic, and the mix of vehicles (e.g., trucks versus cars). Although deterioration is expected to varying degrees, it is not possible to estimate the extent of the deterioration because current pavement condition and the existing vehicle mix are unknown. Many of the heavy construction vehicles would remain within one of the project areas for the duration of construction activities, which would protect installation roadways.

If the DAF used an on-installation batch plant, the delivery of asphalt and concrete to or within the North Ramp project area would require less than 20 trips by mixer trucks per day during the construction. Because the asphalt and concrete batch plant would be on Andersen AFB, and potentially within the North Ramp project area, traffic from asphalt and concrete deliveries to the North Ramp project area would be localized. Any potential increases in traffic volume associated with the Proposed Action would be temporary.

Following construction, access to the North Ramp project area from the west on Marianas Boulevard would be gate access only, and general base traffic on Marianas Boulevard would be routed northwestward around the North Ramp project area on an existing roadway, 5th Street, rather than through it. This reroute would increase volumes on 5th Street and the existing perimeter road, but would not increase traffic volumes on the base. Additionally, traffic following the reroute would generally be less than that previously occurring on Marianas Boulevard, as some vehicles would continue to travel along Marianas Boulevard on the gate access-only roadways. This long-term change to installation traffic patterns could result in an increased rate of deterioration on 5th Street; however, it is not expected that this roadway would be subject to a decline in LOS or an increased rate of deterioration beyond that which currently occurs on Marianas Boulevard.

Pedestrian and Bicycle Facilities. No pedestrian or bicycle facilities are located near the North Ramp project area. Pedestrian and bicycle activities are uncommon or restricted northwest of the airfield. During construction, pedestrians would be prevented from using Marianas Boulevard within the project area; while not a main pedestrian thoroughfare, any foot traffic would be restricted. Therefore, short-term, less than significant, adverse impacts would occur on pedestrian and bicycle facilities. Long-term, beneficial impacts on pedestrian facilities would occur from the construction of pedestrian walkways near proposed buildings at the North Ramp, which may increase walkability within the area.

Public Transit. No construction activities would occur along roadways used for public transit services. Additional traffic on regional roadways from construction could cause minor traffic delays on Routes 1 and 9. However, GRTA services typically run ahead of their anticipated schedules, and minor delays would not noticeably affect transit operations. Additionally, construction traffic would not travel on installation roadways used for the Andersen AFB Shuttle Service. Therefore, less than significant adverse impacts on public transit would occur under the Proposed Action.

Operations

Five permanent personnel would be required for maintenance of the new North Ramp infrastructure in addition to the 205 permanent F-15 personnel, which would result in additional vehicles traveling to and from Andersen AFB on regional roadways, and within Andersen AFB, daily. The total additional personnel traveling to and from the North Ramp area in their personal vehicles would represent less than 5 percent of the total traffic on regional and installation roadways, and would not contribute to pavement deterioration nor reduce the LOS on those roadways. Therefore, no long-term, adverse impacts on regional roadways would occur. Long-term, beneficial impacts on the installation roadway network could occur from construction of new roadways, which would increase connectivity within the North Ramp, and replacement of existing roadways, which would improve the overall longevity of the Andersen AFB roadway network.

3.16.2.1.3 MSA-1

Construction

Construction for MSA-1 would not require additional vehicle trips from construction crews and materials beyond what was described for the North Ramp construction. Therefore, the short-term, less than significant, adverse impacts from construction for MSA-1 would be similar to those described for the North Ramp construction (see **Section 3.16.2.1.2**). If the DAF used an on-installation batch plant at the North Ramp project area, asphalt and concrete would be delivered to the MSA-1 project area via 5th Street, which would avoid additional traffic within the cantonment area or near the flightline. Asphalt and concrete deliveries to the MSA-1 project area would be coordinated with MSA-1 and airfield operations.

Operations

Operation of the proposed MSA-1 would not require additional personnel; therefore, no additional vehicle trips on regional or installation roadways would be expected, and no long-term impacts would occur.

3.16.2.2 No Action Alternative

Under the No Action Alternative, the DAF would not implement the Proposed Action, and existing conditions discussed in **Section 3.16.1.4** would remain unchanged. Therefore, no impacts on transportation would occur.

3.16.3 Cumulative Impacts

Construction traffic associated with reasonably foreseeable actions near the North Ramp and MSA-1 project areas (e.g., construction of Munitions Storage Igloos in MSA-1, Standoff Weapons Complex, JP-8 Storage Tanks, Fencing and Gates, and the ongoing Guam and CNMI Military Relocation), when combined with the Proposed Action, would result in increased vehicle traffic on regional roadways, installation roadways, and at installation gates beyond what is predicted for the Proposed Action, resulting in short-term, less than significant, adverse, cumulative impacts. Reasonably foreseeable construction would likely be phased to avoid overlapping construction periods, when possible. Reasonably foreseeable projects that require additional permanent personnel to be stationed at or near Andersen AFB (e.g., Beddown of Space Control Squadron, additional USMC family housing associated with the ongoing Guam and CNMI Military Relocation) would increase daily commuter traffic accessing installation gates and overall traffic volumes on-installation. Increases in temporary construction traffic or traffic from additional permanent personnel could increase the rate of roadway deterioration, increase V/C ratio on regional and installation roadways, degrade intersection LOS, and/or reduce accessibility and efficiency of roadway networks, which would result in long-term, less than significant, adverse, cumulative impacts on transportation.

3.16.4 Mitigations

Mitigation measures have not been identified for transportation and would not be required to reduce impacts to less than significant.

3.17 Hazardous Materials and Wastes

3.17.1 Affected Environment

3.17.1.1 Definition of the Resource

The focus of this hazardous materials and wastes analysis is on the storage, transportation, handling, and use of hazardous materials and petroleum products as well as the generation, storage, transportation, handling, and disposal of hazardous wastes. In addition to being a threat to humans, the improper release or storage of hazardous materials, petroleum products, and hazardous wastes can threaten the health and well-being of wildlife species, habitats, soil systems, and water resources.

Environmental contamination is also addressed in this hazardous materials and wastes analysis. Areas of known or suspected contamination are grouped into sites. Each site is investigated and appropriate remedial actions are taken under the supervision of applicable federal and territory regulatory programs. When no further remedial action is necessary for a given site, the site is closed and no longer represents a threat to human health. These sites can be associated with various contaminants, including hazardous wastes, petroleum wastes, and chemicals such as polyfluoroalkyl substances (PFAS). The DAF is studying releases of Aqueous Film Forming Foam (AFFF), a historical firefighting foam containing PFAS with the potential to contaminate groundwater.

This hazardous materials and wastes analysis also addresses implications from the presence of radon. Radon is a naturally occurring, odorless, and colorless radioactive gas found in soils and rocks that can lead to the development of lung cancer. Radon tends to accumulate in enclosed spaces, usually those that are below ground and poorly ventilated (e.g., basements).

Toxic substances are also addressed in this hazardous materials and wastes analysis. A toxic substance is a chemical or mixture of chemicals that may present an unreasonable risk of injury to human health or the environment. These substances include asbestos-containing materials (ACMs), lead-based paint (LBP), and polychlorinated biphenyls (PCBs), all of which are typically found in older buildings and utilities infrastructure. Because the Proposed Action does not entail the demolition or renovation of any substantial buildings[3] or utility infrastructure, it is unlikely that existing toxic substances would be disturbed during construction activities associated with the Proposed Action. Additionally, bans limiting the use of ACMs, LBP, and PCBs in most new construction make it unlikely that toxic substances would be used in construction associated with the Proposed Action. For these reasons, toxic substances are not addressed further in this EIS.

3.17.1.2 Regulatory Overview

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Hazardous materials are defined by 49 CFR 171.8 as hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials

[3] The Proposed Action includes demolition of Buildings 2550, 2551, and 2552. The demolition of these shed to garage-sized, concrete-construction storage structures is unlikely to disturb noteworthy quantities of ACMs, LBP, and PCBs and would be complete within the first days of construction.

Table (49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR 173.

Petroleum products include crude oil or any derivative, such as gasoline, diesel, or propane. They are considered hazardous materials because they present health hazards to users in the event of incidental releases or extended exposure to their vapors.

Hazardous wastes are defined by the RCRA at 42 USC 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."

DAF installations manage hazardous materials and wastes through DAFMAN 32-7002, *Environmental Compliance and Pollution Prevention*. Andersen AFB has implemented an installation-wide *Facility Response Plan* (PCCI 2014a); *Spill Prevention, Control, and Countermeasure (SPCC) Plan* (PCCI 2014b); and *Hazardous Waste Management Plan* (JRM 2018). These plans define roles and responsibilities, address record-keeping requirements, and provide spill contingency and response requirements.

Environmental Contamination. The Comprehensive Environmental Response, Compensation, and Liability Act governs the response or cleanup actions to address releases of hazardous substances, pollutants, and contaminants into the environment and includes federal facilities such as Andersen AFB. In 1986, Congress formally established the Defense Environmental Restoration Program to provide for the cleanup of DoD property at active installations, Base Realignment and Closure installations, and formerly used defense sites throughout the U.S. and its territories. The two substantive restoration programs under the Defense Environmental Restoration Program are the IRP and Military Munitions Response Program (MMRP). The IRP addresses contaminated sites, while the MMRP addresses non-operational military ranges and other sites suspected or known to contain MEC, which includes unexploded ordnance, discarded military munitions, and munitions constituents.

Radon. The USEPA established a guidance radon level of 4 picocuries per liter (pCi/L) in indoor air for residences. Radon levels above this amount are considered a health risk to occupants.

3.17.1.3 Region of Influence

The ROI for hazardous materials and wastes consists of the North Ramp and MSA-1 project areas, which are shown on **Figure 2-1** and **Figure 2-2**, respectively.

3.17.1.4 Existing Conditions

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Hazardous materials and petroleum products such as liquid fuels, pesticides, oils, lubricants, coolants, batteries, cleaners, hydraulic fluids, adhesives, paints, and solvents are used for everyday operations at Andersen AFB. The use of these hazardous materials and petroleum products results in the generation and storage of hazardous wastes and used petroleum products on-installation.

Andersen AFB is a RCRA Large Quantity Generator (USEPA identification number GU6571999519; USEPA 2024b). RCRA Large Quantity Generators generate more than 1,000 kilograms of hazardous waste in any single month.

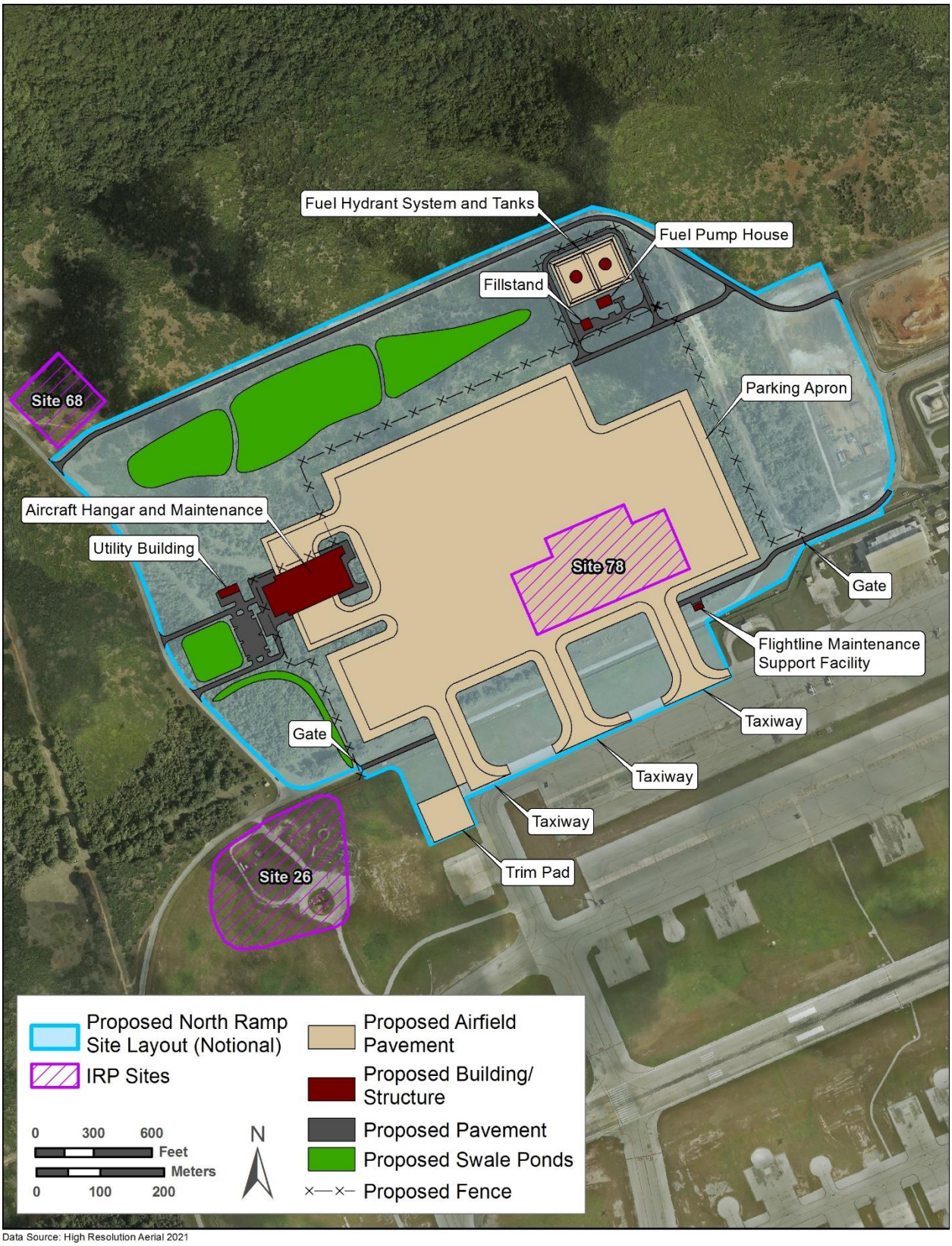
Hazardous materials, petroleum products, or hazardous wastes may be present within Buildings 2550, 2551, and 2552. These buildings currently are used to store vehicles, groundwater sampling equipment, and other tools that support installation restoration, cultural resources, and natural resources programs. Hazardous materials, petroleum products, or hazardous wastes are not stored elsewhere at the North Ramp and MSA-1 project areas.

As noted in **Section 3.10.1.4**, aviation fuel is transported to Andersen AFB via pipeline from the DFSP Guam facility at the DON port facility at Apra Harbor. It is then stored in bulk storage tanks and distributed, as needed, to the hydrant systems on the airfield ramps. Andersen AFB has approximately 66 million gallons of aviation fuel storage capacity. Fuel storage facilities on-installation have primary and secondary containment and leak detection features to contain unintended releases.

Environmental Contamination. Buildings 2550 and 2552 within the North Ramp project area were previously classified as Solid Waste Management Unit (SWMU) 15 based on the presence of an oil/water separator (OWS). The *2011 OWS Management Plan* indicates the OWS at SWMU 15 has been removed. No environmental contamination was associated with SWMU 15, and the site has been removed from further management.

As of October 2021, a total of 81 IRP and 18 MMRP sites were located on Andersen AFB. Of these sites, only one IRP site (Site 78, Former Firefighter Training Area 3) is within the North Ramp project area. Two other IRP sites are in the immediate vicinity of the North Ramp project area: Site 26, Firefighting Training Area 2; and Site 68, Beach Road Waste Pile. No MMRP sites are within the North Ramp project area, and no IRP nor MMRP sites are within the MSA-1 project area (DON 2013). IRP Sites 78, 26, and 68 are shown on **Figure 3-16** and described below:

- **Site 78, Former Firefighter Training Area 3.** Site 78 is an approximately 10-acre area formerly used for firefighter training exercises. The site is on the eastern portion of the North Ramp project area. Firefighting training exercises occurred on this site from 1955 to 1973, and consisted of extinguishing flammable liquids. In 2000, approximately 50, 55-gallon drums were discovered on the site. Five drums were still intact, and contained hydraulic and fuel oil; the remaining drums were empty, rusted, and deteriorated. Surface soil sampling occurred in 2003 at locations of suspected contamination, and discovered six analytes at concentrations exceeding screening levels. A human health risk assessment concluded that no unacceptable risks to human health occur at the site. A no-further-action determination for this site was completed in 2014. The no-further-action determination does not provide unlimited use/unrestricted exposure, and if the anticipated land use of the site changes, DAF would have to perform another risk evaluation to confirm no further action remains valid (DON 2013, NAVFAC PAC 2022).



Data Source: High Resolution Aerial 2021

Figure 3-16. IRP Sites at the North Ramp Project Area

- **Site 26, Firefighting Training Area 2.** Site 26 is an approximately 5-acre area formerly used for firefighter training exercises. The site does not directly coincide with the North Ramp project area, but is immediately to the southwest. Firefighting training exercises occurred on this site from 1958 to 1988, and consisted of extinguishing flammable liquids. The area included a burn pit, OWS, aboveground storage tank, and underground storage tank. The storage tanks held aviation and diesel fuel, gasoline, waste oils, and solvents. A 2010 remedial investigation concluded that although subsurface soils were impacted, the contamination did not represent a risk to human health because of lack of exposure pathways. A no-further-action determination for this site is pending USEPA and GEPA approval (DON 2013).
- **Site 68, Beach Road Waste Pile.** Site 68 is an approximately 10-acre waste pile. The site does not directly coincide with the North Ramp project area, but is immediately to the northwest. A field investigation in June 2005 located two asphalt mounds and a surface depression, but found no debris items. Soil samples found no unacceptable risks to human health or the environment. A no-further-action determination for this site was approved by the USEPA and GEPA in 2008 (DON 2013).

An installation-wide Preliminary Assessment (PA) was prepared in 2022 for Andersen AFB to identify past and current facility operations that could be potential PFAS sources where AFFF or other PFAS-containing materials were used, stored, or disposed. IRP Sites 78 and 26, both of which were former firefighter training areas, were identified as potential PFAS areas of interest in the PA (NAVFAC PAC 2022). The collection of soil samples for the PFAS PA was completed at these sites in December 2023. Sample analyses are currently in progress, and data validation will occur shortly thereafter. The results will be incorporated into the Final EIS if they are available at that time.

While no MMRP sites are at the North Ramp and MSA-1 project areas, both project areas have been identified as locations with a history of MEC and without full clearance. Within these areas, the potential for encountering MEC during construction is considered likely. The types of munitions potentially used at the project areas include small arms, hand grenades, projected grenades, anti-tank rockets, mortars, land artillery, naval artillery, aircraft bombs, and aircraft rockets from U.S. and Japanese forces during World War II. The *Munitions Response Explosive Safety Submission, Guam Construction Support* provides further information on MEC hazards on Andersen AFB, and provides guidance to protect human safety during construction (NOSSA 2020).

Radon. The USEPA rates northern Guam as radon zone 1. Radon zone 1 has a predicted average indoor radon screening level greater than 4 pCi/L (USEPA 1993).

3.17.2 Environmental Consequences

Impacts on or from hazardous materials and wastes would be considered significant if the Proposed Action would result in noncompliance with applicable federal or territory regulations, or would increase the amounts of generated or procured hazardous materials and wastes beyond current management procedures, permits, and capacities. Impacts on contaminated sites would be considered significant if: (1) a proposed action would disturb or create contaminated sites, resulting in negative impacts on human health or the environment; or (2) a

proposed action would make it substantially more difficult or costly to remediate existing contaminated sites.

3.17.2.1 Proposed Action

3.17.2.1.1 F-15 Beddown

Hazardous Materials, Petroleum Products, and Hazardous Wastes. The beddown of up to 12 F-15 aircraft at Andersen AFB would result in long-term, less than significant, adverse impacts on hazardous materials and wastes. Additional quantities of hazardous materials, petroleum products, and hazardous wastes from the maintenance of the proposed F-15s would need to be delivered, stored, used, and disposed appropriately at Andersen AFB, but the quantities required would be similar and proportional to those required for other aircraft operating at the installation. As such, Andersen AFB is anticipated to have sufficient delivery, storage, and disposal capacity to accommodate the increased hazardous material, petroleum product, and hazardous waste requirements from maintenance on up to 12 F-15s.

Flight operations with the proposed F-15 and temporary support aircraft would consume aviation fuel, and additional quantities of aviation fuel may need to be delivered, stored, and used at Andersen AFB. Andersen AFB is proposing upgrades to the North Ramp aviation fuel infrastructure to provide additional fuel receipt, storage, and distribution. These upgrades would increase Andersen AFB's aviation fuel storage capacity by 20,000 barrels (84,000 gallons; approximately 0.1 percent of Andersen AFB's total aviation fuel storage capacity) and provide additional capacity for the proposed F-15s. Impacts from the construction and operation of this aviation fuel infrastructure is provided in **Section 3.17.2.1.2**.

Environmental Contamination and Radon. The beddown of up to 12 F-15 aircraft at Andersen AFB would have no effects on environmental contamination site and radon management.

3.17.2.1.2 North Ramp

Construction

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Temporary, less than significant, adverse impacts would occur from the use of hazardous materials and petroleum products as well as the generation of hazardous wastes during infrastructure construction at the North Ramp. Hazardous materials that could be used include paints, welding gases, solvents, preservatives, and sealants. Hydraulic fluids and petroleum products, such as diesel and gasoline, would be used in the vehicles and equipment supporting construction. Construction would generate minor quantities of hazardous wastes. Disposal of waste would follow applicable regulations identified in **Section 3.17.1.2**. Impacts from the use and generation of hazardous materials, petroleum products, and hazardous wastes would occur during the 3- to 7-year construction period, and would end when construction is complete.

Hazardous materials, petroleum products, and hazardous wastes used or generated during construction would be contained, stored, and managed to minimize the potential for releases. The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan, as required by Section 311(j)(1)(C) of the CWA (as amended by the Oil Pollution Act of 1990); 40

CFR 112, *Oil Pollution Prevention*; and DAFI 32-7044, *Storage Tank Environmental Compliance*, to manage spills or leaks of hazardous materials or wastes.

Hazardous materials, petroleum products, and hazardous wastes discovered within Buildings 2550, 2551, and 2552 would be removed prior to the demolition of these buildings. Removal, handling, and disposal of hazardous materials, petroleum products, and hazardous wastes potentially within these buildings would be performed in accordance with the Andersen AFB SPCC Plan or a site-specific SPCC Plan. No other stored hazardous materials, petroleum products, and hazardous wastes would require removal prior to construction.

The Proposed Action would provide aviation fuel receipt, storage, and distribution capabilities to the North Ramp. The proposed upgrades would be an extension of the existing aviation fuel system at Andersen AFB, and would include a hydrant fueling system and pits, pumphouse, truck fillstands, fuel storage tanks, tie-in to existing fuel transfer lines, and a new transfer line. Approximately 20,000 barrels (84,000 gallons) of new aviation fuel storage capability is proposed using two new aboveground storage tanks. The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage spills or leaks of fuels. The DAF would design and construct the proposed fuel facilities in accordance with all appropriate federal, DoD, and DAF regulations for petroleum fuel pipelines and facilities. The fuels infrastructure would be equipped with a leak detection system, emergency power down stations, and a cathodic protection system with block and bleed valves.

The fuel facilities would also be constructed in accordance with seismic and tropical requirements, including those for seismic and wind loads outlined in American Society of Civil Engineers Standard 7-10, *Minimum Design Loads for Buildings and Other Structures*; UFC 3-310-04, *Seismic Design for Buildings*; UFC 3-301-01, *Structural Engineering*; and UFC 3-440-05N, *Tropical Engineering*. Transfer lines would be equipped with a cathodic protection system with block and bleed valves. All aboveground components of the fuel system would have enhanced corrosion control treatments due to the highly corrosive chloride-moisture-condensing climate of Andersen AFB.

Environmental Contamination. Temporary, less than significant, adverse impacts on human health from environmental contamination would occur. Contractors performing construction could encounter undocumented soil or groundwater contamination. Therefore, prior to construction, soil sampling and analysis would occur on both project areas to evaluate the presence of potential contamination. If soil or groundwater that is believed to be contaminated is discovered during construction, the contractor would be required to immediately stop work, report the discovery to the installation, and implement appropriate safety measures. Commencement of field activities would not continue within that area until the issue was investigated and resolved.

While the North Ramp project area coincides with SWMU 15 and IRP Site 78, these sites require no further action and would not impede the proposed infrastructure upgrades. The proposed infrastructure upgrades would not change the land use of Site 78; therefore, the DAF would not need to perform additional risk evaluation on this site. It is anticipated that Sites 26 and 68 would not impede the proposed infrastructure upgrades because they are immediately adjacent to the North Ramp project area, and no ground disturbance would occur within the

footprint of the contaminated subsurface soils at Site 26 nor the asphalt mounds at Site 68. All applicable land use controls would be followed before, during, and after construction, as appropriate. The construction contractor would be subject to applicable federal, DoD, and Guam requirements for the proper handling of contaminated soil and water.

An installation-wide PA identified IRP Sites 78 and 26 as potential PFAS areas of interest based on their former use as firefighter training areas. Prior to construction, DAF would collect and analyze soil and groundwater samples from the vicinity of both sites to determine the extent of possible PFAS contamination. The results of this sample analysis would assist the DAF in the development of effective PFAS avoidance and management measures, should such measures be necessary.

While no MMRP sites are at the North Ramp project area, the potential for encountering MEC during construction is considered likely. Therefore, the project area would be surveyed and cleared of MEC prior to construction. Even with pre-construction surveys and clearance, some potential for MEC discovery during construction would remain. The greatest potential for discovery of MEC would occur during the land clearing, excavation, and grading phases of construction. In accordance with the requirements of the *Munitions Response Explosive Safety Submission, Guam Construction Support*, construction contractors would undergo MEC identification training. Should any MEC be encountered during construction, the contractor would be required to immediately stop work, report the discovery to the installation, and implement appropriate safety measures. MEC would be collected and disposed in accordance with federal and installation regulations by trained and certified personnel. Commencement of construction within that area would not continue until the issue was resolved.

Radon. Long-term, less than significant, adverse impacts from radon are possible. Based on the USEPA rating of radon zone 1, it is possible the proposed facilities could have indoor radon screening levels greater than 4 pCi/L. Although basements and poorly ventilated areas are most commonly affected by radon, any indoor space in contact with the ground (i.e., first floor of a slab building) is at risk.

New construction would be designed in accordance with UFC 3-490-04A, *Indoor Radon Prevention And Mitigation*, to reduce health risks from indoor radon. Radon management measures apply to buildings occupied for at least 4 hours per day or easily convertible to occupied space in the future. The proposed flightline maintenance facility is the only structure of the Proposed Action that is considered to be “occupied space,” and would be subject to radon management measures. In buildings that test higher than 4 pCi/L, post-construction radon management measures would be required.

Operations

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Long-term, less than significant, adverse impacts would occur from the use of hazardous materials and petroleum products as well we generation of hazardous wastes at the North Ramp. Hazardous materials and petroleum products are most likely to be used and stored, and hazardous wastes are most likely to be generated and stored, in the proposed aircraft hangar and maintenance facility, flightline maintenance facility, and utility building. The proposed aircraft hangar would be

equipped with a fire suppression system, to include an automatic wet-pipe fire sprinkler system and high-expansion foam system. High-expansion foam formulations currently available for use do not contain chemicals classified as PFAS.

New hazardous materials storage and hazardous waste collection points would be established, as necessary, and the proposed aircraft hangar and maintenance facility would include an OWS. The quantities of hazardous materials, petroleum products, and hazardous wastes required at these buildings would be similar and proportional to those required for other hangar and maintenance facilities on Andersen AFB.

One 300-kW standby generator would be installed at the North Ramp. The generator is assumed to be diesel fueled and would hold fuel in an aboveground storage tank integrated into the machine. Minimal volumes of diesel fuel would be periodically delivered to the generator.

All hazardous materials, petroleum products, or hazardous wastes would be stored and handled in accordance with applicable federal, territory of Guam, and DAF management regulations. The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan. The Andersen AFB *Facility Response Plan* and *Hazardous Waste Management Plan* would be amended, as needed, for any new hazardous material, petroleum product, or hazardous waste capabilities.

Environmental Contamination and Radon. Operation of the new infrastructure at the North Ramp would have no effects on environmental contamination site and radon management.

3.17.2.1.3 MSA-1

Construction

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Similar to the construction for the North Ramp infrastructure, construction for the MSA-1 infrastructure would have temporary, less than significant, adverse impacts from the use of hazardous materials and petroleum products as well as the generation of hazardous wastes. Examples of hazardous materials, petroleum products, and hazardous wastes associated with construction and their management procedures are described in **Section 3.17.2.1.2**. The scope of construction for the MSA-1 infrastructure upgrades is much smaller than that of the North Ramp upgrades, resulting in comparatively lesser quantities of hazardous materials, petroleum products, and hazardous wastes required for construction. No hazardous materials, petroleum products, and hazardous wastes would require removal prior to construction of the MSA-1 infrastructure upgrades.

Environmental Contamination. No IRP sites coincide with the MSA-1 project area; therefore, no impacts would occur. While no MMRP sites coincide with the MSA-1 project area, the potential for encountering MEC during construction is considered likely. Therefore, the project area would be surveyed and cleared of MEC prior to construction. Even with pre-construction surveys and clearance, some potential for MEC discovery during construction would remain. The greatest potential for discovery of MEC would occur during the land clearing, excavation, and grading phases of construction. Construction contractors would undergo MEC identification training in accordance with the *Munitions Response Explosive Safety Submission, Guam Construction Support*. Should any MEC be encountered during construction, the contractor

would be required to immediately stop work, report the discovery to the installation, and implement appropriate safety measures. MEC would be collected and disposed in accordance with federal and installation regulations by trained and certified personnel. Commencement of construction within that area would not continue until the issue was resolved.

Radon. Long-term, less than significant, adverse impacts from radon are possible. The proposed buildings at the MSA-1 area are not considered to be "occupied space" and would not be subject to radon management measures.

Operations

Hazardous Materials, Petroleum Products, and Hazardous Wastes. No long-term hazardous materials, petroleum products, and hazardous wastes impacts would occur from operations at the MSA-1 area. No hazardous materials and petroleum products would be used, and no hazardous wastes would be generated from operation of the new infrastructure at the MSA-1 area. The establishment of hazardous materials storage and hazardous waste collection points would not be necessary in the proposed structures at the MSA-1 area.

One 30-kW standby generator would be installed at the MSA-1 project area. The generator is assumed to be diesel fueled and would hold fuel in an aboveground storage tank integrated into the machine. Minimal volumes of diesel fuel would be periodically delivered to the generator. No other aspect of the MSA-1 infrastructure upgrades would affect hazardous materials, petroleum products, and hazardous wastes.

Environmental Contamination and Radon. Operation of the new infrastructure at the MSA-1 area would have no effects on environmental contamination site and radon management.

3.17.2.2 No Action Alternative

Under the No Action Alternative, DAF would not beddown up to 12 F-15s and implement the infrastructure upgrades within the North Ramp and MSA-1 project areas. The existing conditions discussed in **Section 3.17.1.4** would remain unchanged. Therefore, no impacts on hazardous materials and wastes would occur due to the No Action Alternative.

3.17.3 Cumulative Impacts

The Proposed Action and reasonably foreseeable actions would result in temporary increases in the use of hazardous materials and petroleum products as well as the generation of hazardous wastes during construction. Proper equipment maintenance, management of hazardous materials and petroleum products, and disposal of hazardous wastes would be implemented at each project to minimize impacts. Therefore, the reasonably foreseeable actions, when combined with the Proposed Action, would result in less than significant, adverse, cumulative impacts on hazardous materials and wastes.

3.17.4 Mitigations

Mitigation measures have not been identified for hazardous materials and wastes, and would not be required to reduce impacts to less than significant.

3.18 Other Environmental Considerations

3.18.1 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the impacts that use of these resources would have on future generations. Irreversible impacts primarily result from use or destruction of a specific resource that cannot be replaced or retrieved within a reasonable time frame (e.g., energy, minerals). For the Proposed Action, most resource commitments would be neither irreversible nor irretrievable. Most impacts would be short term and temporary (e.g., air emissions from construction), or longer lasting but less than significant (e.g., meeting housing demand for proposed personnel increases). The irreversible environmental changes that would result from implementation of the Proposed Action involve biological resources, and the use/consumption of material, energy, and human resources. The use of these resources is considered to be permanent.

Biological Resources. The Proposed Action would result in the removal of 150.7 acres of vegetated land, or approximately 1.4 percent of the total forested habitat on Andersen AFB. Adverse impacts of the physical disturbance on vegetation as well as the associated habitat loss and modification impacts on vegetation would be addressed by the conservation measures identified through consultation with the USFWS.

Material Resources. Building materials (for construction of facilities) and various material supplies (for infrastructure) would be irreversibly consumed for implementation of the Proposed Action. While construction materials have been less available since the COVID-19 pandemic due to slower production processes and higher demand, material availability is expected to recover prior to construction under the Proposed Action. The use of materials for the Proposed Action would not limit other unrelated construction activities, and their loss would not be considered significant.

Energy Resources. No significant impacts would be expected on energy resources used for the Proposed Action; however, any nonrenewable energy resources consumed would be irretrievably lost. These include petroleum-based products (e.g., gasoline, diesel fuel). During construction, gasoline and diesel fuel would be used for the operation of construction vehicles. Additionally, the proposed increased in annual aircraft operations would require the use of fossil fuels, a non-renewable natural resource. Consumption of these non-renewable energy resources would not place a significant demand on their availability within the region.

Human Resources. The use of human resources for construction is considered an irretrievable loss, but only in that it would preclude such persons from engaging in other work activities. The use of human resources for the Proposed Action represents employment opportunities and is considered beneficial.

3.18.2 Unavoidable Adverse Impacts

Unavoidable adverse impacts would result from implementation of the Proposed Action. As discussed in detail in **Chapter 3**, the Proposed Action would result in short- and long-term, unavoidable, adverse impacts associated with construction, including removal of 150.7 acres of vegetation and wildlife habitat, ground and soils disturbance, and generation of demolition and

construction waste; and associated with construction and increased aircraft operations, including increased noise, increased air emissions, use and generation of small amounts of hazardous materials and wastes, and use of fossil fuels (a nonrenewable natural resource). Significant adverse effects on special status species would be minimized through the implementation of conservation measures identified through consultation with the USFWS. Significant but mitigable, short-term, localized, cumulative impacts on potable water would also be expected.

3.18.3 Relationship between Short-term Uses and Long-term Productivity

CEQ regulations (40 CFR 1502.16) specify that environmental analysis must address "…the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity." Short-term use of the biophysical components of the human environment includes impacts, usually related to construction activities, that occur over a period of less than 5 years. Long-term uses of the human environment include those impacts that occur over a period of more than 5 years, including permanent resource loss.

Under the Proposed Action, short-term uses of the environment would result in potential short-term, adverse impacts as a result of construction activities. These short-term adverse impacts would occur on biological resources, cultural resources, socioeconomics, environmental justice, geology and soils, water resources, infrastructure and utilities, noise, air quality, health and safety, recreation, transportation, and hazardous materials and wastes. Long-term adverse impacts would also be expected on biological resources, cultural resources, geology and soils, water resources, infrastructure and utilities, noise, air quality, recreation, and hazardous materials and wastes. The long-term and permanent loss of vegetation and soil to impervious surfaces would have irreversible and irretrievable impacts on natural resources. The nature of activities for the Proposed Action would not differ from the current use of Andersen AFB, and would not result in the additional intensification of land use within the surrounding area. The long-term beneficial impacts of implementing the Proposed Action would support the ongoing and future missions of Andersen AFB.

3.18.4 Compatibility with Existing Plans and Policies

The Proposed Action would occur on government-owned lands on which the DAF currently operates. The nature of activities for the Proposed Action would not differ from current DAF use of Andersen AFB. The DAF would continue to follow all requirements related to installation development, and operations would therefore be consistent with current federal, territory of Guam, and local land use policies and controls. The Proposed Action and alternatives would not conflict with any applicable off-installation land use ordinances and would follow all applicable permitting, building, and safety requirements. Proposed development would be consistent with the goals and visions outlined in the 2017 Andersen AFB IDP (Andersen AFB 2017).

4. Submitted Alternatives, Information, and Analysis

4.1 Public Involvement Summary

The DAF, and the DoN acting as a cooperating agency, initially issued a Notice of Intent (NOI) on April 20, 2021, to prepare an EIS for Infrastructure Upgrades at Andersen AFB, Guam (Vol. 86, No. 74 *Federal Register*, 20487, April 20, 2021). The initial NOI marked the start of the scoping period, which was conducted from April to May 2021.

Following the initial scoping period, the DAF placed the EIS on a strategic pause to further consider the scope of the EIS, including evolving strategic initiatives in the Indo-Pacific and how the Proposed Action could best support these initiatives. Following the strategic pause, the DAF revised the scope of the Proposed Action to include the beddown of up to 12 RSAF fighter aircraft and associated mission support. On December 15, 2023, the DAF reissued an NOI and initiated an additional scoping period for the revised Proposed Action for the preparation of the EIS for F-15 Beddown and Infrastructure Upgrades at Andersen AFB, Guam (Vol. 88, No. 240 *Federal Register*, 86884, December 15, 2023). The additional scoping period was conducted from December 2023 to January 2024.

4.2 Scoping Periods

4.2.1 Initial Scoping Period (April 2021 to May 2021)

In total, six comment correspondence submissions were received during the initial public scoping period from two federal agencies, three Guam agencies, and one member of the public. No comments were received from federal and Guam political representatives or non-governmental organizations. One comment correspondence was received from an individual who submitted comments via the website three times, one comment correspondence was received via postal mail, and four comment correspondences were received via email. Each comment correspondence submission addressed multiple topics, and submissions were broken down into substantive individual comments; **Table 4-1** provides a summary of the main themes identified in the substantive individual comments. Individual comments and responses are included in **Appendix A**.

Table 4-1. Main Themes in Substantive Comments for First Scoping Period

Theme	Count
Water Resources	9
Cultural Resources	4
Alternatives	3

4.2.2 Additional Scoping Period (December 2023 to January 2024)

In total, 62 comment correspondence submissions were received during the second public scoping period. Each comment correspondence submission addressed multiple topics; a total of 363 substantial individual comments covering 17 main themes were extracted from the comment correspondences (these included 313 substantive individual comments that contained duplicate form content). Submissions were received from 3 federal agencies, 4 Guam agencies, 2 non-governmental organizations, and 43 members of the public. **Table 4-2** provides a summary of the main themes identified in the substantive individual comments. Individual comments and responses are included in **Appendix A**.

Table 4-2. Main Themes in Substantive Comments for Additional Scoping Period

Theme	Count
Hazardous Materials and Wastes	98
Water Resources	68
Biological Resources	42
Noise	36
Military Presence	36
Public Scoping Period	35
Alternatives	35
Socioeconomics	35
Cumulative Projects	34
Air Quality	33
Infrastructure	33
Environmental Justice	33
Cultural Resources	32
Transportation	31
Other	4
Geological Resources	1
Coastal Zone Management Act Consistency	1

4.2.3 Submitted Alternatives

No additional alternatives were submitted by the public or agencies during either scoping period via the scoping process.

4.2.4 Information and Analysis

Appendix A provides scoping comment tables for each of the two distinct scoping periods. Comments are broken down by subject or theme. Individual comments, both substantive and non-substantive, are included in the tables in **Appendix A**; however, only substantive comments are provided responses. Responses indicate how a particular comment issue is addressed in the Draft EIS. The DAF considers substantive comments to be those that offer

information regarding the alternatives and analysis, or those that offer information relative to the EIS process.

Non-substantive comments generally include, but are not limited to, comments that express a conclusion, opinion, or vote for or against the proposal itself, or some aspect of it; that state a position for or against a particular alternative; or that otherwise state a personal preference or opinion. Several non-substantive comments express views opposing military buildup on Guam or the Mariana Islands in general. Although such comments tend to be considered non-substantive as a “no vote,” they are included in the tables due to the cultural importance of the views that are expressed by the local population. All comments received on this proposal will be included in the Administrative Record regardless of when they were received and their substantive or non-substantive nature.

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6. List of Preparers

This EIS has been prepared by HDR, Inc., under the direction of the DAF Civil Engineer Center, Headquarters PACAF, and Installation and Mission Support Center. The individual contractors who contributed to the preparation of this document are:

Jennifer Abrincia
Biological and Water Resources
B.S. Biology
Years of Experience: 4

Kelly Albery
Quality Assurance/Quality Control
B.S. Wildlife Conservation and Management
Years of Experience: 10

Isha Alexander
Project Manager/Biological and Water Resources
M.S. Biology
M.S. Organizational Psychology
B.S. Psychology
Years of Experience: 20

Michelle Bare
Geology and Soils
B.A. General Studies
Years of Experience: 32

Chad Blackwell
Cultural Resources Lead
M.H.P. Historic Preservation
Years of Experience: 20

Timothy Didlake
Hazardous Materials and Wastes
B.S. Earth Sciences
Years of Experience: 16

Jessica Forbes
Cultural Resources
M.A. History/Public History
B.A. History
Years of Experience: 18

Kevin Gilmore
Cultural Resources
PhD Physical Geography
M.A. Anthropology
B.A. Anthropology
Years of Experience: 43

Cheyenne Ginther
Biological Resources/EFH
M.S. Fish, Wildlife and Conservation
B.S. Biology
Years of Experience: 11

Elizabeth Grover
Environmental Planner and Technical Editor
M.A. Anthropology
B.A. Anthropology
Years of Experience: 23

Becky Hawkins
Natural Resources Lead
M.S. Forestry
B.S. Natural Resources and Environmental Sciences
Years of Experience: 20

Carolyn Hein
Health and Safety and Transportation
B.S. Environmental Science
Years of Experience: 5

Becky Holloway
Biological Resources/EFH
M.S. Biology
B.S. Marine Biology
Years of Experience: 27

Abbey Humphreys
Land Use, Recreation, and Coastal Zone Management
M.S. Biology
B.S. Environmental Biology
B.S. Geospatial Science
Years of Experience: 7

Timothy Lavallee
Noise and Air Quality
M.S. Civil/Environmental Engineering
B.S. Mechanical Engineering
Years of Experience: 30

Kathy Lemberg
Geographic Information Systems
B.A. Anthropology
Years of Experience: 14

Shelby Pace
Biological Resources/EFH
B.S. Environmental Science
Years of Experience: 6

Celeste Pachella
Infrastructure and Utilities
GIT Certified
B.S. Environmental Science
Years of Experience: 2

Deborah Peer
Environmental Justice
M.S. Environmental Science and Management
B.S. Zoology
B.S. Wildlife Science
Years of Experience: 22

Stephen Pyle
Senior Project Manager
J.D. with Certification in Environmental Law
B.S. Natural Resources Management
Years of Experience: 20

Amberlyn Rector
Socioeconomics
B.S.G. General Studies
Years of Experience: 3

Meghan Robinson
Socioeconomics and Environmental Justice
M.S. Environmental Management and Policy
B.S. Environmental Biology
Years of Experience: 11

Craig Shirk, AICP, ENV SP
Infrastructure and Utilities
M.S. Environmental Science
B.A. Geoenvironmental Studies
Years of Experience: 26

Emily Smith Moeller
Quality Assurance/Quality Control
M.R.L.S. Natural Resources Law Studies
B.A. Biology
Years of Experience: 18

Patrick Solomon, CEP
Quality Assurance/Quality Control
M.S. Geography
B.A. Geography
Years of Experience: 30

Morgan Tassone
Quality Assurance/Quality Control
M.S. Environmental Sciences
B.S. Environmental Studies
Years of Experience: 7

7. Glossary

A-weighted decibel (dBA): Decibel measurement on the "A-weighting" scale. A decibel adjusted (weighted) to reflect the relative loudness of sounds most sensitive to human ears.

Air Quality: The degree to which the ambient air is pollution-free, assessed by measuring a number of indicators of pollution.

Air Quality Control Region (AQCR): A contiguous area where air quality is relatively uniform. AQCRs may consist of two or more cities, counties, or other governmental entities, and each region is required to adopt consistent pollution control measures across the political jurisdictions involved.

Attainment Areas: A region within which the level of a pollutant is considered to meet the NAAQS.

Clean Air Act (CAA): This Act empowered the USEPA to establish standards for common pollutants that represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect public health and safety.

Clean Water Act (CWA): This Act is the primary federal law in the U.S. governing water pollution. The CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution, and ensuring that surface waters would meet standards necessary for human sports and recreation.

Council on Environmental Quality (CEQ): The CEQ is within the Executive Office of the President, and is composed of three members appointed by the President, subject to approval by the Senate. Members are to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs of the nation as well as formulate and recommend national policies to promote the improvement of environmental quality.

Cultural Resource: Any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes.

Day-Night Average Sound Level (DNL): Represents the average sound energy in a 24-hour period, with a 10 dB penalty added to the nighttime levels from between 10:00 p.m. and 7:00 a.m.

Decibel (dB): A unit used to express the intensity of a sound wave, equal to 20 times the common logarithm of the ratio of the pressure produced by the sound wave to a reference pressure, usually 0.0002 microbar.

Department of the Air Force Instruction (DAFI): Instructions implementing U.S. laws and regulations, and providing policy for DAF personnel and activities.

Endangered Species: The ESA of 1973 defined the term "endangered species" to mean any species (including any subspecies of fish, wildlife, or plant, and any distinct population segment

of any vertebrate fish or wildlife species that interbreeds when mature) that is in danger of extinction throughout all or a significant portion of its range.

Environmental Justice: Pursuant to EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, review must be made as to whether a federal program, policy, or action presents a disproportionately high and adverse human health or environmental effect on minority and/or low-income populations.

Equivalent Sound Level (L_{eq}): The level of a steady-state noise without impulses or tone components, which is equivalent to the actual noise emitted over a period of time.

Fiscal Year (FY): The U.S. government accounting year, from October 1 through September 30.

Greenhouse Gas (GHG): Any gas, such as carbon dioxide or chlorofluorocarbons, that contributes to the greenhouse effect when released into the atmosphere.

Groundwater: Water held underground in the soil, or in pores and crevices in rock.

Floodplain: An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.

Hazardous Material: Includes solids, liquids, or gases that can harm people, other living organisms, property, or the environment.

Hazardous Waste: Waste that poses substantial or potential threats to public health or the environment. In the U.S., the treatment, storage, and disposal of hazardous waste is regulated under the RCRA.

Hertz (Hz): A unit of frequency equal to one cycle per second.

Important Farmland: A designation assigned by the U.S. Department of Agriculture. Important farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The land is also used as cropland, pastureland, rangeland, forest land, or other land, but cannot be used as urban built-up land or water.

Mobile Sources: Includes cars and light trucks, heavy trucks and buses, nonroad engines, equipment, and vehicles.

National Ambient Air Quality Standards (NAAQS): The USEPA establishes NAAQS for criteria pollutants that represent the maximum levels of background pollution considered safe, with an adequate margin of safety, to protect public health and safety.

National Environmental Policy Act (NEPA): This Act directs federal agencies to take environmental factors into consideration in their decisions.

National Historic Preservation Act (NHPA): This Act established a program for the preservation of historic properties throughout the U.S.

National Register of Historic Places (NRHP): The federal government's official list of districts, sites, buildings, structures, and objects deemed worthy of preservation.

Nonattainment Areas: A region where air pollution levels persistently exceed NAAQS.

PM_{10}: Particulate matter less than 10 microns in diameter.

$PM_{2.5}$: Particulate matter less than 2.5 microns in diameter.

Scoping: A NEPA process for identifying the main issues of concern at an early stage in planning to discover any alternatives and aid in site selection.

Threatened Species: A species likely to become endangered within the foreseeable future throughout all, or a significant portion, of its range.

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