Draft

Environmental Impact Statement / Overseas Environmental Impact Statement

GUAM AND CNMI MILITARY RELOCATION

Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force

Volume 5: Army Air and Missile Defense Task Force

November 2009

Comments may be submitted to:

Joint Guam Program Office
c/o Naval Facilities Engineering Command, Pacific
Attn: Guam Program Management Office
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860

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Guam and CNMI Military Relocation EIS/OEIS

Volume 5: Army Air and Missile Defense Task Force

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CHAPTER 1.
PURPOSE OF AND NEED FOR ACTION

Chapter 1:

1.1 INTRODUCTION

On December 16, 2002, National Security Presidential Directive (NSPD)-23 (Bush 2002) directed the Department of Defense (DoD) to establish a capability to protect the United States (U.S.) homeland, forces, and its allies from ballistic missile attacks starting in 2004.

The ballistic missile defense program develops the capability to defend territories and forces of the U.S. and its allies against all classes and ranges of ballistic missile threats. To protect the territory of Guam and the U.S. forces on Guam from such threats, an Army Air and Missile Defense Task Force (AMDTF) is proposed.

1.2 PURPOSE AND NEED

The overarching purpose of and need for the proposed actions, including the AMDTF, is outlined in Volume 1, Section 1.3.1. With regard to the specific proposed action in Volume 5, the purpose is to develop land-based terminal defense and to develop infrastructure and facilities that support the presence and operation of an AMDTF land based air defense capability on Guam.

A significant number of countries have ballistic missile capabilities and others are working to establish these missile systems. Such systems can deliver conventional, nuclear, biological, and chemical weapons. The range of the defensive ballistic missiles dictates their location must be in the proximity of the protected assets. The need for the proposed action is to protect the territory of Guam, its citizens, and U.S. forces on Guam from the threat of harm from ballistic missile attacks from other countries and enemies of the U.S.

1.3 DECISIONS TO BE MADE

Siting and construction of associated facilities to support training and operations for the Army AMDTF on Guam.

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CHAPTER 2.
PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW

The proposed master planning action for an Army Air and Missile Defense Task Force (AMDTF) on Guam contains the following three missile components:

- The Terminal High Altitude Area Defense (THAAD) system is a long-range, land-based air defense weapon system that provides terminal defense against ballistic missiles. This system is designed to intercept missiles during late mid-course or final stage flight. The THAAD flies at high altitudes and provides broad area coverage against threats to critical assets such as population centers, industrial resources, and military forces.
- Patriot Missiles target cruise missiles and air breathing threats that threaten the THAAD or other civilian or military assets on Guam. This weapons system is a point defense option with limited range designed to strike threat aircraft, unmanned aerial vehicles, and cruise missiles just before impact. This system utilizes hit-to-kill technology.
- A Surface-Launched Advanced Medium-Range Air-to-Air Missile (SLAMRAAM) engages targets to beyond line-of-sight and defends against the air threat from unmanned aerial vehicles and cruise missiles.

The Army AMDTF is a ground force that would not be accompanied by aircraft or ships. Components would include command and control, missile field teams, maintenance, and logistics/supplies support. The proposed mode of operation relies on inter-service agreements for all other support facilities. The Army has set aside $242 million for funding in Fiscal Year (FY)-14 and FY-15 for construction of the required facilities (including the weapons emplacement site).

Figure 2.1-1 summarizes the three alternatives carried forward in the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) impact analysis.

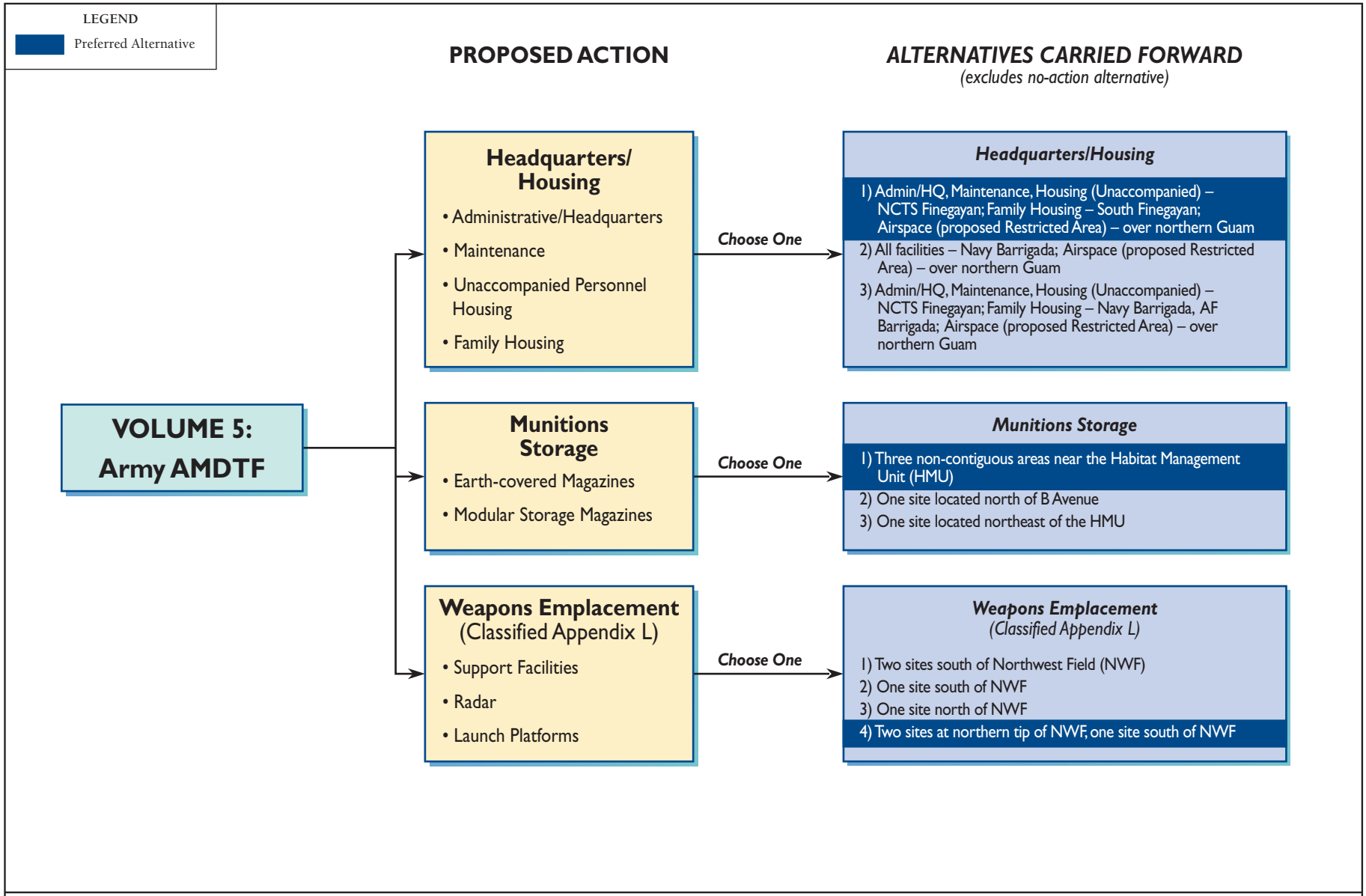

Figure 2.1-1
Summary of Proposed Action and Alternatives Carried Forward for the Army Air and Missile Defense Task Force, Guam

2.2 ALTERNATIVES ANALYSIS METHODOLOGY

The siting options and analyses, including the alternatives considered and dismissed, would be as described for the United States (U.S.) Marine Corps (Marine Corps) portion of the proposed action (see Volume 2). The siting process addressed the major components of the proposed action, such as Headquarters (HQ), Operations, bachelor quarters, and family housing. Requirements for the facilities are addressed in the Marine Corps Main Cantonment component as the Army and Marine Corps would be sharing these facilities. Weapon platform siting is classified and is assessed in a Classified Appendix (Appendix L) to this public EIS/OEIS. The general areas of the proposed weapons emplacement sites are not classified, but the proposed configurations within the areas are classified.

2.3 PROPOSED ACTION

The proposed action addressed in this volume is to construct facilities and infrastructure on Guam to support relocating Army and dependent personnel, and to establish and operate an Army AMDTF. Three key elements of the proposed action include personnel, facilities, and operations, as discussed in more detail below.

2.3.1 Personnel

The Army AMDTF would require approximately 630 soldiers, 126 civilian personnel, and 950 dependents, as summarized in Table 2.3-1. For planning purposes it is assumed that all soldiers, contractors, and dependents would be permanently stationed on Guam. The on-island Army population associated with the Army AMDTF would be 50 personnel by 2014, with all 630 military personnel arriving by 2015. All of the civilian population would arrive in 2015. Currently, there are no active duty deployable Army units on Guam. The Guam Army National Guard and Army Reserve have a presence, but are not part of the proposed Army AMDTF action.

Table 2.3-1. Summary of Population Increase Associated with the Proposed AMDTF Action on Guam

Service	*Persons*
Army	630
Dependents – Army	950
Total military personnel and dependents	**1,580**
Total Civilians[1]	126

Notes: [1]Estimated based on Guam Air Force and Navy Civilian positions. Would be filled by new population moving to Guam.
Source: NAVFAC Pacific 2009.

2.3.2 Facilities

Facilities associated with the Army AMDTF would include: administration/HQ and maintenance facilities, munitions storage, weapons emplacement sites, and family housing and associated quality of life (QOL) facilities.

All building construction projects associated with the Army would attain a Silver Leadership in Energy and Environmental Design (LEED) New Construction rating.

2.3.2.1 Administration/HQ and Maintenance Facilities

The administration/HQ and maintenance facilities would comprise approximately 28 acres (ac) (11 hectares [ha]) of developed land including a battalion headquarters, company facilities, and tactical vehicle maintenance facilities (Table 2.3-2).

Table 2.3-2. Army AMDTF Facility Requirements

List of Structures	*Total Floor Area (ft^2)*	*# of floors/BLDG*	*BLDG Footprint (ft^2)*	*Parking Req. (ft^2)*
1. Battalion HQ	18,010 (1,682m^2)	2	10,985 (1,020 m^2)	16,380 (1,820m^2)
2. Company Facilities	71,600 (6,652m^2)	2	61,546 (5,7182,934 m^2)	109,725 (10,194m^2)
3. Tactical Equipment Maintenance Facilities	57,031 (1,614 m^2)	2	46,200 (4,2922,649 m^2)	39,5923 (3,678m^2)
4. Central Vehicle Wash Facilities	255,697 (23,755m^2) (includes water collection components)	2	75,100 (6,968 m^2)	
5. Organizational Storage	7,000 (650m^2)	2	7,000 (650m^2)	1,750 (624 m^2)
6. Organizational Parking		Paved		373,950 (34,741m^2)
7. Housing	Enlisted and Officer housing would be required for 1,580 personnel and dependents.			
8. Oil Storage Building	1,800 (167m^2)		1,800 (167m^2)	

Legend: BLDG = building; ft^2 = square foot, m^2 = square meter.

2.3.2.2 Munitions Storage

Eight new climate-controlled, earth–covered magazines (ECMs) and Modular Storage Magazines (MSMs) are proposed on Andersen Air Force Base (AFB) approximately 1 mile (1.6 kilometers [km]) north of the junction of Route 9 and Route 3A. The proposed magazines would be used to store Army missiles and provide safe stowage of the system launchers during inclement weather. The proposed magazines would be constructed based on a standard design that provides required structural components, humidity control, and fire and lightning protection systems. All proposed magazines would meet Anti-Terrorism/Force Protection requirements.

One THAAD launcher storage module (ECMs), two Patriot launcher storage module (ECMs), one SLAMRAAM/Avenger launcher storage module (ECMs), and four missile magazines (MSMs) (see table 2.3-3). The ECMs would be covered with a minimum of 2 ft (0.6 m) of earth. In accordance with established ammunitions storage requirements, native grassy vegetation would be established on and around the magazines. The vegetation would be maintained (e.g., periodically mowed) to minimize fire hazard.

An important operational component of ammunition storage is the associated explosive safety hazard arc, called the Explosive Safety Quantity Distance (ESQD) arc. These are planning areas that surround explosive hazard sites and define the minimum permissible distance between the hazard of the explosive and any inhabited building, public assembly area, and/or the boundary of Department of Defense (DoD) lands. Existing munitions storage facilities generate an ESQD arc that encompasses much of the land in central Andersen AFB. The new magazines would require expansion of the existing ESQD arc. The arc could be up to 1,250 feet (381 m) from each magazine.

2.3.2.3 Weapons Emplacement Sites

The weapons emplacement sites would be constructed to accommodate THAAD and Patriot Missile operations. The THAAD and Patriot Missile facilities are summarized in Table 2.3-3. The missile system components are mobile, but the emplacement sites are fixed. The Avenger/SLAMRAAM operations are mobile units. Weapons emplacement sites would include bermed fuel storage areas and crew billeting for shift use.

The general areas of the proposed weapons emplacement sites are not classified. The four geographic alternatives are shown in Figure 2.3-1. Proposed configurations within the areas are classified. These locations and their respective potential environmental impacts are described in a Classified Appendix to this EIS/OEIS, which will be reviewed by resource agency personnel with the appropriate security clearance.

Table 2.3-3. THAAD and Patriot Equipment at Emplacement Sites and Missile Storage Facilities

List of Structures (Assumed Quantity)	*Footprint*
1. THAAD – Launchers (3)	100ft × 50 ft = 5,000ft^2 (30m × 15 m = 465 m^2)
2. THAAD – THAAD Fire Control and Communications TFCC	197ft × 164 ft = 32,292 ft^2 (60m × 50 m = 3,000 m^2)
3. THAAD – Radar (Antenna Equipment Unit, Prime Power Unit, Electronic Equipment Unit and Cooling Equipment Unit).	197ft × 164 ft = 32,292 ft^2 (60m × 50 m = 3,000 m^2)
4. THAAD – Missile Reload	82ft × 82 ft = 6,724ft^2 (25m × 25 m = 625 m^2)
5. THAAD – Personnel Operations Area	82ft × 82 ft = 6,724 ft^2 (25m × 25 m = 625 m^2)
6. THAAD – Readiness Building	70 ft × 50 ft = 3,510 ft^2 (15 m × 21 m = 326 m^2) For 24/7 manning 25-person crew showers
7. THAAD – Maintenance Personnel Pad	98 ft × 164 ft = 16,072 ft^2 (50 m × 30 m = 1,493 m^2)
8. THAAD – FMTV Tractor Pad	164 ft × 197 ft = 32,308 ft^2 (60 m × 50 m = 3,002 m^2)
9. THAAD – Vehicle Parking Area	82 ft × 246 ft = 20,160 ft^2 (75 m × 25 m = 1,873 m^2)
10. Patriot – Launchers (6)	50 ft × 50 ft = 2,500 ft^2 (15 m × 15 m = 232 m^2)
11. Patriot – Radar, Engagement Control Station, Electric Power Plant, Antenna Mast Group	131ft x 148 ft = 19,375 ft^2 (45m × 40 m = 1,800 m^2)
12. Patriot – Fuel Tankers	50 ft × 100 ft = 5,000 ft^2 (15 m × 30 m = 465 m^2)
13. Patriot – Readiness Building	70 ft × 50 ft = 3,510 ft^2 (15 m × 21 m = 326 m^2) For 24/7 manning 25-person crew showers
14. Patriot – Communication Tower	100 ft (30 m) telescopic Antenna – truck mounted
15. Patriot – Fire Direction Center (FDC)	82 ft × 82 ft = 6,724 ft^2 (25 m × 25 m = 625 m^2)
16. Patriot – Vehicle Parking Area	82 ft × 246 ft = 20,160 ft^2 (75 m × 25 m = 1,873 m^2)
Missile Storage (4)	
17. Patriot – Reload Pad	130 ft x 52 ft = 6,760 ft^2 (16 m × 40 m = 628 m^2)
18. Security Control Center (SCC)	20 ft × 25 ft = 500 ft^2 (8 m × 6 m = 46 m^2)
19. Entry Control Point (ECP)	20 ft × 8 ft = 160 ft^2 (2 m × 6 m = 15 m^2)
20. THAAD Launcher Storage (ECM) (1)	60’ X 66’ = 3,960 ft^2
21. Patriot/Avenger/ SLAMRAAM Launcher Storage (ECM) (3)	80’ X 66’ = 5,280 SF ft^2
22. Guided Missile Magazines (MSM) (4)	85’ X 30’ = 2,550 SF ft^2

2.3.2.4 Family Housing and Associated QOL Facilities

New facilities would be required to house Army personnel and their dependents. Requirements for the accompanied and unaccompanied housing facilities and QOL support facilities are addressed in the Marine Corps Main Cantonment component, as the Army and Marine Corps would be sharing these facilities (see Volume 2).

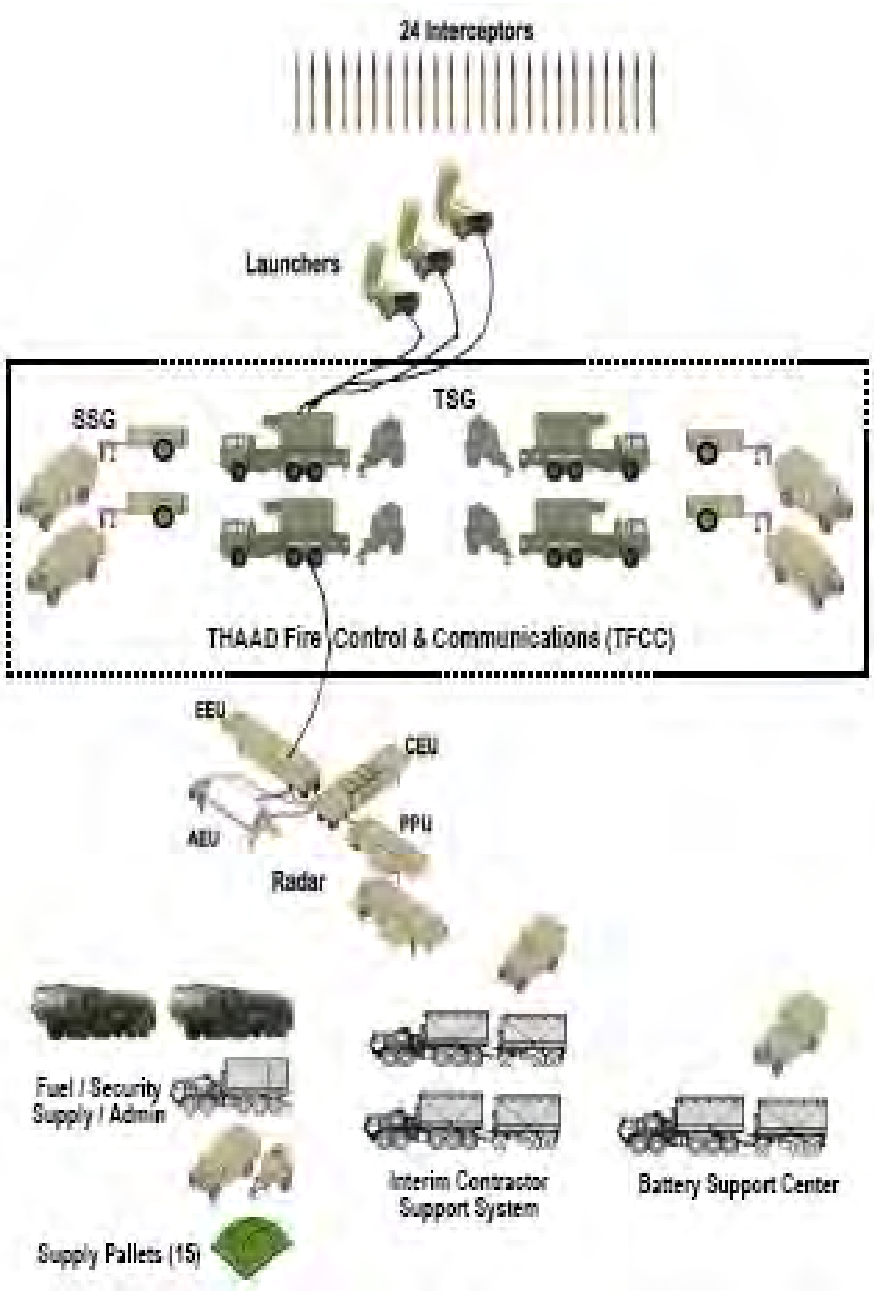

Figure 2.3-1
THAAD Conceptual Configuration

Source: THAAD Capabilities Brief MDA/DOS Case No: T00-D-0134-07 (29 Mar 07)

2.3.3 Operations

2.3.3.1 Administration/HQ and Maintenance

During a typical notional work week, operations at the administration/HQ and maintenance facilities would occur 12 hours per day and 5 days per week. Approximately 630 personnel and approximately 30 visitors per day would access the facility. Among the 630 personnel are those who support the emplacement sites. Each day, these personnel must first report to the administration/HQ facilities for daily briefings and other activities before reporting to the emplacement site location.

Maintenance activities, including vehicle services (oil changes and lubrications, brake jobs) and any engine maintenance repairs that are needed, would be conducted. Other repair activities would include air conditioning repair, generator repair, communication equipment repair and testing, radar system repairs. Painting would only be done for minor repairs. Other activities would include storage of petroleum, oils, and lubricants (POL); battery storage; fuel dispensing; and welding.

2.3.3.2 Weapons Emplacement Sites

Based on requirements, (Contingency, Maintenance, Training, Certification), planned preventive maintenance would require a minimum continuous period of 45 minutes daily Monday through Friday. Personnel would be on-site after initially reporting to administration/HQ and the system would be active based on need. The THAAD, Patriot, and SLAMRAAM/Avenger facilities would be maintained by approximately 25 personnel at any given time.

The proposed THAAD, Patriot, and SLAMRAAM/Avenger facilities are itemized in Table 2.3-3. In addition to the facilities, the following basic components make up the THAAD, Patriot, and SLAMRAAM/Avenger weapons systems (Figure 2.3-1):

- Fire Direction Center (FDC) – The FDC exercises direct control and supervision of Patriot FUs and attached THAAD batteries during the air battle. The FDC is responsible for operating the Information Coordination Central (ICC). The ICC exchanges data and voice information with the Headquarters Operations Center, the Patriot Fire Unit(s), and the THAAD battery. If the Task Force Operations Center is non-mission capable, the ICC can establish TADIL-J as a primary or TADIL-B communications directly with the regional Control and Reporting Center (CRC). The Engagement Control Station communicates with the launching stations, other AD units, and higher command headquarters. It is the tactical control station that provides the human interface for control of the automated system functions. Operators maintain situational awareness of active and passive airspace as well as the status of unit communications and power generators.
- Radar – provides a broad range of surveillance services that perform target search, acquisition, identification, and tracking functions.
- Interceptor – the missile that intercepts an incoming hostile missile threat or air breathing threat.
- Launch Platforms / Fire Unit – truck-mounted launchers transport, aim, and launch missiles.
    - The THAAD launcher carries a missile round pallet which contains up to eight missiles.
    - Each Patriot Missile launcher has four to 16 missiles, depending on configuration. The Guidance Enhanced Missile variant load is four each, and the PAC-III missile load is 16 each.
    - The SLAMRAAM/Avenger launcher capacity is eight missiles.

2.3.3.3 Training

Two major categories of training would be required: individual/crew and collective. Individual/crew training would include basic rifle marksmanship and crew-served weapons training. Training ranges on Guam and in the Commonwealth of the Northern Mariana Islands (CNMI) are considered joint use, i.e., available to all U.S. forces. Consequently, the Army would utilize ranges within the Mariana Islands Range Complex (MIRC) for this type of training. Collective training and certification would be required for the Army AMDTF. Routine crew training on all aspects leading up to and through a launch would be required for THAAD, Patriot, and SLAMRAAM weapons systems. These training exercises would be conducted at the Army facilities and no training-specific facilities would be required. No live-fire missile launch training exercises would occur on Guam or in the CNMI.

2.3.3.4 Airspace

During THAAD radar operation, there is a potential hazard to military and civilian aircraft. Therefore, proposed Special Use Airspace (SUA) would be located along and off the northwest coast of Guam. The SUA would consist of a proposed Restricted Area to accommodate hazards associated with THAAD radar operations. The proposed Restricted Area (to be called R-7205) would be from the surface up to 22,000 ft (6,700 m) above mean sea level (MSL) (Flight Level [FL] 220) and would be activated based on Federal Aviation Administration (FAA) approved airspace periods required for system maintenance, training, certification, and contingency operations. Planned preventive maintenance would require a minimum continuous period of 45 minutes daily Monday through Friday. Training and certification periods would be processed to the FAA for approval to use the R-7205 airspace. The FAA would issue a Notice to Airmen (NOTAM) prior to scheduled use of the airspace.

Figure 2.3-2 depicts the proposed SUA associated with the THAAD. Proposed R-7205 boundaries would start at lat. 13^{0}34'20"N., long. 144^{0}43'00"E.; to lat. 13^{0}40'00"N., long. 144^{0}44'41"E.; to lat. 13^{0}45'18"N., long. 144^{0}54'00"E.; to lat. 13^{0}38'38"N., long. 144^{0}54'03"E.; to lat. 13^{0}34'13"N., long. 144^{0}48'25"E.; to the point of beginning.

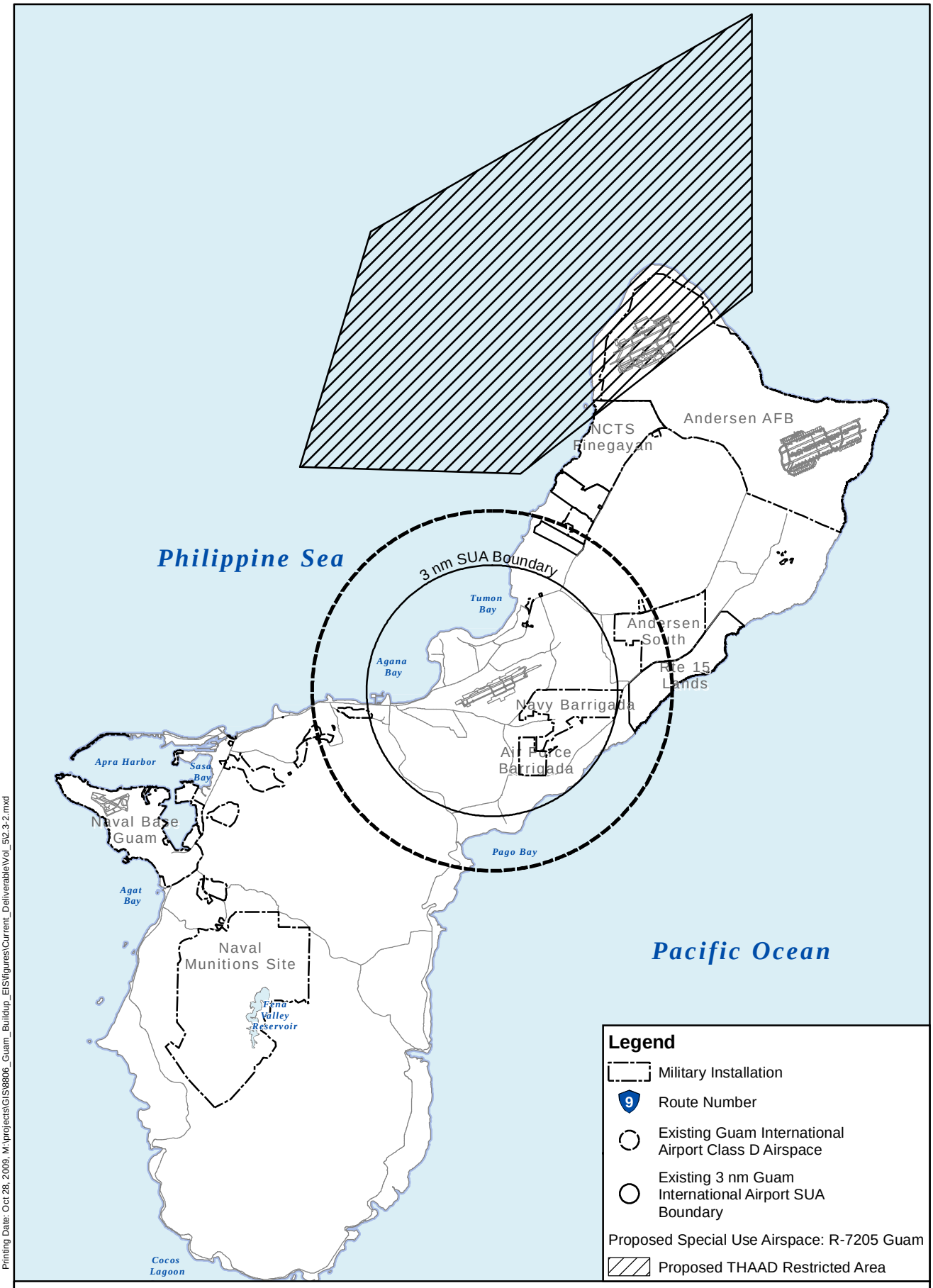

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Figure 2.3-2
New Special Use Airspace Requirements for the Proposed Action

2.4 ALTERNATIVES

The Navy and Army have conferred and identified three action alternatives and the no-action alternative for consideration of proposed Army AMDTF facilities and operations on Guam. The two lesser components (the munitions storage magazines and the weapons emplacement sites) each have their own set of alternatives. All sets of alternatives are described below. The preferred alternative for the headquarters/housing component of the AMDTF action is Alternative 1, the preferred alternative for munitions storage is Alternative 1, and the preferred alternative for the weapons emplacement sites is Alternative 4.

2.4.1 Headquarters/Housing Alternatives

2.4.1.1 Headquarters/Housing Alternative 1 – Army AMDTF Co-located with Marine Corps at Finegayan (Preferred Alternative)

- Administrative/HQ, maintenance operations, and housing facilities for unaccompanied personnel would be co-located in the eastern portion of Naval Computer and Telecommunications Station (NCTS) Finegayan and are compatible with adjacent proposed Marine Corps land uses (Figure 2.4-1).
- Accompanied personnel housing facilities would be co-located with the Main Cantonment housing areas in South Finegayan, while recreational and QOL facilities would be co-located within and adjacent to the housing areas.
- The administrative/HQ, maintenance, housing, and QOL portions of this alternative are included in Marine Corps Alternatives 2 and 3 (refer to Volume 2).

2.4.1.2 Headquarters/Housing Alternative 2 – Army AMDTF Located at Navy Barrigada

- The administrative/HQ and maintenance operations would not be co-located with the Marine Corps Main Cantonment facilities. The administrative/HQ and maintenance element would be located within Navy Barrigada (Figure 2.4-1) adjacent to the NCTS antenna farms.
- Accompanied and unaccompanied personnel housing facilities would be located within Navy Barrigada, with recreational and QOL facilities included in the housing areas.
- The administrative/HQ, maintenance, housing, and QOL portions of this alternative are not included in any of the Marine Corps Alternatives (refer to Volume 2).

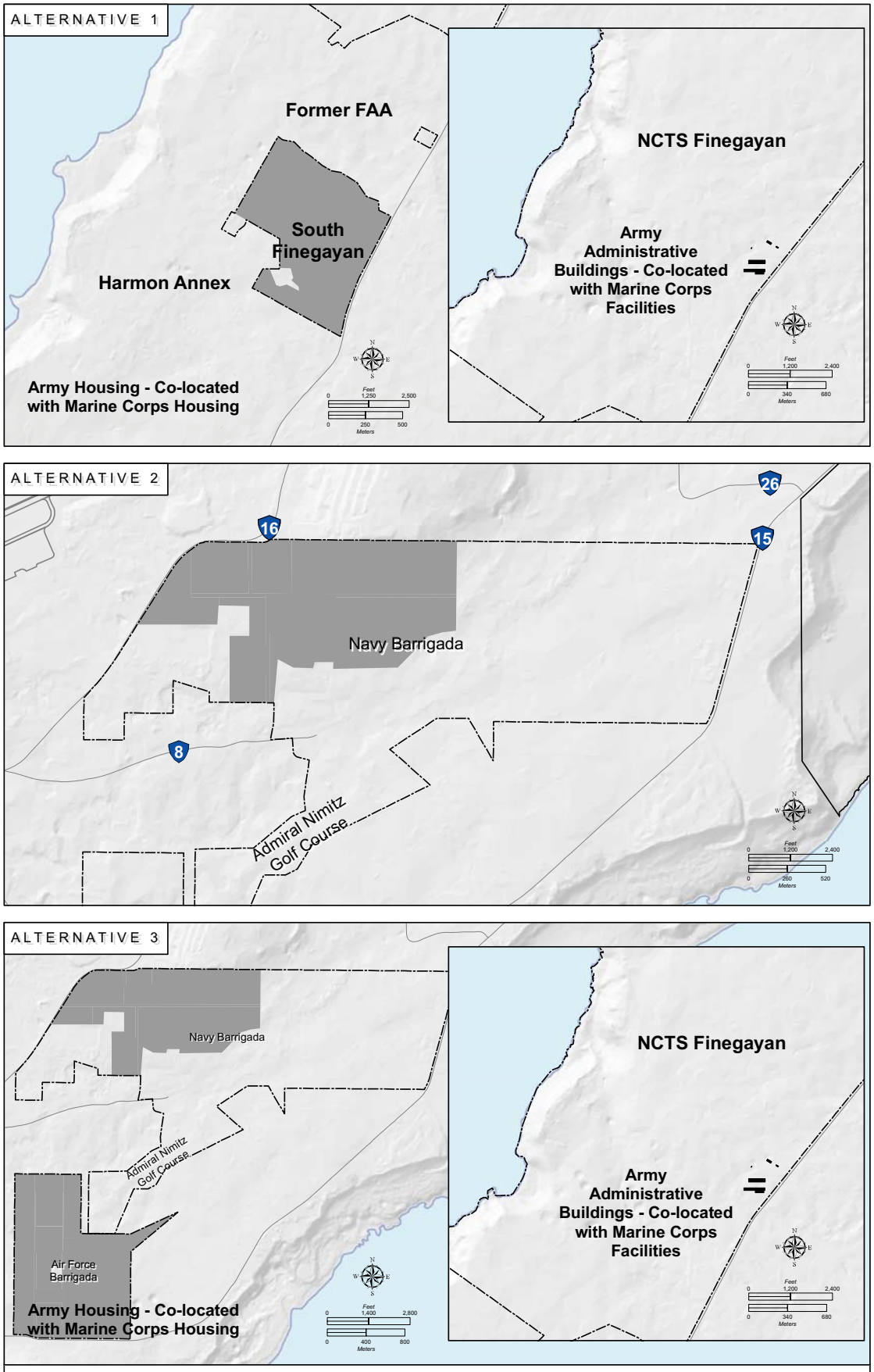


Figure 2.4-1
Army AMDTF Headquarters/Housing Alternatives

2.4.1.3 Headquarter/Housing Alternative 3 - Army AMDTF Co-located with Marine Corps at Finegayan, Navy Barrigada, and Air Force Barrigada

- The administrative/HQ, maintenance, and unaccompanied personnel housing would be co-located in the eastern portion of NCTS Finegayan and are compatible with adjacent proposed Marine Corps land uses (Figure 2.4-1).
- Accompanied personnel housing facilities would be co-located with Marine Corps housing within Navy Barrigada and Air Force Barrigada. Recreational and QOL facilities would be included in the housing areas.
- The administrative/HQ, maintenance, housing, and QOL portions of this alternative are included in Marine Corps Alternative 3 (refer to Volume 2).

2.4.2 Munitions Storage Alternatives

2.4.2.1 Munitions Storage Alternative 1 (Preferred Alternative)

Munitions storage would be in three non-contiguous areas near the Habitat Management Unit (HMU) (Figure 2.4-2). The HMU boundaries specifically exclude two magazine storage areas on 0.7 ac (0.3 ha). These magazines are currently being used by the AAFB for inert storage. The proposed magazines would be constructed at these two sites (requiring demolition) and at a third site located east of the HMU across an unnamed roadway. The area of ground disturbance including a buffer (and excluding the existing munitions storage facilities) is estimated to be 6.6 ac (2.7 ha). Existing munitions storage facilities may need to be relocated. The relocation of existing munitions storage facilities would be in Munitions Storage Area 1; however, an exact location has not been determined at this time.

2.4.2.2 Munitions Storage Alternative 2

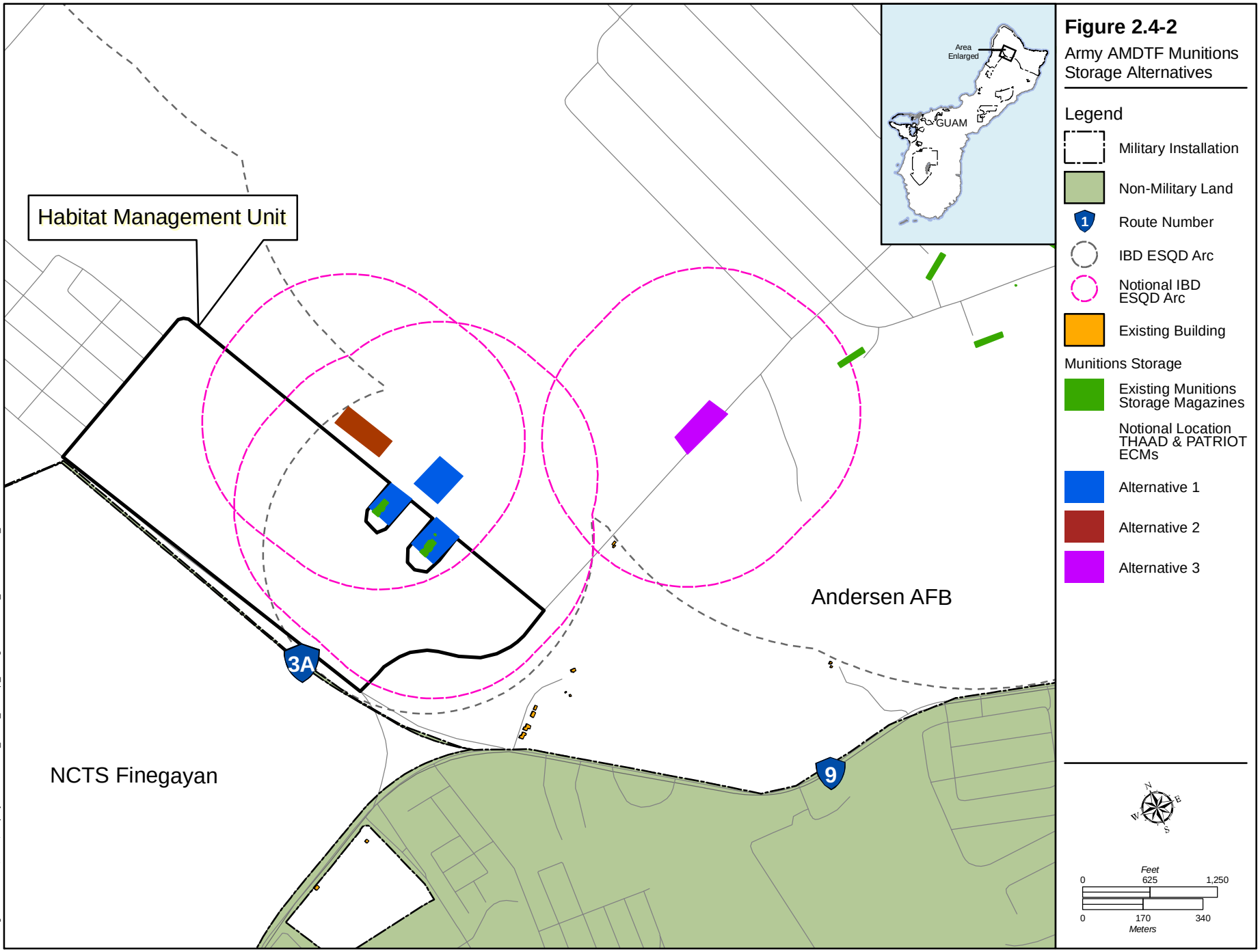
Munitions storage magazines would be consolidated at one site that is located north of B Avenue (see Figure 2.4-2) and allows for future expansion should that be required. The area of ground disturbance including a buffer is estimated to be 2.7 ac (1.1 ha).

2.4.2.3 Munitions Storage Alternative 3

Munitions storage magazines would be consolidated at a site located northeast of the HMU and an unnamed road (see Figure 2.4-2). The area of ground disturbance including a buffer is estimated to be 2.7 ac (1.1 ha).

2.4.3 Weapons Emplacement Alternatives (Analysis in Classified Appendix)

There are four alternatives for the weapons emplacement sites. The general areas proposed for locating weapons emplacement sites are not classified, but the proposed configurations within the areas are classified. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L) that is only available to regulatory agency reviewers with the appropriate security clearance. A brief, unclassified description of the locations is presented below. The four geographic alternatives are shown in Figure 2.4-3.


Habitat Management Unit
Andersen AFB
NCTS Finegayan
3A
9
Area Enlarged
GUAM
Figure 2.4-2
Army AMDTF Munitions Storage Alternatives
Legend
Military Installation
Non-Military Land
Route Number
IBD ESQD Arc
Notional IBD ESQD Arc
Existing Building
Munitions Storage
Existing Munitions Storage Magazines
Notional Location THAAD & PATRIOT ECMs
Alternative 1
Alternative 2
Alternative 3
N
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0
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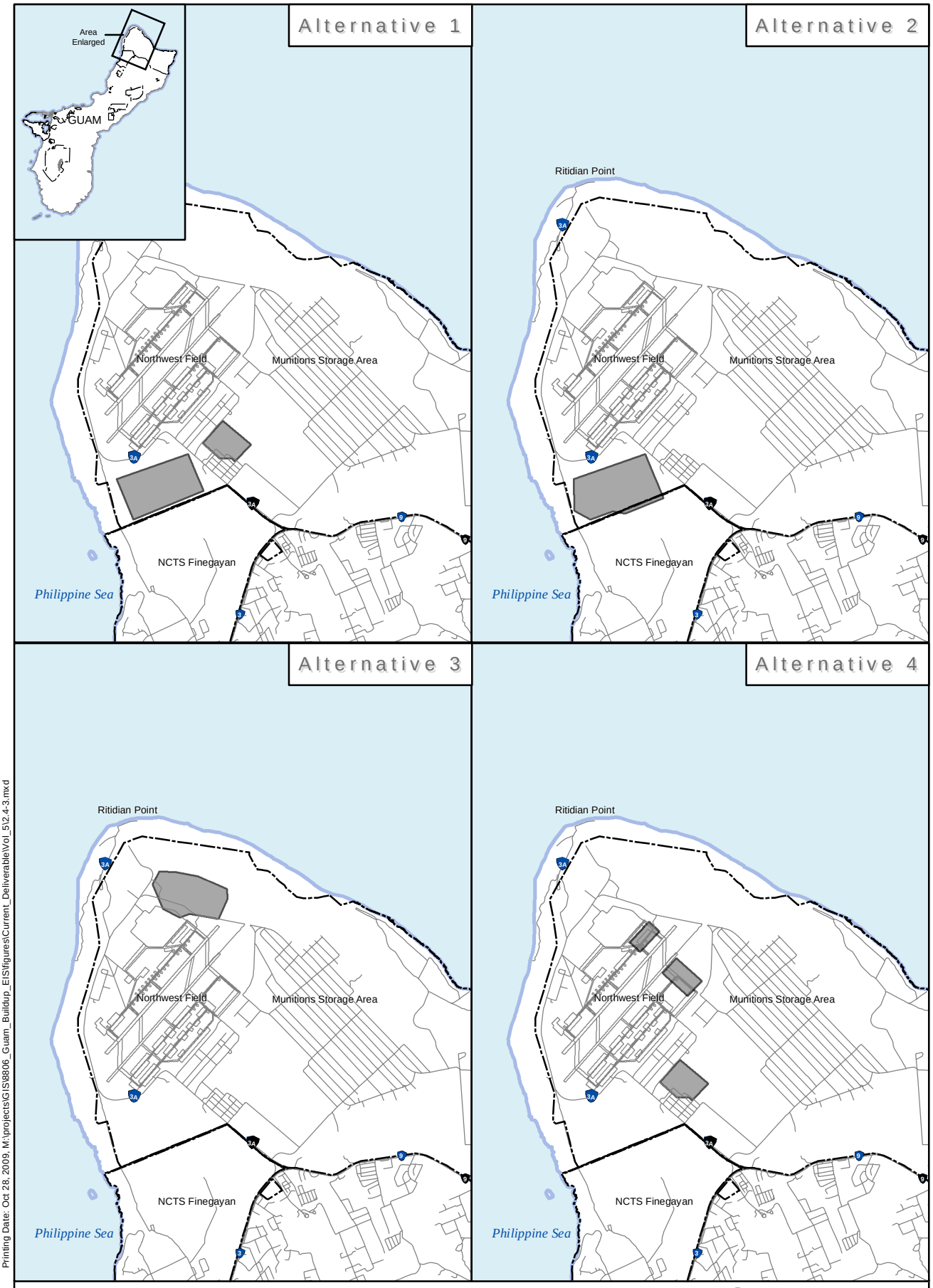

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Figure 2.4-3
Army AMDTF Weapons Emplacement Alternatives in the Classified Appendix

2.4.3.1 Weapons Emplacement Alternative 1

This alternative consists of two general areas totaling 368 acres (149 ha).

2.4.3.2 Weapons Emplacement Alternative 2

This alternative consists of one general area totaling 333 acres (135 ha).

2.4.3.3 Weapons Emplacement Alternative 3

This alternative consists of one general areas totaling 228 acres (92 ha).

2.4.3.4 Weapons Emplacement Alternative 4 (Preferred Alternative)

This alternative consists of three general areas totaling 187 acres (76 ha).

2.4.4 No-Action Alternative

Under the no-action alternative, there would be no construction to support the proposed AMDTF. Under the no-action alternative, areas proposed for AMDTF facilities would continue to be used for existing DoD functions. The no-action alternative would not meet the purpose of and need for the proposed action.

CHAPTER 3. GEOLOGICAL AND SOIL RESOURCES

3.1 INTRODUCTION

This chapter describes the potential environmental impacts to geologic and soil resources associated with implementation of the alternatives within the region of influence (ROI). Geology describes the surface and subsurface materials of which a land area is composed, including soils and rocks. The characteristics of soils and underlying rocks include stability, slope, compatibility, shear strength, and agricultural productivity. This chapter assesses how the action alternatives would potentially affect geological and soil resources. Because the geology and soils relate to the physical foundation of Guam, the proposed land uses would affect characteristics of erosion and surface changes, such as land clearing and slope cuts, but not the overall geological and soil conditions. Instead, geology and soils are more likely to affect the placement or location of a land use; for example a sinkhole could provide an obstacle to establishing a housing land use.

For a description of the affected environment for all resources, refer to the respective chapters of Volume 2 (Marine Corps Relocation – Guam); those chapters are presented in the same order as the resource areas contained in this volume. The locations described in Volume 2 also include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action.

This chapter first discusses existing conditions, then identifies impacts by alternatives and components, and concludes with identification and discussion of mitigation measures that apply to impacts.

3.2 ENVIRONMENTAL CONSEQUENCES

3.2.1 Approach to Analysis

3.2.1.1 Methodology

The methodology for identifying, evaluating, and mitigating impacts to geology and soil resources was established through review of geologic and soil studies, federal laws and regulations, state and local building codes, and grading ordinances. Previously published National Environmental Policy Act (NEPA) documents for actions in the Mariana Islands Range Complex (MIRC) and surrounding area were also reviewed. A site-specific geotechnical investigation was not undertaken for this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS).

Light Detection and Ranging (LIDAR) Contour Data was used to identify potential sinkholes on proposed sites. Development of road alignments were adjusted to avoid these potential sinkhole location and buffer areas of 100 feet (ft) (30 meters [m]) or more were established around the potential sinkhole sites. These buffer areas would be maintained in their current natural state and would not be used for any facility development. Analysis of topography, soil, and vegetation was completed during site characterization using LIDAR Contour Data, geotechnical reports, and site visits to ensure minimal impacts to geological and soil resources.

Geologic and soil impacts include any resulting effects that the proposed action would have on the geology and soils of each geographic area as described in the affected environment section. Effects can occur during construction or during operations, and may include:

Construction

- Cut and fill activities leading to soil erosion
- Removal of vegetation leading to soil erosion
- Use of heavy equipment resulting in soil compaction
- Impacts to karst topography (surface collapse)

Operation

The potential effects of these activities and their significance within the areas of occurrence under the proposed actions are described below. The analysis of potential impacts to geology and soils considers both direct and indirect impacts. Direct impacts result from physical soil disturbances or topographic alterations, while indirect impacts include risks to individuals from geologic hazards. Factors considered in determining whether an impact would be significant include the potential for substantial change in soil or slope stability. An impact to geologic resources would be considered significant if the action would have the potential to disrupt geologic features, or if actions were to be affected by potential geologic hazards.

Construction activities are major sources of karst collapse, which can occur as a result of excavation, change of drainage patterns, or lowering the groundwater table (Islam 2005). Soil disturbance from construction can cause deposits to form in openings near the bedrock surface, which get heavier when saturated causing the underlying structure to collapse.

Potential geology and soil impacts addressed in this chapter are limited to elements of the proposed actions that could affect onshore land forms or that could be affected by geologic hazards. Potential soil contamination issues are addressed in Chapter 17 (Hazardous Materials and Wastes). Increased soil erosion also may indirectly impact water quality and aquatic ecosystems. Potential impacts to these resources are described in Chapter 4, Water Resources and Chapter 10, Terrestrial Biological Resources.

Regulatory Standards

The United States (U.S.) Environmental Protection Agency (USEPA) Region 9 grants the Guam Environmental Protection Agency (GEPA) authority to enforce portions of federal statutes via a Memorandum of Agreement (MOA). Under this MOA, the Safe Drinking Water Program, Water Resources Management Program, and the Water Pollution Control Program are administered by GEPA. GEPA's Water Pollution Control Program is responsible for protecting Guam's resources from point and non-point source pollution that includes administration of the National Pollutant Discharge Elimination System (NPDES) program. NPDES permits are required for large and small construction activities. Requirements include a Notice of Intent, a Notice of Termination, and a construction site Stormwater Pollution Prevention Plan (SWPPP). Permits are required for projects that disturb greater than 1 acre (ac) (0.4 hectare [ha]) of soil, including lay-down, ingress and egress area. Phase I regulates construction activities disturbing 5 ac (2 ha) or more of total land area and Phase II regulates small construction activities disturbing between 1 and 5 ac (0.4 and 2 ha) of total land area. Erosion and sediment control plans would be typically included in the General Permits under NPDES for construction projects greater than 1 ac (0.4 ha).

3.2.1.2 Determination of Significance

For geology and soils, the significance of potential project impacts is determined by subjective criteria as well as regulatory standards. The following factors were considered in assessing the significance of impacts to geology and soils from proposed activities in each project area:

- Increased rate of erosion and soil loss from physical disturbance
- Reduced amounts of agriculturally productive soils
- Changes to the landscape due to alteration of topography and loss of vegetation
- Alteration of surrounding landscape and affect on important geologic features (including soil or rock removal and filling of sinkholes)
- Diminished slope stability
- Increased vulnerability to a geologic hazard (e.g., seismic activity, tsunami, landslides, liquefaction), and the probability that such an event could result in injury

3.2.1.3 Issues Identified During Public Scoping Process

The following analysis focuses on possible effects to geologic and soils resources that could be impacted by the proposed actions. As part of the analysis, related concerns expressed by the public, including regulatory stakeholders, during scoping meetings were considered. These include:

- Implementing erosion control measures for construction and post-construction phases
- Ensuring the proper permitting and local government clearances are sought where applicable

3.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

3.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

<u>North</u>

NCTS Finegayan

Construction. The proposed Alternative 1 development would disturb soil during construction. There is a risk of increased rate of erosion, compaction, and soil loss from physical disturbance caused by construction activity; however, construction Standard Operating Procedures (SOPs) would be implemented to minimize impacts. Erosion potential for soils found at Finegayan is shown in Table 3.2-1.

Table 3.2-1. Soil Erosion Potential at Proposed Sites

Soil Type	*Location*	*Erosion Potential*
Guam Cobbly Clay Loam at 3-7% slope	Andersen AFB	slight
Guam Cobbly Clay Loam at 7-15% slope	Andersen AFB	slight
Guam Urban Land Complex at 0-3% slope	Andersen AFB	slight
Guam Urban Land Complex at 0-3% slope	NCTS Finegayan	slight
Guam Cobbly Clay Loam at 3-7% slope	NCTS Finegayan	slight
Guam-Yigo Complex at 0-7% slope	South Finegayan	slight
Guam Cobbly Clay Loam at 3-7% slope	South Finegayan	slight
Guam Urban Land Complex at 0-3% slope	South Finegayan	slight
Guam Cobbly Clay Loam at 7-15% slope	Andersen South	slight
Guam Cobbly Clay Loam at 7-15% slope	Andersen South	slight
Guam Urban Land Complex at 0-3% slope	Andersen South	slight
Guam Cobbly Clay Loam at 7-15% slope	Navy Barrigada	slight
Pulantat Clay at 3-7% slope	Navy Barrigada	slight
Pulantat Clay at 7-10% slope	Navy Barrigada	slight
Urban Land Coastal Fill at 0 -3% slope	Navy Barrigada	slight
Guam Cobbly Clay Loam at 3-7% slope	Air Force Barrigada	slight
Chacha Clay at 0-5% slope	Air Force Barrigada	slight
Pulantat-Kagman Clays at 0-7% slope	Air Force Barrigada	slight

Source: Young 1988.

Soil types disturbed would not be agriculturally productive soils. Soil erosion is primarily a concern for discharge into surface or near shore waters that are not located near the proposed construction. Construction SOPs would be followed to minimize soil erosion. Therefore, Alternative 1 impacts to soil erosion, compaction, or loss of agriculturally productive soil would be less than significant.

Construction SOPs would include requirements for stormwater compliance and BMPs, including the use of hay bales and silt fences around disturbed soil areas, to ensure that all aspects of the project construction would be performed in a manner to minimize impacts during construction activity. A description of the standard BMPs and resource protection measures required by regulatory mandates can be found in Volume 7. A more detailed explanation of regulatory permitting requirements is available in Volume 8. Implementation of measures noted in the geology and soils column would prevent erosion; therefore, the impacts from soil erosion would be less than significant. Alternative 1 would result in less than significant impacts to soil compaction and agriculturally productive soil.

Construction activities under Alternative 1 would include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, Alternative 1 would result in less than significant impacts to unique geologic resources by changing the landscape of the affected area.

There are at least ten sinkholes in the vicinity of the proposed Main Cantonment area. The sinkholes would be avoided and a buffer zone of vegetation would be left around all sinkholes to prevent further erosion or expansion. The sinkholes would not be affected by construction activities. If deemed hazardous, sinkholes found in proximity to the planned headquarters/housing area could be fenced off and signs put in place to warn of the potential danger. Less than significant impacts are expected. Finegayan is

located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). The Alternative 1 proposed developments would be located on a relatively level area that would not be subject to slope instability. This would result in less than significant impacts associated with geologic hazards during construction.

Operation. Topography and landscape features would not change substantively under Alternative 1. The topography is relatively level thus slope stability would not be diminished. The action area is located in an area with karst geologic features that are of concern for the operation of these facilities. Operations would not occur over unstable karst features. If deemed hazardous, sinkholes found in proximity to the planned headquarters/housing area could be fenced off and signs put in place to warn of the potential danger. Operations activities would not disturb or compact soil or cause an increase in erosion. Therefore, Alternative 1 would result in less than significant impacts to unique geologic resources or result in erosion or compaction.

NCTS Finegayan is located in a potentially active seismic zone. Hazards associated with earthquakes and fault ruptures would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). The Alternative 1 proposed developments would be located on a relatively level area that would not be subject to slope instability. The predominant limestone bedrock is not subject to liquefaction. Therefore, Alternative 1 would result in less than significant impacts associated with geologic hazards during the operations phase of the proposed action.

South Finegayan

Construction. The proposed Alternative 1 development would disturb soil during construction. There would be a risk of an increased rate of erosion, compaction, and soil loss from physical disturbance caused by construction activity; however, SOPs would be implemented to minimize impacts. Erosion potential for soils found at Finegayan is shown in Table 3.2-1.

Soil types disturbed would not be agriculturally productive soils. Soil erosion is primarily a concern for discharge into surface or near shore waters that are not located near the proposed construction. Construction SOPs, including use of hay bales and silt fences to surround disturbed areas, would be followed to minimize soil erosion. Therefore, Alternative 1 impacts to soil erosion and loss of agriculturally productive soil would be less than significant.

Construction SOPs would include requirements for stormwater compliance and BMPs to ensure that all aspects of the project construction would be performed in a manner to minimize impacts during construction activity. A description of the standard BMPs and resource protection measures required by regulatory mandates can be found in Volume 7. A more detailed explanation of regulatory permitting requirements is available in Volume 8. Implementation of measures noted in the geology and soils column would prevent erosion; therefore, the impacts from soil erosion would be less than significant. Alternative 1 would result in less than significant impacts to soil compaction and agriculturally productive soil.

Construction activities under Alternative 1 would include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, Alternative 1 would result in less than significant impacts to unique geologic resources by changing the landscape of the affected area.

South Finegayan is located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). This would result in less than significant impacts associated with geologic hazards.

Operation. Topography and landscape features would not change substantively under Alternative 1. The topography is level, thus slope stability would not be diminished. The action area would be located in an area with karst geologic features that are of concern for the operation of these facilities. Operations would not occur over unstable karst features. Operations activities would not disturb or compact soil or cause an increase in erosion. Therefore, Alternative 1 would result in less than significant impacts to unique geologic resources or result in erosion or compaction.

South Finegayan is located in a potentially active seismic zone. Hazards associated with earthquakes and South fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). The Alternative 1 proposed developments would be located on a relatively level area that would not be subject to slope instability. The predominant limestone bedrock is not subject to liquefaction. Therefore, Alternative 1 would result in less than significant impacts associated with geologic hazards during the operations phase of the proposed action.

Central

Navy Barrigada

Navy Barrigada lands would not be used; therefore, there would be no impacts to those lands under Alternative 1.

Air Force Barrigada

Air Force Barrigada lands would not be used; therefore, there would be no impacts to those lands under Alternative 1.

Alternative 1 Potential Mitigation Measures

Since there would be less than significant impacts to geological and soil resources as a result of implementing Alternative 1, there are no proposed potential mitigation measures. Implementation of SOPs and BMPs including erosion and sedimentation controls and stormwater management would minimize impacts to geological and soil resources.

3.2.2.2 Headquarters/Housing Alternative 2

Under Alternative 2, the Army AMDTF HQ would be co-located with the unaccompanied housing at the 1,081-ac (438-ha) Navy Barrigada site.

North

NCTS Finegayan

Finegayan land would not be used; therefore, there would be no impacts to Finegayan under Alternative 2.

South Finegayan

South Finegayan would not be used under Alternative 2; therefore, there would be no impacts to South Finegayan under Alternative 2.

Central

Navy Barrigada

Construction. The proposed Alternative 2 at Navy Barrigada would disturb soil during construction. There is a potential for soil loss and an increased rate of erosion and/or compaction from physical disturbance caused by construction activity. SOPs would be implemented to minimize these impacts. Erosion potential for soils found at Barrigada is shown in Table 3.2-1.

The soil types disturbed would not be agriculturally productive soils. Soil erosion is primarily a concern for discharge into surface or near shore waters that are not located near the proposed construction. Construction SOPs would be followed to minimize soil erosion. The construction SOPs would include requirements for stormwater compliance and BMPs to ensure that all aspects of the project construction would be performed in a manner to minimize impacts during construction activity. A description of the standard BMPs and resource protection measures required by regulatory mandates can be found in Volume 7. A more detailed explanation of regulatory permitting requirements is available in Volume 8. Implementation of measures noted in the geology and soils column would prevent erosion; therefore, the impacts from soil erosion would be less than significant. Alternative 1 would result in less than significant impacts to soil compaction and agriculturally productive soil.

Construction activities under Alternative 2 would include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, Alternative 2 would result in less than significant impacts to geologic resources by changing the landscape of the affected area.

There are no known sinkholes at Navy Barrigada. Therefore, Alternative 3 would result in less than significant impacts to geologic resources.

Navy Barrigada is located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). The Alternative 2 proposed developments would be located on a relatively level plateau that would not be subject to slope instability. No fault lines run directly through Barrigada. The predominant limestone bedrock is not vulnerable to liquefaction. This would result in less than significant impacts associated with geologic hazards.

Operation. Topography and landscape features would not change substantively under Alternative 2. The topography is level, thus slope stability would not be diminished. The action area is located in an area with karst geologic features that are of concern for the operation of these facilities. Operations would not occur over unstable karst features. Operations activities would not disturb or compact soil or cause an increase in erosion. Therefore, Alternative 2 would result in less than significant impacts to unique geologic resources and would not result in significant erosion or compaction.

Navy Barrigada is located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). This would result in less than significant impacts associated with geologic hazards. Although Navy Barrigada is located in a potentially active seismic zone, the hazards associated with earthquakes, fault rupture and slope instability would be minimized during construction. The Alternative 2 proposed developments would be located on a relatively level area that would not be subject to slope instability. The predominant limestone bedrock is not vulnerable to liquefaction. Therefore, Alternative 2 would result in less than significant impacts associated with geologic hazards.

Air Force Barrigada

Air Force Barrigada lands would not be used; therefore, there would be no impacts to those lands under Alternative 2.

Alternative 2 Potential Mitigation Measures

As indicated for potential mitigation measures under Alternative 1, since impacts on geological and soil resources are less than significant, there are no mitigation measures proposed. SOPs and BMPs for erosion and sedimentation controls would protect geological and soil resources during construction and BMPs such as sound stormwater management practices would minimize impacts to these resources during the operations phase of the proposed action.

3.2.2.3 Headquarters/Housing Alternative 3

Under Alternative 3, the Administration/HQ and Maintenance Facility would be co-located with Marine Corps facilities in the northern portion of NCTS Finegayan. The unaccompanied personnel housing facilities would also be located on NCTS Finegayan. Accompanied personnel housing would be co-located with Marine Corps housing at Navy Barrigada and Air Force Barrigada. Recreational and QOL facilities would be co-located within and adjacent to the housing areas.

North

NCTS Finegayan

Construction. The proposed Alternative 3 development would disturb soil during construction. There is a potential for an increased rate of erosion and soil loss from physical disturbance caused by construction activity; however, SOPs would be implemented to minimize impacts. Erosion potential for soils found at Finegayan is shown in Table 3.2-1.

Soil types disturbed would not be agriculturally productive soils. Soil erosion is primarily a concern for discharge into surface or near shore waters that are not located near the proposed construction. Construction SOPs would be followed to minimize soil erosion. Therefore, Alternative 3 would not result in significant soil erosion, compaction, or loss of agriculturally productive soil.

Construction SOPs would include requirements for stormwater compliance, with BMPs to ensure that all aspects of the project construction would be performed in a manner to minimize impacts during construction activity. A description of the standard BMPs and resource protection measures regularly done can be found in Volume 7. A more detailed explanation of regulatory permitting requirements is available in Volume 8. Implementation of measures noted in the geology and soils column would prevent erosion; therefore, the impacts from soil erosion would be less than significant. Alternative 1 would result in less than significant impacts to soil compaction and agriculturally productive soil.

Construction activities under Alternative 3 would include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, Alternative 3 would result in less than significant impacts to unique geologic resources by changing the landscape of the proposed project area.

There are at least ten sinkholes in the vicinity of the proposed Main Cantonment area. The sinkholes would be avoided and a buffer zone of vegetation would be left around all sinkholes to prevent further erosion or expansion. Therefore, Alternative 3 would result in less than significant impacts to a unique geologic resource.

NCTS Finegayan, Navy Barrigada and Army Barrigiada are located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). The Alternative 3 proposed developments would be located on a relatively level area that would not be subject to slope instability.

Operation. Topography and landscape features would not change substantively under Alternative 3. The topography is level thus slope stability would not be diminished. The action area is located in an area with karst geologic features that are of concern for the operation of these facilities. Operations would not occur over unstable karst features. If deemed hazardous, sinkholes found in proximity to the planned headquarters could be fenced off and signs put in place to warn of the potential danger. Operations activities would not disturb or compact soil or cause an increase in erosion. Therefore, Alternative 3 would result in less than significant impacts to unique geologic resources or result in erosion or compaction.

NCTS Finegayan, Navy Barrigada and Army Barrigiada are located in a potentially active seismic zone. Hazards associated with earthquakes and South fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). The Alternative 1 proposed developments would be located on a relatively level area that would not be subject to slope instability. The predominant limestone bedrock is not subject to liquefaction. Therefore, Alternative 1 would result in less than significant impacts associated with geologic hazards during the operations phase of the proposed action.

South Finegayan

South Finegayan would not be developed under Alternative 3; therefore, there would be no impacts to South Finegayan.

Central

Navy Barrigada

Construction. The proposed Alternative 3 at Navy Barrigada would disturb soils during construction. There is a potential for soil loss and an increased rate of erosion from physical disturbance caused by construction activity. SOPs would be implemented to minimize these impacts. Erosion potential for soils found in the areas of proposed Alternative 3 is shown in Table 3.2-1.

Soil types disturbed would not be agriculturally productive soils. Soil erosion is primarily a concern for discharge into surface or near shore waters that are not located near the proposed construction. Construction SOPs would be followed to minimize soil erosion. Therefore, Alternative 3 would result in less than significant impacts to unique geologic resources or result in significant soil erosion, compaction, or loss of agriculturally productive soil.

Construction SOPs would include requirements for stormwater compliance and BMPs to ensure that all aspects of the project construction would be performed in a manner to minimize impacts during construction activity. A description of the standard BMPs and resource protection measures regularly undertaken can be found in Volume 7. Implementation of measures noted in the geology and soils column would prevent erosion; therefore, the impacts from soil erosion would be less than significant. A more detailed explanation of regulatory permitting requirements is available in Volume 8.

Construction activities under Alternative 3 would include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, Alternative 3 would result in minimal impacts to unique geologic resources by changing the landscape of the affected area.

There are no known sinkholes at Navy Barrigada. Therefore, Alternative 3 would result in less than significant impacts to a unique geologic resource.

Operation. Impacts would be identical to those found under Alternative 2 at Navy Barrigada.

Air Force Barrigada

Construction. The proposed Alternative 3 at Air Force Barrigada would disturb soils during construction. There is a potential for soil loss and an increased rate of erosion from physical disturbance caused by construction activity. SOPs would be implemented to minimize these impacts. Erosion potential for soils found in the areas of proposed Alternative 3 is shown in Table 3.2-1.

Soil types disturbed would not be agriculturally productive soils. Soil erosion is primarily a concern for discharge into surface or near shore waters that are not located near the proposed construction. Construction SOPs would be followed to minimize soil erosion. Therefore, Alternative 3 would result in less than significant impacts to unique geologic resources.

Construction SOPs would include requirements for stormwater compliance and BMPs to ensure that all aspects of the project construction would be performed in a manner to minimize impacts during construction activity. A description of the standard BMPs and resource protection measures required by regulatory mandates can be found in Volume 7. A more detailed explanation of regulatory permitting requirements is available in Volume 8. Implementation of measures noted in the geology and soils column would prevent erosion; therefore, the impacts from soil erosion would be less than significant. Alternative 3 would result in less than significant impacts to soil compaction and agriculturally productive soil.

Construction activities under Alternative 3 would include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, Alternative 3 would result in minimal impacts to unique geologic resources by changing the landscape of the affected area.

There are no known sinkholes at Air Force Barrigada. Therefore, Alternative 3 would result in less than significant impacts to a unique geologic resource.

Navy Barrigada and Air Force Barrigada are located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). The Alternative 3 proposed developments would be located on a relatively level plateau that would not be subject to slope instability. This would result in less than significant impacts associated with geologic hazards.

Operation. Impacts would be identical to those found under Alternative 2 at Air Force Barrigada.

Alternative 3 Potential Mitigation Measures

No mitigation measures under Alternative 3 are proposed.

3.2.3 Munitions Storage Alternatives

3.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

The proposed Alternative 1 magazine construction would occur near the Habitat Management Unit (HMU) (see Figure 2.3-1). Proposed construction would disturb 6.6 ac (2.7 ha) of soil during construction. Erosion potential for soils found at Andersen AFB is shown in Table 3.2-1. The type of soil

disturbed by the construction of the ECMs would be Guam Urban Land Complex. There is a risk of increased rate of erosion, compaction, and soil loss from physical disturbance caused by construction activity. However, construction Standard Operating Procedures (SOPs) would be implemented to minimize impacts.

Soil types disturbed near the HMU during construction of the ECMs would not be agriculturally productive soils. Construction SOPs would be followed to minimize soil erosion. The construction SOPs would include requirements for stormwater compliance and Best Management Practices (BMPs), including use of hale bales and silt fences, to ensure that all aspects of the project construction would be performed in a manner to minimize impacts during construction activity. A description of the standard BMPs and resource protection measures required by regulatory mandates can be found in Volume 7. Implementation of measures noted in the geology and soils column would prevent erosion, thus the impacts from soil erosion would be less than significant. A more detailed explanation of regulatory permitting requirements is available in Volume 8.

Construction activities under Alternative 1 would include clearing, grading, and grubbing. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, Alternative 1 would result in minimal impacts to unique geologic resources by changing the landscape of the affected area.

Andersen AFB is located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to Unified Facility Code (UFC) 3-310-04 Seismic Design for Buildings (U.S. Army Corps of Engineers [USACE] 2007). This would result in less than significant impacts associated with geologic hazards.

Operation

Under Munitions Storage Alternative 1, operations at Andersen AFB MSA 1 would be minimal since the magazines would be primarily used for storage. In accordance with established ammunitions storage requirements, native grassy vegetation would be established on and around the magazines and would be maintained (e.g., periodically mowed) to minimize fire hazard. Operations would not impact soil or geological resources.

3.2.3.2 Munitions Storage Alternative 2

Existing conditions do not vary between the three munitions storage alternatives at Andersen AFB MSA 1. Therefore, impacts for Munitions Storage Alternative 2 are identical those described for Munitions Storage Alternative 1.

3.2.3.3 Munitions Storage Alternative 3

Existing conditions do not vary between the three munitions storage alternatives at Andersen AFB MSA 1. Therefore, impacts for Munitions Storage Alternative 3 are identical those described for Munitions Storage Alternative 1.

3.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

3.2.5 No-Action Alternative

Under the no-action alternative, the Army AMDTF would not be established on Guam. No construction or operation would occur. Existing activities on Guam would continue; therefore, the no-action alternative has no impacts to geology or soils.

3.2.6 Summary of Impacts

Tables 3.2-2, 3.2-3, and 3.2-4, summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 3.2-2. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings • Less than significant impacts to topography and slope stability • Less than significant impacts to erosion and compaction through use of construction SOPs and BMPs	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1
Operation		
LSI • Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings • Less than significant impacts to topography and slope stability • Less than significant impacts to erosion and compaction	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact.

Table 3.2-3. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings • Less than significant impacts to topography and slope stability • Less than significant impacts to erosion and compaction through use of construction SOPs and BMPs	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1
Operation		
• Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings • Less than significant impacts topography and slope stability • Less than significant impacts to erosion or compaction	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

Table 3.2-4. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
LSI • Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings • Less than significant impacts to topography and slope stability • Less than significant impacts to erosion and compaction through use of construction SOPs and BMPs	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1
Operation			
LSI • Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings • Less than significant impacts topography and slope stability • Less than significant impacts to erosion and compaction	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact.

Construction

Construction activities under the proposed action would include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur however replanting and ground maintenance would promote regrowth. Therefore, the proposed action would result in less than significant impacts to unique geologic resources by changing the landscape of the affected area.

There are at least ten sinkholes in the vicinity of the proposed Main Cantonment area. The sinkholes would be avoided and a buffer zone of vegetation would be left around all sinkholes to prevent further erosion or expansion. The sinkholes would not be affected by construction activities of Alternatives 1 and 3. Therefore, the proposed action would result in less than significant impacts to geologic resources.

Finegayan, Navy Barrigada, and Air Force Barrigada are located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). This would result in less than significant impacts associated with geologic hazards.

Soil types disturbed during construction of the ECMs at Andersen AFB would not be agriculturally productive soils. Construction SOPs would be followed to minimize soil erosion. Replanting and ground maintenance would promote regrowth of vegetation would result in minimal impacts to unique geologic resources by changing the landscape of the affected area.

Operation

Topography and landscape features would not be changed substantively by the proposed action. The topography is level, thus slope stability would not be diminished. The action area is located in an area with karst geologic features that are of concern for the operation of these facilities. Operations would not occur over unstable karst features. If deemed hazardous, any sinkholes found in the headquarters/housing area could be fenced off and signs put in place to warn of the potential danger. No significant impacts relative to sinkholes are expected. Headquarters/housing activities would not disturb or compact soil or cause an increase in erosion Therefore, the proposed action would result in less than significant impacts to unique geologic resources or result in significant erosion or compaction.

Andersen AFB, Finegyan, and Barrigada are located in a potentially active seismic zone. Hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). This would result in less than significant impacts associated with geologic hazards. Although Finegayan, Navy Barrigada, and Air Force Barrigada are located in a potentially active seismic zone, the hazards associated with earthquakes, fault rupture and slope instability would be minimized during construction. The proposed action would result in less than significant impacts associated with geologic hazards. In accordance with established ammunitions storage requirements, native grassy vegetation would be established on and around the magazines and would be maintained (e.g., periodically mowed) to minimize fire hazard. Operations would have less than significant impacts to soil or geological resources. All of the four alternatives for the weapons emplacement component would have the same (less than significant) impact upon geological and soil resources.

3.2.7 Summary of Potential Mitigation Measures

Table 3.2-5 summarizes potential mitigation measures.

Table 3.2-5. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Topography		
• None	• None	• None
Geology		
• None	• None	• None
Soil		
• None	• None	• None
Geologic Hazards		
• None	• None	• None

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CHAPTER 4. WATER RESOURCES

4.1 INTRODUCTION

Water resources as defined in this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) are sources of water available for use by humans, flora, or fauna, including surface and groundwater, nearshore waters, and wetlands. Surface water resources, including but not limited to lakes, streams, and rivers, are important for economic, ecological, recreational, and human health reasons. Groundwater may be used for potable water, agricultural irrigation, and industrial applications. Groundwater is classified as any source of water beneath the ground surface, and is the primary source of potable water used to support human consumption. Consistent with the definition contained in 22 Guam Administrative Regulations (GAR) 5105, nearshore waters are defined as all coastal waters lying within a defined reef area, all coastal waters of a depth of less than ten fathoms (60 feet [ft], 18.3 meters [m]), and all coastal waters greater than 10 fathoms up to 1000 ft (305 m) offshore where there is no defined reef area. Nearshore waters can be directly affected by human activity, and are important for human recreation and subsistence. Wetlands are habitats that are subject to permanent or periodic inundation or prolonged soil saturation, and include marshes, swamps, and similar areas. Areas described and mapped as wetland communities may also contain small streams or shallow ponds, or pond or lake edges.

This chapter describes the potential environmental consequences for water resources associated with implementation of the alternatives within the region of influence (ROI). For a description of the affected environment for all resources, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in Volume 2 include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action, and the chapters are presented in the same order as the resource areas contained in this volume.

4.2 ENVIRONMENTAL CONSEQUENCES

4.2.1 Approach to Analysis

4.2.1.1 Methodology

This section contains a discussion of potential environmental consequences associated with implementation of the alternatives within the ROI for water resources. The environmental consequences of each alternative and the no-action alternative are presented in this section. The available literature was used to assess the existing conditions and to establish a baseline for the assessment, as described in the affected environment section (Volume 2, Chapter 4, Section 4.1). The methodology for identifying, evaluating, and mitigating impacts to water resources have been established based on federal and local laws and regulations as described in Volume 2, Chapter 4, Section 4.1.

The environmental consequences evaluation for water resources includes a qualitative and quantitative analysis of surface water, groundwater, nearshore waters, and wetlands to the extent possible given available project data. Environmental impact assessments were made and compared to baseline conditions, items of public concern, and significance criteria to determine the magnitude of potential impacts to water resources.

The proposed action analysis is separated in two main activities: construction and operation (consisting of non-training and training operations). Each of these activities has potential effects with associated

impacts. The analysis of potential impacts considers both direct and indirect impacts. Direct impacts are those that may occur during the construction phase of the project and cease when the project is complete or those that may occur as a result of project operations following the completion of construction. Indirect impacts are those that may occur as a result of the completed project or those that may occur during operations but not as a direct result of the construction or operational action.

Sustainability Requirements and Goals

Implementation of the proposed action would be consistent with Navy policy in compliance with laws and executive orders whereby Department of Defense (DoD) entities are required to reduce demand for indoor water by as much as 20% and outdoor water use by 50% in the coming years. Concurrent with these mandates is the Navy/Marine Corps policy to pursue and facilitate Leadership in Energy and Environmental Design (LEED) Silver certification for their facilities. LEED is a voluntary point system tool that measures the degree of sustainability features incorporated into a development.

Water resource sustainability is addressed in two categories: minimize water demand and maximize the quantity and quality of groundwater recharge. Elements identified to achieve minimum water use are:

- Water Conservation - identify and specify appropriate minimum water demand fixtures and devices
- Irrigation - minimize use of irrigation systems and water
- Grey Water Use - evaluate options for use of grey water for irrigation
- Rainwater Harvesting - investigate harvesting, storage, and distribution systems

The quantity and quality of groundwater recharge is addressed in the existing Unified Facility Code Low Impact Development (LID) Manual that would be followed. This manual includes specific Integrated Management Practices (IMPs) to be considered and included in the drainage design of the proposed action sites. In addition, National Pollutant Discharge Elimination System (NPDES) permitting requirements, LEED goals, and recent laws (e.g., the Energy Independence and Security Act of 2007), mandate certain drainage quantity and quality performance standards. Thus, the proposed action includes incorporating post-construction drainage quality, quantity, and velocity dissipation measures to approximate (or improve upon) pre-construction conditions at the property line.

Surface Water/Stormwater

Surface water issues include:

- Water quality
- Flooding
- Flow path alterations

Surface water quality impacts are evaluated by examining the potential increase of contamination including chemicals, heavy metals, nutrients, and/or sediments in the surface water as a result of the proposed action. The analysis is performed by comparing existing water quality data with possible increases in water quality contaminants in the surface water. Potential impacts to surface water quantity and velocity are analyzed by examining changes in drainage volumes and patterns associated with the proposed action. For construction activities, some of the key effects include stormwater discharges that may contain elevated sediment concentrations, and spills and leaks of chemicals such as lubricants, fuels, or other construction materials that may increase pollutant loading in to the surface water. In addition, direct construction or alteration of stream channels or reservoirs may cause increased contamination by sedimentation or chemical constituents. If flow paths or patterns are altered, additional studies, such as

instream flow analysis, would be conducted to ensure the human uses and/or biological services are preserved.

For non-training operation activities, effects include stormwater discharges which may increase the volume of sediment loading to the surface water as well as increase contaminants from vehicle maintenance, household discharge, privately-owned vehicles, and animal waste. Contamination of surface water from leaks or spills of hazardous, or otherwise regulated materials, is also a potential impact. Increased water usage may reduce the water availability in the reservoirs and/or reduce instream flows. Increased impervious areas may increase the runoff and increase the potential for flooding. Development in the floodplain may result in potential damage from flooding. Diversion of water courses for municipal water consumption may impact the ecological services that the resource provides. Training operation activities include potential contaminants from range and course training activities. For example, vehicle traffic could result in an increase in runoff due to the removal of ground cover. The storage of hazardous materials and fuels pose a continued risk of contamination for surface water from leaks or spills.

Groundwater

Groundwater impact concerns include water quality and water quantity. Groundwater quality was assessed by examining the potential risk of a hazardous or regulated waste release, as well as approximating the amount of additional stormwater and associated non-point source pollution that enter the groundwater.

The groundwater quality was assessed by examining the potential risk of a hazardous or regulated waste release, as well as approximating the amount of additional stormwater and associated non-point source pollution that would enter the groundwater. Water availability is addressed in Volume 6, Chapter 3, Section 3.1. Potential groundwater impacts associated with construction activities include direct spills and leaks having direct impacts to stormwater runoff that can contribute to groundwater contamination, well as direct contamination of groundwater resources through percolation.

The effects connected with the non-training operation activities include increases in impervious surfaces, waste generating activities, storage of potential contaminants, and landfill leaching. The direct impacts include an increase in polluted stormwater runoff and contamination from leaks or spills of hazardous or regulated materials. In addition, the increased water usage may increase the rate of depletion of groundwater resources. The indirect impacts may include decreases in groundwater recharge due to an increase in impervious areas. There may also be saltwater intrusion.

The possible impacts connected with operations include increases of impervious areas, waste-generating activities, storage of potential contaminants, and landfill leaching. The direct impacts include an increase in polluted stormwater runoff and contamination from leaks or spills of hazardous or regulated materials. The effects related to the training operations include contamination from expended training materials, discharges from latrines, and leaks or spills from hazardous materials. These training activities can pose both short-term and long-term effects.

Nearshore Water

The nearshore water impact analysis focuses on water quality. Recreational nearshore issues are addressed in Chapter 9, Recreational Resources. The potential increases of contamination including chemicals, heavy metals, nutrients, and/or sediments in nearshore waters as a result of the proposed action are assessed by comparing existing water quality data with the projected changes in water quality.

Potential impacts associated with construction activities include construction spills and leaks that may discharge to nearshore waters and an increase in stormwater discharge that may increase non-point source pollution.

Operations effects include potential non-point source from chemicals, nutrients, and/or sediments that may runoff from bivouac sites. Training operation activity effects include direct contamination from training materials that are used and not recovered.

Wetlands

The proposed project areas do not contain wetlands therefore an approach for analyzing wetland impacts is not presented here.

4.2.1.2 Determination of Significance

The following factors are considered in evaluating impacts to groundwater and surface waters:

- Long-term increased inundation, sedimentation, and/or damage to water resources in the ROI caused by project activities, including impervious surfacing that increases and/or diverts rainfall runoff and/or affects the collection and conveyance and implementation of mitigation measures.
- Depletion, recharge, or contamination of a usable groundwater aquifer for municipal, private, or agricultural purposes.
- Increases in soil settlement or ground swelling that damages structures, utilities, or other facilities caused by inundation and/or changes in groundwater levels.
- Creating noncompliance with all applicable laws and regulations.
- Increasing risk associated with environmental hazards or human health.
- Decreasing existing and/or future beneficial use.
- Reducing the amount of water or wetlands available for human use or ecological services.
- Reducing availability or accessibility of water resources.
- Long-term increased inundation, sedimentation, and/or damage to water resources.

If an activity is deemed as having an impact, the activity then can be evaluated to determine if the impact is significant or insignificant. For significant impacts, a determination is made as to whether the impacts can be mitigated to less than significant impacts.

4.2.1.3 Issues Identified During Public Scoping Process

The following analysis focuses on the effects to water resources: surface water, groundwater, nearshore water, and wetlands that could be impacted by the proposed action. As part of the analysis, concerns relating to water resources that were identified by the public, including regulatory stakeholders, during the scoping meetings are addressed. The concerns include:

- Describing water quality with respect to public health requirements, drinking water regulations, and applicable water quality standards.
- Estimate quality and quantity of storm water runoff to be generated by increased impervious surface, methods of contaminant removal, methods of runoff redirection to recharge the aquifer, and groundwater under the direct influence of surface water.
- Accidental or intentional contamination of groundwater.
- Capacity of water resources to meet the agricultural needs.

- Stormwater management controls to prevent pollution during construction and subsequent operations.
- Construction and bulldozing of the jungles that could potentially cause runoff, pollute the beaches, and destroy marine life.
- Effects of training and dredging on sedimentation stress for the coral reefs and other marine life.
- Identify ways to monitor and mitigate indirect impacts from sediments on coral reefs.

4.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

4.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

North

NCTS Finegayan

Construction

Surface Water/Stormwater. Under Alternative 1, proposed administrative and housing construction activities at Naval Computer Telecommunications Station (NCTS) Finegayan would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation. To minimize these potential impacts, general construction BMPs (Volume 2, Chapter 4, Table 4.2-1) would be implemented to reduce the potential for erosion, runoff, sedimentation, and associated water quality impacts. In addition, roadway-specific BMPs would be included in the planning, design, and construction of all roadways. Proposed construction activities would not occur within the 100-year flood zone. Therefore, construction activities associated with Alternative 1 at NCTS Finegayan would result in less than significant impacts to surface water.

Groundwater. Under Alternative 1, construction activities would include surface water protection measures (identified above) that would also serve to protect the quality of the underlying NGLA groundwater. These BMPs and follow-on measures would reduce the pollutant loading potential in stormwater and thus the underlying groundwater subbasins. Therefore, construction activities associated with Alternative 1 at NCTS Finegayan would result in less than significant impacts to groundwater.

Nearshore Waters. Alternative 1 on NCTS Finegayan is adjacent to the coastline, and the entire island of Guam is classified as a coastal zone under the CZMA. Due to the proximity of the activity, Alternative 1 has the potential for impacting nearshore water quality. These potential impacts would be lessened through the implementation of the surface water BMPs and adherence to all applicable orders, laws, and regulations relating to water quality. Therefore, construction activities associated with Alternative 1 at NCTS Finegayan would result in less than significant impacts to nearshore waters.

Wetlands. No wetlands are located in or near the construction areas associated with Alternative 1 at NCTS Finegayan. Therefore, construction activities associated with Alternative 1 at NCTS Finegayan would result in no impacts to wetlands.

Operation

Surface Water/Stormwater. The operations under Alternative 1 would result in minor increase in impervious area that would result in an associated relatively minor increase in stormwater discharge intensities and volume. This increase would be minor and would be accommodated by stormwater infrastructure, and stormwater flow paths would continue to mimic area topography. Examples of stormwater infrastructure LID measures are described below.

Alternative 1 would incorporate the concept of LID in the final planning, design, and permitting of the stormwater runoff and drainage design. The goals of LID are too closely match the post-development topography and stormwater runoff hydrology to the pre-development status. The intent of LID is to control non-point source runoff through the implementation of plant-soil-water and man-made, where appropriate, mechanisms that protect and sustain the ecological integrity of the receiving water bodies and wetlands. In areas of karst geology such as NCTS Finegayan, LID techniques must also protect groundwater quality. LID designs focus on small scale, close to the source stormwater management, where such techniques can achieve the water quality goals. LID technologies are well suited to reduce stormwater runoff loadings for a variety of potential contaminants including sediment, nutrients, and heavy metals. LID practices at the planning level are in conformance with United States Environmental Protection Agency (USEPA) non-structural pollution prevention strategies.

It is anticipated that several LID techniques would be used during the final planning, design, and permitting of Alternative 1. These measures could include a series of IMPs to match as closely as possible the "pre-/post-" hydrologic conditions in the development areas. The IMPs reduce flow peaks, intercept flows resulting from all levels of rainfall intensities, and provide water quality treatment. The projects may incorporate downspout disconnections, re-vegetation, and bio-retention to reduce pollutant loads and stormwater volumes. Additional appropriate measures are expected to be included such as the use of bio-retention cells, bio-retention strips, oil/water separators, a combination of bioswales and vegetated swales, and detention/retention basins.

As part of LID planning, areas for vehicle parking may use pervious paving designs when practicable. The potential use of such paving systems would be balanced with the requirement to avoid percolation of contaminated stormwater into groundwater; this protection of groundwater would have the highest priority when considering such paving designs. Drainage swales instead of stormwater conveyance piping systems are also being considered as a way to reduce the quantity and velocity of stormwater while simultaneously improving stormwater quality. The combination of LID technologies and compliance with federal and GovGuam regulations would reduce potential impacts to the storm drainage system and nearby receiving water bodies. With the implementation of LID measures to reduce impacts, stormwater flow paths would continue to mimic area topography and no diversion or restriction of surface water flow would occur.

Alternative 1 would potentially increase the amount of petroleum, oils, and lubricants (POLs); hazardous waste; pesticides; and fertilizers being stored, transported, and utilized on the proposed facilities. Increasing the storage, transportation, and use of these substances would increase the potential for releases to receiving waters. The stormwater runoff would continue to have the potential to have elevated contaminants such as sediment, nutrients, heavy metals, organic and inorganic compounds, and detrimental microorganisms.

Alternative 1 would be conducted in accordance with all applicable orders, laws, and regulations. SWPPPs and SWMPs are documents that would be prepared as part of the NPDES permit process and are designed to reduce the impacts associated with nonpoint source pollution from stormwater runoff. In

addition, the Oil Pollution Act mandates the implementation of the SPCC Plan that is used to prevent and control potential leaks and spills. Implementation of these plans and their associated protective measures would minimize potential impacts of runoff, spills, and leaks. The combination of LID technologies and compliance with federal and GovGuam regulations would ensure that no significant impacts to receiving water bodies would result from Alternative 1. Therefore, operations associated with Alternative 1 at NCTS Finegayan would result in less than significant impacts to surface water.

Groundwater. Under Alternative 1, proposed operations would be in compliance with the water protection measures identified in the surface water section above during training operations, which would therefore also protect the quality of the underlying NGLA groundwater. These BMPs and follow-on measures and plans would reduce the pollutant loading potential into stormwater and to the underlying groundwater subbasins.

Under all alternatives, groundwater withdrawal is expected to increase by approximately 0.30 million gallons per day (MGd) (1.14 million liters per day [mld]) due to the increase in personnel and facilities associated with the Volume 5 actions. Implementation of aforementioned sustainability practices would reduce the amount of groundwater needed, which would help minimize impacts to groundwater availability. Water resource managers would continue to proactively monitor groundwater chemistry data to ensure increased pumping does not adversely affect military or non-military sources of drinking water. Careful monitoring of the chloride concentrations in the subbasins and the capability to shift pumping to wells further from impacted subbasins if unacceptable chloride concentrations are detected would reduce any potential negative impacts on the groundwater resource. In addition, increased pumping would have the potential to lower the groundwater pressure in underlying sediments, which could undergo compaction and minor ground surface settlement. This potential would be monitored; if this is detected, groundwater pumping would shift to other areas. Therefore, Alternative 1 at NCTS Finegayan would result in less than significant impacts to groundwater.

Nearshore Waters. Following construction, alterations to the watershed such as increased runoff may result in direct and indirect impacts that could alter nearshore water quality including the addition of sediments, nutrients, detrimental microorganisms, heavy metals, and organic and inorganic compounds. These effects would be minimized by complying with all applicable orders, laws, and regulations. In addition, the planning process would be conducted in conjunction with the Watershed Protection Committee (WPC). The project would also incorporate published guidance documents including but not limited to the Clean Water Action Plan, Protection and Restoring Guam's Waters, and the northern Watershed Restoration Strategy. Therefore, operations associated with Alternative 1 at NCTS Finegayan would result in less than significant impacts to nearshore waters.

Wetlands. No wetland areas would be affected by operations associated with Alternative 1 as no wetland areas are located near the proposed operations areas. Therefore, operations associated with Alternative 1 at NCTS Finegayan would result in no impacts to wetlands.

South Finegayan

Construction

Surface Water/Stormwater. Under Alternative 1, proposed administrative and housing construction activities at South Finegayan would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation. To minimize these potential impacts, general construction BMPs (Volume 2, Chapter 4, Table 4.2-1) would be implemented to reduce the potential for erosion, runoff, sedimentation, and water quality impacts. In addition, roadway-specific BMPs would be included in the planning, design, and construction of all roadways. Proposed construction activities would not occur within the 100-year flood zone. Therefore, construction activities associated with Alternative 1 at South Finegayan would result in less than significant impacts to surface water.

Groundwater. Under Alternative 1, proposed housing/community support construction activities at South Finegayan would include surface water protection measures that would also serve to protect the quality of the underlying NGLA groundwater. BMPs and follow-on measures and plans would reduce the pollutant loading potential into stormwater and thus the underlying groundwater subbasins. Therefore, construction activities associated with Alternative 1 at South Finegayan would result in less than significant impacts to groundwater.

Nearshore Waters. Alternative 1 on South Finegayan is located well-away from the coastline; however, the entire island of Guam is classified as a coastal zone under the CZMA. Potential impacts to nearshore waters would be lessened through the implementation of the surface water BMPs and adherence to all applicable orders, laws, and regulations relating to water quality. Therefore, construction activities associated with Alternative 1 at South Finegayan would result in less than significant impacts to nearshore waters.

Wetlands. No wetlands are located in or near the construction areas associated with Alternative 1 on South Finegayan. Therefore, construction activities associated with Alternative 1 at South Finegayan would result in no impacts to wetlands.

Operation

Surface Water/Stormwater. Operations under Alternative 1 would result in minor increase in impervious area, which would result in an associated relatively minor increase in stormwater discharge intensities and volume. This increase would be minor and would be accommodated by stormwater infrastructure, and stormwater flow paths would continue to mimic area topography. Examples of stormwater infrastructure LID measures are described below.

Alternative 1 at South Finegayan would also include the incorporation of LID into the final planning, design, and permitting of the stormwater runoff and drainage design, as described in detail above under NCTS Finegayan. Selected IMPs would reduce flow peaks, intercept flows resulting from all levels of rainfall intensities, and provide water quality treatment. The combination of LID technologies and compliance with federal and GovGuam regulations would ensure that less than significant impacts to the storm drainage system and nearby receiving water bodies would result from Alternative 1. Alternative 1 would be conducted in accordance with all applicable orders, laws, and regulations, including the preparation and implementation of a SWPPP, SWMP, and SPCC Plan that would control runoff and minimize potential leaks and spills. Implementation of these protective measures would minimize potential impacts of runoff, spills, and leaks. Therefore, operations associated with Alternative 1 at South Finegayan would result in less than significant impacts to surface water.

Groundwater. Under Alternative 1 at South Finegayan, proposed operations would be in compliance with the water protection measures identified in the surface water section above during operations, which would also protect the quality of the underlying NGLA groundwater. Therefore, operations associated with Alternative 1 at South Finegayan would result in less than significant impacts to groundwater.

Nearshore Waters. Following construction, alterations to the watershed such as increased runoff could potentially result in direct and indirect impacts that could alter nearshore water quality including the addition of sediments, nutrients, detrimental microorganisms, heavy metals, and organic and inorganic compounds. These effects would be minimized by complying with all applicable orders, laws, and regulations. In addition, the planning process would be conducted in conjunction with the WPC. The project would also incorporate published guidance documents including but not limited to the Clean Water Action Plan, Protection and Restoring Guam's Waters, and the northern Watershed Restoration Strategy. Therefore, operations associated with Alternative 1 at South Finegayan would result in less than significant impacts to nearshore waters.

Wetlands. No wetland areas would be affected by operations associated with Alternative 1 as no wetland areas are located near the proposed operation areas. Therefore, operations associated with Alternative 1 at South Finegayan would result in no impacts to wetlands.

Central

Navy Barrigada

Alternative 1 would not occur at Navy Barrigada; there would be no construction or operations at this location. Therefore, Alternative 1 at Navy Barrigada would result in no impacts to water resources.

Air Force Barrigada

Alternative 1 would not occur at Air Force Barrigada; there would be no construction or operations at this location. Therefore, Alternative 1 at Air Force Barrigada would result in no impacts to water resources.

Alternative 1 Potential Mitigation Measures

No mitigation measures have been identified for Alternative 1.

4.2.2.2 Headquarters/Housing Alternative 2

Under Alternative 2. the Army AMDTF HQ would be co-located with the unaccompanied housing at the 1,081 ac (438 ha) Navy Barrigada site.

North

NCTS Finegayan

Alternative 2 would not occur at NCTS Finegayan; there would be no construction or operations at this location. Therefore, Alternative 2 at NCTS Finegayan would result in no impacts to water resources.

South Finegayan

Alternative 2 would not occur at South Finegayan; there would be no construction or operations at this location. Therefore, Alternative 2 at South Finegayan would result in no impacts to water resources.

Central

Navy Barrigada

Construction

Surface Water/Stormwater. Under Alternative 2, proposed administrative and housing construction activities at Navy Barrigada would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation. To minimize these potential impacts, general construction BMPs (Volume 2, Chapter 4, Table 4.2-1) would be implemented to reduce the potential for erosion, runoff, sedimentation, and associated water quality impacts. In addition, roadway-specific BMPs would be included in the planning, design, and construction of all roadways. Proposed construction activities would not occur within the 100-year flood zone. Therefore, construction activities associated with Alternative 2 at Navy Barrigada would result in less than significant impacts to surface water.

Groundwater. Under Alternative 2, construction activities would include surface water protection measures (identified above) that would also serve to protect groundwater quality. These BMPs and follow-on measures and plans would reduce the pollutant loading potential into stormwater and thus the underlying groundwater subbasins. Therefore, construction activities associated with Alternative 2 at Navy Barrigada would result in less than significant impacts to groundwater.

Nearshore Waters. Alternative 2 at Navy Barrigada would be located away from the coastline; however, the entire island of Guam is classified as a coastal zone under the CZMA. As a result, Alternative 1 has the potential for impacting nearshore water quality. These potential impacts would be lessened through the implementation of the surface water BMPs and adherence to all applicable orders, laws, and regulations relating to water quality. Therefore, construction activities associated with Alternative 2 at Navy Barrigada would result in less than significant impacts to nearshore waters.

Wetlands. No wetlands are located in or near the construction areas associated with Alternative 2 at Navy Barrigada. Therefore, construction activities associated with Alternative 2 at Navy Barrigada would result in no impacts to wetlands.

Operation

Surface Water/Stormwater. The operations under Alternative 2 at Navy Barrigada would result in minor increase in impervious area, which would result in an associated relatively minor increase in stormwater discharge intensities and volume. This increase would be minor and would be accommodated by stormwater infrastructure, and stormwater flow paths would continue to mimic area topography. Examples of stormwater infrastructure LID measures are described below.

Alternative 2 at Navy Barrigada would also include the incorporation of LID into the final planning, design, and permitting of the stormwater runoff and drainage design, as described in detail in Section 4.2.2.1. Selected IMPs would reduce flow peaks, intercept flows resulting from all levels of rainfall intensities, and provide water quality treatment. The combination of LID technologies and compliance with federal and GovGuam regulations would ensure that less than significant impacts to the storm drainage system and nearby receiving water bodies would result from Alternative 2. Alternative 2 would be conducted in accordance with all applicable orders, laws, and regulations, including the preparation and implementation of a SWPPP, SWMP, and SPCC Plan that would control runoff and minimize potential leaks and spills. Implementation of these protective measures would minimize potential impacts of runoff, spills, and leaks. Therefore, operations associated with Alternative 2 at Navy Barrigada would result in less than significant impacts to surface water.

Groundwater. Under Alternative 2, proposed operations would be in compliance with the water protection measures identified in the surface water section above during training operations, which would therefore also protect groundwater quality.

Under all alternatives, groundwater withdrawal is expected to increase by approximately 0.30 MGd (1.14 mld) due to the increase in personnel and facilities associated with the Volume 5 actions. Implementation of aforementioned sustainability practices would reduce the amount of groundwater needed, which would help minimize impacts to groundwater availability. Water resource managers would continue to proactively monitor groundwater chemistry data to ensure increased pumping does not adversely affect military or non-military sources of drinking water. Careful monitoring of the chloride concentrations in the subbasins and the capability to shift pumping to wells further from impacted subbasins if high chloride concentrations are detected would reduce any potential negative impacts on the groundwater resource. In addition, increased pumping would have the potential to lower the groundwater pressure in underlying sediments, which could undergo compaction and minor ground surface settlement. This potential would be monitored; if this is detected, groundwater pumping would shift to other areas. Therefore, operations associated with Alternative 2 at Navy Barrigada would result in less than significant impacts to groundwater.

Nearshore Waters. Following construction, alterations to the watershed such as increased runoff may result in direct and indirect impacts that could alter nearshore water quality including the addition of sediments, nutrients, detrimental microorganisms, heavy metals, and organic and inorganic compounds. These effects would be minimized by complying with all applicable orders, laws, and regulations. In addition, the planning process would be conducted in conjunction with the WPC. The project would also incorporate published guidance documents including but not limited to the Clean Water Action Plan, Protection and Restoring Guam's Waters, and the northern Watershed Restoration Strategy. Therefore, operations associated with Alternative 2 at Navy Barrigada would result in less than significant impacts to nearshore waters.

Wetlands. No wetland areas would be affected by operations associated with Alternative 2 as no delineated wetland areas are located near the proposed operation areas. Therefore, operations associated with Alternative 2 at Navy Barrigada would result in no impacts to wetlands.

Air Force Barrigada

Alternative 2 would not occur at Air Force Barrigada; there would be no construction or operations at this location. Therefore, Alternative 2 at Air Force Barrigada would result in no impacts to water resources.

Alternative 2 Potential Mitigation Measures

No mitigation measures have been identified for Alternative 2.

4.2.2.3 Headquarters/Housing Alternative 3

Under Alternative 3, the Administration/HQ and Maintenance Facility would be co-located with Marine Corps facilities in the northern portion of NCTS Finegayan. The unaccompanied personnel housing facilities would also be located on NCTS Finegayan.

North

NCTS Finegayan

Construction. Under Alternative 3, proposed construction activities at NCTS Finegayan would be slightly less than those under Alternative 1. However, the same impact analysis is valid for Alternative 3;

therefore, potential construction impacts to water resources resulting from implementation of Alternative 3 would be similar to the potential impacts discussed under Alternative 1 (refer to Section 4.2.2.1). Therefore, construction activities associated with Alternative 3 at NCTS Finegayan would result in less than significant impacts to water resources.

Operation. Under Alternative 3, proposed operations at NCTS Finegayan would be slightly less than those under Alternative 1; however, the same impact analysis is valid for Alternative 3. Therefore, potential operation impacts to water resources resulting from implementation of Alternative 3 would be similar to the potential impacts discussed under Alternative 1 (refer to Section 4.2.2.1); operations associated with Alternative 3 at NCTS Finegayan would result in less than significant impacts to water resources.

South Finegayan

Alternative 3 would not occur at South Finegayan; there would be no construction or operations at this location. Therefore, Alternative 3 at South Finegayan would result in no impacts to water resources.

Central

Navy Barrigada

Construction. Under Alternative 3, proposed construction activities at Navy Barrigada would be slightly less than those under Alternative 2. However, the same impact analysis is valid for Alternative 3; therefore, potential construction impacts to water resources resulting from implementation of Alternative 3 would be similar to the potential impacts discussed under Alternative 2 (refer to Section 4.2.2.2). Therefore, construction activities associated with Alternative 3 at Navy Barrigada would result in less than significant impacts to water resources.

Operation. Under Alternative 3, proposed operations at Navy Barrigada would be slightly less than those under Alternative 2; however, the same impact analysis is valid for Alternative 3. Therefore, potential operation impacts to water resources resulting from implementation of Alternative 3 would be similar to the potential impacts discussed under Alternative 2 (refer to Section 4.2.2.2); operations associated with Alternative 3 at Navy Barrigada would result in less than significant impacts to water resources.

Air Force Barrigada

Construction

Surface Water/Stormwater. Under Alternative 3, proposed administrative and housing support construction activities at Air Force Barrigada would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation. To minimize these potential impacts, general construction BMPs (Volume 2, Chapter 4, Table 4.2-1) would be implemented to reduce the potential for erosion, runoff, sedimentation, and water quality impacts. In addition, roadway-specific BMPs would be included in the planning, design, and construction of all roadways. Proposed construction activities would not occur within the 100-year flood zone. Therefore, construction activities associated with Alternative 3 at Air Force Barrigada would result in less than significant impacts to surface water.

Groundwater. Under Alternative 3, construction activities at Air Force Barrigada would include surface water protection measures (identified above) that would also serve to protect groundwater quality. These BMPs and follow-on measures and plans would reduce the pollutant loading potential into stormwater and thus the underlying groundwater subbasins. Therefore, construction activities associated with Alternative 3 at Air Force Barrigada would result in less than significant impacts to groundwater.

Nearshore Waters. Construction activities associated with Alternative 3 at Air Force Barrigada would occur less than 0.5 mi (0.8 km) from the coastline, yet the entire island of Guam is classified as a coastal zone under the CZMA. Due to the proximity of the activity, Alternative 3 could potentially indirectly impact nearshore water resources. These potential impacts would be lessened through the implementation of the surface water BMPs and adherence to all applicable orders, laws, and regulations relating to water quality. Therefore, construction activities associated with Alternative 3 at Air Force Barrigada would result in less than significant impacts to nearshore waters.

Wetlands. No wetland areas would be affected by construction associated with Alternative 3 at Air Force Barrigada as no wetland areas are located near the proposed construction areas. Therefore, construction associated with Alternative 3 at Air Force Barrigada would result in no impacts to wetlands.

Operation

Surface Water/Stormwater. The operations under Alternative 3 at Air Force Barrigada would result in minor increases in impervious areas that would result in an associated relatively minor increase in stormwater discharge intensities and volume. This minor increase would be accommodated by stormwater infrastructure, and stormwater flow paths would continue to mimic area topography. Examples of stormwater infrastructure LID measures are described below.

Alternative 3 at Air Force Barrigada would also include the incorporation of LID into the final planning, design, and permitting of the stormwater runoff and drainage design, as described in detail in Section 4.2.1. Selected IMPs would reduce flow peaks, intercept flows resulting from all levels of rainfall intensities, and provide water quality treatment. The combination of LID technologies and compliance with federal and GovGuam regulations would ensure that less than significant impacts to the storm drainage system and nearby receiving water bodies would result from Alternative 3. Alternative 3 would be conducted in accordance with all applicable orders, laws, and regulations, including the preparation and implementation of a SWPPP, SWMP, and SPCC Plan that would control runoff and minimize potential leaks and spills. Implementation of these protective measures would minimize potential impacts of runoff, spills, and leaks. Therefore, operations associated with Alternative 3 at Air Force Barrigada would result in less than significant impacts to surface water.

Groundwater. Under Alternative 3 at Air Force Barrigada, proposed operations would be in compliance with the water protection measures identified in the surface water section above during operation, which would therefore also protect groundwater quality. Therefore, operations associated with Alternative 3 at Air Force Barrigada would result in less than significant impacts to groundwater.

Nearshore Waters. Following construction, alterations to the watershed such as increased runoff could potentially result in direct and indirect impacts that could alter nearshore water quality including the addition of sediments, nutrients, detrimental microorganisms, heavy metals, and organic and inorganic compounds. These effects would be minimized by complying with all applicable orders, laws, and regulations. In addition, the planning process would be conducted in conjunction with the WPC. The project would also incorporate published guidance documents including but not limited to the Clean Water Action Plan, Protection and Restoring Guam's Waters, and the northern Watershed Restoration Strategy. Therefore, operations associated with Alternative 3 at Air Force Barrigada would result in less than significant impacts to nearshore waters.

Wetlands. No wetland areas would be affected by operations associated with Alternative 3 at Air Force Barrigada as no delineated wetland areas are located near the proposed operation areas. Therefore, operations associated with Alternative 3 at Air Force Barrigada would result in no impacts to wetlands.

Alternative 3 Potential Mitigation Measures

No mitigation measures have been identified for Alternative 3.

4.2.3 Munitions Storage Alternatives

4.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Under Alternative 1, three site plans have been developed for Army AMDTF munitions storage at Andersen Air Force Base (AFB), reflecting slight differences in location (all within the existing munitions storage area): Alternatives 1, 2, and 3 (refer to Chapter 2, Figure 2.4-2). In general terms from a water resources impact perspective, potential impacts from implementing Alternatives 1, 2, or 3 would be nearly identical. Thus, the following impact analysis addresses potential impacts from Alternative 1, 2, or 3 as the same for water resources under both construction and operation activities.

Construction

Surface Water/Stormwater

Under Alternative 1, proposed munitions storage construction activities at Andersen AFB would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation. To minimize these potential impacts, general construction Best Management Practices (BMPs) (Volume 2, Chapter 4, Table 4.2-1) would be implemented to reduce the potential for erosion, runoff, sedimentation, and water quality impacts. Proposed construction activities would not occur within the 100-year flood zone. Therefore, construction activities associated with Alternative 1, 2, or 3 at Andersen AFB would result in less than significant impacts to surface water.

Groundwater

Under Alternative 1, proposed munitions storage construction activities would include surface water protection measures that would also serve to protect the quality of the underlying Northern Guam Lens Aquifer (NGLA) groundwater. These BMPs and follow-on measures and plans would reduce the pollutant loading potential into stormwater and thus the underlying groundwater subbasins. Therefore, construction activities associated with Alternative 1, 2, or 3 at Andersen AFB would result in less than significant impacts to groundwater.

Nearshore Waters

Implementation of Alternative 1 at Andersen AFB would occur greater than 0.5 mile (0.8 kilometer) from the coastline, yet the entire island of Guam is classified as a coastal zone under the Coastal Zone Management Act (CZMA). Due to the proximity of the activity, Alternative 1 has the potential to indirectly impact nearshore water resources. These potential impacts would be lessened through the implementation of the surface water BMPs and adherence to all applicable orders, laws, and regulations relating to water quality. Therefore, construction activities associated with Alternative 1, 2, or 3 at Andersen AFB would result in less than significant impacts to nearshore waters.

Wetlands

No wetlands are located in or near the construction areas associated with Alternative 1 on Andersen AFB. Therefore, construction activities associated with Alternative 1, 2, or 3 at Andersen AFB would result in less than significant impacts to wetlands.

Operation

Surface Water/Stormwater

Under Alternative 1 at Andersen AFB, munitions storage operations would result in a minor increase in the area of impervious surface as a result of new earth-covered ammunition storage facilities, which would result in an associated relatively minor increase in stormwater discharge intensities and volume. This increase would be minor and would be accommodated by stormwater infrastructure, and stormwater flow paths would continue to mimic area topography. The grass-covered magazines would not alter existing stormwater runoff volumes due to their consistency with the surrounding vegetation. Alternative 1 would include the preparation and implementation of a (or update of the existing) Stormwater Pollution Prevention Plan (SWPPP); Stormwater Management Plan (SWMP); and Spill Prevention, Control, and Countermeasure (SPCC) Plan that would control runoff and minimize potential leaks and spills. Implementation of these protective measures would minimize potential impacts of runoff, spills and leaks.

Implementation of Alternative 1 at Andersen AFB would be in compliance with all federal, Government of Guam (GovGuam), and military orders, laws, and regulations, including Commander Navy Region (COMNAV) Marianas Instruction 3500.4, as well as the implementation of BMPs. Regulatory compliance and implementation of protective measures and plans would minimize potential impacts to surface water resources. Therefore, operations associated with Alternative 1, 2, or 3 at Andersen AFB would result in less than significant impacts to surface water.

Groundwater

Under Alternative 1, operations would be in compliance with the water protection measures identified in the surface water section above during operation, which would therefore also protect the quality of the underlying NGLA groundwater. Therefore, operations associated with Alternative 1, 2, or 3 at Andersen AFB would result in less than significant impacts to groundwater.

Nearshore Waters

Following construction, alterations to the watershed such as increased runoff may result in direct and indirect impacts that could alter nearshore water quality including the addition of sediments, nutrients, detrimental microorganisms, heavy metals, and organic and inorganic compounds. These effects would be minimized by complying with all applicable orders, laws, and regulations. In addition, the planning process would be conducted in conjunction with the Watershed Protection Committee (WPC). The project would also incorporate published guidance documents including but not limited to the Clean Water Action Plan, Protection and Restoring Guam's Waters, and the northern Watershed Restoration Strategy. Therefore, operations associated with Alternative 1, 2, or 3 at Andersen AFB would result in less than significant impacts to nearshore waters.

Wetlands

No wetland areas would be affected by operations associated with Alternative 1 as no wetland areas are located near the proposed operation areas. Therefore, operations associated with Alternative 1, 2, or 3 at Andersen AFB would result in no impacts to wetlands.

4.2.3.2 Munitions Storage Alternative 2

Andersen AFB

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 2 are identical those described for Munitions Storage Alternative 1.

4.2.3.3 Munitions Storage Alternative 3

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 3 are identical those described for Munitions Storage Alternative 1.

4.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

4.2.5 No-Action Alternative

4.2.5.1 Surface Water/Stormwater

Under the no-action alternative, no AMTDF construction, training, or operations would occur; therefore, existing surface water conditions would remain as described in the affected environment section (Volume 2, Chapter 4, Section 4.1). The identified surface water availability and quality concerns for Guam (e.g., construction-related discharges, sewage overflows, animal waste, and sediment erosion) would continue to exist. These threats to surface water would continue to be monitored by federal and Guam agencies, and appropriate regulatory action would continue to occur in order to maximize surface water quality and availability. In time, surface water quality is expected to slowly improve as point and non-point sources of pollution are identified and pollution loading to surface waters is reduced. Not constructing the AMTDF on Guam would not change the on-going water quality concerns or protection actions for surface waters; these conditions and actions would continue to persist. Therefore, implementation of the no action alternative would result in no impacts to surface water.

4.2.5.2 Groundwater

Under the no-action alternative, no AMTDF construction, training, or operations would occur; therefore, existing groundwater conditions would remain as described in the affected environment section (Volume 2, Chapter 4, Section 4.1). The identified groundwater availability and quality concerns for Guam (e.g., saltwater intrusion, leaky septic systems) would continue to exist. These threats to groundwater availability and quality would continue to be monitored by federal and Guam agencies to minimize potential impacts, and appropriate regulatory action would continue to occur in order to protect groundwater resources. Monitoring for saltwater intrusion and coordination amongst water users, as well as potential designations for groundwater resources is expected to ensure there is a dependable, safe supply of groundwater for Guam users. Not constructing the AMTDF on Guam would not change the on-going groundwater availability and quality concerns or the protection actions for Guam nearshore waters; these conditions and actions would continue to persist. Therefore, implementation of the no-action alternative would result in no impacts to groundwater.

4.2.5.3 Nearshore Waters

Under the no-action alternative, no AMTDF construction, training, or operations would occur; therefore, existing nearshore conditions would remain as described in the affected environment section (Volume 2, Chapter 4, Section 4.1). The identified nearshore water quality concerns for the marine waters of Guam (copper, aluminum, nickel, e*nterococci* bacteria, total residual chlorine, biochemical oxygen demand and total suspended solids) would continue to persist. These threats to nearshore water quality would continue to be monitored by federal and Guam agencies to minimize potential impacts, and appropriate regulatory action would continue to occur to protect nearshore waters. In time, nearshore water quality is expected to slowly improve as point and non-point sources of pollution are identified and pollution loading to nearshore waters is reduced. Not constructing the AMTDF on Guam would not change the on-going nearshore water quality concerns or the protection actions for Guam nearshore waters; these conditions and actions would continue to persist. Therefore, implementation of the no action alternative would result in no impacts to nearshore waters.

4.2.5.4 Wetlands

Under the no-action alternative, no AMTDF construction, training, or operations would occur; therefore, existing wetland conditions would remain as described in the affected environment section (Volume 2, Chapter 4, Section 4.1). The identified primary threats to wetlands on Guam (feral ungulates, human disturbance, invasive plants species, sedimentation, and erosion) would continue to occur. These threats to wetland areas are of concern therefore, monitored by federal and Guam agencies to protect wetland areas. Not constructing the AMTDF on Guam would change the on-going threats or protection actions for wetlands on Guam; these conditions and actions would continue to persist. Therefore, implementation of the no-action alternative would result in no impacts to wetlands.

4.2.6 Summary of Impacts

Tables 4.2-1, 4.2-2, and 4.2-3, summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 4.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
SW: LSI • Temporary increase in stormwater runoff, erosion, and sedimentation minimized through use of construction and roadway specific BMPs GW: LSI • Increased potential for NGLA groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: NI • There would be no impacts to wetlands	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 NW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 NW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1
Operation		
SW: LSI • Increase in stormwater volume and intensity and potential for non-point source pollution minimized through use of LID, SWPPP, SWMP, and SPCC Plan GW: LSI • Increased potential for local groundwater contamination; increase in annual groundwater withdrawal of 0.30 MGd (1.14 mld) NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: NI • There would be no impacts to wetlands	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 NW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as for Alternative 1 GW: LSI • The impacts would be the same as for Alternative 1 NW: LSI • The impacts would be the same as for Alternative 1 WL: NI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact, NI = No impact, SW = Surface water/Stormwater, GW = Ground water, NW = Nearshore Water, WL = Wetlands.

Table 4.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
SW: LSI • Temporary increase in Stormwater runoff, erosion, and sedimentation minimized through use of construction and roadway specific BMPs GW: LSI • Increased potential for NGLA groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: NI • There would be no impacts to wetlands	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 NW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 NW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1
Operation		
SW: LSI • Increase in stormwater volume and intensity and potential for non-point source pollution minimized through use of LID, SWPPP, SWMP, and SPCC Plan GW: LSI • Increased potential for NGLA groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: NI • There would be no impacts to wetlands	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 NW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 NW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, NI = No impact, SW = Surface water/Stormwater, GW = Ground water, NW = Nearshore Water, WL = Wetlands.

Table 4.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
SW: LSI • Temporary increase in stormwater runoff, erosion, and sedimentation minimized through use of construction and roadway specific BMPs GW: LSI • Temporary increased potential for groundwater contamination due to proximity of proposed injection control wells would be minimized through use of construction BMPs WL: NI • There would be no impacts to wetlands	SW: LSI • The impacts would be the same as Alternative 1 GW: NI • There would be no impacts to groundwater WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1
Operation			
SW: LSI • Increase in stormwater volume and intensity and potential for non-point source pollution minimized through use of LID, SWPPP, SWMP, and SPCC Plan GW: LSI • Increased potential for groundwater contamination due to proximity of proposed injection control wells would be minimized through use of a SWPPP WL: NI • There would be no impacts to wetlands	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • There would be no impacts to groundwater WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1	SW: LSI • The impacts would be the same as Alternative 1 GW: LSI • The impacts would be the same as Alternative 1 WL: NI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, NI = No impact, SW = Surface water/Stormwater, GW = Ground water, NW = Nearshore Water, WL = Wetlands.

Implementation of the action alternatives would have the potential to impact the quality and quantity of stormwater runoff, during both construction and operation of the project. Construction activities would have the potential to cause erosion and sedimentation that could degrade surface water quality. In addition, the action alternatives would increase the potential for leaks and spills from contaminants. These potential impacts would be reduced through the combination of site-specific BMPs (Volume 2, Chapter 4, Table 4.2-1), LID measures, and plans. In addition, roadway-specific BMPs would be included in the planning, design, and construction of all roadways. Increases in stormwater runoff would be managed by stormwater infrastructure, stormwater flow paths would continue to mimic area topography, and no construction would occur in a flood zone; therefore, there would be no increase in flooding risk. While groundwater withdrawal rates would increase, implementation of sustainability practices would reduce the amount of groundwater needed, which would help minimize impacts to groundwater availability. The

resulting total annual groundwater withdrawal would be less than the sustainable yield and monitoring of groundwater chemistry would ensure no harm to existing or beneficial use. The action alternatives would be implemented in compliance with all federal, local, and military orders, laws, and regulations (Volume 8, Chapter 3, Table 3.1-1), including COMNAV Marianas Instruction 3500.4 and would include the implementation of BMPs, LID measures, and monitoring.

4.2.7 Summary of Mitigation Measures

Table 4.2-4 summarizes potential mitigation measures for each action alternative.

Table 4.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Construction		
• None Identified	• None Identified	• None Identified
Operation		
• None Identified	• None Identified	• None Identified

4.3 LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE

Since none of the alternatives involve potential impacts to wetlands as defined in Section 404(b)(1) of the Clean Water Act (CWA), no analysis relative to Section 404 is necessary to identify the *least environmentally damaging alternative* as defined in the CWA.

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CHAPTER 5. AIR QUALITY

5.1 INTRODUCTION

This chapter describes the potential environmental consequences associated with implementation of the alternatives within the region of influence (ROI) – North and Central – where air quality resources may be impacted. For a description of the affected environment for all resources, refer to the respective chapters of Volume 2 (Marine Corps Relocation – Guam). The locations described in that volume include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action, and the chapters are presented in the same order as in this volume.

5.2 ENVIRONMENTAL CONSEQUENCES

5.2.1 Approach to Analysis

This section describes the analytical approach used to address potential air quality impacts from the development of infrastructure and facilities to support the proposed Army AMDTF on Guam.

5.2.1.1 Methodology

The Army AMDTF alternatives include construction of the administration and maintenance facilities, bachelor housing, family housing, and roads associated with facilities at the proposed sites, as described in Chapter 2. Assumptions made in developing the list of major construction items, the equipment necessary to complete construction, and construction productivity are presented in Volume 9, Appendix I, Section 3.4 Construction Activity Emissions.

In estimating construction-related criteria pollutant and carbon dioxide (CO_2) emissions, the usage of equipment, the likely duration of each activity, and manpower estimates for construction are based on information provided in this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) for the future project-associated construction activities under each alternative.

Estimates of construction crew and equipment requirements and productivity are based on data contained in 2003 *RS Facilities Construction Cost Data* (RSMeans 2003) and 2006 *RSMeans Heavy Construction Cost Data* (RSMeans 2006).

Estimates of construction equipment operational emissions are based on estimated hours of use and the emission factors for each equipment type, as provided by the United States Environmental Protection Agency (USEPA) using the NONROAD emission factor model (USEPA 2008). National default model inputs for non-road engines, equipment, and vehicles of interest are also taken from USEPA (2008), as were average equipment horsepower values and equipment power load factors. The operational activity data presented in RSMeans cost data books are generated based on the overall length of equipment presence on site. Therefore, an equipment actual running time factor (i.e., actual usage factor) was used to determine actual equipment usage hours for estimating equipment emissions. The usage factor for each equipment type was obtained from Federal Highways Administration's (FHWA) Roadway Construction Noise Model User's Guide (FHWA 2006). Emission factors related to construction-associated delivery trucks were estimated using the USEPA Mobile6 emission factor model (USEPA 2003), which provides a specific emission factor database for various truck classifications. The workers' commuting vehicle emissions were estimated using the same Mobile6 model (USEPA 2003) and assumed workers would

travel an average of 10 miles (16 kilometers) per day to the site using shuttle buses or vans. The detailed methodology used to calculate these emissions is presented in Volume 9, Appendix I, Section 3.4 Construction Activity Emissions. Given Guam's exempt status from using low sulfur fuel, the highest sulfur content (0.5%) diesel fuel input available in both NONROAD and Mobile 6 models was conservatively used to predict SO_2 and particulate matter (PM) emissions for diesel-powered equipment and vehicles.

Operational activities produce potential air quality impacts from the operation of stationary and non-stationary sources. Vehicle operational impacts are addressed in Volume 6 through evaluation of the overall on-road vehicular traffic air quality impacts on Guam. Vehicle trips generated from all proposed activities, including the action described here, are covered in Volume 6. Therefore, only construction activity emissions are analyzed here.

5.2.1.2 Determination of Significance

Under the Clean Air Act (CAA), motor vehicles and construction equipment are exempt from air permitting requirements. Emissions from sources associated with the construction of the proposed Army AMDTF facilities and housing occur in attainment areas that meet the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants; therefore, the General Conformity Rule (GCR) is not applicable. Nonetheless, the National Environmental Policy Act (NEPA) and its implementing regulations require analysis of the significance of air quality impacts from these sources, as well as non-major stationary sources. However, neither NEPA nor its implementing regulations have established criteria for determining the significance of air quality impacts from such sources in CAA attainment areas.

In GCR applicable non-attainment areas, USEPA uses the "major stationary source" definition under the New Source Review (NSR) program as the *de minimis* level to separate presumably exempt actions from those requiring a positive conformity determination. As the proposed action and alternatives would typically occur in areas which have always been in attainment, the EIS/OEIS applies the "major stationary source" definition (250 tons per year [TPY] or more of any air pollutant subject to regulations under the CAA) from the Prevention of Significant Deterioration (PSD) program as the criteria for determining the potential significance of air quality impacts from these sources. CO_2 is not a criteria pollutant and the 250 TPY significance criterion is not applicable to it. The potential effects of CO_2 and other greenhouse gas emissions are by nature global and are based on cumulative impacts. Individual sources are not large enough to have an appreciable effect on climate change. Hence, the impact of proposed CO_2 and other greenhouse gas emissions is discussed in the context of summary of impacts for Alternative 1 in Volume 7.

As noted above, neither the PSD permitting program nor the GCR are applicable to mobile sources or non-major stationary sources in attainment areas. Therefore, the analysis of construction and operational incremental emissions from these sources in attainment areas, and the significance criteria selected (250 TPY), are solely intended to inform the public and decision makers of the relative air quality impacts from the proposed action, and the other alternatives under NEPA requirements.

It should be noted that the above thresholds established for emissions comparison purposes must be used for all relevant emissions from the entire proposed action. The emissions quantification described in this section is for disclosure purposes only and addresses individual action component air quality impacts using the same thresholds. However, the overall air quality impacts are addressed for Alternative 1 in Volume 7 through a comparison with these thresholds. Volume 7 addresses the summary of effects from all project components under the proposed action.

5.2.1.3 Issues Identified During Public Scoping Process

The following analysis quantifies potential air quality impacts within each applicable ROI from the proposed action. As part of the analysis, concerns related to air quality that were mentioned by the public, including regulatory stakeholders during the public scoping meetings were addressed. These include increases in construction-related emissions and impacts including emissions estimates of criteria pollutants and diesel PM.

5.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

5.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

Under Alternative 1, the Army administration/headquarters (HQ) and maintenance facility would be co-located with the Marine Corps in the northern portion of Naval Computer and Telecommunications Station (NCTS) Finegayan. Unaccompanied personnel housing facilities would also be located within NCTS Finegayan. Accompanied personnel housing facilities would be co-located with the Main Cantonment housing areas in South Finegayan. Recreational and quality of life (QOL) facilities would be co-located within and adjacent to the housing areas.

North

NCTS Finegayan

Construction. Assumptions were made to develop a list of major construction items, necessary equipment, and productivity levels necessary for the completed installation of the Army AMDTF within the Marine Corps site at Finegayan. This list includes prototype structures for administration and maintenance components, and prototypes including unique elements for munitions storage and the weapons emplacement components.

Construction at both NCTS and South Finegayan were considered together and the emissions presented in Table 5.2-1 represent the total for both areas. The calculated total construction emissions from equipment and trucks with potential to occur between 2011 and 2014 are assumed to be evenly distributed among those years in TPY (Table 5.2-1). These emissions are further considered in Volume 7 in determining the potential air emissions impact significance of all project components.

Table 5.2-1. Total Annual Construction Emissions – Munitions Storage Alternative 1

Construction Activity	*Pollutant*						
	SO_2	CO	PM_{10}	$PM_{2.5}$	NO_x	VOC	CO_2
Total Annual Emissions (TPY)	1.3	4.2	0.2	0.2	2.5	0.9	453.7

The construction emissions shown in Table 5.2-1 are all well below the significance criteria of 250 TPY for air pollutants subject to regulations under the CAA, indicating that there would be less than significant impacts for this action. As discussed in Section 5.2.1.2, CO_2 is not a criteria pollutant and the 250 TPY significance criterion is not applicable to it.

Operation. As described in the methodology (Section 5.2.1.1), only construction emissions are analyzed here. Information on operational emissions is considered in Volume 6 that discusses utility and roadway project impacts.

South Finegayan

Construction. Construction at both NCTS and South Finegayan were considered together and the emissions presented in Table 5.2-1 represent the total for both areas. The calculated total construction emissions from equipment and trucks with potential to occur between 2011 and 2014 are assumed to be evenly distributed among those years in TPY (Table 5.2-1). These emissions are further considered in Volume 7 in determining the combined air emissions impact significance of all project components.

Operation. As described in the methodology (Section 5.2.1.1), only construction emissions are analyzed here. Information on operational emissions is considered in Volume 6 that discusses utility and roadway project impacts.

Central

Navy Barrigada

Construction. No new construction would occur at Navy Barrigada under Alternative 1; therefore, impacts to air quality would be less than significant.

Operation. Operations would not increase at Navy Barrigada under Alternative 1; therefore, impacts to air quality would be less than significant.

Air Force Barrigada

Construction. No new construction would occur at Air Force Barrigada under Alternative 1; therefore, impacts to air quality would be less than significant.

Operation. Operations would not increase at Air Force Barrigada under Alternative 1; therefore, impacts to air quality would be less than significant.

Alternative 1 Potential Mitigation Measures

No mitigation measures would be required for this action, as emissions are below criteria levels. Mitigation measures for summary of impacts of all components considered in this EIS/OEIS are discussed in Volume 7.

5.2.2.2 Headquarters/Housing Alternative 2

Under Alternative 2, the administration/HQ and maintenance facilities would be located within Navy Barrigada adjacent to the NCTS antenna farms. Accompanied and unaccompanied personnel housing facilities would be located within Navy Barrigada, with recreational and QOL facilities included in the housing areas.

North

NCTS Finegayan

Construction. No new construction would occur at NCTS Finegayan under Alternative 2; therefore, impacts to air quality would be less than significant.

Operation. Operations would not increase at NCTS Finegayan under Alternative 2; therefore, impacts to air quality would be less than significant.

South Finegayan

Construction. No new construction would occur at South Finegayan under Alternative 2; therefore, impacts to air quality would be less than significant.

Operation. Operations would not increase at South Finegayan under Alternative 2; therefore, impacts to air quality would be less than significant.

Central

Navy Barrigada

Construction. Total annual construction emissions under Alternative 2 are estimated as described in Section 5.2.1.1 and are summarized in Table 5.2-2. The detail emissions calculation can be found in Volume 9, Appendix I, Section 3.4.4 Construction Emissions: Marine Corps Relocation –Army Air and Missile Defense Task. The predicted emissions are slightly less than Alternative 1 and are all well below the significance criteria of 250 TPY for air pollutant subject to regulations under the CAA, indicating that there would be less than significant impacts for this action.

Table 5.2-2. Total Annual Construction Emissions – Headquarters/Housing Alternative 2

Construction Activity	*Pollutant*						
	SO_2	*CO*	PM_{10}	$PM_{2.5}$	NO_x	*VOC*	CO_2
Total Annual Emissions (TPY)	1.3	4.1	0.2	0.2	2.4	0.8	445.4

Operation. As described in the methodology (Section 5.2.1.1), only construction emissions are analyzed here. Information on operational emissions is presented in Volume 6.

Air Force Barrigada

Construction. No new construction would occur at Air Force Barrigada under Alternative 2; therefore, impacts to air quality would be less than significant.

Operation. Operations would not increase at Air Force Barrigada under Alternative 2; therefore, impacts to air quality would be less than significant.

Alternative 2 Potential Mitigation Measures

The predicted construction emissions (2011 to 2014) and operational emissions (2015 and after) for criteria pollutants within each ROI are all below the 250 TPY threshold or 100 TPY SO_2 threshold applicable for SO_2 nonattainment areas. Therefore potential air quality impacts under Alternative 2 are considered less than significant and emissions mitigation measures are not warranted.

5.2.2.3 Headquarters/Housing Alternative 3

Under Alternative 3, Army administrative and maintenance facilities and part of the housing facilities would be placed at NCTS Finegayan. The remainder of the housing facilities would be co-located within Marine Corps housing at Navy Barrigada and Air Force Barrigada.

North

NCTS Finegayan

Construction. The calculated total construction emissions for components proposed for NCTS Finegayan are summarized in Table 5.2-3. The combined emission levels under Alternative 3 (Table 5.2-3) are similar to the levels predicted under both Alternatives 1 and 2 (Table 5.2-1 and Table 5.2-2) and are detailed in Volume 9, Appendix I, Section 3.4.4 Construction Emissions: Marine Corps Relocation –

Army Air and Missile Defense Task, given the similarity of the proposed activities. Total annual construction emissions at NCTS Finegayan are all well below the significance criteria of 250 TPY for criteria pollutants.

Table 5.2-3. Total Annual Construction Emissions – Headquarters/Housing Alternative 3

Location	*Pollutant (TPY)*						
	SO_2	*CO*	*PM_{10}*	*$PM_{2.5}$*	*NO_x*	*VOC*	CO_2
NORTH							
Andersen AFB	0.0	0.1	0.0	0.0	0.0	0.0	3.9
NCTS Finegayan	0.9	2.5	0.1	0.1	1.5	0.6	289.3
CENTRAL							
Navy Barrigada and Air Force Barrigada	0.5	1.6	0.1	0.1	1.0	0.1	157.4
Total	1.4	4.2	0.2	0.2	2.5	0.7	450.6

Operation. As described in the methodology (Section 5.2.1.1), only construction emissions are analyzed here. Information on operational emissions is presented in Volume 6.

South Finegayan

Construction. No new construction would occur at South Finegayan under Alternative 3; therefore, impacts to air quality would be less than significant.

Operation. Operations would not increase at South Finegayan under Alternative 3; therefore, impacts to air quality would be less than significant.

Central

Navy Barrigada

Construction. The combined Navy Barrigada and Air Force Barrigada construction emissions shown in Table 5.2-3 are well below the significance criteria of 250 TPY for criteria pollutants, indicating that there would be less than significant impacts for this action.

Operation. As described in the methodology (Section 5.2.1.1), only construction emissions are analyzed here. Information on operational emissions is presented in Volume 6.

Air Force Barrigada

Construction. The combined Navy Barrigada and Air Force Barrigada construction emissions shown in Table 5.2-3 are well below the significance criteria of 250 TPY for criteria pollutants, indicating that there would be less than significant impacts for this action.

Operation. As described in the methodology (Section 5.2.1.1), only construction emissions are analyzed here. Information on operational emissions is presented in Volume 6.

Alternative 3 Potential Mitigation Measures

The predicted construction emissions (2011 to 2014) and operational emissions (2015 and after) for criteria pollutants within each ROI are all below the 250 TPY threshold or 100 TPY SO_2 threshold applicable for SO_2 nonattainment areas. Therefore, potential air quality impacts under Alternative 3 are considered less than significant and emissions mitigation measures are not warranted.

5.2.3 Munitions Storage Alternatives

5.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Eight earth–covered magazines (ECMs) are proposed within Munitions Storage Area (MSA) 1 to store Army missiles and provide safe storage of the system launchers during inclement weather. The new earth–covered magazines would be located in the eastern area of Andersen Air Force Base (AFB) near the intersection of Routes 3, 3A and 9. This location is remote from most of the existing ECMs in MSA 1. A typical munitions storage module would have 2,000 square feet (ft^2) (186 square meters [m^2]) of physical capacity and dimensions of 80 ft (24 m) in length and a maximum width of 30 ft (9.1 m). Each ECM would be covered with a minimum of 2 ft (0.6 m) of earth.

In accordance with established ammunitions storage requirements, native grassy vegetation would be established on and around the magazines and would be maintained (e.g., periodically mowed) to minimize a potential fire hazard.

Construction

The emissions from construction of eight earth-covered magazines (ECMs) described in Chapter 2, Section 2.3.2.2 were estimated together with those at both NCTS and South Finegayan. The emissions presented in Table 5.2-1 represent the total for all three areas and the detail emissions calculation can be found in Volume 9, Appendix I, Section 3.4.4 Construction Emissions: Marine Corps Relocation –Army Air and Missile Defense Task. The calculated total construction emissions from equipment and trucks with potential to occur between 2011 and 2014 are assumed to be evenly distributed among those years in TPY (Table 5.2-1). These emissions are further considered in Volume 7 in determining the potential air emissions impact significance of all project components.

Operation

As described in the methodology (Section 5.2.1.1), only construction emissions are analyzed here. Information on operation emissions is considered in Volume 6, which discusses utility and roadway project impacts, and Volume 2, which discusses the on base commuting vehicle emissions component.

5.2.3.2 Munitions Storage Alternative 2

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 2 are identical those described for Munitions Storage Alternative 1.

5.2.3.3 Munitions Storage Alternative 3

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 3 are identical those described for Munitions Storage Alternative 1.

5.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

5.2.5 No-Action Alternative

Under the no-action alternative, the Army AMDTF relocation would not occur and there would be no associated construction or operations. Therefore, no air quality impacts would result under the no-action alternative.

5.2.6 Summary of Impacts

Tables 5.2-4, 5.2-5, 5.2-6 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 5.2-4. Summary of Headquarters/Housing Alternative Alternatives 1, 2, and 3

Alternatives 1 ,2 and 3
Construction
LSI • Less than significant adverse impacts to air quality. Construction emissions from all components would be well below significance criteria
Operation
LSI • Less than significant adverse impacts to air quality. Operations emissions from all components would be well below significance criteria

Legend: LSI = Less than significant impact.

Table 5.2-5. Summary of Munitions Storage Alternatives 1, 2 and 3

Alternatives 1, 2, and 3
Construction
LSI • Less than significant adverse impacts to air quality. Construction emissions from all components would be well below significance criteria
Operation
LSI • Less than significant adverse impacts to air quality. Operations emissions from all components would be well below significance criteria

Legend: LSI = Less than significant impact.

Table 5.2-6. Summary of Weapons Emplacement Alternatives 1, 2, 3, and 4

Alternatives 1, 2, 3, and 4
Construction
LSI • Less than significant adverse impacts to air quality. Construction emissions from all components would be well below significance criteria
Operation
LSI • Less than significant adverse impacts to air quality. Operations emissions from all components would be well below significance criteria

Legend: LSI = Less than significant impact.

The air emissions predicted for Alternatives 1, 2, and 3 associated with construction and operation activities required for the relocation of the Army AMDTF to Guam are all well below the significance

criterion of 250 TPY. This criterion is used in the PSD program for determining the potential significance of air quality impacts. All calculated emissions for regulated pollutants subject to this criterion, criteria pollutants in this instance (see Volume 2 for further discussion), are well below 250 TPY. CO_2 is not a criteria pollutant and the 250 TPY significance criterion is not applicable to it. The potential effects of CO_2 and other greenhouse gas emissions are by nature global and are based on cumulative impacts. Therefore, Alternatives 1, 2, and 3 from this action would result in less than significant impacts to air quality resources. The no-action alternative would result in no impacts to air quality resources.

Air quality impacts associated with vehicle trips generated from all proposed activities, including the action described in this volume, are covered in Volume 6. However, it should be noted that emissions thresholds must be applied to all relevant emissions from the entire proposed action to determine potential impact significance. Overall air quality impacts are addressed for Alternative 1 in Volume 7 through a detailed comparison of such thresholds. Volume 7 also addresses the aggregate effects of all project components under the proposed action.

5.2.7 Summary of Potential Mitigation Measures

As the predicted air emissions would result in less than significant impacts for all three alternatives for both construction and operation components of the proposed action, no mitigation measures are not required, as summarized in Table 5.2-7.

Table 5.2-7. Summary of Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Construction		
• Not mitigation required	• Not mitigation required	• Not mitigation required
Operation		
• Not mitigation required	• Not mitigation required	• Not mitigation required

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CHAPTER 6. NOISE

6.1 INTRODUCTION

This chapter describes the potential environmental consequences associated with implementation of the alternatives within the region of influence (ROI) for noise. For a description of the affected environment for all resources, refer to the respective chapters of Volume 2 (Marine Corps Relocation – Guam). The locations described in that volume include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action, and the chapters are presented in the same order as in this volume.

6.2 ENVIRONMENTAL CONSEQUENCES

6.2.1 Approach to Analysis

Potential sound-generating events associated with the proposed action were identified and the potential sound levels from these activities were estimated on the basis of published military sound sources information. These estimated sound levels were reviewed to determine: if they would represent a significant increase in the current ambient sound level, would have an adverse impact on a substantial population of sensitive receptors, or would be inconsistent with any relevant and applicable standards.

Noise impacts in this section are relative to the noise source where the activity generating the noise occurs. For example, noise impacts to non-Department of Defense (DoD) lands from construction activities on Naval Computer Telecommunications Station (NCTS) Finegayan are found in the NCTS Finegayan section. Unless specifically stated as an on-base receptor, sensitive receptors are assumed to be located on non-DoD lands.

6.2.1.1 Methodology

Construction noise is generated by the use of heavy equipment on job sites. Table 6.2-1 in Volume 4 provides a list of representative samples of construction equipment and their associated noise levels. Impact devices typically generate more noise than non-impact devices. Acoustical Usage Factor refers to the percentage of time the equipment is running at full power on the job site. The Federal Highway Administration (FHWA) published a Roadway Construction Noise Model to predict noise levels adjusted from empirical data for construction operations to the actual distance of a receptor.

The decibel (dB) level of a sound decreases (or attenuates) exponentially as the distance from the source increases. For a single point source, like a construction bulldozer, the sound level decreases by approximately six dBs for each doubling of distance from the source. Sound that originates from a linear, or 'line' source, such as a passing aircraft, attenuates by about three dBs for each doubling of distance where no other features such as vegetation, topography, or walls absorb or deflect the sound. Depending upon their nature, such features can range from having minimal to substantial noise levels reduction capabilities.

Operational activities produce potential noise impacts from the operation of stationary and non-stationary sources. Vehicle operational impacts are addressed in Volume 6 through evaluation of the overall on-road vehicular traffic noise impacts on Guam. Vehicle trips generated from all proposed activities, including

the action described here, are covered in Volume 6. Therefore, only noise from construction activity is analyzed in this chapter.

6.2.1.2 Determination of Significance

Noise impacts result from perceptible changes in the overall noise environment that increase annoyance or affect human health. Annoyance is a subjective impression of noise and is subject to various physical and emotional variables. Annoyance levels generally increase as the cumulative noise energy also increases. Human health effects such as hearing loss and noise-related awakenings can result from noise.

For this EIS/OEIS, noise is evaluated for both construction and operation activities. It is not anticipated that maintenance activities would noticeably contribute to the noise environment due to their intermittent nature and short duration. The threshold level of significant impacts for construction noise for construction is: noise resulting in an hourly equivalent sound level (L_{eq}) of 75 A-weighted decibels (dBA), based on United States (U.S.) Environmental Protection Agency (USEPA) data for construction noise at a sensitive receptor. Such noise exposure would be equivalent to noise Zone III or consistent exposure to noise levels at 85 dBA over an 8-hour period under the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (NIOSH 1998).

The significance criteria expressed in this section applies to human receptors, but noise could also affect biological resources, land use, and cultural resources. Please refer to the specific resource sections for details about potential noise impacts to biological resources and other resources.

6.2.1.3 Issues Identified During Public Scoping Process

As part of the analysis, concerns related to noise pollution that were mentioned by the public, including regulatory stakeholders, during the public scoping meetings were addressed. These include: AMDTF associated activities.

6.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

6.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. The major component is headquarters/administrative and housing, for which there are three alternatives. The two lesser components (the Modular Storage Magazines [MSMs] and the weapons emplacement sites) each have their own set of alternatives. A full analysis of each alternative is presented beneath the respective headings of this chapter. The components addressed include: Headquarters/Administrative/Housing, Modular Storage Magazines (MSMs), and weapons emplacement sites. There are multiple alternatives for each component. A full analysis of each alternative of the Headquarters/Administrative components is presented beneath the three subheadings of this chapter. The MSM alternatives are all located on Andersen AFB, so those alternatives are discussed in the "North" portion of the chapter. The weapons emplacement sites analysis is classified. However, a summary of

impacts specific to each alternative (including an unclassified summary of weapons emplacement sites) is presented at the end of this chapter.

Alternative 1 would co-locate the administration/headquarters (HQ) and maintenance facility with the Marine Corps in the northern portion of NCTS Finegayan and are compatible with adjacent proposed Marine Corps land uses. Unaccompanied personnel housing facilities would be located within NCTS Finegayan. Accompanied personnel housing facilities would be co-located with the Main Cantonment housing areas in South Finegayan, while recreational and quality of life (QOL) facilities would be co-located within and adjacent to the housing areas. This alternative is compatible with Marine Corps Alternatives 1 and 8 (refer to Volume 2).

The proposed action would include: administration/HQ and maintenance facility; munitions storage; weapons emplacement sites; and family housing, unaccompanied personnel housing, and associated QOL facilities. Housing and QOL facilities would be shared between the Army and Marine Corps and is addressed in Volume 2.

The administration/HQ and maintenance facility would comprise approximately 28 acres (ac) (11 hectares [ha]) of developed land including a battalion headquarters, company facilities, and tactical vehicle maintenance facilities. Training operations for AMDTF units would involve gunnery tables that are non-missile live-fire in nature, but would involve maneuvering and emplacement battle-drills in accordance with standard Army Gunnery Tables. Missile live-fire training will be conducted at an off-island location suitable for Patriot and Terminal High Altitude Area Defense (THAAD).

Eight earth–covered magazines (ECMs) are proposed within Munitions Storage Area (MSA) 1 to store Army missiles and provide safe storage of the system launchers during inclement weather. The new earth–covered magazines would be located in the eastern area of Andersen Air Force Base (AFB) near the intersection of Routes 3, 3A and 9. This location is remote from most of the existing ECMs in MSA 1. A typical munitions storage module would have 2,000 square feet (ft^2) (186 square meters [m^2]) of physical capacity and dimensions of 80 ft (24 m) in length and a maximum width of 30 ft (9.1 m). Each ECM would be covered with a minimum of 2 ft (0.6 m) of earth.

In accordance with established ammunitions storage requirements, native grassy vegetation would be established on and around the magazines and would be maintained (e.g., periodically mowed) to minimize a potential fire hazard.

North

NCTS Finegayan

Construction. To characterize construction activity noise levels, the FHWA Handbook (U.S. Department of Transportation [USDOT] 2006) was used. Noise from construction activity varies with the types of equipment used and the duration of use. Noise impacts are reduced by 6 dBA as distance from the noise producing activity is doubled. During operation, heavy equipment and other construction activities generate noise levels ranging typically from 70 to 90 dBA at a distance of 50 feet (ft) (15 meters [m]).

AMDTF facilities proposed in NCTS Finegayan include the administration/HQ and maintenance facilities. These facilities would be sited in the north-central part of NCTS Finegayan approximately 200 ft (61 m) to the west of Route 3. During construction of facilities, use of heavy equipment would occur sporadically throughout the daytime hours. Generally, heavy equipment would generate the highest noise levels throughout the construction phase; however, this noise would be temporary in nature and would diminish the farther sensitive noise receptors are from the construction site. Although some heavy

equipment would be used throughout the construction process, the noisiest heavy equipment is associated with site preparation and their use would tail off as construction of the structures begins. The type of equipment necessary for site preparation would be graders, pavers, dump trucks, and concrete mixers. Use of heavy equipment also depends on the construction schedule, and would not be permanent. A compressed schedule versus a long-term schedule would likely use more pieces of heavy equipment for longer daily periods raising noise levels; however, the duration would be shorter.

This analysis assumes the use of 20 pieces of heavy equipment, including multiple graders, excavators, dump trucks, and pavers. Under this assumption, the noise level would be approximately 91 dBA at 50 ft (15 m) from the source. The proposed construction would be approximately 2,000 ft (610 m) from Route 3 and the nearest off-base receptor; therefore, the noise level would attenuate down to approximately 59 dBA L_{eq}. On-base receptors would be much closer and would experience noise levels as high as 76 dBA at 300 ft (92 m) away. Outdoor noise levels would be reduced due to the effects of terrain and distance from the construction site.

Temporary increases in truck traffic used to transport materials on- and off-site would result in a temporary increase in localized noise. Greater noise disturbance would occur within and near the construction corridors. Construction traffic would not create any permanent, adverse noise impacts to human health or the local environment. Therefore, noise impacts would be less than significant.

Operation. As described in the methodology (Section 6.2.1.1), only noise from construction activity is analyzed here. Information on operation noise is presented in Volume 6.

South Finegayan

Construction. Construction in South Finegayan would include housing projects co-located with the Marine Corps housing. Noise impacts would be to the same as those described above for NCTS Finegayan; however, sensitive receptors would be much closer to the construction activities. Although the area across Route 3 is low density residential, sensitive receptors on non-DoD lands could receive higher than the 75 dBA L_{eq} USEPA acceptable level for residential areas during construction in the areas closest to Route 3. These noise levels would be considered significant, but can be reduced to less than significant levels by using Best Management Practices (BMPs).

Operation. As described in the methodology (Section 6.2.1.1), only noise from construction activity is analyzed here. Information on operation noise is presented in Volume 6.

Central

Navy Barrigada

Construction. Under Alternative 1, no construction activities for the AMDTF would occur at Navy Barrigada. Therefore, there would be no noise impacts from construction.

Operation. As described in the methodology (Section 6.2.1.1), only noise from construction activity is analyzed here. Information on operation noise is presented in Volume 6.

Air Force Barrigada

Construction. Under Alternative 1, no construction activities for the AMDTF would occur at Air Force Barrigada. Therefore, there would be no noise impacts from construction.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

Alternative 1 Potential Mitigation Measures

No noise mitigation measures would be required for the housing construction portion of the AMDTF facilities for this alternative.

However, BMPs would be implemented to reduced noise to a less than significant impact. The perimeter fence design has not been completed; however, construction of a concrete block wall as a sound barrier would reduce noise levels by 5 to 10 dBA (USDOT 2006). Other minor practices would be to place stationary equipment, such as generators, as far in from the fence line as practicable. Furthermore, sequencing the project work such that fewer pieces of heavy equipment are working adjacent to sensitive on-base and off-base receptors at a time would reduce the noise levels below the USEPA standard.

6.2.2.2 Headquarters/Housing Alternative 2

Under Alternative 2, all AMDTF projects would occur on Navy Barrigada. Proposed construction would include administrative/HQ and maintenance facility, accompanied and unaccompanied personnel housing, and recreational and QOL facilities.

North

NCTS Finegayan

Construction. Under Alternative 2, no construction activities for the AMDTF would occur at NCTS Finegayan. Noise generated by construction activities on Navy Barrigada would not reach NCTS Finegayan. Therefore, there would be no noise impacts from construction.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

South Finegayan

Construction. Under Alternative 2, no construction activities for the AMDTF would occur at South Finegayan. Noise generated by construction activities on Navy Barrigada would not reach South Finegayan. Therefore, there would be no noise impacts from construction.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

Central

Navy Barrigada

Construction. Under Alternative 2, construction-related noise levels at Navy Barrigada would be the same as those described for Alternative 1 at NCTS Finegayan in Section 6.2.2.1. However, the nearest sensitive receptors would be located in residential areas located adjacent to the property line along the northern boundary of Navy Barrigada. This analysis assumes there would be at least a 150 ft (46 m) distance to the nearest off-base receptor and a limited number of heavy equipment (i.e., one grader, backhoe, paver, dump truck, and concrete mixer) would be used in the areas adjacent to the residences. Under these assumptions, noise levels would be approximately 74 dBA L_{eq}, which is just under the USEPA limit for residences. BMPs would reduce the noise levels to acceptable levels. There are no on-base receptors at Navy Barrigada. Therefore, noise impacts would be considered less than significant.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

Air Force Barrigada

Construction. Under Alternative 2, no construction projects would occur at Air Force Barrigada. Noise generated by construction activities on Navy Barrigada would not impact Air force Barrigada. Therefore, there would be no noise impacts from construction.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

Noise impacts from construction activities at Navy Barrigada would affect off-base receptors. BMPs, such as sound walls and project sequencing, would reduce impacts to a less than significant level. Noise levels due to operation would be similar to traffic noise, and therefore, would result in less than significant impacts.

Alternative 2 Potential Mitigation Measures

No noise mitigation measures would be required for any aspect of the AMDTF actions for Alternative 2.

6.2.2.3 Headquarters/Housing Alternative 3

Under Alternative 3, the administration/HQ, maintenance facility, and unaccompanied housing would be co-located with the Marine Corps facilities in the northern portion of NCTS Finegayan. Accompanied housing, recreational, and QOL facilities would be co-located with Marine Corps housing within Navy Barrigada and Air Force Barrigada.

North

NCTS Finegayan

Construction. Under Alternative 3, construction related noise levels at NCTS Finegayan would be the same as those described for Alternative 1 in Section 6.2.2.1. Off-base sensitive receptors would be located approximately 800 ft (244 m) from the proposed construction area. Construction activities would generate noise levels of approximately 72 dBA L_{eq} for off-base sensitive receptors and approximately 76 dBA for on-base receptors. These levels are considered significant; however, BMPs (i.e., sound walls and project sequencing) would reduce impacts to a less than significant level.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

South Finegayan

Construction. Under Alternative 3, no construction activities would occur at South Finegayan. Due to the distance of sensitive receptors, noise generated by construction activities on NCTS Finegayan would result in less than significant impacts.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

Central

Navy Barrigada

Construction. Construction related noise impacts would be the same as those described for Navy Barrigada (refer to Section 6.2.2.1). Implementation of BMPs would reduce noise impacts to a less than significant level.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

Air Force Barrigada

Construction. Residential areas line the west edge of Air Force Barrigada; therefore, construction related noise impacts and BMPs would be the same as those described above for Navy Barrigada, in Section 6.2.3.2. These BMPs (i.e., sound walls and project sequencing) would reduce noise impacts to a less than significant level.

Operation. As described in the methodology (Section 6.2.1.1), only construction noise is analyzed here. Information on operational noise is presented in Volume 6.

Alternative 3 Potential Mitigation Measures

No noise mitigation measures would be required for any aspect of the AMDTF actions for Alternative 3.

6.2.3 Munitions Storage Alternatives

6.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

Proposed construction for munitions storage in earth-covered magazines (ECM) would be at the Andersen Air Force Base (AFB) Munitions Storage Area (MSA). The proposed ECM would be located away from any inhabited facility in accordance with required explosive safety distances. Noise generated by construction of the ECM would be barely audible to any off-base receptor and would be considered less than significant.

Operation

Noise impacts associated with the operation of munitions storage in the ECMs would be limited to occasional vehicular noise when loading and unloading the magazines. Noise generated by operation of the ECM would be barely audible to any off-base receptor and would be considered less than significant.

6.2.3.2 Munitions Storage Alternative 2

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Noise generated by munitions storage construction and operation on Andersen AFB would be the same as described in Alternative 1. Therefore, impacts for Munitions Storage Alternative 2 are identical those described for Munitions Storage Alternative 1.

6.2.3.3 Munitions Storage Alternative 3

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Noise generated by munitions storage construction and operation on Andersen AFB would be the same as described in Alternative 1. Therefore, impacts for Munitions Storage Alternative 3 are identical those described for Munitions Storage Alternative 1.

6.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

6.2.5 No-Action Alternative

Under the no-action alternative, there would be no construction to support the proposed AMDTF. Under the no-action alternative, areas proposed for AMDTF facilities would continue to be used for existing DoD functions. Therefore, there would be no noise impacts from implementation of the no-action alternative.

6.2.6 Summary of Impacts

Tables 6.2-1, 6.2-2, 6.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 6.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • At NCTS Finegayan off-base receptors would receive up to 59 dBA and on base would be as high as 76 dBA. BMPs would reduce to noise impacts to a less than significant level • At South Finegayan construction noise impacts would be just over 75 dBA. BMPs would reduce the impacts to a less than significant level	LSI • Construction noise levels for Navy Barrigada would be approximately 74 dBA; therefore, would be less than significant. BMPs would further reduce noise levels	LSI • The impacts for Navy Barrigada and Air Force Barrigada would be the same as Alternative 2 • The impacts for NCTS Finegayan would be the same as Alternative 1
NI • There would be no impacts for Navy Barrigada or Air Force Barrigada	NI • There would be no impacts for NCTS or South Finegayan	NI • There would be no impacts for South Finegayan
Operation		
SI • Operational noise is discussed in Volume 6	SI • The impacts would be the same as Alternative 1	SI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, SI = Significant impact, NI = No impact.

Table 6.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Construction of the ECMs would be well away from any sensitive receptor, and therefore, would be less than significant impacts.	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1
Operation		
LSI • Operations at the ECMs would be well away from any sensitive receptor, and therefore, would be less than significant impacts.	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact.

Table 6.2-3. Summary of Weapons Emplacements Impacts – Alternatives 1, 2, 3, and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
LSI • There are no sensitive receptors in or near the project location. Construction noise levels would attenuate down to almost ambient levels (71 dBA) at the nearest receptor off Andersen AFB. Therefore the noise impacts would be less than significant.	LSI • The impacts would be the same as Alternative 1	LSI The impacts would be the same as Alternative 1	LSI The impacts would be the same as Alternative 1
Operation			
LSI • The primary noise impacts would be traffic noise from increased vehicle trips and temporary intermittent generator use, creating noise levels of approximately 81 dBA at a distance of 50 ft (15 m) from the source. The impacts of these operational noise levels would be less than significant.	LSI • The impacts would be the same as Alternative 1	LSI The impacts would be the same as Alternative 1	LSI The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact.

Noise impacts associated with the proposed Army AMDTF action would be primarily due to construction activities. Noise impacts from operations would be similar to traffic noise. These impacts would be localized around NCTS Finegayan, South Finegayan, Navy Barrigada, and Air Force Barrigada depending upon the alternative selected. Although the noise impacts would be limited to the construction period and would cease once construction has been completed, noise levels could exceed acceptable

USEPA standards. These levels would be reduced to less than significant levels through implementation of BMPs, such as project sequencing and sound barriers.

6.2.7 Summary of Potential Mitigation Measures

Table 6.2-4 summarizes the potential mitigation measures proposed for each action alternative.

Table 6.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Construction		
• No mitigation required	• No mitigation required	• No mitigation required
Operation		
• No mitigation required	• No mitigation required	• No mitigation required

CHAPTER 7. AIRSPACE

7.1 INTRODUCTION

This chapter contains a description of the potential environmental consequences on airspace associated with implementation of the alternatives within the region of influence (ROI). For a description of the affected environment for all resources, refer to respective chapters of Volume 2, (Marine Corps Relocation – Guam). The locations described in that volume include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action, and the chapters are presented in the same order as the resource areas contained in this volume.

7.2 ENVIRONMENTAL CONSEQUENCES

7.2.1 Approach to Analysis

7.2.1.1 Methodology

As the airspace impacts would be island-wide in nature with no difference in effects among the various alternatives, the summary of impacts presented below covers all of the alternatives except the no-action alternative, which is treated separately in Section 7.2.3. Impacts on airspace use were assessed by evaluating the potential effects of the proposed training activities on the principal attributes of airspace use. Listed below are the impact categories and how they were assessed for this project:

- Impacts on controlled and uncontrolled airspace were assessed by determining if the project would reduce the amount of navigable airspace by creating new or expanding existing special use airspace (SUA) or by introducing temporary flight restrictions or presenting an obstruction to air navigation.
- Impacts on SUA were assessed by determining the project's requirement either for new SUA or for modifying existing SUA.
- Impacts on enroute airways were assessed by determining if the project would lead to a change in a regular flight course or altitude or instrument procedures.
- Impacts on airports and airfields were assessed by determining if the project would restrict access to or affect the use of airports/airfields available for public use or if it would affect airfield/airport arrival and departure traffic flows.

Factors used to assess impacts on air traffic include consideration of an alternative's potential to result in an increase in the number of flights such that they could not be accommodated within established operational procedures and flight patterns, a requirement for airspace modification, or an increase in air traffic that might increase collision potential between military and nonparticipating civilian operations.

7.2.1.2 Determination of Significance

Based part on Federal Aviation Administration (FAA) Order 1050.1E, Change 1, Environmental Impacts: Policies and Procedures and FAA Order 7400.2E, Procedures for Handling Airspace Matters, an action is considered to have a potential significant airspace impact if it would result in any of the following:

- Reduction in the amount of navigable airspace that would have adverse aeronautical impacts to non-participating users that could not be mitigated.

- Creation of an obstruction to air navigation.
- Assignment of new SUA (including Controlled Firing Areas, Restricted Areas, Warning Areas, and/or Military Operations Areas) or require the modification of existing SUA that would have adverse aeronautical impacts that could not be mitigated.
- Change to an existing or planned Instrument Flight Rule (IFR), minimum flight altitude, a published or special instrument procedure, or an IFR departure procedure or require a visual flight rule operation to change from a regular flight course or altitude.
- Reduction in public health and safety due to a change in aviation safety risk.
- Restricted access to or effects on the use of airports and airfields available for public use.
- Change to commercial or private airfield or airport arrival and departure traffic flows.

7.2.1.3 Issues Identified During Public Scoping Process

As part of the analysis, concerns related to Airspace that were mentioned by the public, including regulatory stakeholders, during the public scoping meetings include potential impacts to commercial aircraft using Guam International Airport (GIA).

7.2.2 Proposed Action

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L).

The proposed SUA (Restricted Area R-7205) would be located along and off the northwest coast of Guam. The SUA includes all components of the proposed action, and would be the same for all the alternatives. The THAAD radar radio frequency hazard areas for military aircraft with electro-explosive devices exists from the radar out to 3.4 miles (mi) (5.5 kilometers [km]) from the radar, 65 degrees to the left and right of the main radar bore site and 90 degrees straight up. A THAAD radar radio frequency hazard area for civilian aircraft exists from the radar out to 1.5 mi (2.4 km) from the radar, 65 degrees to the left and right of the main radar bore site and 90 degrees straight up. A personnel hazard exists for 328 feet (ft) (100 meters [m]) on level ground in front of the radar and for elevations 5 degrees above the radar elevation out to 2.2 mi (3.6 km). For distances from the radar between 328 ft (100 m) and 2.2 mi (3.6 km), if the difference in elevation between the radar and the terrain (or a tower or building in an urban environment) divided by the distance from the radar is greater than 0.0875, then an uncontrolled personnel hazard exists. Planned preventive maintenance will require a minimum continuous period of 45 minutes daily Monday through Friday. Training and certification periods will be processed to the FAA for approval to utilize pre-approved R-7205 airspace.

The proposed restricted area would not impact GIA. The proposed Restricted Area-THAAD would be from the Surface up to Flight Level 22,000 ft mean sea level (MSL) (FL220) (4.2 mi [6.7 km]) and would be activated from 0800-2200L (i.e., from 8:00 a.m. until 10:00 p.m. local time), Monday – Friday; 7:00-6:00, Saturday and Sunday; other times by Notice to Airmen (NOTAM.).

Under this alternative there would be no change to enroute airways or IFR procedures. There would also be no restrictions on access to and no effect on the use of civilian airports or airfields available for public use. Class D airspace surrounding Andersen Air Force Base (AFB) would fall partially within the existing Class D airspace surrounding Andersen AFB. Under this option, current Class D airspace would be modified to exclude the proposed SUA. This would not cause any direct adverse impacts on general

aviation air traffic flying out of GIA. Operations would continue to be subject to air traffic control clearances and instructions. Hazardous air training activities are communicated to commercial airlines and general aviation by NOTAMs, published by the FAA.

There would be no additional impacts on the FAA's capabilities, no expected decrease in aviation safety, and no adverse effect on commercial or general aviation activities. No significant impacts are anticipated. Arrival and departures for Andersen AFB would be impacted, but changes and coordination of proposed SUA use with Andersen AFB Arrival and Departure Control would limit impacts. Therefore, impacts to airspace would be less than significant.

7.2.3 No-Action Alternative

Under the no-action alternative, no SUA or restricted airspace associated with the Army AMDTF would occur. Therefore, no airspace impacts would result from the no-action alternative.

7.2.4 Summary of Impacts

Tables 7.2-1 summarize the potential impacts of the proposed action to airspace island-wide. A text summary is provided below.

Table 7.2-1. Summary of Army AMDTF Impacts

All Alternatives
Construction
NI • No impacts to airspace from construction
Operation
LSI • No change to enroute airways or IFR procedures • No restrictions on access to and no effect on the use of civilian airports or airfields available for public use. • No direct adverse impacts on general aviation air traffic flying out of GIA. • No additional impacts on the FAA's capabilities, no expected decrease in aviation safety, and no adverse effect on commercial or general aviation activities. • Impact on air traffic to and from Andersen AFB would be limited with coordination.

Legend: NI = No impact; LSI = Less than significant impact.

None of the alternatives would have significant impacts on airspace. Alternatives 1, 2, 3, and 4, would establish SUA for THAAD training. A new SUA would be necessary to accommodate THAAD training, but would not require any changes to existing arrival and departures from GIA. There would be no enroute low-altitude airways, and no IFR procedures would need to change. Well-established and understood aviation procedures and rules governing flight operations in both controlled and uncontrolled navigable airspace and SUA make future adverse impacts on public health and safety extremely unlikely. Aircrews for military participants and non-participating aircraft would be responsible for using see and avoid techniques to avoid hazards. The impact on this airspace action on air traffic control and airspace users is anticipated to be less than significant once new procedures have been in effect for a few months.

7.2.5 Summary of Potential Mitigation Measures

Table 7.2-2 summarizes the potential mitigation measures proposed for each action alternative.

Table 7.2-2. Summary of Potential Mitigation Measures

Impact Area	*Adverse Impacts*	*Mitigation Measures*
Airspace	• None	• No mitigation required

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CHAPTER 8.
LAND AND SUBMERGED LAND USE

8.1 INTRODUCTION

This section relies on the Volume 2 affected environment description of land and submerged land ownership and use for both civilian and Department of Defense (DoD) property. Submerged lands refer to areas in coastal waters extending from the Guam coastline into the ocean 3 nautical miles (nm) (5.6 kilometers [km]), which is the limit of territorial jurisdiction. The focus of Chapter 8 is to address the land ownership and land use impacts associated with the proposed action for an Army Air and Missile Defense Task Force (AMDTF) on Guam.

Relative to the Marine Corps proposed action, the Army proposed action is small and would not require land acquisition. Land use planning for the Army was conducted concurrently with the Marine Corps planning to identify opportunities for maximum land use efficiency. The potential impacts are described by alternatives and components. The chapter concludes with identification and discussion of possible mitigation measures.

The region of influence (ROI) for land and submerged land is land and ocean in the Territory of Guam within 3 nm (5.6 km) of shore.

8.2 ENVIRONMENTAL CONSEQUENCES

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

8.2.1 Approach to Analysis

8.2.1.1 Methodology

Land and submerged land ownership and use is organized into two categories: 1) land and submerged lands ownership and management (here after referred to as just land and submerged lands ownership); and 2) land and submerged land use. There are different criteria for assessing potential impacts under these two categories and they are discussed below.

Specific resource categories such as noise, terrestrial biological resources, public health and safety, and recreational resources address the potential indirect impacts that are due to changes in land ownership and use.

Federal actions on federal lands are not subject to local zoning or land management regulations; however, consistency with surrounding non-federal land uses is an important consideration in land use planning. A Coastal Zone Management Act consistency determination assessment is being prepared for all Guam proposed actions and the correspondence will be included in the Final Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) appendices.

Land Ownership Category

There are two criteria applied for assessing impacts on land and submerged land ownership:

- Acquisition by the federal government
- Changes in current access policy due to a change in ownership

The impact assessment for land and submerged land ownership is not based on regulatory authority or permit requirements. Assumptions are made for this analysis and the basic premise is that releases of federal lands and submerged lands to the Government of Guam (GovGuam) or individuals have beneficial impacts on the new landowners. Conversely, land acquisition (e.g., through purchase, lease, etc.) by the federal government is considered an adverse impact on the entities that are losing ownership. There may be some property owners who are motivated to sell or lease land to the federal government and would perceive the federal acquisition of their property as a beneficial impact. However, the conservative assumption is that current land and submerged land owners (including GovGuam) would prefer to retain their property and leases.

Land Use Category

There are three criteria applied for assessing impacts on land and submerged land use:

- Consistency with the Farmland Protection Policy Act (FPPA) of 1981 (not applicable to submerged lands)
- Consistency with current or documented planned land and submerged land use
- Access restriction on DoD lands

Land Use Criterion 1: FPPA

The FPPA is intended to minimize the impact of federal programs on the unnecessary and irreversible conversion of land to non-agricultural uses. Actions inconsistent with this Act are considered to have an adverse impact though determination of significance is a qualitative assessment based on the value of the farmland affected. The DoD lands on Guam are not currently used or planned for farming; therefore, there would be no impact associated with changes in land use.

Land Use Criterion 2: Consistency with current or documented planned land use

Land use plans are intended to guide future development. Potential adverse land use impacts would result from proposed land uses which are inconsistent with the existing land use, planned land use, or if vacant land and open space is developed. Potential adverse impacts would also result from incompatible changes in use within submerged lands.

Federal actions on federal lands and submerged lands are subject to Base Command approval, but are not required to conform to state/territory land use plans or policies. The proposed action alternatives of this EIS/OEIS have been developed in consultation with Base Command planners and approved by Base Commands. As a result, a finding of no impacts would occur.

Proposed land uses on newly acquired lands would have an adverse impact if inconsistent with existing or proposed land uses at that site. Similarly, a change in use within non-DoD submerged land could have an adverse impact. The test for significance is qualitative and concerns the related degree of incompatibility. For example, proposed military housing would be consistent with existing or planned civilian residential communities, and would not adversely impact land use. A proposed industrial facility in an area designated for public park use would be a significant adverse impact, while the same facility in an area designated for heavy commercial land use would have no significant adverse impact.

While proposed land use under the alternatives may be consistent with existing land use, potential adverse impacts may arise due to changes in land use intensity (e.g., a training range use increasing from once monthly to daily). Intensity of land use is an important consideration. The resultant potential impacts on other resource categories are the criteria for significance; therefore, it is discussed in those other resource chapters. Intensity in land use is mentioned in this chapter, but is not assigned specific significance criteria.

Land Use Criterion 3: Restrictions on access

Additional restrictions on public access would be a potential adverse impact. The test for significance is subjective and based on the geographic area affected, the schedule or timing of the access restrictions (permanent or occasional), and the population affected.

8.2.1.2 Issues Identified During Public Scoping Process

As part of the analysis, concerns relating to land ownership and use that were mentioned by the public, including regulatory stakeholders, during scoping meetings were addressed. The following are public, including regulatory agency, preferences:

- No increases in federal land ownership (although some land owners were interested in selling)
- No re-acquisition of lands that have been or are in the process of being released by the federal government
- All land uses proposed on federal land should be consistent with GovGuam land use plans. Specifically, civilian housing should not be adjacent to industrial or training uses on the Base (Yigo and Dededo were areas of concern)
- Federal government release of South Finegayan and Andersen South
- Current public rights-of-way retained

There was concern that the Army AMDTF would be located at Barrigada and be incompatible with surrounding uses. Presumably, the concern was the siting of missile launch and other operational facilities, not for family housing and community support.

8.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

8.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

Alternative 1 would have the AMDTF co-located with the Marine Corps at Naval Computer and Telecommunications Station (NCTS) and South Finegayan.

North

NCTS Finegayan

Construction. Existing DoD land would be used; therefore, there would be no change in land ownership. In isolation of the Marine Corps proposed action, the construction footprint could potentially be limited to previously developed, and therefore not FPPA protected, areas. Construction impacts would be consistent with current and documented land use since it would be limited to the project area and adjacent previously disturbed area. There would be no new restrictions on access. This would result in no change to land use. Consequently, there would be no impacts to land ownership or use.

Operation. Existing DoD land would be used so there would be no change in land ownership. The proposed land use is consistent with FPPA, current and proposed land use, and there would be no new restriction on access. Consequently, there would be no impacts to land ownership or use.

South Finegayan

Construction. Existing DoD land would be used; therefore, there would be no change in land ownership. In isolation of the Marine Corps proposed action, the construction footprint could potentially be limited to previously developed, and therefore not FPPA protected, areas. Construction impacts would be consistent with current and documented land use since it would be limited to the project area and adjacent previously disturbed area. There would be no new restrictions on access. This would result in no change to land use. Consequently, there would be no impacts to land ownership or use.

Operation. Existing DoD land would be used, therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA, current and proposed land use, and there would be no new restriction on access. Consequently, there would be no impacts to land ownership or use.

Central

Navy Barrigada

Construction. Under Alternative 1, no construction activities for the Army AMDTF would occur at Navy Barrigada. Therefore, there would be no land ownership or use impacts from construction.

Operation. Under Alternative 1, no operational activities for the Army AMDTF would occur at Navy Barrigada. Therefore, there would be no land ownership or use impacts from operation.

Air Force Barrigada

Construction. Under Alternative 1, no construction activities for the Army AMDTF would occur at Air Force Barrigada. Therefore, there would be no land ownership or use impacts from construction.

Operation. Under Alternative 1, no operational activities for the Army AMDTF would occur at Air Force Barrigada. Therefore, there would be no land ownership or use impacts from operation.

Alternative 1 Potential Mitigation Measures

No impacts to land and submerged land ownership or use were identified under Alternative 1; therefore, no mitigation is necessary or proposed.

8.2.2.2 Headquarters/Housing Alternative 2

Alternative 2 would have the AMDTF located at Navy Barrigada.

North

NCTS Finegayan

Construction. Under Alternative 2, no construction activities for the Army AMDTF would occur at NCTS Finegayan. Therefore, there would be no land ownership or use impacts from construction.

Operation. Under Alternative 2, no operational activities for the Army AMDTF would occur at NCTS Finegayan. Therefore, there would be no land ownership or use impacts from operation.

South Finegayan

Construction. Under Alternative 2, no construction activities for the Army AMDTF would occur at South Finegayan. Therefore, there would be no land ownership or use impacts from construction.

Operation. Under Alternative 2, no operation activities for the Army AMDTF would occur at South Finegayan. Therefore, there would be no land ownership or use impacts from operation.

Central

Navy Barrigada

Construction. Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA, current and proposed land use, and there would be no new restriction on access. Consequently, there would be no impacts to land ownership or use.

Operation. Existing DoD land would be used so there would be no change in land ownership. The proposed land use is consistent with FPPA. Vacant land and open space would be replaced with housing and community service facilities on DoD land. The housing and community service facilities would be compatible with the existing Navy golf course, NCTS Finegayan, and Army administrative facilities. The proposed development on the boundary of Navy Barrigada is consistent with adjacent residential communities. Consequently, there would be no impacts to land ownership or use.

Air Force Barrigada

Construction. Under Alternative 2, no construction activities for the Army AMDTF would occur at Air Force Barrigada. Therefore, there would be no land ownership or use impacts from construction.

Operation. Under Alternative 2, no operation activities for the Army AMDTF would occur at Air Force Barrigada. Therefore, there would be no land ownership or use impacts from operation.

Alternative 2 Potential Mitigation Measures

No impacts to land and submerged land ownership or use were identified under Alternative 2; therefore, no mitigation is necessary or proposed.

8.2.2.3 Headquarters/Housing Alternative 3

Alternative 3 would have the AMDTF co-located with the Marine Corps at NCTS Finegayan, Navy Barrigada, and Air Force Barrigada.

North

NCTS Finegayan

Construction. Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA, current and proposed land use, and there would be no new restriction on access. Consequently, there would be no impacts to land ownership or use.

Operation. Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA, current and proposed land use, and there would be no new restriction on access. Consequently, there would be no impacts to land ownership or use.

South Finegayan

Construction. Under Alternative 3, no construction activities for the Army AMDTF would occur at South Finegayan. Therefore, there would be no land ownership or use impacts from construction.

Operation. Under Alternative 3, no operation activities for the Army AMDTF would occur at South Finegayan. Therefore, there would be no land ownership or use impacts from operation.

Central

Navy Barrigada

Construction. Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA. Vacant land and open space would be replaced with housing and community service facilities on DoD land. The housing and community service facilities would be compatible with the existing Navy golf course, NCTS Finegayan, and Army administrative facilities. The proposed development on the boundary of Navy Barrigada is consistent with adjacent residential communities. Consequently, there would be no impacts to land ownership or use.

Operation. Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA. Vacant land and open space would be replaced with housing and community service facilities on DoD land. The housing and community service facilities would be compatible with the existing Navy golf course, NCTS Finegayan, and Army administrative facilities. The proposed development on the boundary of Navy Barrigada is consistent with adjacent residential communities. Consequently, there would be no impacts to land ownership or use.

Air Force Barrigada

Construction. Under Alternative 3, no construction activities for the Army AMDTF would occur at Air Force Barrigada. Therefore, there would be no land ownership or use impacts from construction.

Operation. Under Alternative 3, no operation activities for the Army AMDTF would occur at Air Force Barrigada. Therefore, there would be no land ownership or use impacts from operation.

Alternative 3 Potential Mitigation Measures

No impacts to land and submerged land ownership or use were identified under Alternative 3; therefore, no mitigation is necessary or proposed.

8.2.3 Munitions Storage Alternatives

8.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Two magazines would be demolished and replaced with eight climate controlled earth-covered magazines (ECM) on DoD land within the Munitions Storage Area (MSA) 1.

Construction

Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA. The existing storage at the site would be relocated within the MSA. Construction impacts would be consistent with current and documented land use since it would be limited

to the project area and adjacent previously disturbed area. There would be no new restriction on access. Consequently, there would be no impacts to land ownership or use.

Operation

Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with FPPA. The new ECMs would not alter the existing Explosive Safety Quantity Distance (ESQD) arcs generated by the existing ECMs thus they would not result in a change in consistency with current or documented land use. There would be no new restrictions on access. Consequently, there would be no impacts to land ownership or use.

8.2.3.2 Munitions Storage Alternative 2

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 2 are identical to those described for Munitions Storage Alternative 1.

8.2.3.3 Munitions Storage Alternative 3

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 3 are identical to those described for Munitions Storage Alternative 1.

8.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

8.2.5 No-Action Alternative

Under the no-action alternative, the Army AMDTF would not be established on Guam. No construction or operation would occur. Existing operations on Guam would continue; therefore, the no-action alternative would have no impact on land or submerged land ownership or use on Guam.

8.2.6 Summary of Impacts

Tables 8.2-1, 8.2-2 and 8.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 8.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
NI • No impact to land or submerged land ownership or use	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1
Operation		
NI • No impact to land or submerged land ownership or use	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1

Legend: NI = No impact.

Table 8.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
NI • No impact to land or submerged land ownership or use	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1
Operation		
NI • No impact to land or submerged land ownership or use	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

Table 8.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
NI • No impact to land or submerged land ownership or use	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1
Operation			
NI • No impact to land or submerged land ownership or use	NI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

The proposed land ownership and uses under each alternative are within DoD lands and consistent with FPPA. The proposed action would also be consistent with current and documented land use, as well as adjacent land use designations and there would be no new restrictions on access. Consequently, there would be no impacts to land ownership or use.

8.2.7 Summary of Potential Mitigation Measures

Table 8.2-4 summarizes the potential mitigation measures proposed for each alternative.

Table 8.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Construction		
• No mitigation required	• No mitigation required	• No mitigation required
Operation		
• No mitigation required	• No mitigation required	• No mitigation required

CHAPTER 9. RECREATIONAL RESOURCES

9.1 INTRODUCTION

This chapter provides the assessment of potential environmental consequences associated with implementation of the alternatives within the region of influence (ROI) for recreational resources and public access. Recreational resources have been categorized according to similar uses in Volume 2 (Marine Corps Relocation – Guam), and where applicable, limitations on access to each resource were noted. The locations described in Volume 2 include the ROI for the Army Air and Missile Defense Task Force (AMDTF); the chapters in this volume are presented in the same order as the resource areas contained in that volume.

9.2 ENVIRONMENTAL CONSEQUENCES

9.2.1 Approach to Analysis

9.2.1.1 Methodology

Information on recreational resources on Guam and public access was collected through stakeholder meetings in April 2007, geographic information system data compiled and reviewed for this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), literature review, personal communications, and the limited visitor data that are available for a few specific locations on the island. A comprehensive recreational carrying capacity analysis, i.e., assessing the number of individuals who can be supported in a given area within natural resource limits without degrading the natural social, cultural, and economic environment (Global Development Research Center 2009), was not conducted as part of this EIS/OEIS. However, such an analysis is suggested as a mitigation measure to better quantify potential impacts on recreation resources. As indicated in the Affected Environment section in Volume 2, existing baseline data for conducting recreational resource impact analyses are somewhat limited since the Government of Guam (GovGuam), Department of Parks and Recreation does not collect visitor data (e.g. user counts, visitor satisfaction, user conflicts, visitor demands, etc.) for its recreational facilities (GovGuam 2009). Consequently, the analysis in this chapter relied considerably on information obtained through site reconnaissance and communications with natural resource planners at Andersen Air Force Base (AFB) and park rangers at the National Park Service which manages the War in the Pacific National Historical Park.

9.2.1.2 Determination of Significance

For the purpose of this EIS/OEIS, the proposed action would cause a significant impact to recreational resources if it:

- Impeded access to recreational resources
- Substantially reduced recreational opportunities
- Causes substantial conflicts between recreational users
- Causes substantial physical deterioration of recreational resources

9.2.1.3 Issues Identified During Public Scoping Process

As part of the analysis, concerns that were mentioned by the public, including regulatory stakeholders, during the public scoping meetings were addressed. These include: the potential impact of the proposed

action on civilian access to Department of Defense (DoD) facilities, recreation areas, Apra Harbor, and other locations, both in terms of construction and operation impacts.

9.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

9.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

North

NCTS Finegayan

Construction. Construction activities associated with the proposed action would occur at Naval Computer and Telecommunications Station (NCTS) Finegayan. Existing recreational resources at NCTS Finegayan are situated outside of the proposed action areas and would not be impacted by construction. Increased travel time on affected roads may occur, but impacts to the recreational resource itself are not expected. Therefore, Alternative 1 would result in no impacts to recreational resources at NCTS Finegayan.

Operation. Available recreational resources at NCTS Finegayan include Haputo Ecological Reserve Area and Guam National Wildlife Refuge, offering a variety of uses, such as trails, dive sites, passive enjoyment of pristine sand beaches, limestone forests, coral reefs, and ancient pictographic caves. The primary users of these on-base recreational resources would be installation personnel, civilian workers, and their dependents. To shelter military on-base equipments and personnel, as well as to facilitate training operations, persons other than the described would not have access to, and use of, these recreational resources.

The number of potential recreational resource users would increase under Alternative 1 due to the placement of unaccompanied and accompanied housing at NCTS Finegayan. An increase in users would be expected during weekends, holidays, and school vacation months. These potential recreational users may opt to pursue recreational resources on-base at NCTS Finegayan, other bases on Guam, or those available off-base. Persons involved with the proposed action do not represent a significant increase in the number of recreational users island-wide. Nevertheless, some crowding at the existing recreational resources (e.g., more people on trails, beaches, cultural sites) is expected as the result of the presence of the new population on base. Therefore, Alternative 1 would result in less than significant impacts to recreational resources at NCTS Finegayan.

South Finegayan

Construction. There are no existing recreational resources at South Finegayan. Consequently, there would be no impacts on recreational resources from construction. Therefore, Alternative 1 would result in no impacts to recreational resources at South Finegayan.

Operation. There are no existing recreational resources on South Finegayan. Consequently, there would be no impacts on recreational resources from operation. Therefore, Alternative 1 would result in no impacts to recreational resources at South Finegayan.

Central

Navy Barrigada

Construction. The construction activities associated with the proposed action would not occur at Navy Barrigada; however, persons attempting to reach the Admiral Nimitz Golf Course—the sole recreational resource on-base—may experience increased travel time due to the presence of construction-related vehicles. Increased time traveling on affected roads may occur, but impacts to the recreational resource itself are not expected. Therefore, Alternative 1 would result in no impacts to recreational resources at Navy Barrigada.

Operation. The sole recreational resource at Navy Barrigada features one of two golf courses available to installation personnel and guests on Guam, the Admiral Nimitz Golf Course. Golf courses on-base tend to offer lower fees than public and private courses, i.e., Nimitz Golf Course offers a tee time fee ranging from $30 to $49, weekdays and weekends, respectively, while public/private golf courses off base charge from $70 to $160 for weekdays and weekends (Barrigada Admiral Nimitz Golf Course, 2009; Guam Golfnet 2009). The new Army population could potentially increase the number of golf course users. An increase in the number of golfers could potentially lead to reduced availability of tee times at the golf course. Therefore, Alternative 1 would result in less than significant impacts to recreational resources at Navy Barrigada.

Air Force Barrigada

Construction. There are no recreational resources on Air Force Barrigada. Consequently, no impact would occur on recreational resources from construction. Therefore, Alternative 1 would result in no impacts to recreational resources at Air Force Barrigada.

Operation. There are no recreational resources sited on Air Force Barrigada. Consequently, no impact would occur to recreational resources from operation at Air Force Barrigada. Therefore, Alternative 1 would result in no impacts to recreational resources at Air Force Barrigada.

Alternative 1 Potential Mitigation Measures

Proposed quality of life (QOL) facilities offering comparable and alternate choices of recreational resources for use by the new Army population would minimize impacts associated with implementation of Alternative 1; therefore, no mitigation measures would be necessary.

9.2.2.2 Headquarters/Housing Alternative 2

North

NCTS Finegayan

Construction. Construction activities associated with the proposed action would occur at Navy Barrigada. Existing recreational resources at Navy Barrigada are situated outside of the proposed action areas and would not be impacted by construction. Increased travel time on affected roads may occur, but impacts to the recreational resource itself are not expected. Alternative 2 would result in no impacts to recreational resources at NCTS Finegayan.

Operation. The potential impacts on the recreational resources at NCTS Finegayan may be similar to or less than significant as described under Alternative 1 because housing would be located in Navy Barrigada. Currently, with the exception of the Admiral Nimitz Golf Course, there are no recreational resources present at Navy Barrigada. Army personnel and their dependents inhabiting the proposed housing would have to travel elsewhere to pursue recreational activities. Because Navy Barrigada is

situated in close proximity to the east coast of Guam and adjoining villages in Central and Southern Guam comparable and/or alternate forms of recreational resources are available as viable options. NCTS Finegayan offers a sense of exclusivity to its users (military and their dependents and guests only), as well as unique resources not found in other parts of the island. As a result, it can be reasonably anticipated that the resources at NCTS Finegayan would continue to experience usership, but at a lesser degree than where housing elements are co-located with recreational resources. Therefore, Alternative 2 would result in less than significant impact to recreational resources at NCTS Finegayan.

South Finegayan

Construction. There are no existing recreational resources at South Finegayan. Consequently, there would be no impacts on recreational resources from construction or operation at South Finegayan. Therefore, Alternative 2 would result in no impacts to recreational resources at South Finegayan.

Operation. There are no existing recreational resources on South Finegayan. Consequently, there would be no impacts on recreational resources from construction or operation at South Finegayan. Therefore, Alternative 2 would result in no impacts to recreational resources at South Finegayan.

Central

Navy Barrigada

Construction. The construction activities associated with the proposed action would occur at Navy Barrigada. Persons attempting to reach the Admiral Nimitz Golf Course—the sole recreational resource on-base—may experience increased travel time due to the presence of construction-related vehicles. Increased time traveling on affected roads may occur, but impacts to the recreational resource is not expected. Therefore, Alternative 2 would result in no impacts to recreational resources at Navy Barrigada.

Operation. Due to the presence of new permanent population associated with the proposed action at Navy Barrigada, its sole recreational resource, Admiral Nimitz Golf Course, may experience a greater likelihood of attracting new users [due to the proximity of new housing to the Golf Course (e.g. walk-on users)]. Similar to the effects described under Alternative 1, the potential impacts, such as reduced availability of tee time may be minimized by alternate forms of recreational activities. As also discussed previously, this need would be met by the proposed QOL features at NCTS Finegayan. Therefore, Alternative 2 would result in less than significant impacts to recreational resources at Navy Barrigada.

Air Force Barrigada

Construction. There are no existing recreational resources at Air Force Barrigada. Consequently, there would be no impacts on recreational resources from construction or operation at Air Force Barrigada. Therefore, Alternative 2 would result in no impacts to recreational resources at Air Force Barrigada.

Operation. There are no existing recreational resources on Air Force Barrigada. Consequently, there would be no impacts on recreational resources from construction or operation at Air Force Barrigada. Therefore, Alternative 2 would result in no impacts to recreational resources at Air Force Barrigada.

Alternative 2 Potential Mitigation Measures

No mitigation measures would be necessary.

9.2.2.3 Headquarters/Housing Alternative 3

North

NCTS Finegayan

Construction. Construction activities associated with the proposed action would occur at NCTS Finegayan. Existing recreational resources at NCTS Finegayan are situated outside of the proposed action areas and would not be impacted by construction. Increased travel time on affected roads may occur; however, impacts to the recreational resource itself are not expected. Therefore, Alternative 3 would result in no impacts to recreational resources at NCTS Finegayan.

Operation. The impacts under Alternative 3 would be similar to, but reduced from those described for Alternative 1. The primary difference, as it affects recreational resources, is that under Alternative 3 NCTS Finegayan would host only unaccompanied personnel housing. The absence of dependents on NCTS Finegayan would reduce the number of potential users of recreational resources during weekends, holidays, and school vacation months. The number of recreational users at NCTS Finegayan could possibly remain negligible in the likely event the would-be users opt to seek recreational resources on other bases or off-base. Therefore, Alternative 3 would result in less than significant impacts to recreational resources at NCTS Finegayan.

South Finegayan

Construction. There are no existing recreational resources at South Finegayan. Consequently, there would be no impacts on recreational resources from construction or operation at South Finegayan. Therefore, Alternative 3 would result in no impacts to recreational resources at South Finegayan.

Operation. There are no existing recreational resources on South Finegayan. Consequently, there would be no impacts on recreational resources from construction or operation at South Finegayan. Therefore, Alternative 3 would result in no impacts to recreational resources at South Finegayan.

Central

Navy Barrigada

Construction. The construction activities associated with the proposed action would occur at Navy Barrigada. Persons attempting to reach the Admiral Nimitz Golf Course—the sole recreational resource on base—may experience increased travel time due to the presence of construction related vehicles. Increased time traveling on affected roads may occur; however, direct impacts to the recreational resource is not expected. Therefore, Alternative 3 would result in no impacts to recreational resources at Navy Barrigada.

Operation. Due to the presence of new permanent population associated with the proposed action at Navy Barrigada, its sole recreational resource, Admiral Nimitz Golf Course, may experience a greater likelihood of attracting new users [due to the proximity of new housing to the Golf Course (e.g. walk-on users)]. Similar to the effects described under Alternative 1, the potential impacts, such as reduced availability of tee time may be minimized by alternate forms of recreational activities. As also discussed previously, this need would be met by the proposed QOL features at NCTS Finegayan. Therefore, Alternative 3 would result in less than significant impacts to recreational resources at Navy Barrigada.

Air Force Barrigada

Construction. There are no recreational resources on Air Force Barrigada. Consequently, no impact would occur on recreational resources from construction. Therefore, Alternative 3 would result in no impacts to recreational resources at Air Force Barrigada.

Operation. There are no recreational resources sited on Air Force Barrigada. Consequently, no impact would occur to recreational resources from operation at Air Force Barrigada. Therefore, Alternative 3 would result in no impacts to recreational resources at Air Force Barrigada.

Alternative 3 Potential Mitigation Measures

No mitigation measures would be necessary.

9.2.3 Munitions Storage Alternatives

9.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

The majority of construction activities associated with the proposed actions would occur outside of Andersen AFB. Some construction would occur at Andersen AFB for the proposed earth-covered magazines (ECMs) in the Munitions Storage Area (MSA) 1. No recreation resources occur at or near this location. There are several recreational resources on the northern tip of Guam accessible via Route 3A, including scenic vistas, Ritidian Point, and the Guam National Wildlife Refuge (see Figure 9.1-1 in Volume 2). There would be additional vehicle traffic along Route 3A during construction. Increased time traveling on affected roads may occur; however, impacts to recreational resources is not expected. Therefore, Alternative 1 would result in no impacts to recreational resources at Andersen AFB.

Operation

The increase in residents on Guam would likely correlate to an increased usage of recreational resources. Heavier uses of the recreational resources are expected during weekends, holidays, and school vacation days since most persons involved with the proposed actions would otherwise be expected to be engaged with work and/or school. Therefore, Alternative 1 would result in less than significant impacts to recreational resources at Andersen AFB.

9.2.3.2 Munitions Storage Alternative 2

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 2 are identical those described for Munitions Storage Alternative 1.

9.2.3.3 Munitions Storage Alternative 3

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 3 are identical those described for Munitions Storage Alternative 1.

9.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

9.2.5 No-Action Alternative

Under the no-action alternative, there would be no presence of active duty deployable Army units stationed on Guam. Recreational resources would continue to be used as they currently are. Therefore, recreational resources would not be impacted under the no-action alternative.

9.2.6 Summary of Impacts

Tables 9.2-1, 9.2-2, 9.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 9.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
NI • There would be no impacts from construction	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1
Operation		
LSI • Increase in the number of recreational users at NCTS Finegayan is likely. Users may experience crowding	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1
LSI • Increase in the number of Admiral Nimitz Golf Course users is likely. Increased competition for tee times is expected at Navy Barrigada	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1
NI • There would be no impacts to recreation at South Finegayan and Air Force Barrigada	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

Table 9.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
NI • There would be no impacts from construction	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1
Operation		
LSI • Increase in the number of recreational resource users is likely. Users may experience crowding at resources	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

Table 9.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
LSI • The existing recreational resources are not in proximity to the proposed location	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1
Operation			
LSI • The existing recreational resources are not in proximity to the proposed location	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact.

Construction

Under all alternatives, construction activities would cause minor inconvenience to those traveling to the recreational resources at NCTS Finegayan, Navy Barrigada, and Andersen AFB; however, impacts to the recreational resource is not expected. Therefore, the proposed action would result in less than significant impacts to recreational resources.

Operation

Implementation of the Headquarter/Housing Alternative 1 would result in an increase in permanent population at NCTS Finegayan and South Finegayan. As a result, the existing recreational resources in those areas would likely experience an increase in the number of users. Crowding at recreational uses may be offset by alternate and additional forms of recreational resources made available by the proposed QOL facilities. Under Headquarter/Housing Alternative 2, all proposed actions would be confined to Navy Barrigada. Similar to Alternative 1, QOL facilities would be in close proximity to housing areas; by providing alternate forms of recreational resources, potential impacts to the existing recreational resource at Navy Barrigada may be offset. Installations offering different or additional recreational resources, such as NCTS Finegayan and Andersen AFB, would experience an increase in user numbers. Headquarter/Housing Alternative 3 would result in less than significant impacts to existing recreational resources.

In any scenario provided, discussion on potential impacts to the Admiral Nimitz Golf Course was included as it is one of only two golf courses on Guam with restricted use by installation personnel, retired personnel, and dependents. The implementation of any alternatives would result in an increase of installation personnel on Guam, and the Admiral Nimitz Golf Course would inevitably experience user number increase. As discussed under all alternatives, the addition of QOL facilities would complement the golf course uses by providing alternate forms of recreation for use, thereby offsetting potentially adverse impacts. Therefore, the proposed action would result in less than significant impacts to recreational resources.

9.2.7 Summary of Potential Mitigation Measures

Table 9.2-4 summarizes the potential mitigation measures proposed for each action alternative.

Table 9.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Construction		
• No mitigation measures necessary	• No mitigation measures necessary	• No mitigation measures necessary
Operation		
• No mitigation measures necessary	• No mitigation measures necessary	• No mitigation measures necessary

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CHAPTER 10. TERRESTRIAL BIOLOGICAL RESOURCES

10.1 INTRODUCTION

This chapter contains a description of the potential environmental consequences to terrestrial biological resources associated with implementation of the action alternatives within the region of influence (ROI). For a description of the affected environment for all resources, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in that volume include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action, and the chapters are presented in the same order as the resource areas contained in this volume.

10.2 ENVIRONMENTAL CONSEQUENCES

10.2.1 Approach to Analysis

10.2.1.1 Methodology

Biological resource issues and concerns include the potential direct, indirect, and cumulative impacts of the proposed actions and alternatives during the construction and operation phases. Impacts may be either temporary (reversible) or permanent (irreversible). Direct and indirect impacts are distinguished as follows.

Direct impacts are associated with proposed construction activities (e.g., ground-disturbing activities) and operations (e.g., noise and lighting). Potential types of direct impacts include, but are not limited to:

- Loss of habitat due to vegetation removal during construction.
- Temporary loss of habitat during construction from noise, lighting, and human activity.
- Potential loss of habitat due to disturbance of species in areas surrounding operations from noise, lighting, and human activity.
- Injury or mortality to wildlife or special-status species caused by the action that occur at the same time and place as the action.

Indirect impacts are caused by or result from project-related activities, are usually later in time, and are reasonably foreseeable (e.g., increased likelihood of invasive species moving into the area after disturbance). Potential indirect impacts include, but are not limited to:

- All disturbances from human activity, noise, and lighting that would potentially impact unoccupied suitable habitat for special-status species.
- Introduction of new non-native species or increased dispersal of existing non-native species on Guam.
- Dispersal of existing non-native species from Guam to the CNMI, Hawaii, or other destinations.
- Adverse effects from pollutants that are released from construction or military operations.
- Increased threats from feral animals.

General principles used to evaluate impacts are:

- The extent, if any, that the action would permanently lessen ecological habitat qualities that ESA-listed species depend upon, and which partly determines the species' prospects for conservation and recovery.
- The extent, if any, that the action would diminish population sizes, distribution, or habitat of regionally important native plant or animal species.
- The extent, if any, that the action would be likely to jeopardize the continued existence of any ESA-listed species.
- The extent, if any, that the action would be inconsistent with the goals of USFWS recovery plans, Navy and Air Force INRMPs, or the Guam CWCS.

10.2.1.2 Determination of Significance

Significance of impacts to vegetation, wildlife, and special-status species were determined using guidelines in the previous section. Special-status species are defined as ESA- and Guam-listed species and species that are designated candidates for ESA listing. Specific significance criteria are discussed below. If significant impacts are determined, then mitigation may be proposed to offset the impacts. For this EIS/OEIS, a major consideration for mitigation is biosecurity. This issue is discussed under mitigation measures after the evaluation of impacts (see Section 10.2.7).

Vegetation

Impacts would be determined significant if any primary limestone forest (mature forest dominated by native species) would be cleared, unless determined to be very minor in the context of the surrounding forest areas. Any loss of this forest vegetation community would be considered significant because of the large historical and continuing losses of this forest type on Guam. Loss of wetland or mangrove vegetation would also be considered potentially significant.

Wildlife

Impacts would be determined significant if native wildlife species are present and the proposed project results in diminished population sizes or distributions of regionally important native animal species. These wildlife species include those designated as SOGCN in the Guam CWCS. Invasive species impacts that exceed the criteria specified above are evaluated. Historical impacts from non-native species have been severe, particularly from the BTS (see discussion in Volume 2). Although the proposed action would not result in additional impacts from BTS on Guam, the concern is that the BTS would be inadvertently introduced to other islands throughout the Pacific. This concern is addressed comprehensively for all actions proposed in this EIS/OEIS with mitigation measures described in Section 10.2.7.

Migratory Birds

For migratory birds, the Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, or possession of migratory birds, with an exemption for military readiness activities (as defined in federal regulations), provided they do not result in a significant adverse effect on a population of a migratory bird species. Congress defined military readiness activities as all training and operations of the Armed forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Military readiness activities do not include: (A) routine operation of installation support functions such as administrative offices, military exchanges, water treatment facilities, schools, housing, storage facilities, and morale, welfare, and recreation activities; (B)

the operation of industrial activities; and (C) the construction or demolition of facilities used for a purpose described in A or B (50 CFR Part 21).

The DoD must consult with the USFWS if it is determined that a military readiness activity would have a significant adverse effect on a population of a migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem.

Migratory bird conservation relative to non-military readiness activities is addressed separately in a Memorandum of Understanding developed in accordance with EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. The Memorandum of Understanding between the DoD and USFWS was signed in July 2006 and DoD responsibilities included, but are not limited to: (1) incorporating conservation measures addressed in regional or state bird conservation plans and INRMPs; (2) managing military lands and activities other than military readiness in a manner that supports migratory bird conservation; and (3) avoiding or minimizing impacts to migratory birds, including incidental take and the pollution or detrimental alteration of the environments used by migratory birds.

The following species that occur on Guam are considered non-migratory birds and are not covered under the MBTA: black francolin, black drongo, Eurasian tree sparrow, island-collard dove (previously known as Philippine turtle dove), common pigeon, and king quail.

Special-Status Species

The presence of special-status species in the project areas was described in Volume 2. Background information is presented in the species profiles in Appendix G. Impacts would be determined significant if special-status species are present in the project area and any project action is likely to result in harassment or harm of an individual, population or species. Impacts to ESA-listed species would include vegetation clearing of designated undeveloped Overlay Refuge habitat, or recognized essential habitat or recovery zones, unless it is determined that the removal of habitat or other affect is minor when considering all the remaining habitat and quality of habitat available to that species and considering USFWS recovery plan goals. Significant impacts would also include disturbing ESA- and Guam-listed species due to noise, lighting, or human activity. If species are currently present in a proposed project area, noise, lighting, and general human activity are considered direct impacts for the purposes of this analysis, even though it is recognized that some of the impacts from the proposed actions may be indirect, rather than direct. If unoccupied but recognized habitat is affected by noise, lighting, or human activity, impacts would be considered indirect and would be determined significant unless the area affected is considered minor when considering all the remaining habitat and quality of habitat available to that species.

For ESA-listed species, federal agencies are required to ensure that their actions do not jeopardize the continued existence of an endangered or threatened species or its critical habitat. Analyses of potential impacts are based on review of plans for the proposed action and the available current and historical distributional data for each species. In accordance with Section 7 of the ESA, a BA is being prepared by the Navy to analyze the potential impacts on ESA-listed and candidate species and critical habitat under the jurisdiction of the USFWS.

The BA and the subsequent BO issued by the USFWS after their review of the BA, will be the final determination of impacts to ESA-listed species that are being evaluated in this EIS/OEIS. Candidate species must also be evaluated in the BA. However if they are not formally listed by the time the BO is issued and the proposed action would not result in their listing, no determination for these species will be made in the BO. The BO will provide an Incidental Take Statement that will list the amount or extent of

take anticipated. Based on that take it will specify Terms and Conditions that the action proponent must comply with to be exempt from the prohibitions of Section 9 of the ESA. These are non-discretionary requirements. The BO will also specify Conservation Recommendations that are discretionary proponent activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The USFWS effects determinations from the BO will be incorporated into the Final EIS/OEIS.

10.2.1.3 Issues Identified During Public Scoping Process

Terrestrial biological resource issues identified during the public scoping process that are applicable to the proposed action include:

- Activities associated with the military expansion (i.e., construction, expansion, renovation, and military training activities) may result in habitat loss and physical disturbance of federally listed endangered species and other federal trust species.
- Potential for harm to fragile ecosystems on Guam and in the Marianas from the introduction of invasive species due to increased traffic among the islands from the movement of personnel and materials. Such species include the brown treesnake (BTS), flatworms, various insects, and some plants. The Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) should outline inspection and sanitary procedures to prevent this movement.
- Existing control and containment activities at air and sea ports for BTS are insufficient to deal with the risk associated with the increased cargo and personnel movement from Guam to other vulnerable destinations. The issue "of utmost concern" is BTS interdiction and an effective, enforceable, and fail-proof procedure for inspecting all military cargo, personnel, and equipment entering the CNMI must be instituted. The Navy must assure funding to sustain a 100% inspection rate of all cargo, vehicles, munitions, and household goods. Guam regulation protocols 505 and 506 should be incorporated into a BTS control plan to be included as part of the EIS/OEIS.
- Potential impact of placement of facilities on flora and fauna at Navy Barrigada.

10.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

10.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

<u>North</u>

NCTS Finegayan

Construction. Under Alternative 1, the Army AMDTF and housing would be co-located with the Marine Corps Main Cantonment at NCTS Finegayan. These impacts are addressed in Volume 2, Alternative 2 as

part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

Operation. Under Alternative 1, the Army AMDTF and housing would be co-located with the Marine Corps cantonment at NCTS Finegayan. These impacts are addressed in Volume 2, Alternative 2 as part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

South Finegayan

Construction. Under Alternative 1, the Army AMDTF and housing would be co-located with the Marine Corps cantonment at South Finegayan. These impacts are addressed in Volume 2, Alternative 2 as part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

Operation. Under Alternative 1, the Army AMDTF and housing would be co-located with the Marine Corps cantonment at South Finegayan. These impacts are addressed in Volume 2, Alternative 2 as part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

Central

Navy Barrigada

Construction. Under Alternative 1, no construction activities for the AMDTF would occur at Navy Barrigada. Therefore, there would be no terrestrial biology impacts from construction.

Operation. Under Alternative 1, no operation activities for the AMDTF would occur at Navy Barrigada. Therefore, there would be no terrestrial biology impacts from operation.

Air Force Barrigada

Construction. Under Alternative 1, no construction activities for the AMDTF would occur at Air Force Barrigada. Therefore, there would be no terrestrial biology impacts from construction.

Operation. Under Alternative 1, no operation activities for the AMDTF would occur at Air Force Barrigada. Therefore, there would be no terrestrial biology impacts from operation.

Alternative 1 Potential Mitigation Measures

Alternative 1 mitigation measures would be the same as those described in Volume 2, Chapter 10 under Alternative 1.

10.2.2.2 Headquarters/Housing Alternative 2

North

NCTS Finegayan

Under Alternative 2, the Army AMDTF would be located at Navy Barrigada. These impacts are addressed in Volume 2 as part of the Marine Corps Main Cantonment analysis and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

South Finegayan

Under Alternative 2, the Army AMDTF would be co-located with the Marine Corps Main Cantonment at Navy Barrigada. These impacts are addressed in Volume 2 as part of the Marine Corps Main Cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

Central

Navy Barrigada

Construction

Vegetation. A total of 376 ac (152 ha) of three vegetation types would be removed during proposed construction activities at Navy Barrigada (Table 10.2-1 and Figure 10.2-1). Approximately 153 ac (62 ha) of what may be primary limestone forest (never completely cleared) would be removed. The limestone forest at Navy Barrigada is dominated by native species including *Neisosperma oppositifolia* (fago), *Guamia mariannae* (pai pai), *Aglaia mariannensis* (mapunyao), scattered *Cycas circinalis* (Micronesia) (federiko), and some large native breadfruit.

There is some degradation of this forest as indicated by the presence of a significant, although not dominant, non-native component including vitex, limeberry, tangantangan, and papaya. There is light to moderate ungulate damage of the understory.

Removal of this limestone forest, assuming it is a primary limestone forest that has never been cleared, would result in a significant impact to vegetation.

Table 10.2-1. Vegetation Removed with Implementation of Alternative 2

Vegetation Type	*Primary Limestone Forest ac (ha)*	*Vitex-Closed Canopy ac (ha)*	*Shrub/ Grasslands ac (ha)*	*Developed Land ac (ha)*
Navy Barrigada	153 (62)	0	80 (32)	143 (58)

An indirect impact may occur from clearing the large forested area because of changes in evapotranspiration. Evapotranspiration would likely decrease from removal of the forest which would result in additional infiltration of rainwater and groundwater recharge and decreased moisture levels in the air. With respect to groundwater recharge, the construction of buildings and parking lots would have the opposite effect of reducing recharge. The overall effect on recharge is unclear but terrestrial biological resources in the remaining uncleared areas would be unlikely to be affected. With respect to moisture levels in the air, the impact is likely to be localized to the forested area removed and would not have a significant effect on any other area with sensitive biological resources. Overall, the impacts from changed evapotranspiration would be less than significant.

Wildlife. Wildlife species that currently occur at Barrigada include native and non-native species such as the Pacific golden plover, yellow bittern, island collared dove, western cattle egret, black francolin, Eurasian tree sparrow, blue-tailed skink, mutilating gecko, and mourning gecko. All these species are common on Guam. Proposed construction activities would displace wildlife from suitable habitat in the proposed project areas. Smaller, less mobile species, and those seeking refuge in burrows, could inadvertently be killed during construction activities; however, long-term, permanent impacts to populations of such species would not result because these species are abundant in surrounding areas and would rapidly repopulate suitable portions of the affected area. There would be no diminished population sizes or distributions of migratory birds or regionally important native animal species. Therefore, impacts to wildlife would be less than significant.

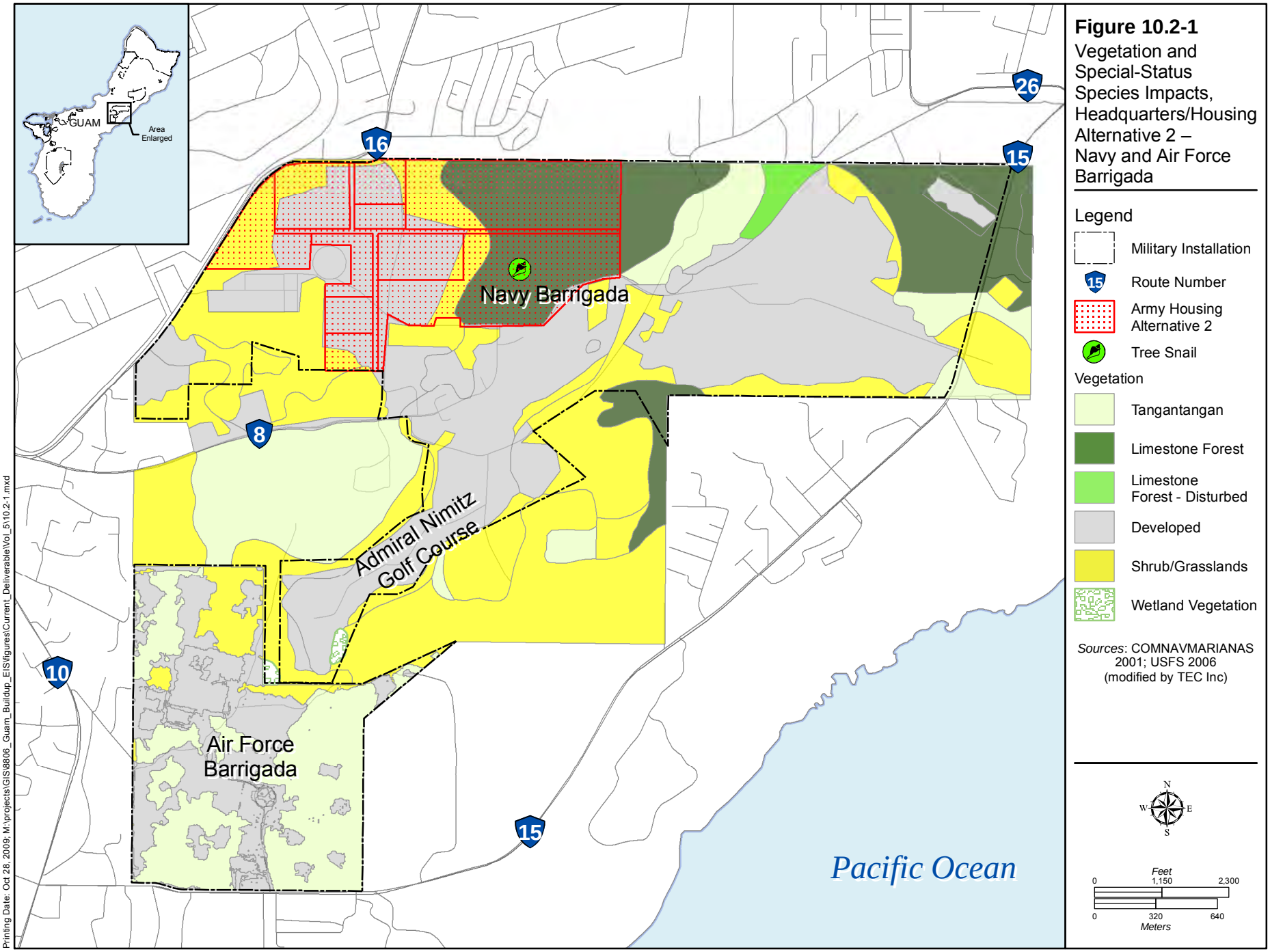

Figure 10.2-1
Vegetation and Special-Status Species Impacts, Headquarters/Housing Alternative 2 – Navy and Air Force Barrigada

Printing Date: Oct 28, 2009; M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_5\10.2-1.mxd

Construction activities for the operation buildings would generate noise. Only a few, widespread migratory bird species are present that would be affected. They would move away from the construction areas; however, there are other areas of suitable habitat nearby. Therefore, indirect impacts to wildlife from construction would be less than significant.

Special-Status Species. Proposed construction activities would impact the Guam tree snail. The Guam tree snail, an ESA candidate species, was documented in the limestone forest on one transect during site-specific surveys in 2008 in support of this EIS/OEIS (refer to Figure 10.2-1). The distribution and numbers of tree snails at the site is unknown. Proposed construction activities would remove primary limestone forest, the habitat of the Guam tree snail, and would result in direct mortality of individuals. Mitigation would include the relocation of snails to another suitable location. With this mitigation, impacts would be less than significant.

Other species that are potentially present at Barrigada have not been documented as present in the proposed Alternative 2 project areas and would not be impacted by construction. They will not be considered further under this alternative.

Operation

Vegetation. There would be no impacts to vegetation.

Wildlife. There would be no direct impacts to wildlife since operations would occur in previously cleared areas.

Operational activities would generate noise throughout the area. However, migratory bird species or other native wildlife that would otherwise use the area are common throughout Guam and are generalists that can utilize numerous habitats that are abundant throughout Guam. Therefore, noise and activity from operations associated with the proposed action would be less than significant.

Special-Status Species. There would be no direct impacts on special-status species. The only special-status species that might occasionally use the area and be affected indirectly is the Mariana fruit bat, however, based on historical observations this would be very infrequently. Impacts to special-status species would be less than significant.

Air Force Barrigada

Construction. Under Alternative 2, no construction activities for the AMDTF would occur at Air Force Barrigada. Therefore, there would be no terrestrial biology impacts from construction.

Operation. Under Alternative 2, no operation activities for the AMDTF would occur at Air Force Barrigada. Therefore, there would be no terrestrial biology impacts from operation.

Alternative 2 Potential Mitigation Measures

A plan to translocate Guam tree snails to another site on Department of Defense (DoD) lands would be developed and implemented after approval by the USFWS. Additional mitigation using compensatory measures described in Volume 2, Chapter 10 for Alternative 1 would be implemented to compensate for the destruction of primary limestone forest, which is habitat for the Guam tree snail. Specific BTS interdiction and control measures would be implemented as described in Volume 2, Chapter 10, Alternative 1.

10.2.2.3 Headquarters/Housing Alternative 3

North

NCTS Finegayan

Under Alternative 3, the Army AMDTF would be co-located with the Marine Corps Main Cantonment at NCTS Finegayan. These impacts are addressed in Volume 2 as part of the Marine Corps Main Cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

South Finegayan

Under Alternative 3, the Army AMDTF would be co-located with the Marine Corps Main Cantonment at South Finegayan. These impacts are addressed in Volume 2 as part of the Marine Corps Main Cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

Central

Navy Barrigada

Impacts from construction and operation of the proposed housing area at Navy Barrigada would be the same as described under Alternative 2. These impacts are addressed in Volume 2 as part of the Marine Corps Main Cantonment and are not separated.

Air Force Barrigada

Under Alternative 3, the Army housing would be co-located with the Marine Corps Main Cantonment at Air Force Barrigada. These impacts are addressed in Volume 2 as part of the Marine Corps Main Cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur.

Alternative 3 Potential Mitigation Measures

Mitigation measures under Alternative 3 would be the same as those described in Volume 2, Chapter 10 for Alternative 3.

10.2.3 Munitions Storage Alternatives

10.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

Vegetation

A total of 2.3 ac (0.9 ha) of disturbed limestone forest (classified as Vitex-closed canopy) would be removed during proposed munitions facility construction activities (Figure 10.2-2 and Table 10.2-2). No known rare plant species would be affected. The vegetation to be removed serves as potential habitat for special-status species and is addressed below. Impacts to vegetation would be less than significant.

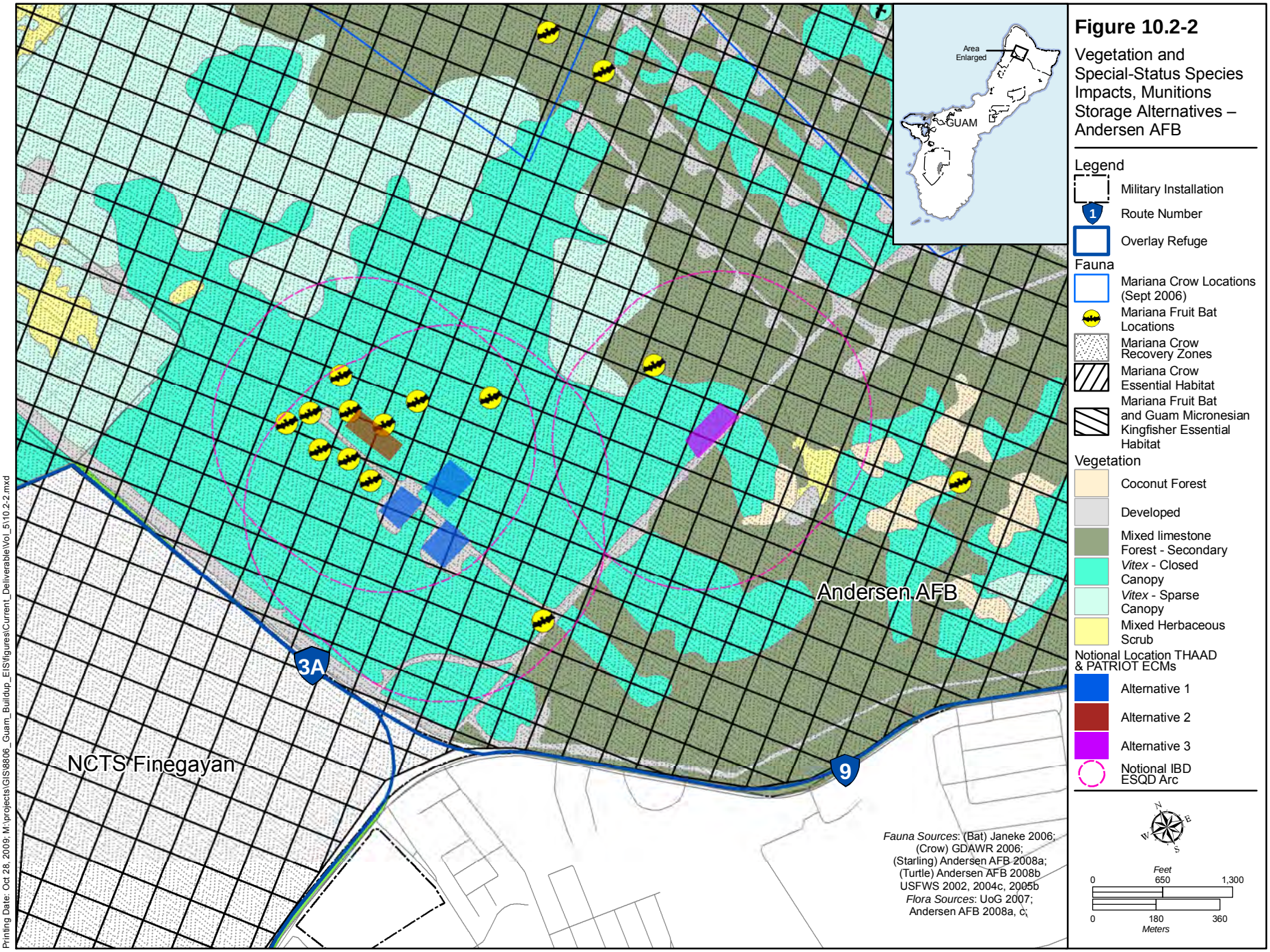
Area Enlarged
GUAM
Andersen AFB
NCTS Finegayan
3A
9
Fauna Sources: (Bat) Janeke 2006; (Crow) GDAWR 2006; (Starling) Andersen AFB 2008a; (Turtle) Andersen AFB 2008b USFWS 2002, 2004c, 2005b
Flora Sources: UoG 2007; Andersen AFB 2008a, c;
Figure 10.2-2
Vegetation and Special-Status Species Impacts, Munitions Storage Alternatives – Andersen AFB
Legend
Military Installation
Route Number
Overlay Refuge
Fauna
Mariana Crow Locations (Sept 2006)
Mariana Fruit Bat Locations
Mariana Crow Recovery Zones
Mariana Crow Essential Habitat
Mariana Fruit Bat and Guam Micronesian Kingfisher Essential Habitat
Vegetation
Coconut Forest
Developed
Mixed limestone Forest - Secondary
Vitex - Closed Canopy
Vitex - Sparse Canopy
Mixed Herbaceous Scrub
Notional Location THAAD & PATRIOT ECMs
Alternative 1
Alternative 2
Alternative 3
Notional IBD ESQD Arc
Feet
0
650
1,300
0
180
360
Meters
Printing Date: Oct 28, 2009; M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_5\10.2-2.mxd

Table 10.2-1. Vegetation Removed at Andersen AFB with Implementation of Munitions Storage Alternative 1

Area	*Vitex-Closed Canopy ac (ha)*	*Developed Land ac (ha)*
Munitions Storage Area	2.3 (0.9)	3.9 (1.6)

Wildlife

Few migratory birds are present in the project area. The only native migratory bird species likely to be present in the project construction area, based on surveys conducted in support of this EIS/OEIS and other studies, are the yellow bittern and possibly the Pacific golden plover in open areas; both species are ubiquitous throughout Guam. The loss of woody vegetation would result in the loss of nesting areas for the bittern, but this loss would not result in significant effects on its population. Impacts would be less than significant.

Proposed construction activities would displace the species and other wildlife from suitable habitat in the proposed project area. Smaller, less mobile species, and those seeking refuge in burrows, could inadvertently be killed during construction activities. However, long-term, permanent impacts to populations of such species would not result because the species known to be present are abundant in surrounding areas, and would rapidly repopulate suitable portions of the affected area. There would be no diminished population sizes or distributions of migratory birds or regionally important native animal species. Therefore, there would be no significant direct impacts to wildlife due to proposed construction activities at Andersen AFB under Alternative 1.

Construction activities for the munitions storage area would generate noise. Construction would take place during daylight hours. Only a few widespread migratory bird species are present that would be affected. They would move away from the construction areas, but there are other areas of suitable habitat nearby and they could return during evenings and to some of the area when construction is complete. Effects would be short-term. There would be no diminished population sizes or distributions of migratory birds or regionally important native animal species. Therefore, indirect impacts to wildlife from construction would be less than significant.

Special-Status Species

Proposed construction activities would directly impact habitat that could be used by special-status species (Figure 10.2-2; Table 10.2-3).

Table 10.2-2. Potential Impacts to Special-Status Species Habitat with Implementation of Munitions Storage Alternative 1

Parcel and Activity	*Overlay Refuge ac (ha)*	*Essential Habitat –Bat and Kingfisher ac (ha)*	*Essential Habitat – Crow ac (ha)*	*Crow Recovery Zone ac (ha)*
Direct Impacts – Habitat Removed				
Munitions Storage Area	6.6 (2.7)	6.6 (2.7)	6.6 (2.7)	6.6 (2.7)
Total Habitat Removed				
Percentage of Habitat Type on Guam that is Affected	0.07 %	0.07 %	0.07 %	0.07 %

Notes: Each habitat category is considered independently of others and is not additive. NA – Not applicable.

Mariana Fruit Bat. Proposed construction activities would include the loss of disturbed limestone forest that is potential foraging and roosting habitat for the Mariana fruit bat population on the base. A total of 6.6 ac (2.7 ha) of essential habitat would be removed for construction of the munitions storage area. This essential habitat is also designated Overlay Refuge. However, of this only 2.3 ac (0.9 ha) is not developed land. Removal of this area due to construction would have a significant impact on the Mariana fruit bat. Impacts would be mitigated to less than significant with a suite of mitigation actions as described in Volume 2, Section 10.2.2.6. Construction would be during the day so would result in a less than significant impact from noise and activity.

Guam Micronesian Kingfisher. Proposed construction activities would include the loss of limestone forest that is potential foraging and nesting habitat for a potential future introduction of the kingfisher. A total of 6.6 ac (2.7 ha) of essential habitat would be removed for construction of the various project components on the base. This essential habitat is also designated Refuge Overlay. However, of this only 2.3 ac (0.9 ha) is not developed land. Removal of this area due to construction would have a significant impact on the kingfisher because of the removal of habitat areas designated as overlay refuge and essential habitat for the conservation and reintroduction of the species. Impacts would be mitigated to less than significant with a suite of mitigation actions as described in Volume 2, Section 10.2.2.6.

Mariana Crow. Proposed construction activities would include the loss of disturbed limestone forest that is potential foraging and nesting habitat for the crow. A total of 6.6 ac (2.7 ha) of essential habitat would be removed for construction of the various project components on the base. This essential habitat is also designated Refuge Overlay. However, of this only 2.3 ac (0.9 ha) is not developed land. Removal of these areas due to construction would have a significant impact. Impacts would be mitigated to less than significant with a suite of mitigation actions as described in Volume 2, Section 10.2.2.6. Construction noise and activity would not result in significant impacts because the crow is not currently present in this area.

Guam Rail. The rail survives only in captivity at this time. Proposed construction activities would not include loss of any shrub/grassland habitat that is potential foraging and nesting habitat for the Guam rail. No specific areas of essential habitat have been designated for this species. Impacts to the species would be less than significant. .

Mariana Eight Spot Butterfly. This species was observed in the Pati Point area (PACAF 2006). The larval stage of this species has two specific host plants not reported in the vicinity of Alternative 1 project areas, and which are generally associated with primary limestone forest in areas of pinnacle karst (karren) that is not present in the proposed project areas. Removal of this area due to construction would have no impact on the eight spot butterfly.

Other species that are potentially present on Andersen AFB, as discussed in Volume 2, Chapter 10, Terrestrial Biological Resources have not been documented as present in the proposed Alternative 1 project areas, and are unlikely to occur there based on all available information; therefore, they are not considered further.

Construction activities would generate noise. Construction would take place during daylight hours to avoid the Mariana fruit bats, which are uncommonly observed in the proposed construction area. With this mitigation measure, indirect impacts to the Mariana fruit bat from noise would be less than significant.

Operation

Vegetation

There would be no impacts to vegetation.

Wildlife

The magazine areas would be used infrequently and there would be no night lighting or shielded lighting. Impacts would be less than significant.

Special-Status Species

The magazine areas would be used infrequently and there would be no night lighting or shielded night lighting. Materials brought in to the area are highly controlled. Impacts would be less than significant.

10.2.3.2 Munitions Storage Alternative 2

Construction

Vegetation

A total of 2.7 ac (1.1 ha) of disturbed limestone forest (classified as Vitex-closed canopy) would be removed during proposed munitions facility construction activities (Figure 10.2-2). No known rare plant species would be affected. The vegetation to be removed serves as potential habitat for special-status species and is addressed below. Impacts to vegetation would be less than significant.

Wildlife

Impacts would be the same as for Alternative 1.

Special-Status Species.

Proposed construction activities would directly impact habitat that could be used by special-status species (Figure 10.2-2; Table 10.2-4).

Table 10.2-4. Potential Impacts to Special-Status Species Habitat with Implementation of Munitions Storage Alternative 2

Parcel and Activity	*Overlay Refuge ac (ha)*	*Essential Habitat –Bat and Kingfisher ac (ha)*	*Essential Habitat –Crow ac (ha)*	*Crow Recovery Zone ac (ha)*
Direct Impacts – Habitat Removed				
Munitions Storage Area	2.7 (1.1)	2.7 (1.1)	2.7 (1.1)	2.7 (1.1)
Total Habitat Removed				
Percentage of Habitat Type on Guam that is Affected	0.07 %	0.07 %	0.07 %	0.07 %

Notes: Each habitat category is considered independently of others and are not additive. NA – Not applicable.

Mariana Fruit Bat. Proposed construction activities would include the loss of disturbed limestone forest that is potential foraging and roosting habitat for the Mariana fruit bat population on the base. A total of 2.7 ac (1.1 ha) of essential habitat would be removed for construction of the munitions storage area. This essential habitat is also designated Refuge Overlay. Removal of this area due to construction would have a significant impact on the Mariana fruit bat. Impacts would be mitigated to less than significant with a suite of mitigation actions as described in Volume 2, Section 10.2.2.6. Construction would also result in the temporary impact to fruit bats in the surrounding areas from noise and disturbance. The impacts were

evaluated similarly to Alternative 1 and the area impacted is shown in Table 10.2-4. Because construction would occur at night, impacts would be less than significant.

Guam Micronesian Kingfisher. Proposed construction activities would include the loss of limestone forest that is potential foraging and nesting habitat for a potential future introduction of the kingfisher. A total of 2.7 ac (1.1 ha) of essential habitat would be removed for construction of the various project components on the base. This essential habitat is also designated Refuge Overlay. Removal of this area due to construction would have a significant impact on the kingfisher because of the removal of habitat areas designated as overlay refuge and essential habitat for the conservation and reintroduction of the species. Impacts would be mitigated to less than significant with a suite of mitigation actions as described in Volume 2, Section 10.2.2.6.

Mariana Crow. Proposed construction activities would include the loss of disturbed limestone forest that is potential foraging and nesting habitat for the crow. A total of 2.7 ac (1.1 ha) of essential habitat would be removed for construction of the various project components on the base. This essential habitat is also designated Refuge Overlay. Removal of these areas due to construction would have a significant impact. Impacts would be mitigated to less than significant with a suite of mitigation actions as described in Volume 2, Section 10.2.2.6. Construction noise and activity would not result in significant impacts because the crow is not currently present in this area.

Guam Rail. The rail survives only in captivity at this time. Proposed construction activities would not include loss of any shrub/grassland habitat that is potential foraging and nesting habitat for the Guam rail. No specific areas of essential habitat have been designated for this species. Impacts to the species would be less than significant

Mariana Eight Spot Butterfly. This species was observed in the Pati Point area (PACAF 2006). The larval stage of this species has 2 specific host plants not reported in the vicinity of Alternative 1 project areas and which are generally associated with primary limestone forest in areas of pinnacle karst (karren) that is not present in the proposed project areas. Removal of this area due to construction would have no impact on the eight spot butterfly.

Other species that are potentially present on Andersen AFB, as discussed in Volume 2, Chapter 10, Terrestrial Biological Resources have not been documented as present in the proposed Alternative 2 project areas, and are unlikely to occur there based on all available information; therefore, they are not considered further.

Operation

Impacts would be the same as for Alternative 1.

10.2.3.3 Munitions Storage Alternative 3

Construction

Vegetation

Although Alternative 3 is in a slightly different location from Alternative 2, impacts would be the same as for Alternative 2 because the vegetation type is the same.

Wildlife

Impacts would be the same as for Alternative 2.

Special-Status Species

Although Alternative 3 is in a slightly different location from Alternative 2, impacts would be the same as for Alternative 2 because the habitat in the area is similar.

Operation

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 3 are identical those described for Munitions Storage Alternative 1.

10.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

10.2.5 No-Action Alternative

Under the no-action alternative the proposed munitions storage area and the proposed Army AMDTF would not be located on Guam and baseline terrestrial biological resources would remain unchanged as presented in Volume 2, Chapter 10, Terrestrial Biological Resources. Therefore, there would be no impacts to biological resources with implementation of the no-action alternative.

10.2.6 Summary of Impacts

Tables 10.2-5, 10.2-6, 10.2-7 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively.

Table 10.2-5. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
• Alternative 1 would have the Army AMDTF and housing co-located with the Marine Corps cantonment at NCTS and South Finegayan. These impacts are addressed in Volume 2, Alternatives 1 or 2 as part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur	SI-M • Direct significant impacts to 153 ac (62 ha) of limestone forest at Navy Barrigada; direct significant impacts to the Guam tree snail known to be present in the limestone forest, mitigated to less than significant	• Alternative 3 would have the Army AMDTF and housing co-located with the Marine Corps cantonment at Barrigada. These impacts are addressed in Volume 2, Alternative 3 as part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur
Operation		
• Alternative 1 would have the Army AMDTF and housing co-located with the Marine Corps cantonment at NCTS and South Finegayan. These impacts are addressed in Volume 2, Alternatives 1 or 2 as part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur	LSI • Noise and activity from operations would be less than significant to wildlife and special-status species	• Alternative 3 would have the Army AMDTF and housing co-located with the Marine Corps cantonment at Barrigada. These impacts are addressed in Volume 2, Alternative 3 as part of the Marine Corps cantonment and are not separated; if that action does not occur, this Army AMDTF Alternative cannot occur

Legend: SI-M = Significant impact mitigable to less than significant, LSI = Less than significant impact.

Table 10.2-6. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Impacts to vegetation and wildlife would be less than significant SI-M • There would be significant impacts to special-status species (the endangered Mariana fruit bat, Micronesian kingfisher, and Mariana crow) from loss of essential habitat that is also Refuge Overlay land, mitigated to less than significant	LSI • Impacts to vegetation and wildlife would be less than significant SI-M • The impacts on special-status species would be the same as Alternative 1	LSI • Impacts to vegetation and wildlife would be less than significant SI-M • The impacts on special-status species would be the same as Alternative 1
Operation		
LSI • Impacts to wildlife and special-status species would be less than significant NI • There would be no impacts to vegetation	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1

Legend: SI-M = Significant impact mitigable to less than significant, LSI = Less than significant impact, NI = No impact.

Table 10.2-7. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
SI-M • There would be significant impacts to three special-status species (the endangered Mariana fruit bat, Micronesian kingfisher, and Mariana crow) from loss of essential habitat, mitigated to less than significant • Impacts to 368 ac (149 ha) of Refuge Overlay	SI-M • The impacts would be the a same as Alternative 1 except for acreage impacted • Impacts to 333 ac (135 ha) of Refuge Overlay	SI-M • The impacts would be the same as for Alternative 1 except for acreage impacted SI • Impacts to 228 ac (92 ha) of Refuge Overlay • There would be a significant impact due to the loss of forest recovery conservation areas (ungulate enclosures) that were to have been established near Ritidian Point, per previous Section 7 Consultation requirements for a previous Air Force action	SI-M • The impacts would be the a same as Alternative 1 except for acreage impacted • Impacts to 187 ac (76 ha) of Refuge Overlay
Operation			
NI • There would be no impacts from operations	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1

Legend: SI = Significant impact, SI-M = Significant impact mitigable to less than significant, NI = No impact.

10.2.7 Summary of Potential Mitigation Measures

Table 10.2-8 summarizes potential mitigation measures for each action alternative.

Table 10.2-8. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Vegetation		
• Mitigation for Alternatives 1 and 3 are included under the Marine Corps action described in Volume 2 (Alternatives 1 or 2); mitigation cannot be determined independently from these • Mitigation of Alternative 2 would include a suite of mitigation actions as described in Volume 2, Section 10.2.2.6.	• No mitigation required	• No mitigation required
Wildlife and Special-status Species		
• Mitigation for Alternatives 1 and 3 are included under the Marine Corps action described in Volume 2 (Alternatives 1 or 2); mitigation cannot be determined independently from these • Under Alternative 2 mitigation would also include translocation of Guam tree snails to another site on DoD lands	• Mitigation for all alternatives would be conducted with compensatory measures described in Volume 2, Section 10.22.6	• Mitigation for all alternatives would be conducted with compensatory measure described in Volume 2, Section 10.22.6

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CHAPTER 11. MARINE BIOLOGICAL RESOURCES

11.1 INTRODUCTION

This chapter contains a description of the potential environmental consequences to marine biological resources associated with implementation of the alternatives within the region of influence (ROI). For a description of the affected environment for all resources, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in that volume include the ROI for the Army Air and Missile Defense Task Force component of the proposed action, and the chapters are presented in the same order as the resource areas contained in this volume.

11.2 ENVIRONMENTAL CONSEQUENCES

The proposed action involves construction and operations that would occur on land only. The proposed locations are in the central and northern portions of the island, and the anticipated effects would not extend to the coastline. Therefore, an analysis of marine biological resources is not presented in this chapter.

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CHAPTER 12. CULTURAL RESOURCES

12.1 INTRODUCTION

This chapter contains a description of the potential environmental consequences to cultural resources associated with implementation of the alternatives within the region of influence (ROI). For a description of the affected environment for all resources, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in Volume 2 include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action; the chapters are presented in the same order as the resource areas contained in this volume. Training for the AMDTF would be co-located with Marine Corps training facilities and is not analyzed in this Volume.

12.2 ENVIRONMENTAL CONSEQUENCES

12.2.1 Approach to Analysis

12.2.1.1 Methodology

The methodology for identifying, evaluating, and mitigating impacts to cultural resources is based on federal laws and regulations including the National Historic Preservation Act (NHPA) and the Archaeological Resource Protection Act (ARPA).

A significant resource is a cultural resource eligible for, or listed on, the National Register of Historic Places (NRHP). A project affects a NRHP-eligible or listed resource when it alters the resource's characteristics, including relevant features of its environment, or use that qualify it as significant according to NRHP criteria. Adverse effects may include the following: physical destruction, damage, or alteration of all or part of the resource; alteration of the character of the surrounding environment that contributes to the resource's qualifications for the NRHP; introduction of visual, audible, or atmospheric elements that are out of character with the resource; neglect of the resource resulting in its deterioration or destruction; or transfer, lease, or sale of the property without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance (36 Code of Federal Regulations [CFR] 800.5(a)(2)).

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts are those that may occur during the construction phase of the project. They may be the result of increased noise or changes from ground disturbing activities involving construction, modification, or the use and maintenance of facilities. Indirect impacts are those that may occur as a result of the completed project such as increased vehicular or pedestrian traffic in the vicinity of the resource that may lead to vandalism or increased erosion. Vandalism is considered to be a significant impact because it damages the integrity of the site, which is the major determinant of NRHP-eligibility. The evidence they left in archaeological sites is finite and cannot renew itself once it has been disturbed. For this reason, federal activities that open areas up to the public or that involve personnel traveling through an area may have an adverse effect if vandalism to NRHP-eligible or listed resources in the vicinity occurs.

12.2.1.2 Determination of Significance

A historic property is a property that is eligible for, or listed on, the NRHP. A significant adverse impact for cultural resources is one that disturbs the integrity of a historic property. If a project disturbs the characteristics that make the property eligible for, or listed on, the NRHP, then it is also considered to be a significant adverse impact.

The Regional Integrated Cultural Resources Management Plan (ICRMP) for Navy property in Guam (Tomonari-Tuggle et al. 2005) has established standard operating procedures for protecting known NRHP-eligible or listed cultural resources; procedures for managing the inadvertent discovery of archaeological resources, inadvertent discovery of human remains, or inadvertent disturbance to historic properties; and for distributing permits for archaeological investigations. In addition, agreements on limitations in training have been made as part of the Mariana Islands Training Range Complex Environmental Impact Statement (EIS) Programmatic Agreement (PA) (Navy 2007). Areas with limited or no training stipulations at Apra Harbor and the Naval Munitions Site are presented in Volume 2, Chapter12, Figures 12.1-1 and 12.1-2. Acceptable training on Andersen Air Force Base (AFB) and Andersen South are described in Volume 2.

As part of the Section 106 consultation process for this EIS/OEIS, a PA for all military training activities, construction, and operations proposed under the proposed action, which includes additional mitigation measures and procedures is being prepared. Current signatories to this PA are: the Department of Defense (DoD) (Joint Region Marianas; DoD Representative Guam, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, and Republic of Palau; Marines; Navy; Army; Air Force), other federal agencies (United States [U.S.] Environmental Protection Agency [USEPA], Advisory Council on Historic Preservation [ACHP], and the National Park Service [NPS]), and local government agencies (Guam Historic Preservation Officer [HPO], Commonwealth of the Northern Mariana Islands [CNMI] HPO). The PA is scheduled for signature in October 2009, prior to the release of the Final Environmental Impact Statement (FEIS) and the signed PA would be incorporated into the FEIS. Stipulations in the PA include the following:

- The DoD would ensure the identification and evaluation of historic properties within the ROI prior to the initiation of any part of the project with the potential to impact historic properties.
- For areas that have not been inventoried for historic properties, the DoD would record surface sites and, when possible, such areas would also be archaeologically sampled for subsurface sites when easily obtainable (i.e., without having to demolish existing facilities or infrastructure).
- Archaeological probability maps have been generated for all current DoD lands on the Island of Guam. For all other areas and islands impacted by the project, archaeological probability maps would be generated to predict the probability of encountering subsurface cultural resources in three categories (no to low, medium, and high). These maps would be compiled using previous archaeological investigations, historic maps, interviews, ethnohistoric accounts, and in consultation with the HPOs and the NPS.
    - *No to Low Probability Areas:* These areas contain no surface sites and include reclaimed fill lands or heavily disturbed areas. No to low probability areas have been previously tested and were found not to contain subsurface resource. Such areas are not likely to contain subsurface materials based on known social practices or history of the area.

- *Medium Probability Areas:* These areas have not been surveyed and may or may not contain surface sites, but have the potential to encounter subsurface historic resources based on known social practices or history of the area.
- *High Probability Areas:* These areas contain known surface and/or subsurface sites or are areas where old maps, documents, or legends indicate former villages, towns, or other types of activity areas.

- Any properties not evaluated, shall be assessed for NRHP eligibility. These historic properties would be incorporated into existing ICRMPs as they are revised or updated or if a new ICRMP is developed in consultation with the appropriate State Historic Preservation Officers.

Any updates to the existing Geographical Information System cultural resource layers (such as shape files showing the locations of known archaeological sites, and historic buildings/structures) would be shared with the appropriate HPO or NPS in accordance with 36 CFR 800.11(c). The HPO and the NPS recognize that these layers may contain sensitive information and would not disseminate or make them available to the public without obtaining permission of the appropriate responsible person within the respective jurisdiction. Maps of all areas with archaeological potential and sensitivity for the presence of NRHP-eligible or listed resources would be appended to the PA. No further review under Section 106 is required for areas designated as no to low probability areas. Mitigation measures for medium and high probability areas are stipulated as follows:

- Medium Probability Areas would be subject to monitoring or testing. Prior to any disturbance or excavation, work plans would be developed and reviewed by the appropriate HPO.
- For High Probability Areas, sites would be avoided if possible. If sites are impacted, a mitigation plan would be developed and reviewed by the appropriate HPO and then data recovery excavations would take place.

In recognition of the significance of many historic properties within the area of potential effect (APE) of the proposed action to various cultural and historic groups, the DoD would look favorably on affording access to historic sites to individuals and organizations that attach significance to these historic properties (where security requirements are not prohibitive). The PA also provides stipulations for treatment in case of emergency discoveries, the review process, and report requirements. The Standard Operating Procedures (SOP) in the current Regional ICRMP would be updated and revised and would be attached to the PA. Although probability maps would be generated based on the likelihood of archaeological resources, treatment of known architectural resources and traditional cultural properties as a result of the proposed action would also be stipulated in the PA.

12.2.1.3 Issues Identified During Public Scoping Process

The following analysis focuses on possible impacts to cultural resources, i.e., archaeological, architectural, and traditional cultural properties that could be affected by the proposal. As part of the analysis, concerns relating to cultural resources that were mentioned by the public, including regulatory stakeholders, during scoping meetings were addressed. These include:

- Access to cultural sites and traditional natural resource collection areas
- Construction impacts to cultural and traditional natural resources
- Thorough and adequate data collection
- Public participation in the planning process relating to cultural resources

12.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

12.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

North

NCTS Finegayan

Construction. The activities associated with Alternative 1 are partially located within the Naval Computer and Telecommunications Station (NCTS) Finegayan site. These activities include the construction of the administration/headquarters (HQ), maintenance facilities, associated quality of life (QOL) facilities, bachelor quarters, and family housing. These facilities would be co-located with Marine Corps facilities on the NCTS Finegayan site. The total amount of potentially disturbed areas in the Finegayan area is 2,432 acres (ac) (984 hectares [ha]); Army facilities would only comprise approximately 1.5% of the total area that would be disturbed.

The majority of the AMDTF construction would occur in a low probability area (Figure 12.2-1). NRHP-eligible or listed sites do not occur in this area, and no construction impacts would occur.

Construction of the bachelor quarters facilities construction would impact sites 1021 (artifact scatter) and 1023 (four defensive structures).

Construction at Finegayan also has the potential to require the removal of dukduk trees, a traditional resource used by canoe builders.

Operation. Operations at the AMDTF would include the use of administrative, maintenance, and housing facilities by Army personnel. The AMDTF would increase the population by 1,832 Soldiers, civilian personnel, and associated dependents. This increase in personnel in the area could increase site vandalism and have impacts on the surrounding area. However, this is a small proportion of the total population of military personnel in the area. Disturbance to NRHP-eligible or listed resources through increasing access to the sites and the resulting damage by vandalism is considered to be a significant adverse impact.

South Finegayan

Construction. Construction of Army housing and QOL facilities would impact areas with low archaeological probability at South Finegayan and significant impacts are unlikely. The Army housing would be shared with Marine Corps housing at South Finegayan. Site 811 (Latte Stone Park), a traditional cultural property would be avoided by construction.

Operation. Operation of these facilities would bring additional personnel into the area. This increase in personnel could increase site vandalism and disturb NRHP-eligible sites in the vicinity. Indirect significant adverse impacts could occur to site 811 (Latte Stone Park) and Haputo.

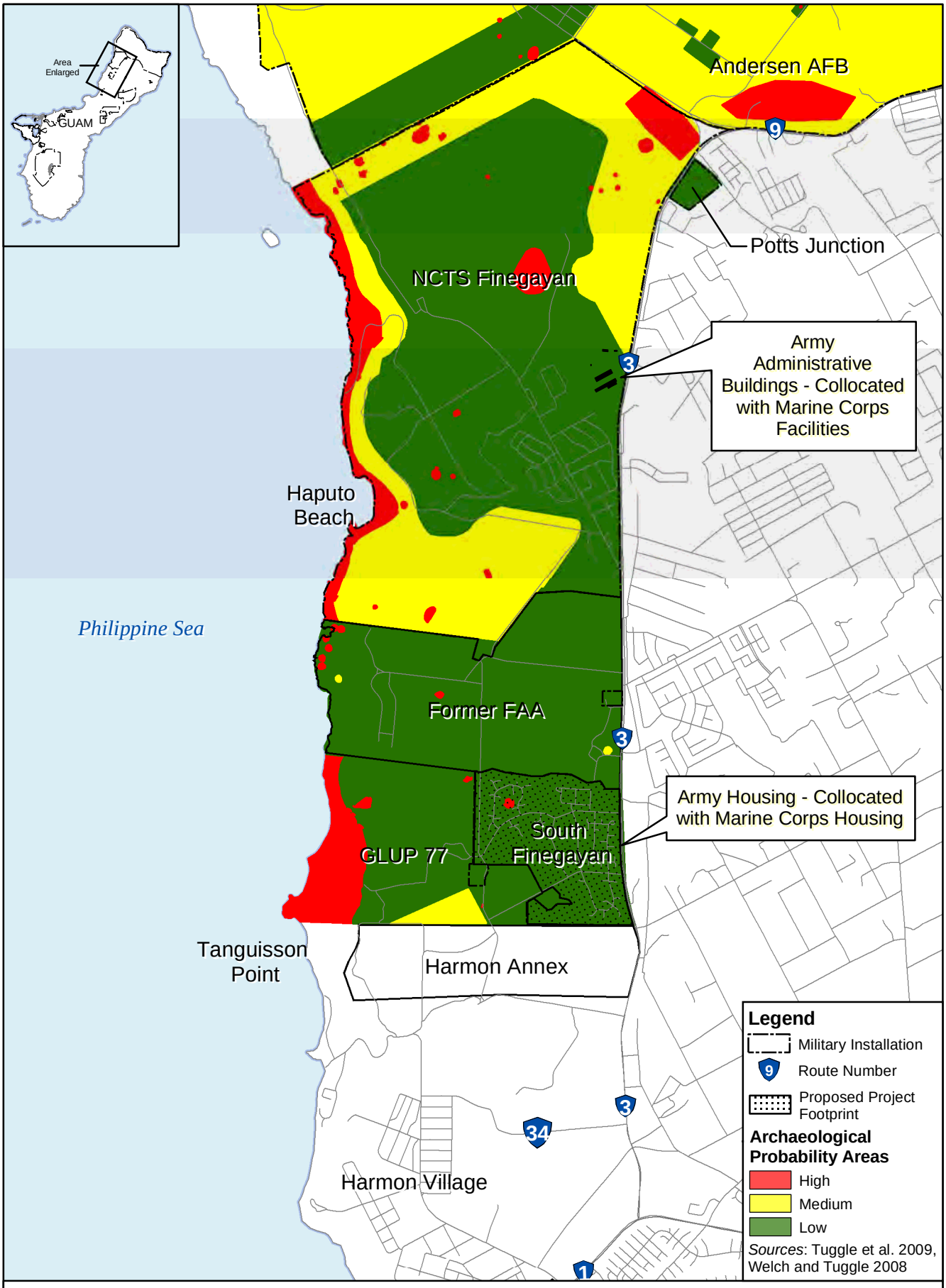

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Figure 12.2-1
Army AMDTF Headquarters/Housing Alternative 1 and Archaeological Probability Zones

Central

Navy Barrigada

No construction or operations at Navy Barrigada would occur under Alternative 1.

Air Force Barrigada

No construction or operations at Air Force Barrigada would occur under Alternative 1.

Alternative 1 Potential Mitigation Measures

Alternative 1 would have significant adverse impacts to cultural resources. However, with implementation of the proposed mitigation measures listed below, these impacts would be resolved through consultation to less than significant levels.

Although the area where Latte Stone Park (site 811) is located is slated for development, the site would be avoided. Also, the signage and plaque for the sign would be corrected and upgraded to enhance the interpretation of the site. Data recovery would be conducted at sites 1021 and 1023. Operational impacts would be mitigated through training of personnel working and living in the area to avoid impacts to archaeological sites.

Impacts to traditional resources such as the nunu tree, dukduk tree, ifit tree, and da'ok tree, would be avoided if possible.

12.2.2.2 Headquarters/Housing Alternative 2

North

NCTS Finegayan

No construction or operations would occur at NCTS Finegayan under Alternative 2.

South Finegayan

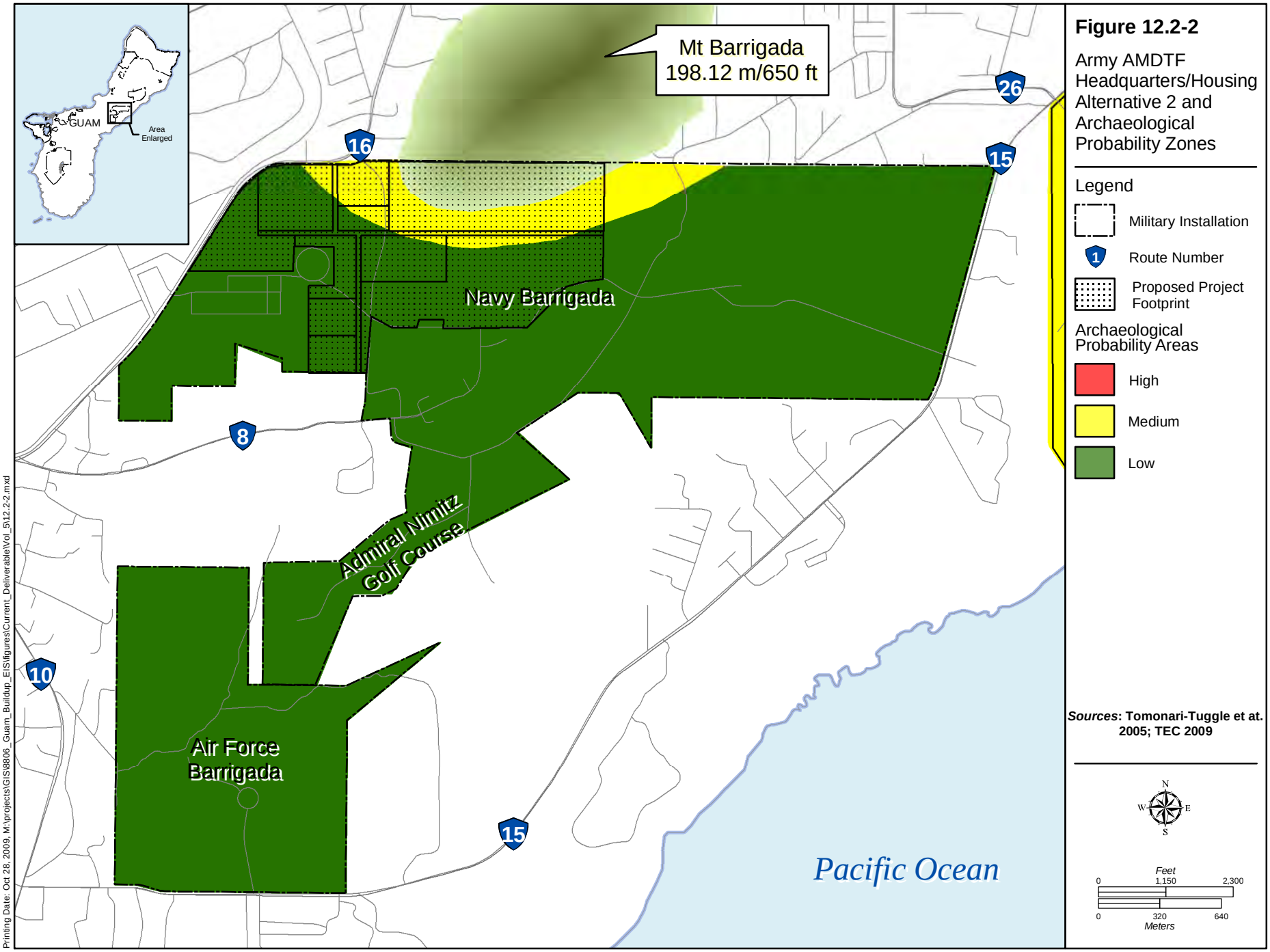
No construction or operations would occur at South Finegayan under Alternative 2.

Central

Navy Barrigada

Construction. Alternative 2 would include construction of the administration/HQ, maintenance facilities, associated QOL facilities, bachelor quarters, and family housing at Navy Barrigada. Alternative 2 encompasses 509 ac (206 ha) of ground disturbance. Of these total acres, the administration/HQ and maintenance facilities occupy 28 ac (11.3 ha), and the HSG, QOL facilities, bachelor quarters combine to occupy 481 total ac (195 ha).

Of the 509 total ac (206 ha) included in Alternative 2, the majority of the construction would occur in a low probability area. Construction at the northern boundary of Navy Barrigada would occur at an area considered to be a medium probability area (Figure 12.2-2). This area is also the southwestern corner of Mount Barrigada or Mount Tuyan, a traditional cultural property.



The proposed action would place the base gate, bachelor quarters, QOL facilities, and some housing facilities atop the steep slope on the southwestern side of Mount Barrigada. This setting would require a substantial amount of excavation and soil removal and has the potential to adversely affect a traditional cultural property by the removal of 100 ac (40.5 ha) at the foot of the mountain, and disturb an area with medium probability. No NRHP-eligible or listed architectural resources would be impacted by Alternative 2.

Construction at Navy Barrigada also has the potential to require the removal of dukduk trees, a traditional resource used by canoe builders.

Operation. Operation at the AMDTF would include the use of administrative, maintenance, and housing facilities by Army personnel. The AMDTF would increase the population by approximately 630 Soldiers, 130 civilian personnel, and 950 associated dependents. This increase in personnel could increase site vandalism and other impacts on the surrounding area. However, most of the area is situated in a low probability area and NRHP-eligible or listed resources do not occur in this area. Increased population in this area would not adversely impact Mount Barrigada as the operations would not restrict access to the property, which is of importance because of its association with Chamorro legends. Therefore, operations due to Alternative 2 would have a less than significant impact on cultural resources.

Air Force Barrigada

No construction or operations at Air Force Barrigada would occur under Alternative 2.

Alternative 2 Potential Mitigation Measures

Alternative 2 would have significant adverse impacts to one traditional cultural property; however, with implementation of the proposed mitigation measures listed below, these impacts would be resolved through consultation to less than significant levels.

Construction of facilities in the north of Navy Barrigada that would require leveling a portion of Mount Barrigada would be redesigned to avoid disturbing this area, if possible. If impacted, a mitigation plan would be developed and reviewed by the Guam HPO and other interested parties and then appropriate documentation or interpretation would take place.

Operational impacts would be mitigated through training of personnel working and living in the area to avoid impacts to archaeological sites.

Impacts to traditional resources such as the nunu tree, dukduk tree, ifit tree, and da'ok tree, would be avoided if possible.

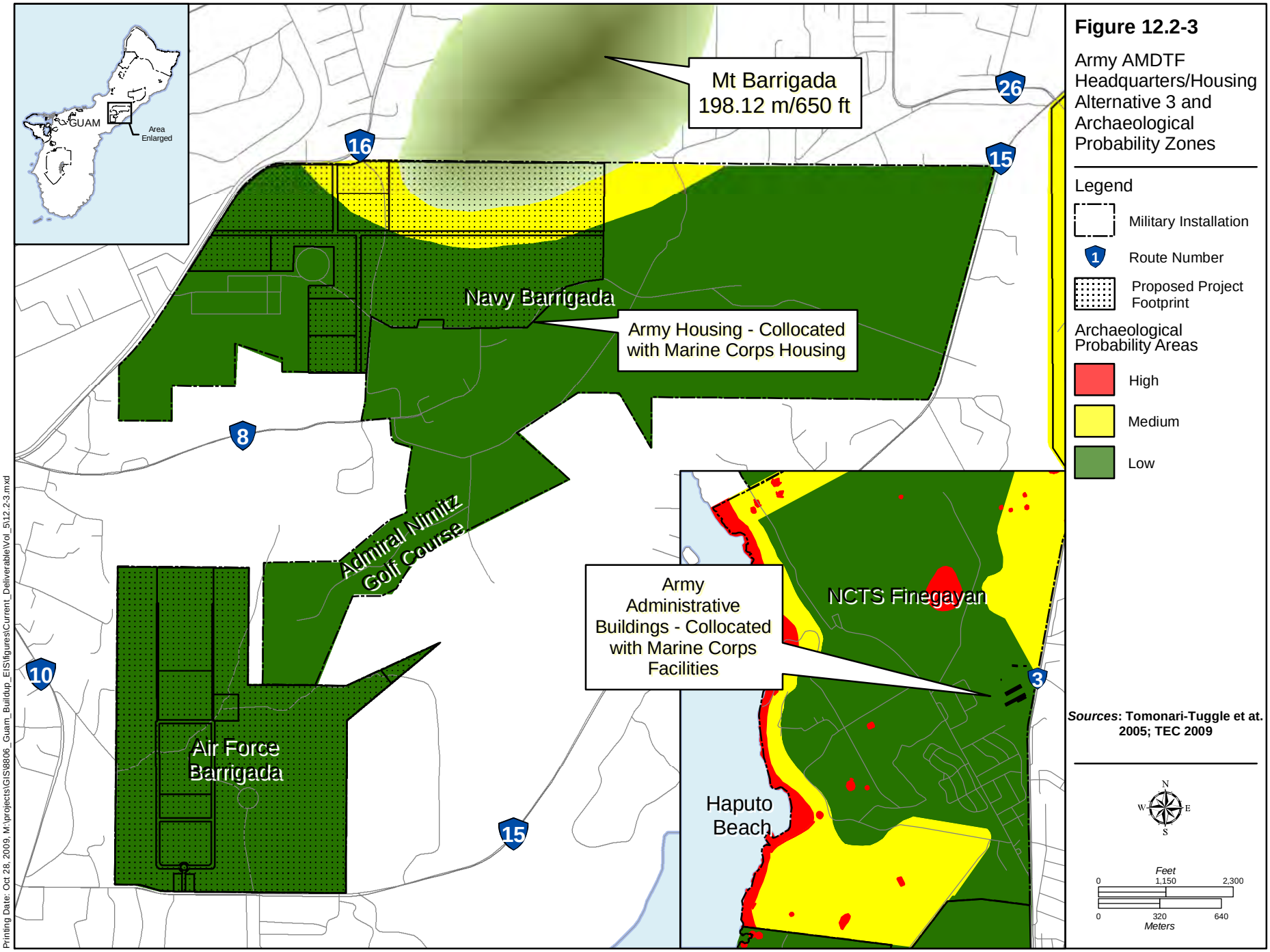
12.2.2.3 Headquarters/Housing Alternative 3

North

NCTS Finegayan

Construction. The activities associated with Alternative 3 are partially located within the NCTS Finegayan site (Figure 12.2-3). These activities include the construction of the administration/HQ, maintenance facilities, and bachelor quarters, and family housing. Under this alternative these facilities would be co-located with Marine Corps facilities as NCTS Finegayan.

The majority of the AMDTF construction would occur in a low probability area. No NRHP-eligible or listed architectural resources would be impacted by Alternative 3.



Construction of the bachelor quarters facilities would impact areas with medium archaeological probability. This setting has the potential to adversely affect sites 1021 (artifact scatter) and 1023 (four defensive structures). Construction of HSG and education facilities would avoid site 811 (Latte Stone Park), a traditional cultural property.

Construction at Finegayan has the potential to require the removal of dukduk trees, a traditional resource used by canoe builders.

Operation. Operation at the AMDTF would include the use of administrative and maintenance facilities by Army personnel. The AMDTF would increase the population by a portion of the 630 Soldiers, 130 civilian personnel, and 950 associated dependents. This increase in personnel in the area has the potential to increase site vandalism and have impacts on the surrounding area. Most of the area is situated in medium and low probability areas and NRHP-eligible or listed resources do occur in this area.

South Finegayan

No construction or operations at South Finegayan would occur under Alternative 3.

Central

Navy Barrigada

The activities associated with Alternative 3 are partially located within the Navy Barrigada site. These activities include the construction of the housing and QOL facilities.

Construction. The majority of the construction would occur in a low probability area. The proposed action would take place partially near the foot of Mount Barrigada. This setting would require a substantial amount of excavation and soil removal, and has the potential to adversely affect a traditional cultural property by the removal of 100 acres (ac) (40.5 hectares [ha]) at the foot of the mountain, and disturb an area with medium probability. No NRHP-eligible or listed architectural resources would be impacted by Alternative 3.

Construction at Navy Barrigada has the potential to require the removal of dukduk trees, a traditional resource used by canoe builders.

Operation. Operations at the AMDTF would include the use of housing by Army personnel. However, most of the area is situated in a low probability area and NRHP-eligible or listed resources do not occur there. Therefore, operations due to Alternative 3 at Navy Barrigada would have a less than significant impact on cultural resources.

Air Force Barrigada

Construction. The activities associated with Alternative 3 are partially located within the Air Force Barrigada site. These activities include the construction of the housing and QOL facilities. Most of the area is situated in a low probability area and NRHP-eligible or listed resources do not occur in the area. No NRHP-eligible or listed architectural resources would be impacted by Alternative 3 at Air Force Barrigada.

Operation. Operation at the AMDTF would include the use of housing by Army personnel. However, most of the area is situated in a low probability area and NRHP-eligible resources or listed do not occur in the area. Therefore, operations due to Alternative 3 at Air Force Barrigada would have less than significant impact on cultural resources.

Alternative 3 Potential Mitigation Measures

Alternative 3 would have significant adverse impacts to cultural resources. However, with implementation of the proposed mitigation measures listed below, these impacts would be resolved through consultation to less than significant levels.

Although the area where Latte Stone Park (Site 811) is located is slated for development, the site would be avoided. Also, the signage and plaque for the sign would be corrected and upgraded to enhance the interpretation of the site. Data recovery would be conducted at site 1021 and 1023. Operational impacts would be mitigated through training of personnel working and living in the area to avoid impacts to archaeological sites.

Impacts to traditional resources such as the nunu tree, dukduk tree, ifit tree, and da'ok tree, would be avoided if possible.

12.2.3 Munitions Storage Alternatives

12.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

Construction of additional storage in the Munitions Storage Area (MSA) would impact high and low probability areas. Ground excavation and soil removal associated with buildings and utilities construction would adversely impact NRHP-eligible archaeological resources known in the project area, including site T-3-1. Figure 12.2-4 shows the new earth–covered magazines that would be located in the eastern area of Andersen Air Force Base (AFB) near the intersection of Routes 3, 3A and 9.

Operation

Operations of the munitions storage facilities would bring additional personnel into the area. This increase in personnel has the potential to increase site vandalism. Disturbance to NRHP-eligible resources, either directly through operations or indirectly through increasing access to the sites and the resulting damage by vandalism, is considered to be a significant adverse effect.

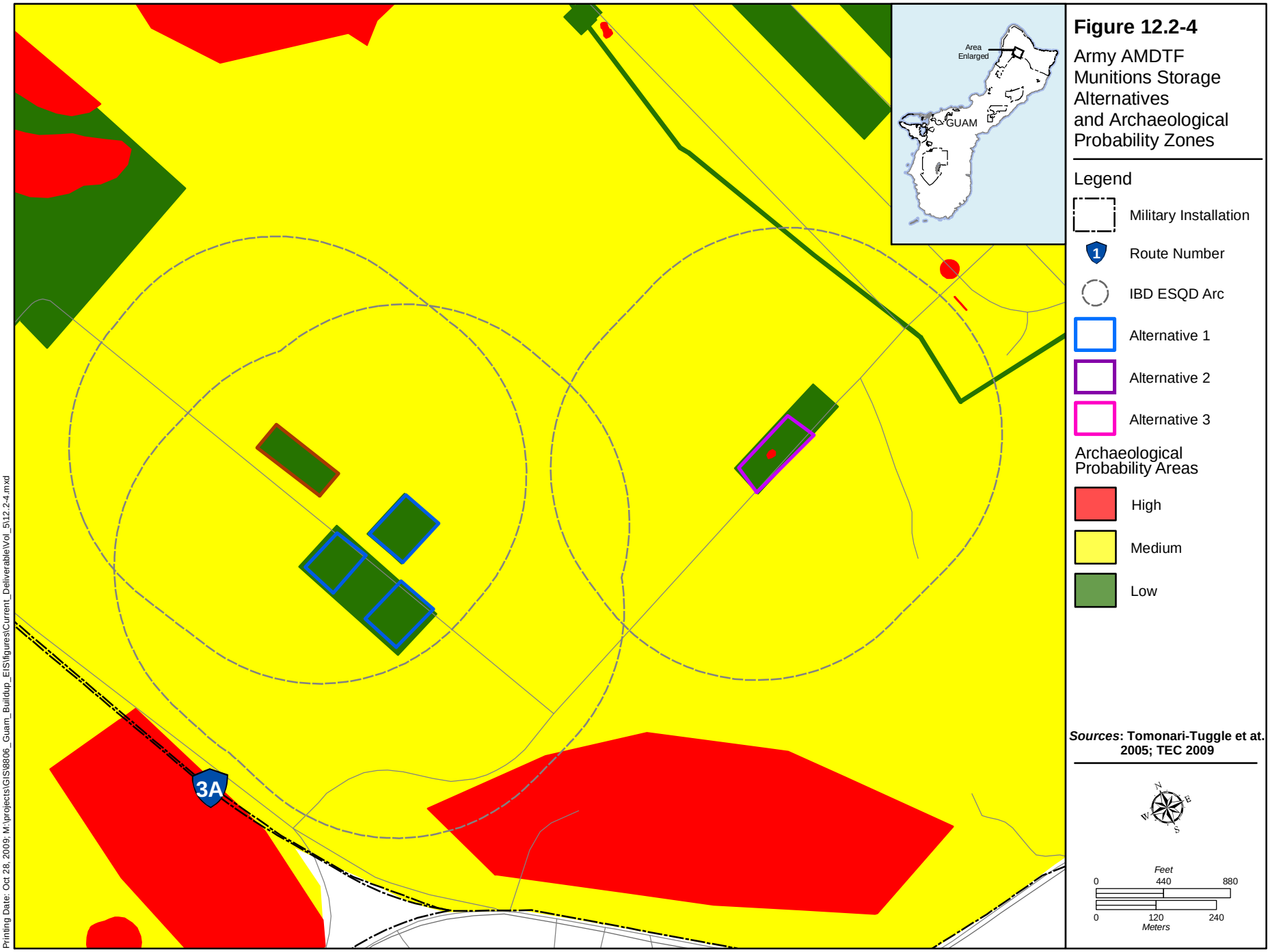
12.2.3.2 Munitions Storage Alternative 2

Construction

Construction of additional storage in the MSA would impact high and low probability areas. Ground excavation and soil removal associated with buildings and utilities construction would adversely impact NRHP-eligible archaeological resources known in the project area, including site T-3-1 (see Figure 12.2-4).

Operation

Operations of the munitions storage facilities would bring additional personnel into the area. This increase in personnel has the potential to increase site vandalism. Disturbance to NRHP-eligible resources, either directly through operations or indirectly through increasing access to the sites and the resulting damage by vandalism, is considered to be a significant adverse effect.


Area Enlarged
GUAM
3A
Figure 12.2-4
Army AMDTF Munitions Storage Alternatives and Archaeological Probability Zones
Legend
Military Installation
1
Route Number
IBD ESQD Arc
Alternative 1
Alternative 2
Alternative 3
Archaeological Probability Areas
High
Medium
Low
Sources: Tomonari-Tuggle et at. 2005; TEC 2009
N
E
S
W
Feet
0
440
880
0
120
240
Meters
Printing Date: Oct 28, 2009; M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_5\12.2-4.mxd

12.2.3.3 Munitions Storage Alternative 3

Construction

Construction of additional storage in the MSA would impact high and medium probability areas. Ground excavation and soil removal associated with buildings and utilities construction would adversely impact NRHP-eligible archaeological resources known in the project area, including site T-3-1 (see Figure 12.2-4).

Operation

Operation of the munitions storage facilities would bring additional personnel into the area. This increase in personnel has the potential to increase site vandalism. Disturbance to NRHP-eligible resources, either directly through operations or indirectly through increasing access to the sites, and the resulting damage by vandalism, is considered to be a significant adverse effect.

12.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

12.2.5 No-Action Alternative

Under the no-action alternative, no construction or operations associated with the AMDTF would occur. Existing operations at the proposed project areas would continue. Therefore, the no-action alternative would not have adverse impacts to significant cultural resources.

12.2.6 Summary of Impacts

Tables 12.2-1, 12.2-2, 12.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 12.2-1 Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
SI-M • Direct and indirect significant adverse impacts to two NRHP-eligible archaeological sites on NCTS Finegayan mitigated to less than significant through data recovery	SI-M • Direct significant adverse impacts to one traditional cultural property at Navy Barrigada	SI-M • Direct and indirect impacts to areas with two NRHP-eligible archaeological sites on NCTS Finegayan mitigated to less than significant through data recovery • Direct significant adverse impacts to one traditional cultural property at Navy Barrigada
Operation		
SI-M • Indirect significant adverse impacts to one traditional cultural property on NCTS Finegayan	SI-M • Indirect significant impacts to one traditional cultural property at Navy Barrigada	SI-M • Indirect significant impacts to one traditional cultural property at Navy Barrigada • Indirect significant adverse impacts to one traditional cultural property on NCTS Finegayan

Legend: SI-M = Significant impact mitigable to less than significant.

Table 12.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
SI-M • Direct and indirect significant adverse impacts to one NRHP eligible archaeological site	SI-M • The impacts would be the same as Alternative 1	SI-M • The impacts would be the same as Alternative 1
Operation		
SI-M • Indirect adverse impacts to one NRHP eligible archaeological site	SI-M • The impacts would be the same as Alternative 1	SI-M • The impacts would be the same as Alternative 1

Legend: SI-M = Significant impact mitigable to less than significant.

Table 12.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
SI-M • Significant adverse impacts to NRHP-eligible archaeological sites mitigated to less than significant through data recovery • Significant adverse impacts to traditional cultural property	SI-M • Significant adverse impacts to traditional cultural property • The impacts would be the same as Alternative 1	SI-M • The impacts would be the same as Alternative 1 • The impacts would be the same as Alternative 1	SI-M • The impacts would be the same as Alternative 1 • The impacts would be the same as Alternative 1
Operation			
NI • There would be no impacts due to operations	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1

Legend: SI-M = Significant impact mitigable to less than significant, NI = No impact.

Construction and operation of Headquarters/Housing Alternative 1 would result in significant impacts to two archaeological sites and one traditional cultural property. Construction of the co-located Army facilities at Finegayan would involve ground disturbance, erosion, and an increase in population in relation to NRHP-eligible or listed sites. However, these impacts could be resolved through the consultation process to less than significant levels. Potential mitigation would include avoidance, monitoring during construction, data recovery, public education, and training of Marines and Soldiers to prevent vandalism.

Construction and operation of Headquarters/Housing Alternative 2 at Navy Barrigada would result in significant impacts to one traditional cultural property. However, this impact could be resolved through the consultation process to less than significant levels. Potential mitigation would include avoidance and public education.

Construction and operation of Headquarters/Housing Alternative 3 would result in significant impacts to two archaeological sites and one traditional cultural property. Construction of the co-located Army facilities at Finegayan would involve ground disturbance, erosion, and an increase in population in relation to NRHP-eligible or listed sites. Construction at Navy Barrigada in areas of medium archaeological probability could result in significant impacts. Construction and operation of the alternative in this area would also change the setting of a potential traditional cultural property. Construction and operation of additional storage in the MSA under all three alternatives would result in significant impacts to one NRHP-eligible archaeological site. Construction and operation of the weapons emplacement facilities would have significant and no impacts upon cultural resources, respectively. However, these impacts could be resolved through the consultation process to less than significant levels. Potential mitigation would include avoidance, monitoring during construction, data recovery, public education, and training of Marines and Soldiers to prevent vandalism.

12.2.7 Summary of Potential Mitigation Measures

Table 12.2-4 summarizes the potential mitigation measures for each action alternative.

Table 12.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Archaeological Resources		
• Data recovery of sites 1021 and 1023 • Cultural resources education training of Marines and Soldiers to promote protection of sensitive sites	• Data recovery of site T-3-1 • Cultural resources education training of Marines and Soldiers to promote protection of sensitive sites	• Cultural resources education training of Marines and Soldiers to promote protection of sensitive sites
Architectural Resources		
• None	• None	• None
Submerged Resources and Objects		
• None	• None	• None
Traditional Cultural Properties		
• Impacts to traditional resources such as the nunu tree, dukduk tree, ifit tree, and da'ok tree, would be avoided if possible	• Impacts to traditional resources such as the nunu tree, dukduk tree, ifit tree, and da'ok tree, would be avoided if possible	• Impacts to traditional resources such as the nunu tree, dukduk tree, ifit tree, and da'ok tree, would be avoided if possible

CHAPTER 13. VISUAL RESOURCES

13.1 INTRODUCTION

This chapter describes the potential environmental consequences associated with implementation of the alternatives within the region of influence (ROI) for this resource. For a description of the affected environment for all resources, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in that Volume 2 include the ROI for the Army Air and Missile Defense Task Force (AMDTF); the chapters are presented in the same order as the resource areas contained in this volume.

13.2 ENVIRONMENTAL CONSEQUENCES

13.2.1 Approach to Analysis

13.2.1.1 Methodology

Information on visual resources was gathered through on-site visits, background research, and participation in stakeholder and public meetings. The analysis of potential impacts to visual resources is based on the long term (operational) effects – i.e., after construction has occurred and all buildings, facilities, and structures are in place. Construction-related activities related to the development of the Army AMDTF facilities would be short-term in duration and minimal in their impacts (i.e., earth-moving equipment clearing vegetation and constructing facilities).

13.2.1.2 Determination of Significance

For the purpose of the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OIES), the proposed action would cause a significant impact to visual resources if they:

- Would substantially alter the views or scenic quality associated with particularly significant and/or publicly recognized vistas, viewsheds, overlooks, or features.
- Would substantially change the light, glare, or shadows within a given area.
- Would substantially affect sensitive receptors – i.e., viewers with particular sensitivity (or intolerance) to a changed view (e.g., a hillside neighborhood with views of a relatively undisturbed, naturally-appearing landscape).

Significant impacts that cannot be mitigated to less-than-significant levels are considered unavoidable.

A discussion is presented for each significance criterion listed that would be triggered by the alternatives.

13.2.1.3 Issues Identified During Public Scoping Process

No visual resource issues regarding the proposed action were raised at the June 2007 public scoping meetings.

13.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

13.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

North

NCTS Finegayan

Construction. Construction-related activities related to the development of the Army AMDTF facilities would be short-term in duration and minimal in their impacts (i.e., earth-moving equipment clearing vegetation and constructing facilities); therefore, less than significant.

Operation. Under Alternative 1, the administration/headquarters (HQ) and maintenance operations would be co-located in the north portion of Naval Computer and Telecommunications Station (NCTS) Finegayan. Development of AMDTF at the NCTS Finegayan area would result in substantial alteration of the existing landscape. Public views from Highway 3 into the densely forested areas proposed for development would take on a more urban/suburban character where naturally-appearing, densely-forested landscape would be replaced with a mix of housing (two-story) and barracks (four-story). Refer to Volume 2, Chapter 13, Section 13.2 Environmental Consequences for a visual depiction of this area post construction.

None of the public views into the Finegayan area are of any particular significance (e.g., a recognized vista or overlook); however, because the proposed development would result in such a substantial and dramatic change to the existing landscape along a major and well-traveled public roadway, it is anticipated to have a significant impact on visual resources. These impacts could be reduced to a level less than significant with mitigation.

Haputo Point Overlook could be negatively impacted. Negative impacts to this overlook could be lessened to a level of less than significant with mitigation.

South Finegayan

Construction. Construction-related activities related to the development of the Army AMDTF facilities would be short-term in duration and minimal in their impacts (i.e., earth-moving equipment clearing vegetation and constructing facilities); therefore, less than significant.

Operation. Under Alternative 1, the accompanied housing facilities would be co-located with the Main Cantonment housing areas in the southern portion of NCTS Finegayan and in South Finegayan. Recreational and quality of life (QOL) facilities would be co-located within and adjacent to the housing areas. As the unaccompanied housing facilities would be located within NCTS Finegayan and are compatible with adjacent proposed Marine Corps land uses, South Finegayan would be completely transformed into a relatively dense area with numerous buildings, roads, parking lots, sidewalks, and landscaping. While this would represent a major change over the existing visual conditions and interior views at Finegayan, it would be expected to be less than significant. Most of the property is already under

Department of Defense (DoD) ownership and few, if any, sensitive views or receptors currently exist on these sites. Refer to Volume 2, Chapter 13, Section 13.2, Environmental Consequences for a visual depiction of this area post construction.

Central

Navy Barrigada

The proposed activities would be confined to NCTS and South Finegayan and would not impact visual resources at Navy Barrigada.

Air Force Barrigada

The proposed activities would be confined to NCTS and South Finegayan and would not impact visual resources at Air Force Barrigada.

Alternative 1 Potential Mitigation Measures

- Establish and implement design guidelines for all buildings that are comparable to the Guam archetype (e.g., Spanish – stucco over concrete with stamped tile concrete roofs, muted and earthen color palette).
- Develop and implement a landscape plan focused on retention of mature specimen trees during construction (where possible) and the establishment of a full suite of vegetation representing Guam's native flora.

13.2.2.2 Headquarters/Housing Alternative 2

North

NCTS Finegayan

The proposed activities would be confined to Navy Barrigada and would not impact visual resources at NCTS Finegayan.

South Finegayan

The proposed activities would be confined to Navy Barrigada and would not impact visual resources at South Finegayan.

Central

Navy Barrigada

Construction. Construction-related activities related to the development of the Army AMDTF facilities would be short-term in duration and minimal in their impacts (i.e., earth-moving equipment clearing vegetation and constructing facilities); therefore, less than significant.

Operation. Under Alternative 2, the AMDTF administrative/HQ and maintenance facilities, bachelor quarters, accompanied housing, and QOL/recreational facilities would all be located in the central portion of Navy Barrigada. While much of Navy Barrigada is composed of mowed grass and low shrubs with antennae and associated facilities and structures, much of this central portion is heavily vegetated and exhibits a natural state.

Development of AMDTF at Navy Barrigada would replace this naturally-appearing landscape with suburban growth. Potentially sensitive receptors include residents of Barrigada Heights and viewers from Mount Barrigada, both located directly to the north of the proposed AMDTF area. However, proposed

AMDTF buildings and structures are not expected to be more than two-stories high and the area would be comparable to other land uses in the nearby vicinity. Nevertheless, this development, a stand-alone Army cantonment, would substantially modify the existing landscape and cause a significant impact to visual resources. These impacts could be expected to be reduced to a level less than significant with mitigation measures in place.

Air Force Barrigada

The proposed activities would be confined to Navy Barrigada and would not impact visual resources at Air Force Barrigada. Therefore, there would be no impact to visual resources at Air Force Barrigada.

Alternative 2 Potential Mitigation Measures

- Establish and implement design guidelines for all buildings that are comparable to the Guam archetype (e.g., Spanish – stucco over concrete with stamped tile concrete roofs, muted and earthen color palette).
- Develop and implement a landscape plan focused on retention of mature specimen trees during construction (where possible) and the establishment of a full suite of vegetation representing Guam's native flora.

13.2.2.3 Headquarters/Housing Alternative 3

North

NCTS Finegayan

As previously noted, none of the public views into the NCTS Finegayan area are of any particular significance (e.g., a recognized vista or overlook); however, because the proposed development would substantially and dramatically change to the existing landscape along a major and well-traveled public roadway, it is anticipated to have a significant impact to visual resources. These impacts could be reduced to a level less than significant with the same mitigation measures in place as described for Alternative 1.

South Finegayan

The proposed actions would be confined to NCTS Finegayan, Navy Barrigada, and Air Force Barrigada; therefore, they would not impact visual resources at South Finegayan.

Central

Navy Barrigada

Under Alternative 3, approximately half of the Navy Barrigada properties would be developed for housing and related supporting facilities. While much of the area is composed of mowed grass and low shrubs with antennae and associated facilities and structures, a large portion is currently heavily vegetated and reflects a more natural state. Development at Navy Barrigada would occur in both the previously disturbed and the densely vegetated areas; thus replacing much of the low and shrub-type landscape, and the naturally-appearing landscape with suburban growth.

Potentially sensitive receptors include people traveling along Highways 15 and 16, residents of Barrigada Heights in the north adjacent to Navy Barrigada, and viewers from Mount Barrigada. Proposed buildings and structures are not expected to be more than two-stories high and the area would comparable to other land uses in the nearby vicinity (residential neighborhoods). Nevertheless, this development would substantially modify the existing landscape and cause a significant impact to visual resources. These impacts could be expected to be reduced to a level less than significant with mitigation measures in place.

Air Force Barrigada

Under Alternative 3, approximately half of the Air Force Barrigada properties would be developed for housing and related supporting facilities. While much of the area is composed of mowed grass and low shrubs with antennae and associated facilities and structures, a large portion is currently heavily vegetated and reflects a more natural state. Development at Air Force Barrigada would occur in both the previously disturbed and the densely vegetated areas; thus replacing much of the low and shrub-type landscape, and the naturally-appearing landscape with suburban growth.

Potentially sensitive receptors include people traveling along Highways 15 and 16, residents of Barrigada neighborhoods to the east and south of Air Force Barrigada, and viewers from Mount Barrigada. Proposed buildings and structures are not expected to be more than two stories high and the area would comparable to other land uses in the nearby vicinity (residential neighborhoods). Nevertheless, this development would substantially modify the existing landscape and cause a significant impact to visual resources. These impacts could be expected to be reduced to a level less than significant with mitigation measures in place.

Alternative 3 Potential Mitigation Measures

- Establish and implement design guidelines for all buildings that are comparable to the Guam archetype (e.g., Spanish – stucco over concrete with stamped tile concrete roofs, muted and earthen color palette).
- Develop and implement a landscape plan focused on retention of mature specimen trees during construction (where possible) and the establishment of a full suite of vegetation representing Guam's native flora.
- Create a buffer area and screen development on NCTS between the Haputo Point Overlook and adjacent proposed development.

13.2.3 Munitions Storage Alternatives

13.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

Construction-related activities related to the development of the Army AMDTF facilities would be short-term in duration and minimal in their impacts (i.e., earth-moving equipment clearing vegetation and constructing facilities); therefore, less than significant.

Operation

The eight new earth-covered magazines (ECMs) proposed within Munitions Storage Area (MSA) 1 would add similar features to a landscape dominated by numerous other ECMs. Thus, proposed ECMs would be in keeping with the current features of the area. Furthermore, this area is away from any public views or sensitive receptors. No impacts would be anticipated to visual resources as a result of the additional ECMs.

13.2.3.2 Munitions Storage Alternative 2

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 2 are identical those described for Munitions Storage Alternative 1.

13.2.3.3 Munitions Storage Alternative 3

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Therefore, impacts for Munitions Storage Alternative 3 are identical those described for Munitions Storage Alternative 1.

13.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

13.2.5 No-Action Alternative

Under the no-action alternative, no construction or operations associated with the Marine Corps relocation would occur. Existing operations at the proposed project areas would continue; therefore, the no-action alternative would have no significant impacts to visual resources.

13.2.6 Summary of Impacts

Tables 13.2-1, 13.2-2, 13.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 13.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Construction-related activities would be short-term in duration and minimal in their impacts	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1
Operation		
SI-M • Few, if any, sensitive views or receptors currently exist in NCTS Finegayan and Finegayan South. However, since the proposed development would result in such a substantial and dramatic change to the existing landscape, impacts would be less than significant with mitigation NI • There would be no impact to visual resources at Navy and Air Force Barrigada	SI-M • Development at Navy Barrigada would replace naturally-appearing landscape with suburban growth in areas with potentially sensitive receptors NI • There would be no impact to visual resources in NCTS Finegayan, Finegayan South, or Air Force Barrigada	SI-M • Few, if any, sensitive views or receptors currently exist in NCTS Finegayan and Finegayan South. However, since the proposed development would result in such a substantial and dramatic change to the existing landscape, impacts would be less than significant with mitigation LSI • Development at Navy Barrigada and Air Force Barrigada would replace naturally-appearing landscape with suburban growth in areas with potentially sensitive receptors, impacts would be less than significant with mitigation NI • There would be no impact to visual resources at South Finegayan

Legend: LSI = Less than significant impact, SI-M = Significant impact mitigable to less than significant, NI = No impact.

Table 13.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Construction-related activities would be short-term in duration and minimal in their impacts	LSI • The impacts would be the same as Alternative 1	LSI • The impacts would be the same as Alternative 1
Operation		
NI • Proposed ECMs would be in keeping with the current features of the area. Furthermore, this area is away from any public views or sensitive receptors	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

Table 13.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
NI • The existing scenic points do not lend viewing ability towards the project area	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1
Operation			
NI • The existing scenic points do not lend viewing ability towards the project area	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1

Legend: NI = No impact.

Construction

Construction-related activities related to the development of facilities would be short-term in duration and minimal in their impacts (i.e., earth-moving equipment clearing vegetation and constructing facilities); therefore, would have less than significant impacts.

Operation

Developing facilities for the Army AMDTF would result in substantial changes to the visual environment at specific locations on Guam. The changed visual environment would affect public views by substantially modifying naturally-appearing landscapes located adjacent to public roadways. It would also potentially affect sensitive receptors traveling along Highways 15 and 16, residents of Barrigada Heights in the north adjacent to Navy Barrigada, residents of Barrigada neighborhoods to the east and south of Air Force Barrigada, and viewers from Mount Barrigada. The changes to the visual environment, while substantial in scale and potentially significant in nature, would be expected to be brought to a level of less than significant with mitigation measures in place. Mitigation measures would include implementing

design guidelines for all buildings that is in keeping with the Guam archetype, implementing a landscape plan focused on retention of mature specimen trees during construction, establishment of a full suite of vegetation in keeping with Guam's native flora, and using native flora to create a natural-appearing "screen" between public roadways and build-up areas.

13.2.7 Summary of Potential Mitigation Measures

Table 13.2-4 summarizes potential mitigation measures for each action alternative.

Table 13.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Construction		
• No mitigation recommended	• No mitigation recommended	• No mitigation recommended
Operation		
• Establish and implement design guidelines for all buildings that are comparable to the Guam archetype (e.g., Spanish – stucco over concrete with stamped tile concrete roofs, muted and earthen color palette). • Develop and implement a landscape plan focused on retention of mature specimen trees during construction (where possible) and the establishment of a full suite of vegetation representing Guam's native flora.	• Establish and implement design guidelines for all buildings that are comparable to the Guam archetype (e.g., Spanish – stucco over concrete with stamped tile concrete roofs, muted and earthen color palette). • Develop and implement a landscape plan focused on retention of mature specimen trees during construction (where possible) and the establishment of a full suite of vegetation representing Guam's native flora.	• Establish and implement design guidelines for all buildings that are comparable to the Guam archetype (e.g., Spanish – stucco over concrete with stamped tile concrete roofs, muted and earthen color palette). • Develop and implement a landscape plan focused on retention of mature specimen trees during construction (where possible) and the establishment of a full suite of vegetation representing Guam's native flora.

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CHAPTER 14. MARINE TRANSPORTATION

14.1 INTRODUCTION

This chapter describes the potential environmental consequences associated with implementation of the alternatives for the Army Air and Missile Defense Task Force (AMDTF) project within the region of influence (ROI) for marine transportation. For a description of the affected environment for all resources, refer to the respective chapters of Volume 2 (Marine Corps Relocation – Guam). The locations described in that volume include the ROI for the Army AMDTF component of the proposed action and the chapters are presented in the same order as in this volume. See Volume 6, Chapter 4 for a discussion of on base and off base roadways.

14.2 ENVIRONMENTAL CONSEQUENCES

The proposed action involves construction and operations that would occur on land only. The proposed locations are in the central and northern portions of the island, and the anticipated effects would not extend to the coastline. Therefore, an analysis of marine transportation is not presented in this chapter.

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CHAPTER 15. UTILITIES

For a complete look at utilities, refer to Volume 6.

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CHAPTER 16. SOCIOECONOMICS AND GENERAL SERVICES

16.1 INTRODUCTION

This chapter describes the potential environmental consequences associated with implementation of the alternatives for the Army Air and Missile Defense Task Force (AMDTF) project within the region of influence (ROI) for socioeconomics and general services. For a description of the affected environment for all resources, refer to the respective chapters of Volume 2 (Marine Corps Relocation – Guam). The locations described in that volume include the ROI for the Army AMDTF component of the proposed action and the chapters are presented in the same order as in this volume.

Socioeconomic impacts would be island-wide in nature with little difference in effects among the various alternatives. Therefore, the summary of impacts presented below covers all of the alternatives except the no-action alternative, which is treated separately in Section 16.2.3.

16.2 ENVIRONMENTAL CONSEQUENCES

16.2.1 Methodology

Refer to the corresponding section of Volume 2.

16.2.1.1 Determination of Significance

Refer to the corresponding section of Volume 2.

16.2.1.2 Issues Identified during Public Scoping Process

Refer to the corresponding section of Volume 2.

16.2.2 Proposed Action

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts of the proposed action is presented at the end of this chapter.

16.2.2.1 Population Impacts

Project Related Population

Refer to the corresponding section of Volume 2 for introductory statements.

Approach to Analysis

Table 16.2-1 provides assumptions made in conducting analysis for the construction phase, as well as the source of or rationale for those assumptions.

Table 16.2-1. Construction Component Assumptions for Project Related Population Impacts

Assumption	*Assumed Value*	*Source/Rationale*
Average number of dependents for in-migrating direct, on-site, construction jobs	0.20 - 0.35	Based on contractor interviews (Appendix F Socioeconomic Impact Assessment Study [SIAS])
Average number of dependents for in-migrating direct from purchases jobs	0.95 - 1.0	United States (U.S.) Census national data on persons per jobs (U.S. Census 2000) and Guam Department of Labor (GDoL) interviews (Appendix F SIAS)
Average number of dependents for in-migrating indirect/induced jobs	0.95 - 1.0	U.S Census national data on persons per jobs (U.S. Census 2000) and GDoL interviews (Appendix F SIAS)

Table 16.2-2 provides assumptions made in conducting analysis for the operations phase, as well as the source of or rationale for those assumptions.

Table 16.2-2. Operational Component Assumptions for Project Related Population Impacts

Assumption	*Assumed Value*	*Source/Rationale*
Number of Army personnel by 2015.	630	Description of proposed action and alternatives
Number of Army dependents by 2015.	950	Description of proposed action and alternatives
Average number of dependents for in-migrating civilian military personnel.	0.95	U.S Census national data on persons per jobs (U.S. Census 2000)
Average number of dependents for in-migrating direct from purchases jobs.	0.95 - 1.0	U.S Census national data on persons per jobs (U.S. Census 2000) and GDoL interviews (Appendix F SIAS)
Average number of dependents for in-migrating indirect/induced jobs.	0.95 - 1.0	U.S Census national data on persons per jobs (U.S. Census 2000) and GDoL interviews (Appendix F SIAS)

Impacts

Table 16.2-3 indicates a 2015 peak-year total impact would be 6,262 in 2015, falling to 2,151 after construction ends.

Table 16.2-3. Estimated Population Increase Associated with Proposed Army Action

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Combined Construction and Operation Total Impact	0	89	89	89	4,353	6,262	2,151	2,151	2,151	2,151	2,151

Notes: Population figures exclude existing Guam residents who obtain employment as a result of the proposed action.

Figure 16.2-1 illustrates that the 2015 population would exceed the baseline trend by about 3% (meeting the criteria for significance used in this analysis), while the increase from 2016 on drops to a less than significant 1%. Population increases are considered to be inherently mixed (both beneficial and adverse), because population growth fuels economic expansion, but sudden growth also strains government services and the social fabric.

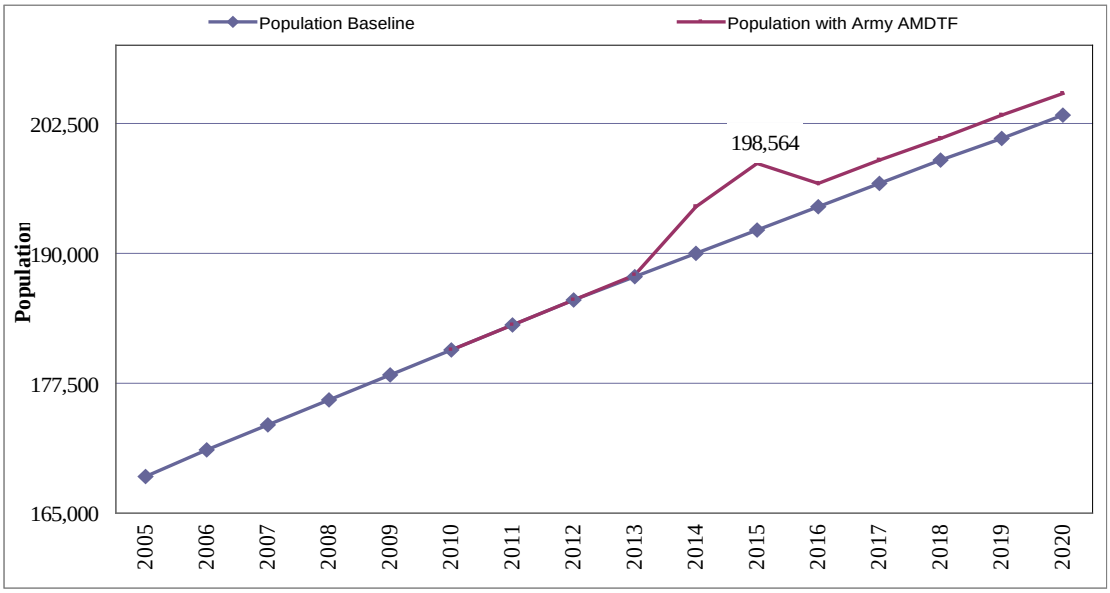


Figure 16.2-1. Population With and Without Proposed Action

Demographic Characteristics

Refer to the corresponding section of Volume 2 for introductory statements, approach to analysis (including data sources), and qualitative analysis.

Household Characteristics

Refer to the corresponding section of Volume 2 for introductory statements, approach to analysis (including data sources), and qualitative analysis.

16.2.2.2 Economic Impacts

Employment and Income

Refer to the corresponding section of Volume 2 for introductory statements and approach to analysis (including data sources).

Civilian Labor Force Demand

Table 16.2-4 shows a combined total civilian labor force demand of 3,787 workers in the peak year of 2015, declining to a stable 553 workers after construction ceases.

Table 16.2-4. Impact on Civilian Labor Force Demand (Full-Time Equivalent [FTE] Jobs)

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Combined Total Impact	0	37	37	37	3,272	3,787	553	553	553	553	553

Notes: Demand is in terms of FTE jobs. Portion assumed to be filled by Guam residents is not subtracted from these figures.

Figure 16.2-2 shows civilian labor force demand with and without the proposed action. The 2015 combined impact is 7% over the baseline trend, while the steady-state operational increase is only about 1% higher. The 7% figure meets the criteria used in this analysis for a beneficial significant impact, but the operational impact from 2016 on would be considered less than significant by itself.

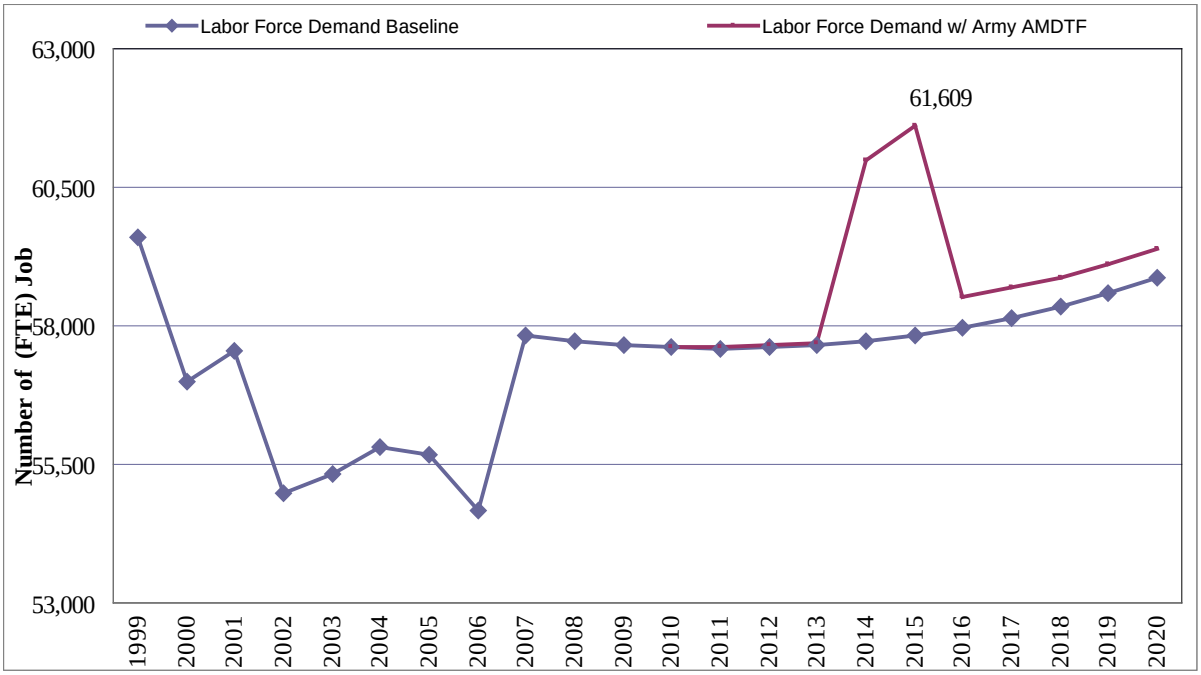


Figure 16.2-2. Labor Force Demand (FTE Jobs) With and Without Proposed Action

Civilian Labor Force Supply

Table 16.2-5 shows the probable labor force supply for direct onsite military construction jobs.

Table 16.2-5. Estimated Origin of Workers Constructing Army AMDTF Facilities

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*
TOTAL	0	0	0	0	1,812	1,812	0
GUAM	0	0	0	0	232	232	0
OFF-ISLAND	0	0	0	0	1,580	1,580	0
H-2B Workers	0	0	0	0	1,101	1,101	0
Philippines	0	0	0	0	935	935	0
Other	0	0	0	0	165	165	0
CONUS/HI/Japan	0	0	0	0	281	281	0
Supervisor (US, Japan)	0	0	0	0	10	10	0
Labor	0	0	0	0	272	272	0
Other U.S. Pacific Islands	0	0	0	0	198	198	0

Note: Numbers may not add exactly due to rounding.

Table 16.2-6 estimates the share of non-military construction direct and indirect jobs, going to Guam residents versus off-island workers.

Table 16.2-6. Estimated Numbers of On-Island Workers for Various Job Categories other than Direct On-Site Construction

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Guam Workers	0	5	5	5	225	363	101	254	254	254	254
Off-Island Workers	0	32	32	32	1,235	1,613	451	299	299	299	299

Note: Demand is in terms of FTE jobs, and assumes one worker per FTE job.

Civilian Labor Force Income

Table 16.2-7 shows that the peak figure for this analysis is $136 million, falling back to $23 million for the operational period from 2016 on.

Table 16.2-7. Impact on Civilian Labor Force Income (Millions of 2008 $s)

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Combined Total Impact	$0	$2	$2	$2	$115	$136	$23	$23	$23	$23	$23

Figure 16.2-3 adds the various combined total impact figures to the baseline trend. Higher construction-period income would result in a significant beneficial 8% increase over the baseline trend in 2015 (though a substantial amount of that benefit would accrue to foreign workers), whereas the steady-state increase from 2016 would be 1% greater than baseline trend and thus be considered less than significant.

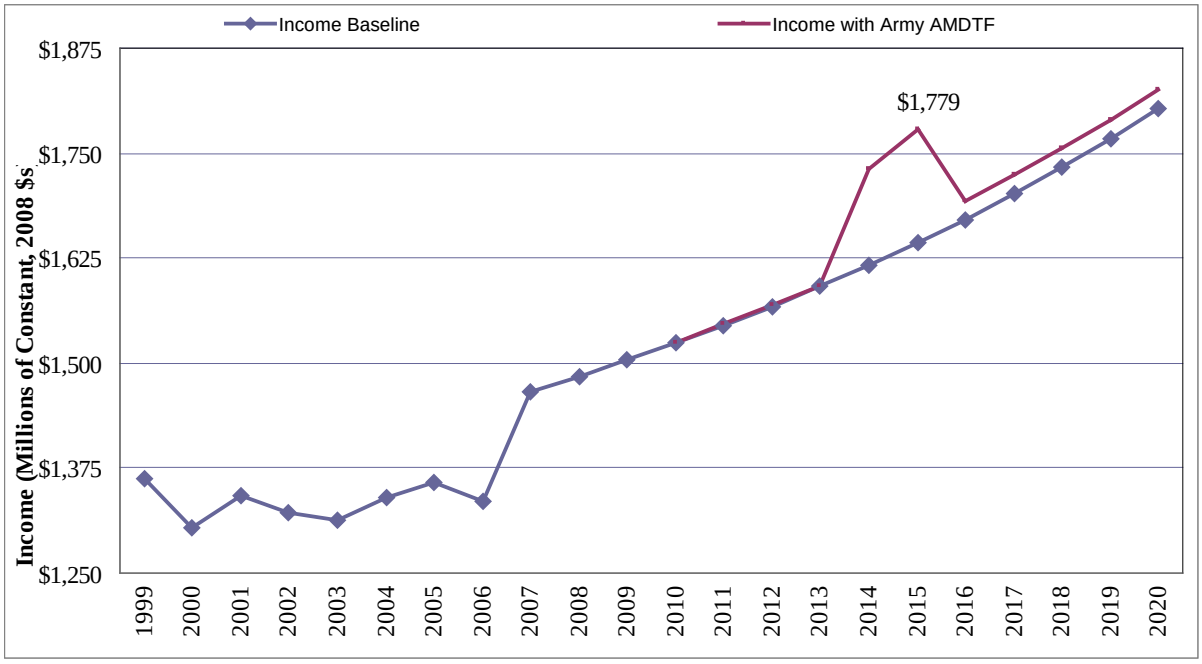


Figure 16.2-3. Labor Force Income (Millions of 2008 $s) With and Without Proposed Action

Standard of Living

Refer to the corresponding section of Volume 2 for general discussion.

Unemployment

Refer to the corresponding section of Volume 2 for general discussion.

Housing

Refer to the corresponding section of Volume 2 for introductory statements and approach to analysis (including data sources).

Impacts

Refer to the corresponding section of Volume 2 for general discussion on housing supply.

Table 16.2-8 indicates the combined total impact of the proposed action would be a demand for 920 new civilian housing units in the peak year of 2015, falling to 147 after construction ends.

Table 16.2-8. Demand for New Civilian Housing Units

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Combined Total Impact	0	10	10	10	823	920	147	147	147	147	147

Figure 16.2-4 below projects a baseline trend in housing supply based on historical rates of development. The combined total 2015 peak demand is about 1% above the projected figure, but even this small increase drops to near equivalence with the projected baseline thereafter. This does not meet the 2% threshold for significance being used for this analysis.

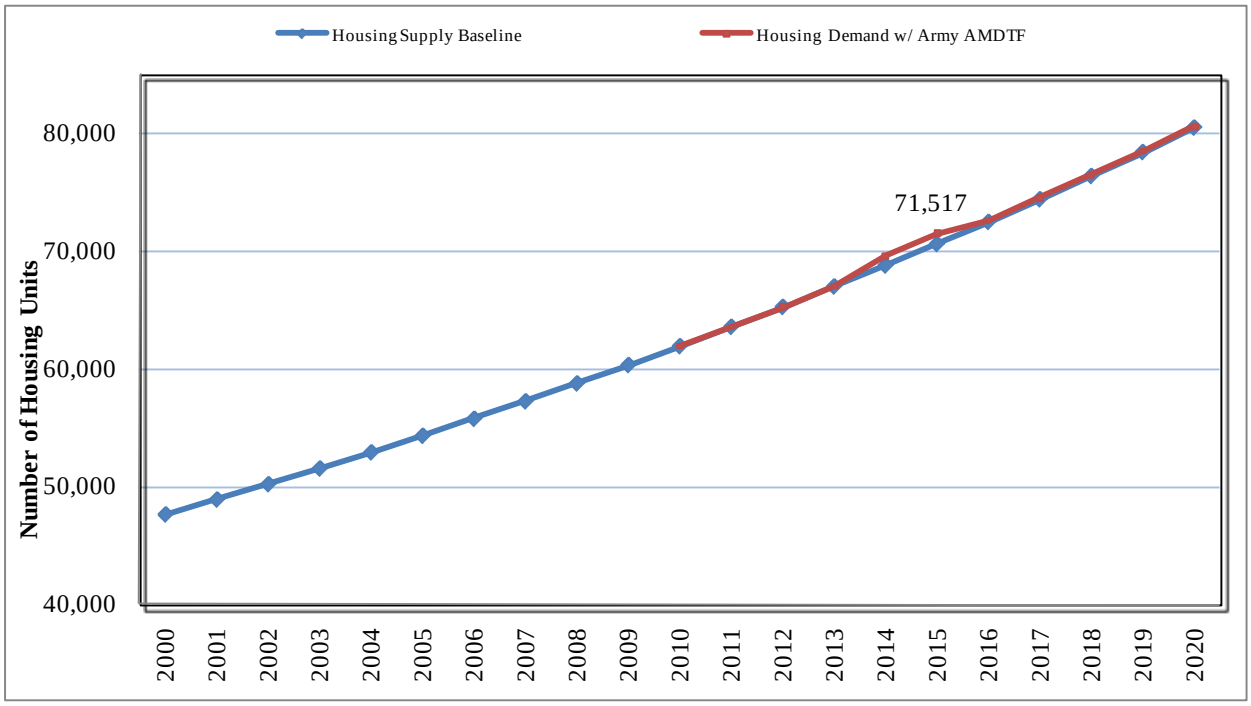


Figure 16.2-4. Housing Demand with Army AMDTF and Housing Supply

Local Government Revenues

Refer to the corresponding section of Volume 2 for introductory statements and approach to analysis (including data sources).

Note that this is not intended as a comprehensive estimate of all revenues, but only of primary ones. Tax revenue sources analyzed here include Gross Receipts Tax, Corporate Income Tax, and Personal Income Tax.

Table 16.2-9 shows the combined total impacts for each of the three primary revenue sources. The additional revenues from Gross Receipts Tax will reach $12.8 million in the peak year of 2015, declining to a stable figure of $901,000 after construction ends. New corporate income tax revenue would reach $3.3 million in 2015, declining to a stable figure of $230,000 in 2016. New personal income tax revenue would peak at $21 million in 2015, declining to a stable figure of $4.6 million thereafter.

Table 16.2-9. Impact on Selected Tax Revenues (1,000s of 2008 $s)

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Gross Receipts Tax	$0	$53	$53	$53	$11,908	$12,755	$901	$901	$901	$901	$901
Corporate Income Tax	$0	$14	$14	$14	$3,037	$3,253	$230	$230	$230	$230	$230
Personal Income Tax	$0	$305	$305	$305	$16,760	$21,047	$4,591	$4,591	$4,591	$4,591	$4,591
Total	$0	$371	$371	$371	$31,705	$37,055	$5,722	$5,722	$5,722	$5,722	$5,722

Figure 16.2-5 shows the projected total Government of Guam (GovGuam) tax revenue for the baseline trend (projected future without the proposed action) plus the impact of the proposed action. The chart shows tax revenues rising to $436.7 million in 2015 and falling off as construction winds down. The 2015 figure represents the largest impact with a significant 9% increase over the baseline trend, while the steady-state level is less than 1% above the baseline trend. The 9% figure meets the criteria used in this analysis for a beneficial significant impact, but the operational impact would be less than significant.

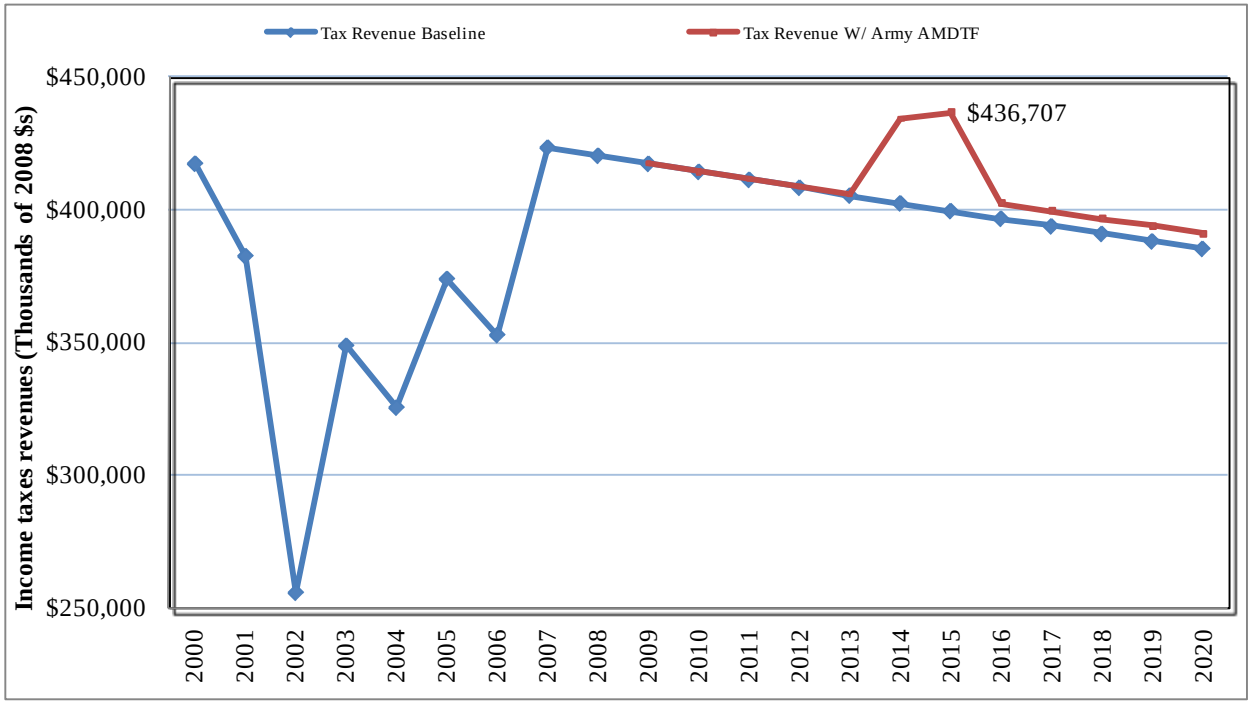


Figure 16.2-5. GovGuam Tax Revenue With and Without Proposed Action

Gross Island Product

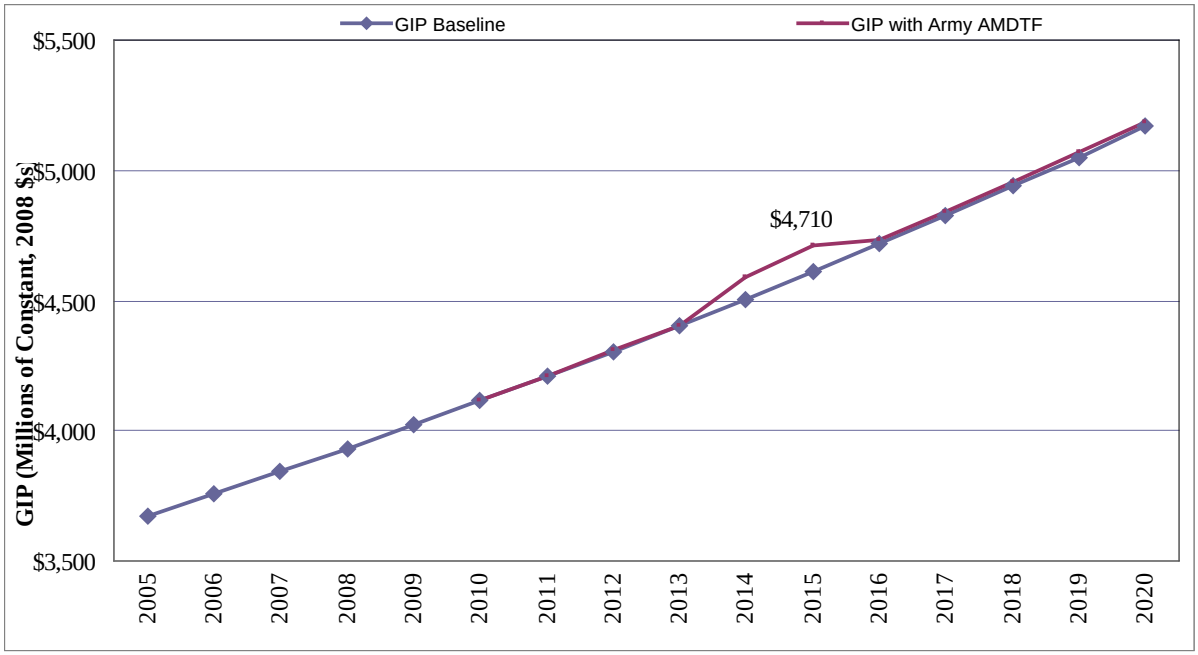
Refer to the corresponding section of Volume 2 for introductory statements and approach to analysis.

Table 16.2-10 shows the Army AMDTF action would add $99 million to the Gross Island Product (GIP) in 2015. When construction stops, the combined total impact would be reduced to $17 million.

Table 16.2-10. Impact on Gross Island Product (Millions of 2008 $s)

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Combined Total Impact	$0	$1	$1	$1	$83	$99	$17	$17	$17	$17	$17

Figure 16.2-6 shows the projected total GIP for the baseline trend (projected future without the proposed action) plus the total combined impact of the proposed action. The chart shows the GIP rising to $4.7 billion in 2015. The 2015 figure represents a 2% increase over the baseline trend, while the steady-state operational level is about the same as the baseline trend.



Notes: In this analysis, a 2% increase over baseline trend at the construction peak will be considered sufficiently significant and beneficial to merit a calculation of the total value. In this and other following figures where that 2% threshold is reached, the number shown at the 2015 peak is the sum of the projected baseline trend – what would happen without the proposed action – plus the estimated combined total impact from the foregoing table. In this case, the 2015 impact from Table 16.2-3 is $99 million (or $0.099 billion), and the 2015 baseline trend value is slightly above $4.6 billion ($4.611 billion). These add to the $4.710 billion figure shown above.

Figure 16.2-6. GIP (Millions of 2008 $s) With and Without Proposed Action

Local Business Contracts

Refer to the corresponding section of Volume 2 for introductory statements and approach to analysis (including data sources).

The construction portion of this action would warrant less construction activity than the Marine Corps relocation; however, as noted therein, local businesses would still experience benefits. The operational phase for this Navy project would present far fewer opportunities than Marine Corps activities.

Tourism

Refer to the corresponding section of Volume 2 for introductory statements and approach to analysis (including data sources).

16.2.2.3 Public Service Impacts

Refer to the corresponding section of Volume 2 for introductory statements.

Public Education

Refer to the corresponding section of Volume 2 for introductory statements, approach to analysis (including data sources), and analysis.

Table 16.2-11 provides an overview of the proposed action's impacts on Guam Public School System (GPSS) student populations for the action's peak year and steady-state.

Table 16.2-12Table 16.2-12 provides an overview of the proposed action's impacts on GPSS staffing for the action's peak year and steady-state.

Table 16.2-11. GPSS Student Population Impacts Summary

Agency	*Baseline Service Population*	*Peak Year*	*Peak Year Additional Service Population*	*Peak Year Percentage Increase*	*Steady Additional Service Population (going forward)*	*Steady Requirements Percentage Increase*
GPSS Elementary	14,436	2015	316	2%	50	<1%
GPSS Middle	6,887	2015	133	2%	21	<1%
GPSS High	9,661	2015	176	2%	28	<1%

Table 16.2-12. Primary and Secondary Education Teacher Requirements Impacts Summary

Agency	*Baseline Teacher Numbers*	*Peak Year*	*Peak Year Additional Teacher Requirements*	*Peak Year Percentage Increase*	*Steady State Additional Teacher Requirements (going forward)*	*Steady Requirements Percentage Increase*
GPSS Elementary	1,035	2015	23	2%	4	<1%
GPSS Middle	504	2015	10	2%	2	<1%
GPSS High	514	2015	9	2%	1	<1%

Table 16.2-13 and Table 16.2-14 provide overviews of the proposed action's impacts on Guam Community College (GCC) and University of Guam (UoG) student populations and non-adjunct faculty requirements for the action's peak year and steady-state.

Table 16.2-13. Higher Education Student Population Impacts Summary

Agency	*Baseline Service Population*	*Peak Year*	*Peak Year Additional Service Population*	*Peak Year Percentage Increase*	*Steady Additional Service Population (going forward)*	*Steady Requirements Percentage Increase*
GCC	1,806	2015	45	2%	11	<1%
UoG	3,282	2015	79	2%	16	<1%

Table 16.2-14. Higher Education Faculty Requirement Impacts Summary

Agency	*Baseline Non-adjunct Faculty Numbers*	*Peak Year*	*Peak Year Additional Non-adjunct Faculty Requirements*	*Peak Year Percentage Increase*	*Steady Additional Non-adjunct Faculty Requirements (going forward)*	*Steady Requirements Percentage Increase*
GCC	100	2015	3	3%	<1	<1%
UoG	185	2015	4	2%	1	<1%

Public Health and Human Services

Refer to the corresponding section of Volume 2 for introductory statements, approach to analysis (including data sources), and qualitative analysis.

Table 16.2-15 provides an overview of the proposed action's impacts on Guam Memorial Hospital Authority (GMHA), Guam Department Public Health and Social Services (GDPHSS), Guam Department of Mental Health and Substance Abuse (GDMHSA) and Guam Department of Integrated Services for Individuals with Disabilities (GDISID) service populations for the action's peak year and steady-state.

Table 16.2-15. Impact on Public Health and Human Services, Service Population Summary

Agency	*Baseline Service Population*	*Peak Year*	*Peak Year Additional Service Population*	*Peak Year Percentage Increase*	*Steady Additional Service Population (going forward)*	*Steady Requirements Percentage Increase*
GMHA	160,797	2015	4,375	3%	264	<1%
GDPHSS	65,954	2015	2,348	4%	807	<1%
GDMHSA	65,954	2015	2,348	4%	807	<1%
GDISID	169,209	2015	6,262	4%	2,151	1%

Table 16.2-16 provides an overview of the proposed action's impacts on various public health and human services agency staffing requirements for the action's peak year and steady-state.

Table 16.2-16. Public Health and Human Services Impact Summary

Agency and Staffing Type	*Baseline Staffing Numbers*	*Peak Year*	*Peak Year Additional Staffing Requirements*	*Peak Year Percentage Increase*	*Steady Additional Staffing Requirements (going forward)*	*Steady Staffing Requirements Percentage Increase*
GMHA Physicians	57	2015	2	3.5%	<1	<1%
GMHA Nurses and Allied Health Professionals	355	2015	10	3%	1	<1%
GDPHSS - Primary Care Medical Providers and Nursing Staff	44	2015	2	4.5%	<1	1%
GDPHSS – Bureau of Communicable Disease Control (BCDC) Communicable Disease Prevention Professionals	33	2015	1	3%	<1	1%
GDPHSS – Bureau of Family Health and Nursing Services (BFHNS) Nurses	22	2015	1	4.5%	<1	1%
GDMHSA – Mental Health Professionals	130	2015	5	4%	2	1.5%
GDISID Social Workers and Counselors	14	2015	1	3.5%	<1	1%

Public Safety Services

Refer to the corresponding section of Volume 2 for introductory statements, approach to analysis (including data sources) and qualitative analysis.

Table 16.2-17 provides an overview of the proposed action's impacts on the Guam Police Department (GPD), Guam Fire Department (GFD), Guam Department of Corrections (GDoC), and Guam Department of Youth Affairs (GDYA) service populations for the action's peak year and steady-state.

Table 16.2-17. Impact on Public Safety Service Population Summary

Agency	*Baseline Service Population*	*Peak Year*	*Peak Year Additional Service Population*	*Peak Year Percentage Increase*	*Steady Additional Service Population (going forward)*	*Steady Requirements Percentage Increase*
GPD	160,797	2015	6,262	4%	2,151	1%
GFD	175,877	2015	5,232	3%	571	<1%
GDoC	1,035	2015	23	2%	5	<1%
GDYA	24,987	2015	949	4%	546	2%

Table16.2-18 provides an overview of the proposed action's impacts on various public safety services agency staffing requirements for the action's peak year and steady-state.

Table 16.2-18. Public Safety Services Staffing Impacts Summary

Agency and Staffing Type	*Baseline Staffing Numbers*	*Peak Year*	*Peak Year Additional Staffing Requirements*	*Peak Year Percentage Increase*	*Steady Additional Staffing Requirements (going forward)*	*Steady Staffing Requirements Percentage Increase*
GPD – Police Officers	309	2015	11	3.5%	4	1%
GFD – Firefighters	190	2015	6	3%	1	<1%
GDoC – Custody and Security Personnel	188	2015	4	2%	1	<1%
GDYA – Youth Service Professionals	79	2015	3	4%	2	2.5%

Other Selected General Services

Refer to the corresponding section of Volume 2 for introductory statements, approach to analysis (including data sources) and qualitative analysis.

Table 16.2-19 provides an overview of the proposed action's impacts on Guam Department of Parks and Recreation (GDPR), Guam Public Library System (GPLS), and Guam Judiciary key staffing requirements for the action's peak year and steady-state.

Table 16.2-19. Impact on Other Selected General Service Agency Service Population

	Baseline Service Population Numbers	*Peak Year*	*Peak Year Additional Service Population*	*Peak Year Percentage Increase*	*Steady Additional Service Population Numbers (going forward)*	*Steady Service Population Percentage Increase*
GDPR, GPLS, and Judiciary Service Population	160,797	2015	6,262	4%	2,151	1%

Table 16.2-20 provides an overview of the proposed action's impacts on GDPR, GPLS and Guam Judiciary key staffing requirements for the action's peak year and steady-state.

Table 16.2-20. Other Selected General Service Agency Impacts Summary

Agency and Staffing Type	*Baseline Key Staffing Numbers*	*Peak Year*	*Peak Year Additional Key Staffing Requirements*	*Peak Year Percentage Increase*	*Steady Additional Key Staffing Requirements (going forward)*	*Steady Requirements Percentage Increase*
GDPR – General Staff	90	2015	3	3%	1	1%
GPLS – General Staff	28	2015	1	3.5%	<1	1%
Judiciary – Judges	6	2015	<1	3%	<1	1%

Growth Permitting and Regulatory Agencies

Refer to the corresponding section of Volume 2 for introductory statements, approach to analysis (including data sources), and qualitative analysis.

Table 16.2-21 shows the estimated number of key professional staff required due to the proposed action. The peak requirement in 2014, when the full effects of the proposed action are added to ongoing construction, is up to 4.1% greater than reported baseline staffing levels for most agencies listed below. However, reflecting small baseline levels, even the small numbers below would represent a 20% increase for the Coastal Management Program (CMP) and 13% increase for GDLM at peak, and an even more sizeable 76% increase for the Alien Labor Processing and Certification Division (ALPCD). Starting in 2017 the required staffing levels would be up to 3% greater than baseline levels for most agencies, but still 8% for CMP and 10% for GDLM. Although the percentages vary by agency, the overall assessment will be one of less than significant impacts for the proposed action alone, except in conjunction with other aspects of the aggregate action.

Table 16.2-21. Additional Growth Permitting Staff Required

	2010	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Guam Department of Public Works (GDPW) Permitting Staff	0.0	0.0	0.0	0.5	0.8	0.2	0.0	0.0	0.0	0.0	0.0
Guam Department of Land Management (GDLM) Permitting Staff	0.9	0.9	1.1	1.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Guam Environmental Protection Agency (GEPA) Permitting Staff	0.0	0.0	0.0	2.0	3.1	0.8	0.1	0.1	0.1	0.1	0.1
CMP Permitting Staff	0.0	0.0	0.0	0.9	1.1	0.7	0.3	0.3	0.3	0.3	0.3
Guam Power Authority (GPA) Permitting Staff	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Guam Waterworks Authority (GWA) Permitting Staff	0.0	0.0	0.0	0.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0
GFD Permitting Staff	0.0	0.0	0.0	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1
GDPHSS - DEH Permitting Staff	0.0	0.0	0.0	0.0	0.3	0.4	0.1	0.1	0.1	0.1	0.1
GDPR - HPO Permitting Staff	0.0	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0
GDoL - ALPCD Permitting Staff	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0

Note: Numbers show combined total impact.

16.2.2.4 Sociocultural Impacts

Refer to the corresponding section of Volume 2 for introductory statements. Most sociocultural impacts are due to the overall aggregate effect of the proposed action, not the unique attributes of any particular service (i.e., Marines, Navy, or Army).

Crime and Serious Social Disorder

Refer to the corresponding section of Volume 2.

Chamorro Issues

Refer to the corresponding section of Volume 2.

Community Cohesion

Refer to the corresponding section of Volume 2.

16.2.3 No-Action Alternative

The no-action alternative assumes that all parts of the aggregate action, not just the proposed action covered in this volume would not occur. Therefore, the no-action conclusions given below are identical to those in Volume 2 for the Marine Corps Relocation – Guam and in Volume 7 for the aggregate action. The references below to substantial impacts with the proposed action would in fact apply more to those volumes than to this Volume 5.

Unlike physical resources, socioeconomic systems do not tend to remain completely at baseline conditions if a proposed action is not implemented. Economies and population levels change due to other reasons as well. The various foregoing exhibits showing baseline trends for economic and demographic variables indicate long-term trends expected to continue without the proposed action, and Volume 7 will list a number of specific socioeconomic changes expected to occur independent of the proposed action. Furthermore, the announcement of the proposed action has already had socioeconomic consequences, such that a decision not to follow through on the military buildup would have short-term effects associated with a reversal of those existing consequences.

16.2.3.1 Population/Economic Impacts

In the short term, a decision not to implement the proposed action would deflate any current speculative activity attributable the proposed action. Real estate values in particular would likely drop, hurting investors but increasing the affordability of housing. The contrast between the business community's expectations and a negative Record of Decision would likely produce a period of pessimism about Guam's economic future, especially if the current national and international economic crisis has not yet abated.

In the long-term, the island's prospects would remain linked to international economic conditions and the health of its tourism industry. Conceivably, a smaller military profile might remove some barriers to growing the potential Chinese tourism market. Growth would resume, though probably with the same volatility experienced in recent decades.

16.2.3.2 Public Service Impacts

In the case of the no-action alternative, the specific agencies discussed earlier in this chapter would not face the listed pressures to expand professional staffing, and agencies involved in planning and regulating growth would not experience such a sharp increase in workload. Although this was not specifically covered in the analysis, it may also be noted that agencies that are required to implement major infrastructure developments, such as the ports and highways, would have substantially more time to implement long-term plans rather than having to achieve much of their objectives over the next few years.

At the broader level, the no-action alternative and the elimination of prospective long-term revenues expected from the proposed action would leave GovGuam agencies in the difficult financial condition described in Volume 2. At least for the foreseeable future, this would negatively impact the various service agencies because of budget cuts, and would probably represent the most important overall consequence for GovGuam.

16.2.3.3 Sociocultural Impacts

To the extent that Guam experiences job losses, crime rates may rise in the short term. The political importance of some Chamorro issues would likely recede as the militarization of Guam is stabilized at something close to present levels. Military-civilian relations would likely remain at the current generally positive level.

The incentive for increased in-migration from the Freely Associated States of Micronesia (FAS) would decrease, reducing sociocultural issues associated with assimilating that population.

16.2.4 Summary of Impacts

Socioeconomic impacts are anticipated to be largely island-wide in nature with little difference in effects among the various alternatives. The impacts in this chapter are calculated under a scenario that assumes there would be no constraints (blockages) to the rapid development of spin-off private-sector economic activity driven by the military construction and permanent military operational stages. Most impacts are characterized by a burst of activity and impacts in the 2013-2014 timeframe, followed by relatively much lower impacts when only permanent personnel are present.

16.2.4.1 Population Impacts

Including active-duty Army personnel and dependents (about 1,580 people), the proposed action would add nearly 6,300 residents to Guam's population in 2014 and a subsequent more stable estimated 2,150 residents in the following years.

16.2.4.2 Economic Impacts

Most long-term economic benefits would be beneficial though small. The construction activity for the Army AMDTF would contribute to economic expansion, but also substantial growing pains related to rapid population influx and public service agency impacts.

Including all the spin-off activity, the proposed action would provide jobs for about 3,800 civilian workers at the 2015 peak and about 550 on a more permanent basis. Guam residents are estimated to capture about 230 of the direct on-site construction jobs for Army AMDTF facilities at the 2015 peak, as well as 360 spin-off jobs that year and a more permanent 250 jobs a few years thereafter.

Standard of living impacts from the proposed action would be small, and some households would benefit from rising wages during the construction period, enough to slow deterioration of purchasing power over-time.

Civilian housing unit demand would peak at about 920 units in 2015, falling to about 150 units for the steady-state phase.

Although a more detailed fiscal impact assessment will be done by GovGuam using output from this EIS/OEIS, preliminary estimates in this chapter suggest revenues from the three most important tax sources – gross receipts, corporate income, and personal income – would exceed $37 million in 2015 and stabilize at about $5.7 million thereafter.

While Guam construction businesses would be expected to benefit from various opportunities, including military set-asides, there would likely be negligible impacts on tourism from the proposed action alone.

Guam's GIP would increase by $99 million (2008 dollars) in 2015 and by nearly $17 million a year from 2016 on.

16.2.4.3 Public Service Impacts

GovGuam's public service agencies would generally need to make only minor staffing increases to serve new population associated with the proposed action alone, though the impacts would be more notable during the construction timeframe. Most of these agencies would need to expand their services and staff slightly during the 2014-2015 peak (raising serious issues of availability of qualified workers), then cut them back as construction ends.

For public education services, the GPSS, GCC, and UoG together would need to hire a combined 49 teachers/faculty for the year 2015, falling to a combined eight after construction ends.

For health and human services, this chapter considered impacts on various aspects of the GMHA, GDPHSS, GDMHSA, and the GDISID. These agencies would need a combined 22 new key professional workers by 2015, dropping to a combined four for the next year and on.

Public safety agencies; Police, Fire, Corrections, and Youth Affairs, would require a combined 24 key professionals in 2015, falling to a combined seven for the next year and on.

Other selected general service agencies; Parks and Recreation, Libraries, and the Judiciary, would require a combined four key professionals in 2015, falling to a combined number of just two after construction ends.

Other agencies deal with permitting and regulating growth; they are affected more by the initial requests for permits and then subsequent inspections and monitoring. Development permitting agencies on Guam would experience very low increases in demands for their services because the amount of housing and commercial space needed to serve this small population and employment increment would be below the existing stock of vacancies. That is, vacancies would absorb most of the demand, so that further new construction and the need for development permitting services would be minimal. DLM, GEPA, and the ALPCD would be the only agencies whose increased workloads would peak at more than one FTE (about one, three, and four, respectively).

16.2.4.4 Sociocultural Impacts

The limited construction activity and operational aspects related to this proposed action likely would not impact the local community. In terms of assessing the possible impact of the operational phase of the component, sociocultural impacts would likely mirror those that accompany the proposed action described in Volume 2.

Table 16.2-22 summarizes the potential socioeconomics impacts of the Army AMDTF proposed actions.

Table 16.2-22. Summary of Impacts of Army AMDTF Proposed Actions

Summary of Impacts
Construction
LSI • Less than significant direct and indirect impact of demand for civilian (private-market, excluding temporary construction workforce housing) housing units peaking at 813 units in 2014, with permanent operational demand for 147 civilian housing units from 2016 on (*Note:* combined total impact peaks in 2015 at demand for 920 units) • Less than significant construction-related adverse impacts to growth permitting and regulatory agencies due to difficulty in meeting fluctuating staffing requirements with an existing environment of staffing and budget shortfalls and recruitment complications LSI • Less than significant adverse impacts to public service agencies, most of which would need to expand their services and staff slightly during the 2014-2015 peak (raising issues of availability of qualified workers), then cut them back as construction ends. No significant lapse or decline in services would be expected NI • No impacts to community cohesion • No impacts to Chamorro Issues • No impacts to crime and social order • No impacts to tourism • No impacts to the standard of living BI • Significant beneficial impact due to economic expansion fueled by increased population (see Economic impacts below) • Significant beneficial impacts to civilian labor force demand due to provision of construction-related jobs on Guam • Significant beneficial impacts to civilian labor force incomes due to infusion of income into the Guam economy • Significant beneficial impact to public service agencies influenced by population increases, due to provision of additional jobs on Guam, if labor supply and funding is available during operational phase • Beneficial impacts to local business opportunities due to increased military service contract opportunities for local Guam businesses • Significant beneficial impacts due to increase in local government revenue
Operation
LSI • Less than significant direct and indirect impact of demand for civilian (private-market, excluding temporary construction workforce housing) housing units peaking at 813 units in 2014, with permanent operational demand for 147 civilian housing units from 2016 on (*Note:* combined total impact peaks in 2015 at demand for 920 units LSI • Less than significant adverse impacts to public service agencies, most of which would need to expand their services and staff slightly to accommodate increased demand for services. No significant lapse or decline in services would be expected. NI • No impacts to community cohesion • No impacts to Chamorro Issues • No impacts to crime and social order • No impacts to tourism • No impacts to the standard of living

Summary of Impacts
BI • Significant beneficial impact due to economic expansion fueled by increased population (See Economic impacts below) • Significant beneficial impacts to civilian labor force demand due to provision of permanent jobs on Guam • Significant beneficial impacts to civilian labor force incomes due to permanent infusion of income into the Guam economy • Significant beneficial impact to public service agencies influenced by population increases, due to provision of additional jobs on Guam, if labor supply and funding is available during operational phase • Beneficial impacts to local business opportunities due to increased military service contract opportunities for local Guam businesses • Significant operational phase beneficial impacts to Gross Island Product due to permanent increased GIP strengthening the Guam economy • Significant beneficial impacts due to increase in local government revenue

Notes: Impacts assessed for the proposed action in isolation from all other aspects of the overall collective action. Aggregate impacts are discussed in Volume 7. For "Growth Permitting and Regulatory Agencies," there are no meaningful distinctions between construction and operational component assumptions for permitting agencies because the permitting agency impacts are driven by population, employment, and spending, regardless of the project phase those drivers arise from.

Legend: SI = Significant impact, SI-M = Significant impact mitigable to less than significant, LSI = Less than significant impact, NI = No impact, BI = Beneficial impact.

16.2.5 Summary of Potential Mitigation Measures

No mitigation measures are necessary to address socioeconomic impacts, as none were determined to be significant.

CHAPTER 17. HAZARDOUS MATERIALS AND WASTE

17.1 INTRODUCTION

This chapter describes the potential environmental consequences of hazardous materials and waste associated with implementation of alternatives within the region of influence (ROI). For a description of the affected environment for all resources, including current hazardous substance handling, storage, transportation, and management plans, techniques, approaches, and potential mitigation measures refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in Volume 2 include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action; the chapters are presented in the same order as the resource areas contained in this volume.

17.2 ENVIRONMENTAL CONSEQUENCES

17.2.1 Approach to Analysis

17.2.1.1 Methodology

Potential environmental consequences and mitigation measures related to the expansion of the utilities infrastructure on Guam were evaluated regarding:

- Army AMDTF construction impacts
- Army AMDTF operation impacts

These potential impacts were assessed for the general public as well as various media (i.e., soils, surface water, groundwater, air, and biota). This section presents an impact analysis for the proposed action and the no-action alternative. As the impacts would be island-wide in nature with little difference in effects among the various alternatives, the summary of impacts presented in Section 17.2.2 is applicable to all of the alternatives except the no-action alternative. Impacts under the no-action alternative are addressed in Section 17.2.3.

17.2.1.2 Determination of Significance

The determination of significance is based upon existing hazardous substance management practices, potential mitigation measures, and expected or potential impacts and environmental consequences with the planned actions. This determination evaluated the overall ability to mitigate or control environmental impacts and consequences to soils, surface water, groundwater, air, and biota. This determination considers current conditions and potential consequences relative to the anticipated ability of the hazardous substance management infrastructure system to accommodate added hazardous substance demand on the overall system. Specifically, for hazardous substances to be considered a significant impact, the following would have to occur:

- Leaks, spills, or releases of hazardous substances to environmental media (i.e., soils, surface water, groundwater, air, and/or biota) resulting in unacceptable risks to the environment.
- Violation of applicable federal, state, or local laws or regulations regarding the transportation, storage, handling, use, or disposal of hazardous substances.

17.2.1.3 Issues Identified During Public Scoping Process

Major issues identified during the public scoping process which involves input from regulatory stakeholders included the desire to:

- Address management practices for hazardous substances including hazardous wastes, toxic substances, hazardous materials, and ordnance.
- Describe the potential overall impacts of hazardous substances from construction and operation of proposed projects.
- Identify the projected hazardous waste types and volumes.
- Identify expected hazardous substance storage, disposal, and management plans.
- Evaluate measures to mitigate generation of hazardous waste, including pollution prevention.
- Discuss how hazardous substances on land and from ships would be managed.
- Discuss the potential for impacts to environmental media from spills, accidents, and/or releases of hazardous substances.
- Identify existing installation restoration sites.

17.2.2 Proposed Action

This description of environmental consequences addresses all components of the proposed action for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts is presented at the end of this chapter.

17.2.2.1 Construction

This subsection analyzes possible impacts related to the construction phase of the proposed Army AMDTF. Construction activities would be the same for all three components (headquarters/housing, weapons storage, and weapons emplacement) and for the alternatives of each component.

Specific activities include site preparation, site grading, trenching and excavation, installation of foundations and building structures, landscaping, and installation or improvement of roads, and other related infrastructure elements.

Hazardous Materials

Proposed construction activities for the proposed action would result in the use of hazardous materials. It is anticipated that the largest increases of hazardous materials would occur from the use of fuels for heavy construction equipment, construction vehicles, generators, and other construction activities. It is estimated that about 3,000 pounds (lbs) (1,361 kilograms [kg]) of hazardous materials would be used during Army AMDTF construction activities. This estimate was based upon professional judgment and Defense Reuse and Marketing Office (DRMO) Guam hazardous material disposal data. Best management practices (BMPs) and standard operating procedures (SOPs) would be used to:

- Prevent, contain, and/or clean up spills and leaks to protect the human health and the environment.
- Provide personnel training and operational protocol and procedures to protect human health and the environment.
- Ensure DMRO has the ability to properly manage and dispose of anticipated hazardous materials.

- Protect overall human health, welfare, and the environment.

The projected increase in the volume of hazardous material represents a potential hazardous material impact to soils, surface water, groundwater, air, and biota. However, the increased volume of hazardous material would be handled and disposed per BMPs and SOPs in accordance with all federal and local regulations, as well as with DoD requirements (see Volume 7). Therefore, the impacts from the increase in hazardous material would be less than significant. The BMPs and SOPs that would be used include (but are not limited to):

- Update/implement HMMP.
- Update/implement Facility Response plans.
- Update/implement SPCC plans (training, spill containment and control procedures, cleanup, notifications, etc.).
- Ensure DoD and construction subcontractor personnel are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous materials. Also, ensure personnel are trained in accordance with spill prevention, control, and cleanup methods.
- Implement aggressive HMMPs that substitute non-hazardous materials for hazardous materials.
- As necessary, expand DRMO's sufficient hazardous materials storage, transportation, and disposal capacity prior to any expected increases
- Verify through surveillance and inspection that construction contractors fully comply with federal and local regulations, as well as DoD requirements, including the use, storage, treatment, and disposal of hazardous materials. Also verify that proper erosion control methods are used during construction activities. Implement corrective actions as necessary.
- Minimize the risk of uncontrolled spills and releases through industry accepted methods for spill prevention, containment, control, and abatement.
- Minimize the use of contaminated sites for new construction. When new construction occurs on sites where contamination has been identified, ensure that the risk of human exposure to contaminated media is minimized via the use of a site-specific health and safety plan, engineering and administrative controls, and appropriate PPE.

Toxic Substances

The primary toxic substances being addressed on Guam regardless of any Department of Defense (DoD) expansion include: asbestos-containing materials (ACM), lead-based paint (LBP), polychlorinated biphenyls (PCBs), and radon. The proposed action would not be expected to result in impacts from ACM, LBP, and PCBs. The USEPA banned the most uses of PCBs in 1979 and banned LBP in 1978. In addition, ACM would not be used in new Army AMDTF facilities. Demolition of existing facilities could result in encountering LBP and/or ACM; however, licensed asbestos and LBP contractors used for these projects would follow established ACM and LBP handling protocol and procedures. Therefore, such impacts of LBP and/or ACM would be less than significant.

New facilities and/or structures could encounter radon intrusion; however, radon resistant construction techniques would be used and DoD would periodically test facilities constructed in known radon zones to verify that no unacceptable radon gas buildup occurs. As appropriate, radon mitigation measures would be installed.

Hazardous Waste

Proposed construction activities would result in an increase in the generation of hazardous waste. Construction activities would increase the use of adhesives, lubricants, solvents, corrosive liquids, and aerosols. It is estimated that approximately 8,000 lbs (3,629 kg) of hazardous wastes would be generated from Army AMDTF facilities construction projects. This estimate was based upon professional judgment and DRMO Guam hazardous waste disposal data. However, BMPs and SOPs would be used to:

- Prevent, contain, and/or clean up spills and leaks to protect the human health and the environment.
- Provide personnel training and operational protocol and procedures to protect human health and the environment.
- Ensure DMRO has the ability to properly manage and dispose of anticipated hazardous waste
- Protect overall human health, welfare, and the environment.

The projected increase in the volume of hazardous waste represents a potential hazardous waste impact to soils, surface water, groundwater, air, and biota. However, the increased volume of hazardous waste would be handled and disposed per BMPs and SOPs in accordance with all federal and local regulations, as well as with DoD requirements (see Volume 7). Therefore, the impacts from the increase in hazardous waste would be less than significant. BMPs and SOPs that would be used include (but are not limited to): used include:

- Update/implement HWMPs.
- Update/implement Facility Response plans.
- Update/implement SPCC plans (training, spill containment and control procedures, cleanup, notifications, etc.).
- Ensure DoD and construction subcontractor personnel are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous waste. Also, ensure they are trained in accordance with spill prevention, control, and cleanup methods.
- Implement aggressive hazardous waste minimization plans based on hazardous waste use minimization plans.
- As necessary, expand DRMO's sufficient hazardous waste storage, transportation, and disposal capacity prior to any expected increases.
- Verify through surveillance and inspection that construction contractors construction contractors fully comply with federal and local regulations, as well as DoD requirements, and implement corrective actions as necessary
- Minimize the risk of uncontrolled spills and releases through industry accepted methods for spill prevention, containment, control, and abatement.
- Minimize the use of contaminated sites for new construction. When new construction occurs on sites where contamination has been identified, ensure that the risk of human exposure to contaminated media is minimized via the use of a site-specific health and safety plan, engineering and administrative controls, and PPE.

17.2.2.2 Operation

This subsection analyzes possible impacts related to the operational phase of the proposed Army AMDTF. For the most part, operations associated with the headquarter/housing component would be residential/recreational and administrative in nature; the hazardous materials/waste impact of these activities would be less than significant through pollution prevention and community awareness/recycling

programs. Operational activities would be the same for all alternatives of each component (headquarters/housing, weapons storage, and weapons emplacement). Army AMDTF training operations involve missile transport/storage training, communications/ radar operations, and non-fire maneuvers. This section discusses the environmental consequences and potential mitigation measures associated with these activities.

Hazardous Materials

Army AMDTF activities would result in the use of military transport vehicles and increased usage of fuels and petroleum, oils, and lubricants (POLs). An estimated 1,600 lbs (726 kg) of hazardous materials would be generated from AMDFT operations annually. This estimate was based upon professional judgment and DRMO Guam hazardous material disposal data. BMPs and SOPs would be used to:

- Prevent, contain, and/or clean up spills and leaks to protect human health and the environment.
- Provide personnel training and operational protocol and procedures to protect human health and the environment.
- Ensure DMRO has the ability to properly manage and dispose of anticipated hazardous materials.
- Protect overall human health, welfare, and the environment.

The projected increase in the volume of hazardous material represents a potential hazardous material impact to soils, surface water, groundwater, air, and biota. However, the increased volume of hazardous material would be handled and disposed per per BMPs and SOPs in accordance with all federal and local regulations, as well as with DoD requirements (see Volume 7). Therefore, the impacts from the increase in hazardous material would be less than significant. The BMPs and SOPs that would be used include (but are not limited to):

- Update/implement HMMPs.
- Update/implement Facility Response plans.
- Update/implement SPCC plans. Also, ensure personnel are trained in accordance with spill prevention, control, and cleanup methods.
- Implement aggressive hazardous materials minimization plans that maximize the use of non-hazardous materials as appropriate.
- Ensure DoD personnel are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous materials.
- Verify through surveillance and inspection that construction contractors fully comply with federal and local regulations, as well as DoD requirements, and implement corrective actions as necessary.
- As necessary, expand DRMO's sufficient hazardous materials storage, transportation, and disposal capacity prior to any expected increases.

Toxic Substances

Activities associated with firing range operations are not expected to produce significant impacts from toxic substances (e.g., ACM, LBP, PCBs, or radon) or produce unwanted environmental consequences requiring potential mitigation measures. BMPs and SOPs would be implemented as appropriate.

Hazardous Waste

There may be limited generation of hazardous wastes as a result of Army AMDTF range operations. Hazardous wastes generated could include: solvents, corrosive or toxic liquids, pesticides/herbicides, and aerosols (primarily used for firing range vehicle maintenance). An estimated 2,500 lbs (1,134 kg) of hazardous waste would be generated from Army AMDTF operations annually. This estimate was based upon professional judgment and DRMO Guam hazardous waste disposal data.

BMPs and SOPs would be used to:

- Prevent, contain, and/or clean up spills and leaks to protect the human health and the environment.
- Provide personnel training and operational protocol and procedures to protect human health and the environment.
- Ensure DMRO has the ability to properly manage and dispose of anticipated hazardous waste
- Protect overall human health, welfare, and the environment.

The projected increase in the volume of hazardous waste represents a potential hazardous material impact to soils, surface water, groundwater, air, and biota. However, the increased volume of hazardous waste would be handled and disposed per per BMPs and SOPs in accordance with all federal and local regulations, as well as with DoD requirements (see Volume 7). Therefore, the impacts from the increase in hazardous waste would be less than significant. The BMPs and SOPs that would be used include (but are not limited to):

- Update/implement HWMPs.
- Update/implement Facility Response plans.
- Update/implement SPCC plans (training, spill containment and control procedures, cleanup, notifications, etc.).
- Ensure DoD personnel are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous wastes. Also, ensure they are trained in accordance with spill prevention, control, and cleanup methods.
- Perform all vehicular maintenance activities off-range at existing DoD maintenance shops
- Implement aggressive hazardous waste minimization plans based on hazardous waste use minimization plans.
- As necessary, expand DRMO's sufficient hazardous waste storage, transportation, and disposal capacity prior to any expected increases.
- Verify through surveillance and inspection that DoD construction contractors fully comply with federal and local regulations, as well as DoD requirements, and implement corrective actions as necessary.
- Minimize the risk of uncontrolled spills and releases through industry accepted methods for spill prevention, containment, control, and abatement.

17.2.2.3 Summary of Impacts

The projected increase in the volume of hazardous material and waste represents a potential hazardous material/waste impact to soils, surface water, groundwater, air, and biota. However, the increased volume of hazardous materials and waste would be handled and disposed per BMPs, SOPs, and all applicable federal and local regulations, as well as DoD requirements (see Volume 7). Therefore, the impacts from the increase in hazardous materials/waste would be less than significant.

17.2.3 No-Action Alternative

Under the no-action alternative none of the proposed DoD expansion activities would be implemented on Guam and baseline condition would remain unchanged. Therefore, there would be no environmental impacts or consequences under the no-action alternative. Furthermore, as a result having no consequences there would be no mitigation measures required. Implementation of the no-action alternative would not meet the mission, readiness, national security and international treaty obligations of the DoD.

17.2.4 Summary of Impacts

Tables 17.2-1, 17.2-2, 17.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 17.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternatives 1 ,2 and 3
Construction
LSI • Less than significant adverse impacts would occur • As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release • BMPs and SOPs would keep the frequency and magnitude of the potential leaks, spills, and releases low • Less than significant impact to hazardous materials/waste management and disposal capacity due to expansion of facilities prior to expected increases
Operation
LSI • Less than significant adverse impacts would occur • As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release • BMPs and SOPs would keep the frequency and magnitude of the potential leaks, spills, and releases low • Less than significant impact to hazardous materials/waste management and disposal capacity due to expansion of facilities prior to expected increases

Legend: LSI = Less than significant impact.

Table 17.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternatives 1 ,2 and 3
Construction
LSI • Less than significant adverse impacts would occur • As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release • BMPs and SOPs would keep the frequency and magnitude of the potential leaks, spills, and releases low • Less than significant impact to hazardous materials/waste management and disposal capacity due to expansion of facilities prior to expected increases
Operation
LSI • Less than significant adverse impacts would occur • As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release • BMPs and SOPs would keep the frequency and magnitude of the potential leaks, spills, and releases low • Less than significant impact to hazardous materials/waste management and disposal capacity due to expansion of facilities prior to expected increases

Legend: LSI = Less than significant impact.

Table 17.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternatives 1 ,2, 3, and 4
Construction
LSI • As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release • BMPs and SOPs would keep the frequency and magnitude of the potential leaks, spills, and releases low • The volume of hazardous waste to be generated by the proposed action construction would be well within the capacity that can be managed on Guam within the existing Navy and Air Force hazardous materials and waste system. The impacts would be less than significant.
Operation
LSI • As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release • BMPs and SOPs would keep the frequency and magnitude of the potential leaks, spills, and releases low • The volume of hazardous waste to be generated by the proposed action operations would be well within the capacity that can be managed on Guam within the existing Navy and Air Force hazardous materials and waste system. The impacts would be less than significant.

Legend: LSI = Less than significant impact.

Proposed Army AMDTF operations involving non-fire maneuvers and troop movement exercises/training would result in increased opportunities for environmental impacts. These potential impacts could result from increased transportation, handling, use, and disposal of hazardous materials and hazardous wastes. It is expected that the largest increases in the use of hazardous materials would occur from the use of POLs and fuels. The proposed action also would increase use hazardous waste including solvents, corrosive or toxic liquids, and aerosols.

There are various controls in place to prevent unintended releases of such substances. These controls include:

- Spill prevention control and countermeasures plans
- Facility Response plans
- Waste management plans
- Stormwater pollution prevention plans
- Hazardous material/waste management plans (e.g., asbestos management plans and lead-based management plans, etc.)
- Mandatory personnel hazardous material/waste training
- Waste minimization plans
- Waste labeling, storage, packaging, staging, and transportation procedures
- DoD waste regulations
- Federal and territorial laws and regulations

Despite expected increases in hazardous materials and hazardous wastes, impacts would be less than significant because the controls discussed above would be properly implemented and related plans and procedures updated and modified as appropriate to meet the potential increased demand upon DRMO regarding hazardous substance transportation, handling, storage, use, and disposal.

17.2.5 Summary of Potential Mitigation Measures

No potential mitigation measures are identified. Table 17.2-4 summarizes the BMPs and SOPs that would be used related to Army AMDTF construction and operations activities for each action alternative.

Table 17.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Army AMDTF Construction and Operation		
• Update/implement HMMP's and HWMP's. • Update/implement Facility Response plans. • Update/implement SPCC plans (training, spill containment and control procedures, clean up, notifications, etc.). • Ensure DoD personnel are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous substances. Also, ensure they are trained in accordance with spill prevention, control, and cleanup methods. • Perform all vehicle maintenance activities at existing DoD maintenance shops. • Implement aggressive hazardous material/waste minimization plans that substitute hazardous material/waste for non-hazardous or less toxic waste as applicable and use LEEDs criteria. • As necessary, expand DRMO's sufficient hazardous materials/waste storage, transportation, and disposal capacity prior to any expected increases • Verify through surveillance and inspection that federal, local, and DoD laws and regulations are being observed and implement corrective actions as necessary. • Minimize the risk of uncontrolled spills and releases through industry accepted methods for spill prevention, containment, control, and abatement. • Minimize the use of contaminated sites for new construction. When new construction occurs on sites where contamination has been identified, ensure that the risk of human exposure to contaminated media is minimized via the use of a site-specific health and safety plan, engineering and administrative controls, and PPE.	• BMPs and SOPs under Alternative 2 are the same as under Alternative 1.	• BMPs and SOPs under Alternative 2 are the same as under Alternative 1.

Legend: DoD = Department of Defense; DRMO = Defense Reutilization and Marketing Office; HMMP = Hazardous Materials Management Plan; HWMP = Hazardous Waste Management Plan; LEED = Leadership in Energy and Environmental Design; PPE = personal protective equipment; SPCC = Spill Prevention Control and Countermeasures.

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CHAPTER 18. PUBLIC HEALTH AND SAFETY

18.1 INTRODUCTION

This chapter describes the potential public health and safety impacts associated with implementation of the alternatives within the region of influence (ROI). For a description of the affected environment for all resources, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in Volume 2 include the ROI for the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action. The chapters are presented in the same order as the resource areas contained in this volume.

18.2 ENVIRONMENTAL CONSEQUENCES

18.2.1 Approach to Analysis

18.2.1.1 Methodology

Potential effects to public health and safety from implementation of the alternatives are based upon information detailed in the descriptions of each alternative provided in Chapter 2. Public health and safety concerns are identified based on anticipated changes in the population of Guam, both from natural increases and the introduction of military personnel and their dependents to Guam. Average per capita incidents for notifiable diseases, mental illness, and traffic accidents are used to calculate the potential increases in such incidents as a result of the proposed alternatives. Safety of construction workers would be the same as outlined in Volume 2. Proposed construction activities supporting Army AMDTF activities would be conducted in accordance with federal and local safety guidelines to ensure a safe work environment.

18.2.1.2 Determination of Significance

Factors considered in determining whether an alternative poses a significant public health and safety impact include the extent/degree to which implementation would subject the public to increased risk of contracting a disease or experiencing personal injury.

18.2.1.3 Issues Identified during Public Scoping Process

As part of the analysis, concerns related to public health and safety were mentioned by the public, including regulatory stakeholders, during public scoping meetings were addressed regarding the proposed relocation of military and civilian personnel to Guam.

These include:

- Potential increases in diseases including:
  - Acquired Immune Deficiency Syndrome (AIDS)
  - Cholera
  - Dengue
  - Hepatitis C
  - Malaria
  - Measles
  - Rubella

  - Tuberculosis
  - Typhoid Fever
  - Sexually Transmitted Diseases (STDs) other than AIDS
- Potential increases in mental illness
- Potential increases in traffic incidents
- Potential contact with UXO

18.2.2 Headquarters/Housing Alternatives

This description of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

18.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

Environmental/Social Safety

Water Quality

Construction and operational activities associated with the Army AMDTF would be implemented in accordance with standard operating procedures (SOPs) and BMPs, and in accordance with applicable regulations. Therefore, no impacts to water quality from construction and operational activities are anticipated.

Air Quality

As discussed in Volume 5, Chapter 5, increased pollutants associated with construction and operational activities associated with the Army AMDTF would be less than significant. Although increased emissions would be less than significant, construction and operational activities would result in a measured increase in pollutant emissions, which could result in health impacts to individuals on Guam. Air pollution can harm individuals when it accumulates in the air in high enough concentrations. People exposed to high enough levels of certain air pollutants may experience:

- irritation of the eyes, nose, and throat
- wheezing, coughing, chest tightness, and breathing difficulties
- worsening of existing lung and heart problems
- increased risk of heart attack

In addition, long-term exposure to air pollution can cause cancer and damage to the immune, neurological, reproductive, and respiratory systems. In extreme cases, it can even cause death. Some groups of people are especially sensitive to common air pollutants such as particulates and ground-level ozone.

It is anticipated that Guam clinics and hospital will increase staffing to meet current health care service ratios and will be capable of handling a potential increase in air quality-related illnesses; therefore, less than significant impacts would be anticipated as a result of increased emissions from construction and operational activities.

Hazardous Substances

Activities associated with the Army AMDTF would result in an increase in the use, handling, storage, transportation, and disposition of hazardous substances. These activities would be conducted in accordance with applicable hazardous material and waste regulations, and established BMPs and SOPs to ensure the health and safety of workers and the general public is maintained. BMPs and SOPs include:

- Implementing Hazardous Materials Management Plans
- Implementing Facility Response Plans
- Implementing Spill Prevention Control and Countermeasures plans (training, spill containment and control procedures, clean up, notifications, etc.). Also, ensure personnel are trained in accordance with spill prevention, control, and clean up methods
- Implementing hazardous materials minimization plans
- Ensuring DoD personnel are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous materials
- Ensuring that Defense Reuse and Marketing Office (DRMO) has sufficient hazardous materials storage, transportation, and disposal capacity prior to any expected increases.
- Verifying full compliance with federal and local laws and regulations, as well as DoD requirements, and implementing corrective actions as necessary.

Because hazardous substance management activities would be conducted in accordance with applicable regulations and established BMPs and SOPs, no impacts to public health and safety are anticipated.

Health Care Services

Volume 5, Chapter 16 discusses the impact of an increased patient to health care provider ratio as a result of population growth associated with the Army AMDTF. It is anticipated that short- and mid-term medical staffing requirements would increase over current requirements as a result of increased population. During the peak construction year (2014) 2 additional doctors (3.5% increase) and 10 additional nurses (3% increase) would be required to maintain the current service ratios; the number of additional doctors drops to less than 1 (<1% increase) and nurses drops to 1 (<1% increase) after construction activities are completed. These additional health care professionals would be hired in order to maintain current service ratios. Without corresponding increases in health care providers potential health and safety impacts could include:

- longer wait/response times for patients
- fewer or no available providers on island for chronic or acute issues
- complications or death from delayed treatment, and/or
- requirements for patients to travel off-island to receive adequate treatment

Because corresponding increases in doctors and nurses are anticipated to occur to maintain existing service conditions, no impact to health care services is anticipated.

Public Services

Police Service. Volume 5, Chapter 16 discusses staffing requirements for Guam Police Department (GPD) necessary to cope with population increases associated with the Army AMDTF. It is anticipated that short- and mid-term GPD staffing requirements would increase over current requirements as a result of increased population. During the peak construction year (2014) the GPD would require 11 (3.5% increase) additional officers to maintain the current service ratio; the number of additional officers drops to 4 (1% increase) after construction activities are completed. The GPD would hire these additional personnel in order to maintain current service ratios. Without increases in police services (i.e., more

police officers) to compensate for population increases, it would be expected that crime rates and police response times would also increase. As a result, the severity of consequences associated with crimes may worsen (i.e., there may be increased injury and or death associated with delayed police responses).

Because corresponding increases in GPD personnel are anticipated to occur to maintain existing service conditions, no impact to police service are anticipated.

Fire Service. Volume 5, Chapter 16 discusses staffing requirements for Guam Fire Department (GFD) necessary to cope with population increases associated with the Army AMDTF. It is anticipated that short- and mid-term GFD staffing requirements would increase over current requirements as a result of increased population. During the peak construction year (2014) the GFD would require 6 (3% increase) additional firefighters to maintain the current service ratio; the number of additional firefighters drops to 1 (<1% increase) after construction activities are completed. The GFD would hire these additional personnel in order to maintain current service ratios. Without increases in fire protection services (i.e., more firemen, trucks and stations) to compensate for population increases, it is anticipated that response times to incidents would increase. As a result, increases in property damage and injuries/deaths could be expected.

Because corresponding increases in GFD personnel are anticipated to occur to maintain existing service conditions, no impact to fire service are anticipated.

Notifiable Diseases

A potential increase in disease occurrences due to the addition of approximately 1,830 Army AMDTF personnel and dependents, as well as natural population increases, would be anticipated. A natural annual increase of 1.4% in the Guam population is expected, resulting in a population of approximately 201,095 by the year 2019. Using the average per capita rates for notifiable diseases on Guam, the potential changes in the numbers of disease occurrence estimates were based on the natural increase in population, and the anticipated introduction of military and civilian personnel and their dependants to Guam. In addition to the increase in personnel and natural population increase on Guam, the construction workforce visiting Guam from other countries to support Army AMDTF construction requirements would have the potential to contribute additional notifiable disease incidents during the construction period.

With construction activities, there is a potential for standing water and water based vectors such as mosquitoes and related diseases. Most mosquitoes require quiet, standing water or moist soil where flooding occurs to lay their eggs. Removal of standing water sources and/or promotion of drainage would eliminate potential breeding sites. To limit the amount of standing water at construction sites, stagnant water pools, puddles, and ditches would be drained or filled; containers that catch/trap water (e.g., buckets, old tires, cans) would be removed; and if necessary, pesticide application (e.g., *Bacillus thuringensis*) would be used to help control mosquitoes. Implementing these BMPs would reduce the opportunities for an outbreak of water-related diseases.

Based on the projected 2019 population of Guam, and the addition of approximately 1,830 Army AMDTF personnel and dependents, the annual numbers of AIDS, cholera, dengue, hepatitis C, malaria, measles, rubella, and typhoid fever cases would not be anticipated to increase; however, occurrences of STDs would likely increase. Young adults are more likely to be susceptible to STDs.

During the construction period, the construction workforce visiting Guam from other countries would have the potential to contribute additional cases of STDs annually. The annual number of AIDS cholera, dengue, Hepatitis C, malaria, measles, rubella, and typhoid fever cases is not anticipated to increase and would remain at about one case annually.

The potential increase in disease occurrences would be low and not likely to impact the resources of the citizens of Guam. The military installations offer hospitals and clinic facilities to treat military personnel; therefore, the presence of additional military personnel and their dependents would not increase stress on the public hospital and other clinics on Guam. Additionally, military personnel are vaccinated against multiple diseases including measles, rubella, and typhoid fever, which would preclude them from the potential increase in disease incidents. Vaccinations for AIDS and STDs are not available. There is only a small potential for increases in notifiable diseases (including construction workforce contribution) and the Navy hospital would be available to treat military personnel; therefore, Alternative 1 would result in less than significant impacts to public health and safety (from notifiable diseases).

Mental Illness

Based on the average per capita rates for mental illness on Guam, the potential increase in mental illness occurrences was estimated based on the natural increase in population, and the anticipated introduction of Army AMDTF personnel and dependents to Guam. Based on the projected 2019 population of Guam, the annual number of mental illness cases is estimated to increase by two. The potential increase in mental illness occurrences is low. During the construction period, the construction workforce visiting Guam from other countries would have the potential to contribute two additional mental illness cases annually. Based on the small potential for increase in mental illness cases (including construction workforce contribution), Alternative 1 would result in less than significant impacts to public health and safety (from mental illness).

Traffic Incidents

The increased number of Army AMDTF personnel and their dependents would potentially add to the number of vehicles on Guam's roadways, traffic congestion, automobile accidents, and traffic related fatalities. Using the average per capita rates for traffic accidents and traffic fatalities on Guam, potential increases were estimated based on the natural increase in population, and the anticipated introduction of Army AMDTF personnel and dependents to Guam.

Based on the additional Army AMTDF increase in personnel and dependents moving to Guam, the annual number of traffic accidents would potentially increase by 73 to a total of 8,273 with no increase in traffic related fatalities. Young adults that are of legal driving age would be more likely to experience a traffic incident. During the construction period, the construction workforce visiting Guam from other countries would have the potential to increase the number of traffic incidents by 63. The annual number of traffic fatalities is not anticipated to increase. Only a small potential for increase in traffic incidents is anticipated from the addition of Army AMDTF personnel and their dependents (as well as the construction workforce contribution); therefore, Alternative 1 would result in no impact to public health and safety (from traffic incidents).

UXO

The Island of Guam was an active battlefield during World War II (WW II). As a result, unexploded military munitions may still remain. Excavation for building foundations, roads, underground utilities, and other infrastructure would potentially encounter unexploded military munitions in the form of UXO, Discarded Military Munitions (DMM), and Materials Potentially Presenting an Explosive Hazard (MPPEH). Exposure to these Munitions and Explosives of Concern (MEC) would potentially result in death or injury to workers or to the public. As a BMP to reduce the potential hazards related to exposure to MEC, qualified UXO personnel would perform surveys to identify and remove potential MEC items prior to the initiation of ground disturbing activities. Additional safety precautions would include UXO

personnel supervision during earth moving activities and MEC awareness training for construction personnel involved in grading and excavations, prior to and during ground-disturbing activities. The identification and removal of MEC (prior to initiating construction activities) and training would ensure minimization of potential impacts; therefore, Alternative 1 would result in less than significant impacts to public health and safety (from UXO).

Alternative 1 Potential Mitigation Measures

No mitigation measures would be required.

18.2.2.2 Headquarters/Housing Alternative 2

Potential impacts to public health and safety from implementation of Alternative 2 would be the same as those discussed under Alternative 1. Therefore, Alternative 2 would result in less than significant impacts to public health and safety.

Alternative 2 Potential Mitigation Measures

No mitigation measures would be required.

18.2.2.3 Headquarters/Housing Alternative 3

Potential impacts to public health and safety from implementation of Alternative 3 would be the same as those discussed under Alternative 1. Therefore, Alternative 3 would result in less than significant impacts to public health and safety.

Alternative 3 Potential Mitigation Measures

No mitigation measures would be required.

18.2.3 Munitions Storage Alternatives

18.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Potential impacts to public health and safety from implementation of Alternative 1 would be similar to those discussed under Headquarters/Housing Alternative 1 Therefore; Munitions Storage Alternative 1 would result in less than significant impacts to public health and safety.

Alternative 1 Potential Mitigation Measures

No mitigation measures would be required.

18.2.3.2 Munitions Storage Alternative 2

Potential impacts to public health and safety from implementation of Munitions Storage Alternative 2 would be the same as those discussed under Alternative 1. Therefore, Munitions Storage Alternative 2 would result in less than significant impacts to public health and safety.

Alternative 1 Potential Mitigation Measures

No mitigation measures would be required.

18.2.3.3 Munitions Storage Alternative 3

Potential impacts to public health and safety (i.e., disease, mental illness, traffic incidents, and UXO) from implementation of Munitions Storage Alternative 3 would be the same as those discussed under Munitions Storage Alternative 1. Therefore, Munitions Storage Alternative 3 would result in less than significant impacts to public health and safety.

Alternative 1 Potential Mitigation Measures

No mitigation measures would be required.

18.2.4 Weapons Emplacement Alternatives

Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). An unclassified summary of impacts specific to each set of alternatives is presented at the end of this chapter.

Weapons Emplacement Alternatives Potential Mitigation Measures

No mitigation measures would be required.

18.2.5 No-Action Alternative

18.2.5.1 Environmental/Social Safety

Water Quality

No new impacts to public health and safety associated with water quality would result from construction or operational activities on Guam. Therefore no impacts to public safety from water quality would be expected from the no-action alternative.

Air Quality

No new impacts to public health and safety associated with air quality would result from construction or operational activities on Guam. Therefore no impacts to public safety from air emissions would be expected from the no-action alternative.

Hazardous Substances

No increase in the types or quantities of hazardous substances would be anticipated under the no-action alternative. Management of hazardous substances would continue to be conducted in accordance with applicable hazardous material and waste regulations, and established BMPs and SOPs to ensure the health and safety of workers and the general public is maintained. Therefore no impacts to management of hazardous substances would be expected from the no-action alternative.

Health Care Services

No increases in demand for health care services would occur as a result of additional military activities on Guam. However, the natural increase in population would result in a slight increase in demand for these services. As a result of natural population increase on Guam, approximately 1 additional doctor and 3 additional nurses would be required to maintain the current service ratios. These additional health care professionals would be hired in order to maintain current service ratios. Without corresponding increases in health care providers potential health and safety impacts could include:

- longer wait/response times for patients
- fewer or no available providers on island for chronic or acute issues
- complications or death from delayed treatment, and/or
- requirements for patients to travel off-island to receive adequate treatment

However, because corresponding increases in doctors and nurses are anticipated to occur to maintain existing service conditions, no impact to health care services from the no-action alternative is anticipated.

Public Services

Under the no-action alternative, natural increases in population on Guam would result in an increased need for police and firefighting presence on the island. As a result of natural population increase on Guam, approximately 3 additional police officers and 5 additional firefighters would be required to maintain the current service ratios. The GPD and GFD would hire these additional personnel in order to maintain current service ratios. Without increases in police and fire services (i.e., more police officers and firefighters) to compensate for population increases, it would be expected that response times would increase. As a result, the severity of consequences associated with crimes and fire may worsen (i.e., there may be increased injury and or death associated with delayed responses). However, because corresponding increases in police and fire service are anticipated to occur to maintain existing service conditions, no impact to public services from the no-action alternative is anticipated.

18.2.5.2 Notifiable Diseases

A potential increase in disease occurrences due to the natural increase in population would be anticipated. Using the average per capita rates for notifiable diseases on Guam, the potential increase in disease occurrences was estimated based on the natural increase in population.

Based on the anticipated 2019 population of Guam, the annual number of AIDS cases would potentially increase by one to a total of six cases; cholera, dengue, malaria, measles, rubella, and Typhoid fever cases would not be anticipated to increase; and the number of cases of hepatitis C would potentially increase by one to a total of four cases. The number of cases of STDs would potentially increase by 172 to a total of 843 cases. Young adults would be more likely to contract an STD. The potential increase in notifiable diseases would occur from natural population increases on the island rather than from proposed military actions and Government of Guam (GovGuam) would ensure adequate health care for Guam residents. Therefore, the no-action alternative would result in no impacts to public health and safety (from notifiable diseases).

18.2.5.3 Mental Illness

A potential increase in mental illness occurrences due to the natural increase in population would occur. Using the average per capita rates for mental illness on Guam, the potential increase in mental illness occurrences was estimated based on the natural increase in population. Based on the anticipated 2019 population of Guam, the annual number of mental illness cases would potentially increase by 45 to a total of 222 cases. The potential increase in mental illness cases would occur from natural population increases on the island rather than from proposed military actions and GovGuam would ensure adequate health care for Guam residents. Therefore, the no-action alternative would result in no impacts to public health and safety (resulting from mental illness).

18.2.5.4 Traffic Incidents

A potential increase in traffic accidents and traffic fatalities due to the natural increase in population would occur. Using the average per capita rates for traffic accidents and traffic fatalities on Guam, the potential increase in traffic accidents and traffic fatalities was estimated based on the natural increase in population.

Based on the anticipated 2019 population of Guam, the annual number of traffic accidents would potentially increase by 1,549 to a total of 8,200 and the number of traffic fatalities would potentially increase by three to a total of 21. Young adults that are of legal driving age would be more likely to experience a traffic incident. The potential increase in traffic incidents would occur from natural

population increases on the island rather than from proposed military actions and the Guam Department of Transportation and Police Department would ensure traffic safety measures are in place to provide safe road conditions. Therefore, the no-action alternative would result in no impacts to public health and safety (from traffic accidents).

18.2.5.5 UXO

The Island of Guam was an active battlefield during WW II. As a result of the invasion, occupation, and defense of the island by Japanese forces and the assault by Allied/American forces to retake the island, unexploded military munitions may still remain. Under the no-action alternative, no excavation for building foundations, roads, underground utilities, and other infrastructure would occur in support of proposed Army AMDTF requirements. As a result, there would not be an increase in the likelihood of encountering unexploded military munitions. Therefore, the no-action alternative would result in no impacts to public health and safety (from UXO).

18.2.6 Summary of Impacts

Tables 18.2-1, 18.2-2, and 18.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

Table 18.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Less than significant impacts to air quality, UXO, notifiable diseases, and mental illness NI • No impacts to water quality, hazardous substances, health care services, public safety services and traffic incidents	LSI • The impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1
Operation		
LSI • Less than significant impacts to air quality, UXO, notifiable diseases, and mental illness NI • No impacts to water quality, hazardous substances, health care services, public safety services, and traffic incidents	LSI • The impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

Table 18.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
LSI • Less than significant impacts to air quality, UXO, notifiable diseases, and mental illness NI • No impacts to water quality, hazardous substances, health care services, public safety services, and traffic incidents	LSI • The impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1
Operation		
LSI • Less than significant impacts to air quality, UXO, notifiable diseases, and mental illness NI • No impacts to water quality, hazardous substances, health care services, public safety services, and traffic incidents	LSI • Less than significant impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1	LSI • Less than significant impacts would be the same as for Alternative 1 NI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact, NI = No impact.

Table 18.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
LSI • Less than significant impacts to health and safety due to construction hazards, UXO, and air quality during construction	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1
Operation			
LSI • Impacts to public health and safety due to operational safety (explosives safety and EMR) would be less than significant BI • A beneficial impact to public safety would result from the increased level of protection provided by the AMTDF forces	LSI • The impacts would be the same as for Alternative 1 BI • The impact would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1 BI • The impacts would be the same as for Alternative 1	LSI • The impacts would be the same as for Alternative 1 BI • The impacts would be the same as for Alternative 1

Legend: LSI = Less than significant impact, NI = No impact, Beneficial impact.

The potential increase in air quality emissions would be less than significant; therefore, overall potential impacts to human health and safety would be less than significant. Corresponding increases in health care professionals, GPD, and GFD personnel are anticipated to occur to maintain existing service conditions; therefore, no impact to health care, police, or fire service is anticipated. No impacts to public health and safety are anticipated from water quality concerns and management of hazardous substances. The potential increase in disease occurrences and mental illness as a result of proposed Army AMDTF activities would be low and unlikely to impact the resources of the citizens of Guam, thus the impact would be considered less than significant. The potential increase in the number of traffic accidents and fatalities would also be less than significant and no adverse impact on the health and safety of the citizens of Guam from traffic incidents would occur. Excavation for building foundations, roads, underground utilities, and other infrastructure would potentially encounter unexploded military munitions. To reduce the potential hazards related to the exposure to MEC, qualified UXO personnel would perform surveys to identify and remove potential MEC items prior to the initiation of ground disturbing activities. UXO supervision during earth moving activities and providing MEC awareness training to construction personnel prior to and during ground-disturbing activities could also occur. The identification and removal of MEC prior to initiating construction activities and training construction personnel regarding hazards associated with MEC would ensure that potential impacts would be minimized. Therefore, less than significant impacts to public health and safety from UXO are anticipated.

18.2.7 Summary of Potential Mitigation Measures

Table 18.2-4 summarizes potential mitigation measures for each action alternative.

Table 18.2-4. Summary of Potential Mitigation Measures

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
• No mitigation required	• No mitigation required	• No mitigation required
Operation		
• No mitigation required	• No mitigation required	• No mitigation required

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CHAPTER 19. ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN

19.1 INTRODUCTION

This chapter focuses on the potential for racial and ethnic minorities, low income populations, or children to be disproportionately affected by project-related impacts. Normally an analysis of environmental justice is initiated by determining the presence and proximity of these segments of the population relative to the specific locations that would experience adverse impacts to the human environment. The situation on Guam is unique in this regard because racial or ethnic minority groups (as defined by the U.S.) comprise a majority of the Guam population, and the proportions of people living in poverty or who are under 18 years of age are also substantially higher than in the general U.S. population. The analysis is further complicated by the fact that Guam is a relatively small and isolated island, and certain types of impacts would be experienced island-wide. Accordingly, the analysis of environmental justice described in this chapter acknowledges the unique demographic characteristics of the island population and assumes that the project effects could disproportionately affect disadvantaged groups and children because they comprise relatively high proportions of the population. By the same logic, mitigation measures that would reduce the severity of any significant project impacts to a less than significant level would be expected to effectively mitigate the associated environmental justice impacts to a less than significant level. Consequently, a distinction is made between potential significant impacts that would be mitigated and those for which no mitigations have been identified. The focus of this analysis is on the latter type of impacts.

This chapter contains a discussion of the potential environmental consequences of the proposed action with regard to environmental justice and protection of children. For a description of the affected environment and a definition of the resource, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in that Volume 2 include the ROI for the Army Air and Missile Defense Task Force (AMDTF); the chapters are presented in the same order as the resource areas contained in this volume.

This analysis of environmental consequences addresses all components of the proposed actions for the Army AMDTF. This includes the headquarters/housing component and the munitions storage component, each of which has three alternatives. A full analysis of each alternative is presented beneath the individual headings of this chapter. The weapons emplacement component has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L). A summary of impacts specific to each set of alternatives (including an unclassified summary of weapons emplacement impacts) is presented at the end of this chapter.

19.2 ENVIRONMENTAL CONSEQUENCES

19.2.1 Approach to Analysis

19.2.1.1 Methodology

Volume 5 of this EIS/OEIS examines the potential impacts that each alternative would potentially have on various environmental and human resources. Based on the conclusions reached in each resource chapter, the analysis of environmental justice sought to identify the adverse impacts that would

disproportionately affect racial minorities, children, and/or low-income populations, based on the following assumptions.

- Environmental justice policies are intended to analyze disproportionate impacts of potentially harmful environmental impacts on minority or other special status populations. However, the island of Guam is unique in that the majority of the population is a racial or ethnic minority, and low-income and child populations also comprise a relatively large proportion of the population (compared to the U.S.). Consequently, in this analysis it is assumed that any adverse impact that would affect the island as a whole, and any localized adverse impact that would affect a particular concentration of special-status residents, would have a disproportionate effect in terms of environmental justice.
- The region of influence (ROI) is defined as the area in which the principal effects arising from the implementation of the proposed action or alternatives are likely to occur. Those who may be affected by the consequences of the alternatives are often those who reside or otherwise occupy areas immediately adjacent to the alternative locations.
- Because the proposed actions are related either to construction or operations, impacts to the ROI would likely be either "spill over" effects that extend beyond an installation's boundary line into the surrounding community, or impacts that directly affect minority populations in the ROI.

In Volume 5, components of the proposed action were determined to have potential adverse cultural resource impacts (Chapter 12) and noise impacts (Chapter 6), both of which have implications for environmental justice and protection of children. Volume 6 (Chapter 4) also identified traffic impacts associated with the action that are also applicable to this analysis (based on a Federal Highway Administration [FHWA] study). No other resource impacts identified in Volume 5 would have potential significant impacts with regard to environmental justice or protection of children. Therefore, this chapter focuses on significant adverse impacts to cultural resources, noise, and traffic as described in Volume 5 and Volume 6.

The analysis involved the application of three tiers of criteria to assess the environmental justice implications of each adverse effect identified in the relevant resource chapters:

- *Tier 1*: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*
- *Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?*
- *Tier 3*: *Would the disproportionate adverse effects be significant?*

19.2.1.2 Determination of Significance

According to Section 1508.27 of the Council on Environmental Quality (CEQ) Regulations for Implementing National Environmental Policy Act (NEPA) (CEQ 1979), determining the level of significance of an environmental impact requires that both context and intensity be considered. These are defined in Section 1508.27 as follows:

- "Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the

case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant".

- "Intensity. This refers to the severity of the impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action." The following should be considered in evaluating intensity:
  - Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect would be beneficial.
  - The degree to which the proposed action affects public health or safety.
  - Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
  - The degree to which the effects on the quality of the human environment are highly uncertain or involve unique or unknown risks.
  - The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
  - Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
  - The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
  - The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined critical under the Endangered Species Act of 1973.
  - Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment."

19.2.1.3 Issues Identified during Public Scoping Process

Concerns related to environmental justice that were raised by the public and regulatory stakeholders during the public scoping meetings were considered during the analysis of environmental justice and are discussed in Volume 2, Chapter 19, Environmental Justice.

19.2.2 Headquarters/Housing Alternatives

19.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

According to Chapter 2 of Volume 5, Alternative 1 for the proposed headquarters/housing projects includes the construction of Army administrative buildings collocated with Marine Corps facilities at NCTS Finegayan and construction of Army housing collocated with Marine Corps housing at South Finegayan. Construction activities and operations would occur on base. The village located adjacent to NCTS Finegayan is Dededo.

Cultural Resources

According to Volume 5, Chapter 12, construction activities at NCTS Finegayan and South Finegayan are anticipated to have both direct and indirect adverse impacts on archaeological resources. Operations at NCTS Finegayan may have indirect impacts to an archaeological site.

Tier 1: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

With only about 15% of its population being Caucasian and 58% of its population being Chamorro and Filipino, Dededo has a majority of racial minorities compared to the U.S. average (U.S. Census Bureau 2000a). Dededo has a similar percentage of households in poverty to other villages on Guam, which is higher than that of the U.S. (U.S. Census Bureau 2000b). Dededo also has a relatively high percentage of children relative to other villages on Guam, CNMI, and the U.S. average (U.S. Census Bureau 2000a; 2005 CNMI Department of Commerce).

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The proposed actions may affect resources of value to a particular racial/ethnic group on the island: the Chamorros. Therefore, there would be a disproportionate impact on a particular minority group. There would be no disproportionate impact to low-income populations or children.

Tier 3: *Would the disproportionate adverse effects be significant?*

While Section 106 would be adhered to and mitigation has been proposed to reduce the adverse effects, Section 1508.27 of the CEQ Regulations (1979) states that the following may be considered a significant impact: "unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wild and scenic rivers, or ecologically critical areas." The impacts may affect the unique historic and cultural resources of a racial minority group. Therefore, the impact in terms of environmental justice is significant.

Chapter 12 proposes mitigation measures to reduce the significance of the anticipated impacts. If the mitigation measures in Chapter 12 are implemented, the cultural resources impact and environmental justice impact would be reduced to less than significant.

Noise

According to Chapter 6 of this EIS/OEIS, adverse noise impacts are anticipated during the construction phase in the communities adjacent to South Finegayan and along Route 3 from construction vehicles traveling and transporting materials and equipment.

Tier 1: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

As with the rest of Guam, the village of Dededo has a high percentage of racial and ethnic minorities, as well as a higher poverty rate and a higher percentage of children than in the U.S.

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The racial minorities and low-income populations that live closest to the installations and near Route 3 would be disproportionately impacted by noise generated by construction activities as discussed in Chapter 6 of this volume. There would be no disproportionate impact to children.

Tier 3: *Would the disproportionate adverse effects be significant?*

Heavy construction equipment would be used for at least 6-9 months during construction at NCTS Finegayan. This would generate some noise, although Chapter 6 anticipates that the noise from construction would not be loud enough off base to be a significant effect to the surrounding community.

Noise would also be generated by construction vehicles along Route 3, but with the implementation of BMPs in Chapter 6 of this volume, the impact should be less than significant.

The sensitive noise receptors are closer to the South Finegayan site than to NCTS Finegayan. Chapter 6 states that the low-density residential area across from South Finegayan and along the eastern side of Route 3 may experience noise levels higher than the 75 dBA U.S. Environmental Protection Agency (USEPA) acceptable level for residential areas during construction. This noise would likely have a disproportionate adverse effect on racial minorities and low-income residents of Dededo that live south of, and along, Route 3 across from South Finegayan. Due to the intensity of the anticipated noise level, the impact would be significant.

Implementation of the proposed BMPs in Chapter 6 of this volume would reduce the impact to less than significant.

Traffic

While traffic is typically light to moderate along Route 3, the construction vehicles associated with the proposed action would increase traffic along this route. During post-construction operations, Army personnel driving to and from NCTS Finegayan would likely increase traffic along Route 3. An increase in traffic would also be anticipated along with the military population that would occupy the housing at South Finegayan.

Tier 1: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

As with the rest of Guam, the village of Dededo has a high percentage of racial and ethnic minorities, as well as a higher poverty rate and a higher percentage of children than in the U.S.

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The racial minorities and low-income populations that live closest to the installations and near Route 3 would be disproportionately impacted by traffic generated by construction activities as discussed in Chapter 4 of Volume 6 and the FHWA study. There would be no disproportionate impact to children.

Tier 3: *Would the disproportionate adverse effects be significant?*

Construction-related travel and the transport of materials and equipment are anticipated to increase traffic along Route 3. The FHWA study uses a volume to capacity ratio (v/c ratio) to determine the anticipated level of traffic congestion by 2014. If a v/c ratio is greater than 1, the increased traffic is anticipated to reach a level that would cause congestion. The FHWA study projects that Alternative 1 would result in a v/c ratio greater than 1 along Route 3. Because the traffic increase along Route 3 is anticipated to lead to congestion, the impact would be significant.

With implementation of mitigation measures described in Volume 6, Chapter 4 of this EIS/OEIS, the impacts would be reduced to less than significant.

Alternative 1 Potential BMPs and Mitigation Measures

To reduce potential impacts from the implementation of Alternative 1, it is recommended that the BMPs and mitigation measures in Chapters 6 and 12 respectively of this volume, as well as those in Chapter 4 of Volume 6, be implemented. This would reduce impacts related to noise, cultural resources, and traffic on the surrounding community.

19.2.2.2 Headquarters/Housing Alternative 2

According to Chapter 2 of this volume, Alternative 2 includes the construction of Army housing, headquarters and support facilities near the northwest corner of Navy Barrigada. The village adjacent to this area is Barrigada. Construction would occur on base; however, the residential area of Barrigada Heights is across the street from the proposed construction site at Navy Barrigada. Proposed operations would occur on base and would be mainly housing and administrative. Volume 5, Chapter 2 states that the on-island Army population would be 50 by 2014, with all 630 personnel arriving by 2015. The total expected population increase from Army personnel and their dependents is 1,580. Therefore, over time there would be an increase in the number of people traveling to and from the base, which may affect traffic along Routes 15 and 16.

Cultural Resources

Chapter 12 of this volume has determined that construction work at Navy Barrigada may have an adverse effect on a potential traditional cultural property and archaeology. With the implementation of mitigation measures described in Chapter 12, this impact would be reduced to less than significant.

Tier 1: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

As with the rest of Guam, the village of Barrigada has a high percentage of racial and ethnic minorities, as well as a higher poverty rate and a higher percentage of children than in the U.S.

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The Chamorros would be disproportionately affected by potential impacts to the archaeological resources. There would be no disproportionate impacts to low income populations or children.

Tier 3: *Would the disproportionate adverse effects be significant?*

While Section 106 would be adhered to and mitigation has been proposed to reduce the adverse effects, Section 1508.27 of the CEQ Regulations (1979) states that the following may be considered a significant impact: "unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wild and scenic rivers, or ecologically critical areas." The impacts may affect the unique historic and cultural resources of a racial minority group. Therefore, the impact in terms of environmental justice is significant.

Chapter 12 proposes mitigation measures to reduce the significance of the anticipated impacts. If the mitigation measures in Chapter 12 are implemented, the cultural resources impact and environmental justice impact would be reduced to less than significant.

Noise

According to Chapter 6 of Volume 5, a few of Barrigada Heights' residents are located immediately adjacent to the DoD property line. Chapter 6 anticipates that construction would generate high noise levels that are just under the EPA limit for residential areas during construction. No noise impacts are anticipated from post-construction operations of the proposed facilities.

Tier 1: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

As with the rest of Guam, the village of Barrigada has a high percentage of racial and ethnic minorities, as well as a higher poverty rate and a higher percentage of children than in the U.S.

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The disadvantaged groups near the proposed construction site, including Barrigada Heights, would be disproportionately affected by the construction noise.

Tier 3: *Would the disproportionate adverse effects be significant?*

Racial minorities and low-income people that live near Routes 15 and 16 would experience noise levels up to the EPA acceptable level for residential areas during construction. This would last at least 6-9 months. Due to the intensity and duration of the anticipated noise level increase, the impact would be significant. However, implementation of the proposed BMPs in Chapter 6 of this volume would reduce the impact to less than significant.

Traffic

The main roadways for Navy Barrigada are Routes 8, 15, and 16. Construction-related travel and the transport of materials and equipment are anticipated to increase traffic along these routes. Post-construction, there would be an increase in the number of people traveling to and from the base, which may affect traffic along Routes 15 and 16 (refer to Volume 6, Chapter 4).

Tier 1: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

As with the rest of Guam, the village of Barrigada has a high percentage of racial and ethnic minorities, as well as a higher poverty rate and a higher percentage of children than in the U.S.

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The disadvantaged groups near the proposed construction site, including Barrigada Heights, would be disproportionately affected by the increased traffic along Routes 15 and 16.

Tier 3: *Would the disproportionate adverse effects be significant?*

The FHWA study projects that Alternative 2 would result in a v/c ratio greater than 1 along Routes 15 and 16. Because the traffic increase along Routes 15 and 16 is anticipated to lead to congestion, the impact would be significant. With implementation of the mitigation measures in Chapter 4, Volume 6 of this EIS/OEIS, the impacts would be reduced to less than significant.

Alternative 2 Potential BMPs and Mitigation Measures

The recommended BMPs and mitigation measures associated with Alternative 2 are the same as for Alternative 1.

19.2.2.3 Headquarters/Housing Alternative 3

Under Alternative 3, Army administrative buildings would be collocated with Marine Corps facilities at NCTS Finegayan and accompanied personnel housing and related recreational and QOL facilities would be co-located with Marine Corps housing within Navy Barrigada and Air Force Barrigada. Proposed

actions and impacts at NCTS Finegayan would be the same as described above for that portion of Alternative 1, and impacts at Navy Barrigada would be the same as described above for that portion of Alternative 2. The additional unique feature of Alternative 3 is that construction of facilities would also occur at Air Force Barrigada. The following describes the additive environmental justice impacts for the project components at Air Force Barrigada only, which would occur in conjunction with previously described impacts at NCTS Finegayan (Alternative 1) and Navy Barrigada (Alternative 2).

Villages adjacent to Air Force Barrigada are Barrigada and Mangilao. There are residential areas in these villages that are adjacent to the proposed construction site. According to Chapter 12 of this volume, there would be less than significant impacts to cultural resources at Air Force Barrigada. Construction noise impacts would be similar to those anticipated at Navy Barrigada. Noise levels are anticipated to nearly reach the USEPA threshold for residential areas. The main roadways leading to and from Air Force Barrigada, Routes 10 and 15, would experience an increase in traffic related to construction.

Tier 1: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

As with the rest of Guam, the villages of Barrigada and Mangilao have a high percentage of racial and ethnic minorities, as well as a higher poverty rate and a higher percentage of children than in the U.S.

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The disadvantaged groups living adjacent to or near the construction site would be disproportionately affected by the construction-generated noise and traffic along Routes 10 and 15. Children would not be disproportionately affected by the components of Alternative 3.

Tier 3: *Would the disproportionate adverse effects be significant?*

Chapter 6 of this volume states that noise impacts at Air Force Barrigada would be similar to those at Navy Barrigada. Therefore, it is anticipated that the impact would be significant. However, implementation of the proposed BMPs in Chapter 6 of this volume would reduce the impact to less than significant.

The FHWA study projects that Alternative 3 would result in a v/c ratio greater than 1 along Routes 10 and 15. Because the traffic increase along Routes 10 and 15 is anticipated to lead to congestion, the impact would be significant. With implementation of the mitigation measures in Volume 6, Chapter 4 of this EIS/OEIS, the impacts would be reduced to less than significant.

Alternative 3 Potential BMPs and Mitigation Measures

The BMPs and mitigation measures under Alternative 3 are the same as for Alternative 1.

19.2.3 Munitions Storage Alternatives

19.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Three munitions storage magazines would be constructed in three non-contiguous areas near the Habitat Management Unit (HMU) in the southwestern part of Andersen AFB. No new operations are proposed at Andersen AFB under Alternative 1. This alternative would not result in any disproportionate impacts to racial or ethnic minorities, low-income populations, or children.

19.2.3.2 Munitions Storage Alternative 2

Munitions storage magazines would be consolidated at one site located north of B Avenue on Andersen AFB. No new operations are proposed at Andersen AFB for Alternative 2. This alternative would not result in any disproportionate impacts to racial or ethnic minorities, low-income populations, or children.

19.2.3.3 Munitions Storage Alternative 3

Munitions storage magazines would be consolidated at a site located northeast of the HMU and an unnamed road on Andersen AFB. No new operations are proposed at Andersen AFB for Alternative 3. This alternative would not result in any disproportionate impacts to racial or ethnic minorities, low-income populations, or children.

19.2.4 Weapons Emplacement Alternatives

The weapons emplacement component of the proposed Army AMDTF action has four alternatives. Detailed information on the weapons emplacements is contained in a Classified Appendix (Appendix L).

One or more alternatives were determined to have potential adverse impacts on Cultural Resources (Chapter 12), which would have a disproportionate impact on a disadvantaged group on Guam (as described below). No other potential impacts of the weapons emplacement alternatives would disproportionately affect any disadvantaged groups or children on Guam.

19.2.4.1 Weapons Emplacement Alternative 1

Cultural Resources

Chapter 12 of this volume (Cultural Resources) has identified significant but mitigable impacts to archaeological resources for all four action alternatives and to traditional cultural properties for all alternatives. With mitigation measures, the impacts to the resources themselves would be less than significant. However, because these resources are of value to a racial/ethnic group on Guam, and an action that may impact them is being proposed, this section analyzes the actions in terms of environmental justice.

Tier 1: Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?

The value of these resources is tied to the Chamorro history and culture, rather than to a specific geographic area.

Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?

The proposed actions may affect resources of value to a particular racial/ethnic group on the island: the Chamorros. So there would be a disproportionate impact on a particular racial minority group. There would be no disproportionate impact to low-income populations or children specifically.

Tier 3: Would the disproportionate adverse effect(s) be significant?

While Section 106 would be adhered to and mitigation has been proposed to reduce the adverse effects, Section 1508.27 of the CEQ Regulations (1979) states that the following may be considered a significant impact: “unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wild and scenic rivers, or ecologically critical areas.” The impacts may

affect the unique historic and cultural resources of the Chamorros. Therefore, the impact in terms of environmental justice is significant.

Chapter 12 proposes mitigation measures to reduce the significance of the anticipated impacts. If the mitigation measures in Chapter 12 are implemented, the cultural resources impact and environmental justice impact would be reduced to less than significant.

19.2.4.2 Weapons Emplacement Alternative 2

Alternative 2 involves the same type of facility, construction, and operations as Alternative 1 and the effects to cultural resources would be the same. Therefore, the environmental justice impacts for actions proposed in Alternative 2 are the same as those discussed under Alternative 1.

19.2.4.3 Weapons Emplacement Alternative 3

Alternative 3 involves the same type of facility, construction, and operations as Alternative 1 and the effects to cultural resources would be same. Therefore, the environmental justice impacts for actions proposed in Alternative 3 are the same as those discussed under Alternative 1.

19.2.4.4 Weapons Emplacement Alternative 4 (Preferred Alternative)

Alternative 4 involves the same type of facility, construction, and operations as Alternative 1 and the effects to cultural resources would be the same. Therefore, the environmental justice impacts for actions proposed in Alternative 4 are the same as those discussed under Alternative 1.

19.2.5 No-Action Alternative

Under the no-action alternative, no construction or operations associated with the Army AMDTF would occur and existing operations at the proposed project areas would continue. There would be no noise or traffic impacts related to construction and no increase in military population. Cultural resources would not be impacted by construction. The no-action alternative would have no adverse environmental justice impacts on the villages of Dededo, Barrigada, and Mangilao.

19.2.6 Summary of Impacts

Tables 19.2-1, 19.2-2, and 19.2-3 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively.

Table 19.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
SI-M • Significant but mitigable impact to minority population as a function of direct and indirect significant adverse impacts to two archaeological sites on NCTS Finegayan SI-M • Significant but mitigable impact to minority and low-income populations from traffic impacts NI • No disproportionate impacts to children LSI • At South Finegayan construction noise impacts would be just over 75 dBA. BMPs would reduce the impacts to a less than significant level	SI-M • Significant but mitigable impact to minority population as a function of direct significant adverse impacts to one traditional cultural property at Navy Barrigada SI-M • Significant but mitigable impact to minority and low-income populations from traffic impacts NI • No disproportionate impacts to children LSI • Construction noise levels for Navy Barrigada would be approximately 74 dBA; therefore, would be less than significant. BMPs would further reduce noise levels	SI-M • Significant but mitigable impact to minority population as a function of direct and indirect impacts to areas with two archaeological sites on NCTS Finegayan SI-M • Significant but mitigable impact to minority and low-income populations from construction noise impacts SI-M • Significant but mitigable impact to minority and low-income populations from traffic impacts. NI • No disproportionate impacts to children LSI • The impacts for Navy Barrigada and Air Force Barrigada would be the same as Alternative 2
Operation		
SI-M • Significant but mitigable impact to minority population as a function of indirect significant adverse impacts to one traditional cultural property on NCTS Finegayan SI-M • Significant but mitigable impact to minority and low-income populations from traffic impacts NI • No disproportionate impacts to children	SI-M • Significant but mitigable impact to minority and low-income populations from traffic impacts NI • No disproportionate impacts to children	SI-M • Significant but mitigable impact to minority population as a function of indirect significant impacts to one traditional cultural property at Navy Barrigada SI-M • Significant but mitigable impact to minority and low-income populations from traffic impacts NI • No disproportionate impacts to children

Legend: SI-M = Significant impact mitigable to less than significant, LSI = Less than significant, NI = No impact.

Table 19.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3

Alternative 1	*Alternative 2*	*Alternative 3*
Construction		
NI • No impacts to racial minorities. • No impacts to low-income populations • No impacts to children • No impacts to cultural resources	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1
Operation		
NI • No impacts to racial minorities • No impacts to low-income populations • No impacts to children.	NI • The impacts would be the same as Alternative 1	NI • The impacts would be the same as Alternative 1

Legend: NI = No impact.

Table 19.2-3. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4

Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 4*
Construction			
SI-M • Significant but mitigable impact to minority population as a function of significant adverse impacts to archaeological sites • Significant but mitigable impact to minority population as a function of significant adverse impacts to traditional cultural property NI • There would be no impacts to low-income populations or children	SI-M • The impacts would be the same as for Alternative 1 NI • There would be no impacts to low-income populations or children	SI-M • The impacts would be the same as for Alternative 1 NI • There would be no impacts to low-income populations or children	SI-M • The impacts would be the same as for Alternative 1 NI • There would be no impacts to low-income populations or children
Operation			
NI • There would be no impacts from operations	NI • There would be no impacts from operations	NI • There would be no impacts from operations	NI • There would be no impacts from operations

Legend: SI-M = Significant impact mitigable to less than significant, NI = No impact.

19.2.7 Summary of Potential Mitigation Measures

Table 19.2-4 summarizes potential mitigation measures for each component of the proposed action.

Table 19.2-4. Summary of Potential Mitigation Measures

Headquarters/Housing Alternatives	*Munitions Storage Alternatives*	*Weapons Emplacement Alternatives*
Cultural Resources		
• DoD would implement the mitigation measures in Volume 5, Chapter 12 of this EIS/OEIS	• No mitigations needed	• DoD would implement the mitigation measures in Volume 5, Chapter 12 of this EIS/OEIS
Noise		
• DoD would implement the mitigation measures in Volume 5, Chapter 6 of this EIS/OEIS	• No mitigations needed	• No mitigations needed
Traffic		
• DoD would implement the mitigation measures in Volume 6, Chapter 4 of this EIS/OEIS	• No mitigations needed	• No mitigations needed

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