Final

Environmental Impact Statement

# GUAM AND CNMI MILITARY RELOCATION

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

## **Reader's Guide**

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# Guam and CNMI Military Relocation EIS
# Reader's Guide

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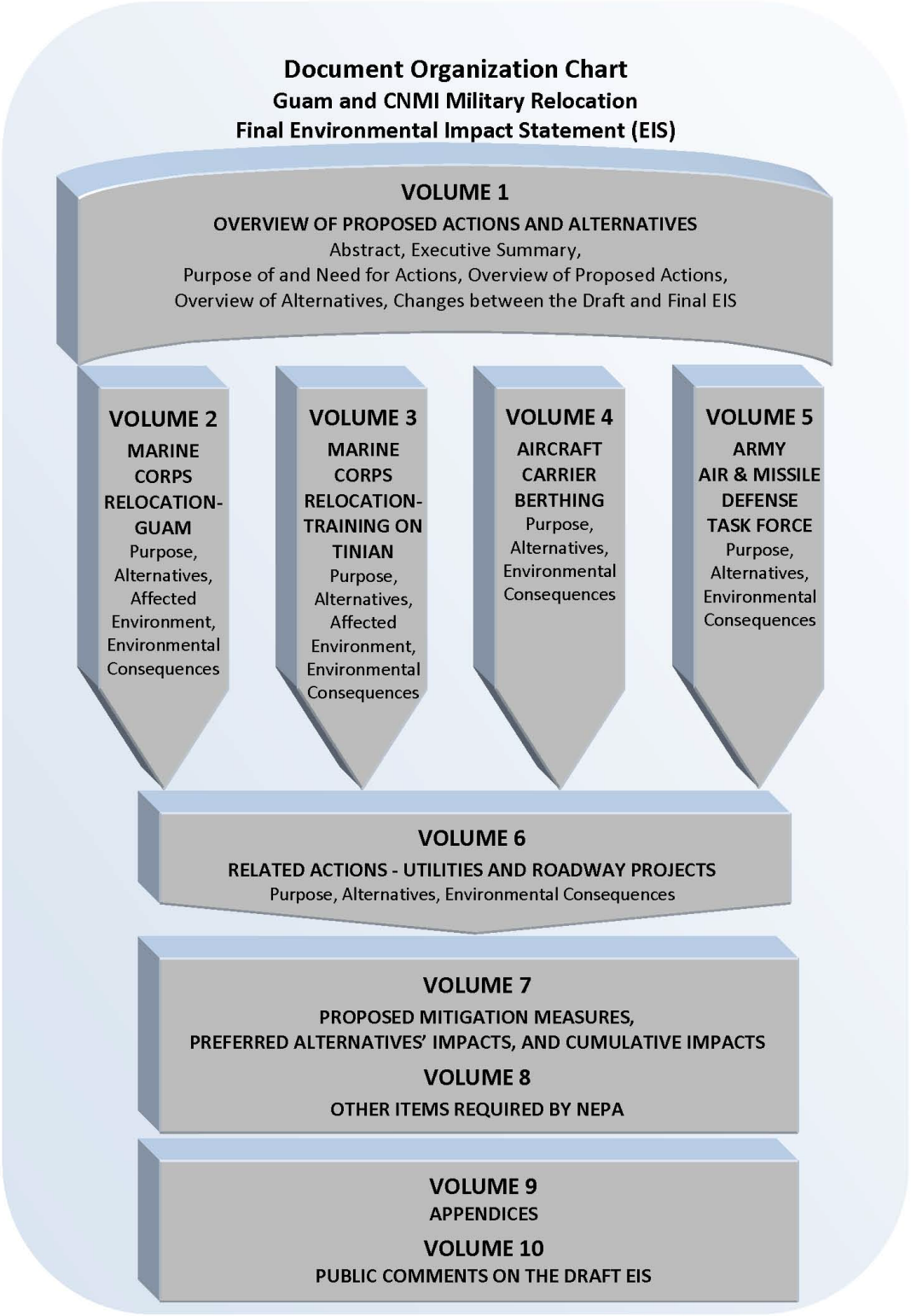

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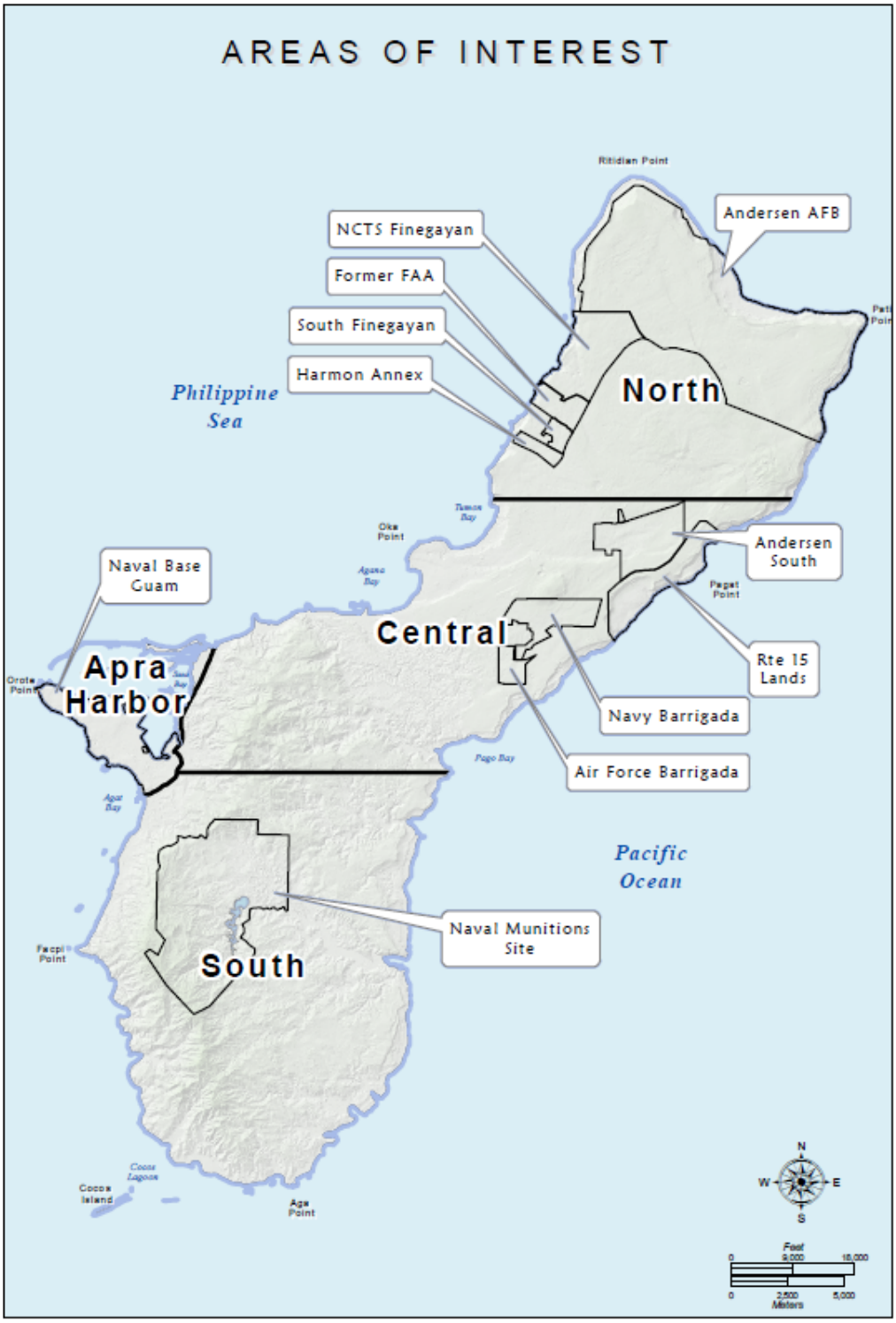

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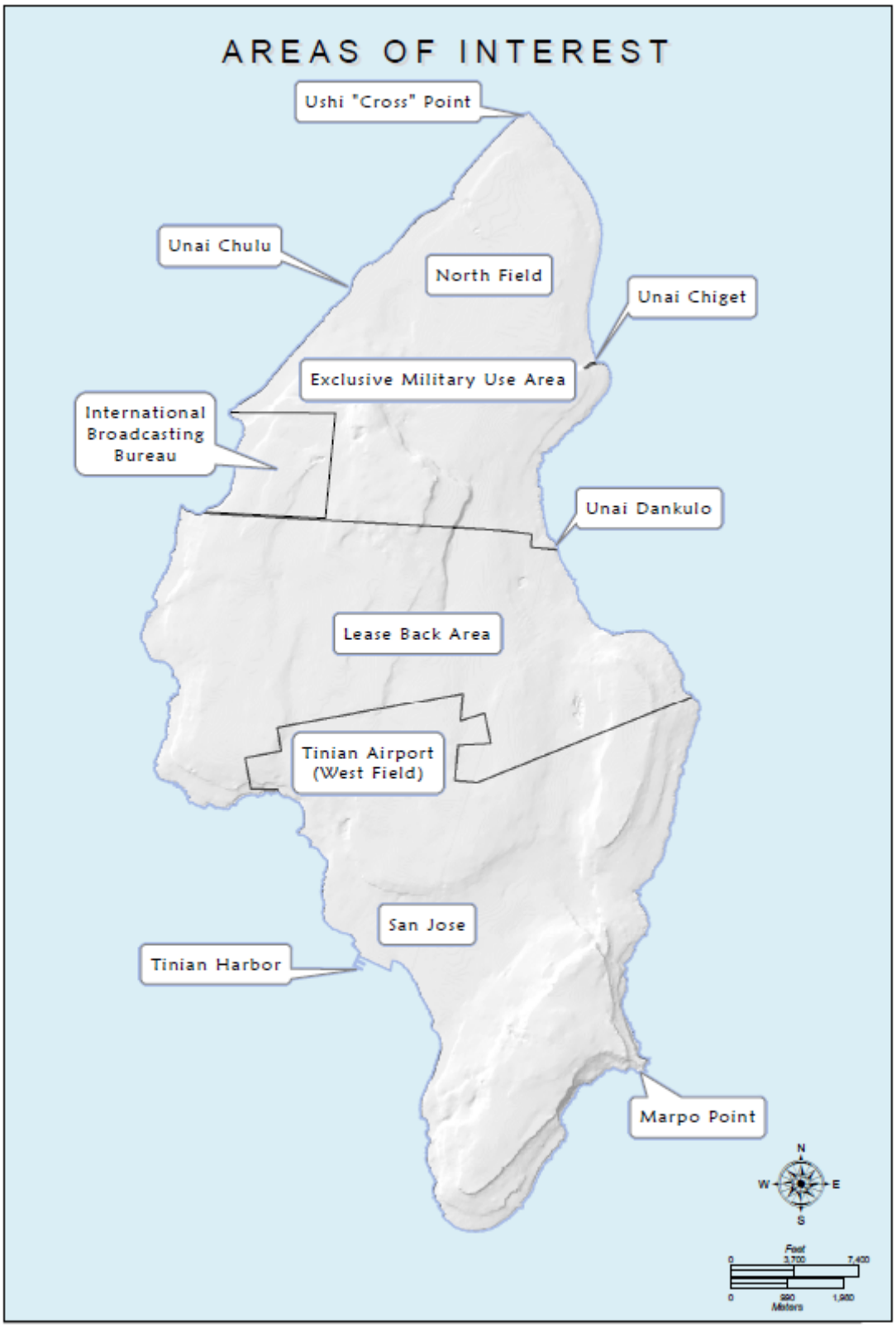
AREAS OF INTEREST
Ushi "Cross" Point
Unai Chulu
North Field
Unai Chiget
Exclusive Military Use Area
International Broadcasting Bureau
Unai Dankulo
Lease Back Area
Tinian Airport (West Field)
San Jose
Tinian Harbor
Marpo Point
N
W
E
S
Feet
0
3,700
7,400
0
990
1,980
Meters

# CHAPTER 4. GLOSSARY

**Access**—the right to transit to and from and to make use of an area.

**Activity**—an individual scheduled training function or action such as missile launching, bombardment, vehicle driving, or Field Carrier Landing Practice.

**Air Traffic Control Assigned Airspace (ATCAA)**—Federal Aviation Administration-defined airspace not over an Operating Area (OPAREA) within which specified activities, such as military flight training, are segregated from other Instrument Flight Rules air traffic.

**Airfield**—usually an active and/or inactive airfield, or infrequently used landing strip, with or without a hard surface, without Federal Aviation Administration-approved instrument approach procedures. An airfield has no control tower and is usually private.

**Airport**—usually an active airport with hard-surface runways of 3,000 feet or more, with Federal Aviation Administration-approved instrument approach procedures regardless of runway length or composition. An airport may or may not have a control tower. Airports may be public or private.

**Airspace, Controlled**—airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rules flights and to Visual Flight Rules flights in accordance with the airspace classification. Controlled airspace is divided into five classes, dependent upon location, use, and degree of control: Class A, B, C, D, and E.

**Airspace, Special Use**—airspace of defined dimensions identified as the space or portion thereof over an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon non-participating aircraft.

**Airspace, Uncontrolled**—airspace, or Class G airspace, refers to airspace not otherwise designated and operations below 1,200 feet above ground level. No air traffic control service to either Instrument Flight Rules or Visual Flight Rules aircraft is provided other than possible traffic advisories when the air traffic control workload permits and radio communications can be established.

**Airspace**—the space lying above the earth or above a certain land or water area (such as the Pacific Ocean); more specifically, the space lying above a nation and coming under its jurisdiction.

**Amphibious Craft Laydown**— location for storing, maintaining and deploying amphibious vehicles.

**Army Air and Missile Defense Task Force (AMDTF)—**a ground force that includes command and control, missile field teams, maintenance, and logistics/supplies support. They also include Weapons Emplacement Sites that would accommodate Terminal High-Altitude Area Defense (THAAD) and Patriot Missile operations.

**Base load power—**the minimum load over a given time period. The generation capacity needed to meet the continuous (24/7) demand for the system.

**Battalion—**in general, a battalion is a group of 5 companies, approximately 960 individuals.

**Biosecurity Risk Assessment—**a risk assessment to evaluate the proposed actions described in this EIS to determine the potential for invasive species to cause harm to ecological or economic systems on Guam or at locations where they may be inadvertently exported.

**Biosecurity Plan—**a plan that includes an invasive species risk assessment (biosecurity risk assessment) and management of risks and damage from invasive plant and animal species.

**Biosecurity—**a multi-level, multi-disciplinary, collaborative program to prevent the introduction and establishment of new invasive species.

**Booster**—an auxiliary or initial propulsion system that travels with a missile or aircraft and that may not separate from the parent craft when its impulse has been delivered; may consist of one or more units. Boosters contain high explosives sensitive enough to be detonated by a small initiator and powerful enough to set off a less sensitive main explosive charge.

**Carrier Vessel Nuclear (CVN)**—a nuclear powered aircraft carrier.

**Coastal Zone**—a region occupying the area near the coastline in depths of water less than 538.2 ft (164.0 m). The coastal zone typically extends from the high tide mark on the land to the gently sloping, relatively shallow edge of the continental shelf. The sharp increase in water depth at the edge of the continental shelf separates the coastal zone from the offshore zone. Although comprising less than 10% of the ocean's area, this zone contains 90% of all marine species and is the site of most large commercial marine fisheries. This differs from the way the term "coastal zone" is defined in the Federal Coastal Zone Management Act where "coastal zone" typically extends from the low tide mark to several hundred feet upland.

**Continental United States (CONUS)**—the United States and its territorial waters between Mexico and Canada, but excluding Alaska, Hawaii, U.S. territories, and possessions.

**Company**—in general, a company is a group of 4 platoons, approximately 192 individuals.

**Controlled Access**—area where public access is prohibited or limited due to periodic training operations or sensitive natural or cultural resources.

**Controlled Airspace**—airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rules flights and to Visual Flight Rules flights in accordance with the airspace classification. Controlled airspace is divided into five classes, dependent upon location, use, and degree of control: Class A, B, C, D, and E.

**Controlled Firing Area**—area where ordnance firing is conducted under controlled conditions so as to eliminate hazard to aircraft in flight.

**Council on Environmental Quality (CEQ)**—established by the National Environmental Policy Act, the CEQ consists of three members appointed by the President. A CEQ regulation (Title 40 Code of Federal Regulations 1500-1508, as of July 1, 1986) describes the process for implementing the National Environmental Policy Act, including preparation of environmental assessments and environmental impact statements, and the timing and extent of public participation.

**Cumulative Impact**—the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

**Discarded Military Munitions**—military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.

**Distance X**—the maximum distance a projectile (including guided missiles and rockets) will travel when fired or launched at a given quadrant elevation with a given charge or propulsion system.

**Economic Adjustment Committee (EAC)**—established by Executive Order 12788 (as amended), the EAC coordinates Federal interagency and intergovernmental assistance to support the Defense Economic Adjustment Program and help communities respond to economic impacts caused by significant Defense program changes. The EAC is chaired by the Secretary of Defense. The Secretaries of Labor and Commerce serve as the Vice Chair men and there are a total of twenty-two federal agencies and departments represented on the EAC.

**Encroachment (per Navy instruction)**—any non-Navy action planned or executed that inhibits, curtails, or possesses the potential to impede the performance of Navy activities. Additionally, the lack of action by the Navy to work proactively with local communities, to monitor development plans, or to adequately manage its facilities and real property could also impact the Navy mission and thereby result in encroachment." Therefore, encroachment may stem from both internal (Navy) and external (civilian) sources.

**Explosive Ordnance Disposal (EOD)**—the detection, identification, field evaluation, rendering-safe recovery, and final disposal of conventional, nuclear, and chemical/biological ordnance. EOD activities are performed by specially trained active duty military personnel.

**Explosive Safety Quantity-Distance (ESQD)**—for a given quantity of explosive material, the distance separation relationships providing defined types of protection based on levels of risk considered acceptable. The size of the ESQD arc is proportional to the net explosive weight present.

**Facilities**—physical elements that can include roads, buildings, structures, and utilities. These elements are generally permanent or, if temporary, have been placed in one location for an extended period of time.

**Fleet Area Control and Surveillance Facility (FACSFAC)**—Navy facility that provides air traffic control services and controls and manages Navy-controlled off-shore operating areas and instrumented ranges.

**Hardfill**—a disposal facility for demolition debris (e.g. reinforced and non-reinforced concrete, asphalt, brick, block, tile, stone, roofing material, drywall, wood, and metal) that is not contaminated with solid waste, infectious waste, or hazardous waste.

**High Explosive (HE)**—an explosive substance designed to function by detonation (e.g., main charge, booster, or primary explosive). High Explosives when initiated change from basic form at a velocity greater than that of sound throughout the material exploding. The reaction, which generates a large volume of gas at high temperature and results in intense shattering effect, is usually referred to as a detonation. Examples: RDX, TNT, dynamite, and HBX.

**Impact Area**—the identified area within a range intended to capture or contain ammunition, munitions, or explosives and resulting debris, fragments, and components from various weapons systems (e.g., the ground and associated airspace within the training complex) A weapon system impact area is the area within the surface danger zone used to contain fired, or launched ammunition and explosives, and the resulting fragments, debris, and components. Indirect fire weapon system impact areas include probable error for range and deflection. Direct fire weapon system impact areas encompass the total surface danger zone from the firing point or position downrange to distance X.

**Instrument Flight Rules (IFR)**—regulations and procedures for flying aircraft by referring only to the aircraft instrument panel for navigation.

**Major Exercise**—a significant operational employment of live, virtual, and/or constructive forces during which live training is accomplished. A Major Exercise includes multiple training objectives, usually occurring over an extended period of days or weeks. An exercise can have multiple training operations (sub-events each with its own mission, objective and time period. Examples include C2X, JTFEX, SACEX, and CAX. Events [JTFEX] are composed of specific operations [e.g., Air-to-Air Missile], which consist of individual activities [e.g., missile launch]).

**Maneuver Element**—basic element of a larger force independently capable of maneuver. Normally, a Marine Division recognizes its infantry battalions, tank battalion, and light armored reconnaissance (LAR) battalion as maneuver elements. A rifle (or tank/LAR) battalion would recognize its companies as maneuver elements. A rifle (or tank/LAR) company would recognize its platoons as maneuver elements. Maneuver below the platoon level is not normally possible since fire and movement can be combined only at the platoon level or higher. The Army and National Guard recognize a squad and platoon as maneuver elements.

**Maneuver**—employment of forces on the battlefield through movement in combination with fire, or fire potential, to achieve a position of advantage with respect to the enemy in order to accomplish the mission.

**Marine Air-Ground Task Force (MAGTF)**— This is how the Marine Corps is set up to perform all types of their military actions. It insures that ground forces and air forces are working together under single leadership and a clear goal.

**Marine Expeditionary Force (MEF)**—A MEF is the largest MAGTF group, and is comprised of a MEF Headquarters Group, Marine Division, Marine Air Wing and Marine Logistics Group.

**Marine Expeditionary Brigade (MEB)**—A MEB is larger than a Marine Expeditionary Unit (MEU) but smaller than a Marine Expeditionary Force (MEF). It is comprised of a reinforced infantry regiment, a composite Marine aircraft group, and a brigade service support group. It can function as part of a joint task force, as the lead echelon of the MEF, or alone.

**Marine Expeditionary Unit (MEU)**—A MEU is the smallest MAGTF group, and is comprised of an air and ground combat team, and combat service support. The specific makeup of the MEU can be customized with additional artillery, armor, or air units.

**Marine Corps Ground Unit**—Marine Expeditionary Unit Ground Combat Element, or Battalion Landing Team, composed of an infantry battalion of about 1,200 personnel reinforced with artillery, amphibious assault vehicles, light armored reconnaissance assets and other units as the mission and circumstances require.

**Material Potentially Presenting an Explosive Hazard (MPPEH)**— material owned or controlled by the Department of Defense that, prior to determination of its explosives safety status, potentially contains explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris) or potentially contains a high enough concentration of explosives that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization, or disposal operations). Excluded from MPPEH are munitions within the DoD-established munitions management system and other items that may present explosion hazards (e.g., gasoline cans and compressed gas cylinders) that are not munitions and are not intended for use as munitions.

**Munitions and Explosives of Concern (MEC)**—this term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded Ordnance (UXO), as defined in 10 U.S.C. 101(e)(5)(A) through (C): (B) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2): or (C) munitions constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

**National Environmental Policy Act (NEPA)**—42 U.S.C. 4321, et seq passed by Congress in 1969. The Act established a national policy designed to encourage consideration of the influences of human activities, such as population growth, high-density urbanization, or industrial development, on the natural environment. The NEPA procedures require that environmental information be made available to the public and the decision-makers before decisions are made. Information contained in the NEPA documents must focus on the relevant issues in order to facilitate the decision-making process.

**Outside the Continental United States (OCONUS)**—the areas of Alaska, Hawaii, U.S. territories, and possessions and their territorial waters excluding the U.S. and its territorial waters between Mexico and Canada.

**Operation**—A combination of activities accomplished together for a scheduled period of time for an intended military mission or task. An operation can range in size from a single unit exercise to a Joint or Combined event with many participants (e.g., aircraft, ships, submarines, troops).

**Operational Range**—a range that is under the jurisdiction, custody, or control of the Secretary of Defense and is used for range activities; or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities per 10 U.S.C. 101(e)(3).

**Ordnance**—broadly encompasses all weapons, ammunition, missiles, shells, and expendables (e.g., chaff and flares).

**Peak load**—the maximum load consumed or produced by a unit or group of units in a stated time period. It may be the maximum instantaneous load or the maximum average load over a designated period of time. The peak system demand during a period of time (peak demand for a day, hour, month).

**Platoon**—in general, a platoon is a group of 42 individuals.

**Range**—a land or sea area designated and equipped for firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access, exclusionary areas. Also includes airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration [10 U.S.C. 101 (e)(3)].

**Range Activity**—an individual training or test function performed on a range or in an Operating Area. Examples include missile launching, bombardment, and vehicle driving. Individual RDT&E functions are also included in this category.

**Range Complex**—a geographically integrated set of ranges, operational areas, and associated special use airspace, designated and equipped with a command and control system and supporting infrastructure for freedom of maneuver and practice in munitions firing and live ordnance use against scored and/or tactical targets and/or Electronic Warfare tactical combat training environment.

**Range Operation**—a live training exercise, a research, development test and evaluation (RDT&E) test, or a field maneuver conducted for a specific strategic, operational or tactical military mission, or task. A military action. Operations may occur independently, or multiple operations may be accomplished as part of a larger event. One operation consists of a combination of activities accomplished together. The type of operation can include air, land, sea, and undersea warfare training or testing. Participants can include a specific number and type of aircraft, ships, submarines, amphibious or other vehicles and personnel.

**Range Safety Zone**—area around air-to-ground ranges designed to provide safety of flight and personnel safety relative to dropped ordnance and crash sites. Land use restrictions can vary depending on the degree of safety hazard, usually decreasing in magnitude from the weapons impact area (including potential ricochet) to the area of armed overflight and aircraft maneuvering.

**Readiness**—the ability of forces, units, weapon systems, or equipment to deliver the outputs for which they were designed (includes the ability to deploy and employ without unacceptable delays).

**Regiment**—a Regiment is a unit of three Battalions, approximately 2,880 individuals.

**Restricted Area**—a designated airspace in which flights are prohibited during published periods of use unless permission is obtained from the controlling authority.

**Safety Zone**—administratively designated/implied areas designated to limit hazards to personnel and the public, and resolve conflicts between operations. Can include range safety zones, ESQDS, surface danger zones, special use airspace, hazards of electromagnetic radiation to ordnance/hazards of electromagnetic radiation to personnel areas, etc.

**Scoping**—a process initiated early during preparation of an Environmental Impact Statement to identify the scope of issues to be addressed, including the significant issues related to the Proposed Action. During scoping, input is solicited from affected agencies as well as the interested public.

**Sortie**—a single operational training or RDT&E event conducted by one aircraft in a range or operating area. A single aircraft sortie is one complete flight (i.e., one take-off and one final landing).

**Special Use Airspace**—consists of several types of airspace used by the military to meet its particular needs. Special use airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of these activities, or both. Special use airspace, except for Control Firing Areas, are charted on instrument flight rules or visual flight rules charts and include hours of operation, altitudes, and the controlling agency.

**Stakeholder**—those people or organizations that are affected by or have the ability to influence the outcome of an issue. In general, this includes regulators, the regulated entity, and the public. It also includes those individuals who meet the above criteria and do not have a formal or statutorily defined decision-making role.

**Submerged Lands**—the areas in coastal waters extending from the Guam coastline into the ocean 3 nautical miles (nm) (5.6 kilometers [km]).

**Surface Danger Zone (SDZ)**—the area surrounding a range that allows for the probability of a munition not landing within the designated target or impact area within which access is controlled for safety during firing.

**Sustainable Range Management**—management of an operational range in a manner that supports national security objectives, maintains the operational readiness of the Armed Forces, and ensures the long-term viability of operational ranges while protecting human health and the environment.

**Targets**—earthwork, materials, actual or simulated weapons platforms (tanks, aircraft, EW systems, vehicles, ships, etc.) comprising tactical target scenarios within the range/range complex impact areas.

**Uncontrolled Airspace**—airspace of defined dimensions in which no air traffic control services to either instrument flight rules or visual flight rules aircraft will be provided, other than possible traffic advisories when the air traffic control workload permits and radio communications can be established.

**Unexploded Ordnance (UXO)**—military munitions that (A) have been primed, fused, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, property, installations, personnel or material; and (C) remained unexploded either by malfunction, design or any other cause [10 U.S.C. 101 (e)(5)(A) through (C)].

**Ungulate**—any animal having hoofs such as deer, pigs, cattle, etc.

**Upland**—an area of land of higher elevation.

**U.S. Territorial Waters**—sea areas within 12 nm of the U.S. coastline, normally measured from the low water mark on the shoreline.

**Visual Flight Rules (VFR)**—regulations which allow a pilot to operate an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.

**Wholly Inert**—ordnance with no explosive, propellant, or pyrotechnic component (non-reactive); example: BDU-50, BDU-56 (both are non-reactive heavy-weights with no explosive charges).

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# CHAPTER 5.
# ACRONYM AND ABBREVIATION LIST

| | |
|---|---|
| °F | degrees Fahrenheit |
| 36 WG | 36th Wing |
| III MEF | Third Marine Expeditionary Force |
| AAV | Amphibious Assault Vehicle |
| AADT | Average Annual Daily Traffic |
| AASHTO | American Association of State Highway and Transportation Officials |
| ac | acre(s) |
| ACE | Air Combat Element |
| ACHP | Advisory Council for Historic Preservation |
| ACM | asbestos-containing material |
| A.D. | Anno Domini |
| AD/ADFM | Active Duty/Active Duty Family Members |
| ADA | Americans with Disabilities Act |
| ADAAG | Americans with Disabilities Act Accessibility Guidelines |
| ADNL | A-weighted Day Night Average Level |
| ADT | Average Daily Traffic |
| AFB | Air Force Base |
| AFI | Air Force Instruction |
| A-G | air-to-ground |
| AGL | above ground level |
| AICUZ | Air Installation Compatible Use Zone |
| AIDS | Acquired Immune Deficiency Syndrome |
| AIP | Agreed Implementation Plan |
| ALPCD | Alien Labor Processing and Certification Division |
| AMC | Air Mobility Command |
| AMDTF | Air and Missile Defense Task Force |
| AMVOC | Advanced Motor Vehicle Operators Course |
| AOC | Area of Concern |
| AOR | Area of Responsibility |
| APC | Areas of Particular Concern |
| APCSR | Air Pollution Control Standards and Regulations |
| APE | Area of Potential Effect |
| APZ | Accident Potential Zone |
| ARG | Amphibious Readiness Group |
| APHIS | Agricultural Animal Plant and Health Inspection Service |
| ARPA | Archaeological Resource Protection Act |
| A-S | air-to-surface |
| ASHRAE | American Society of Heating Refrigeration and Air Conditioning Engineers |
| ASN | Assistant Secretary of the Navy |
| AST | Aboveground Storage Tank |
| ASTM | American Standards Society for Testing and Measurements |
| ATARA | Alliance Transformation and Realignment Agreement |
| ATC | Air Traffic Control |
| ATCAA | Air Traffic Control Assigned Airspace |
| AT/FP | Antiterrorism/Force Protection |
| AUPM | Above and Underground Storage Tank and Pesticide Management |
| B | billion |
| BA | Biological Assessment |
| BACT | Best Available Control Technology |
| BASH | Bird Airstrike Hazard Plan |
| B.C. | Before Christ |
| BCD | Base Command Officer |
| BCDC | Bureau of Communicable Disease Control |
| BDDT | BASH Detection and Dispersal Team |
| BEQ | Bachelor Enlisted Quarters |
| BFHNS | Bureau of Family Health and Nursing Services |
| BFR | Basic Facility Requirements |
| BHC | Bird Hazard Condition |
| BI | Beneficial Impact |
| BMD | Ballistic Missile Defense |
| BMDTF | Ballistic Missile Defense Task Force |
| BMP | Best Management Practice |
| BMUS | Bottomfish Management Unit Species |
| BO | Biological Opinion |
| BOD | biological oxygen demand |
| BOMBEX | Bombing Exercise |
| BOQ | Bachelor Officer Quarters |
| BOW | Bilge Oily Waste |
| BOWTS | Bilge Oily Waste Treatment System |
| B.P. | Before Present |
| BPC | Bureau of Primary Care |
| BFR | Basic Facility Requirements |
| BQ | Bachelors Quarters |
| BRAC | Base Realignment and Closure |
| BRD | Biological Resources Discipline |
| BRS | Biennial Reporting System |
| BRSA | Biological Resource Study Area |
| BS 0 | Battle Site Zero |
| BSP | Bureau of Statistics and Plans |
| BSTF | Battle Staff Training Facility |
| BSTS | Battle Staff Training and Simulation |
| BTS | brown tree snake |
| Btu | British Thermal Units |
| BUMED | Bureau of Medicine and Surgery |
| C&D | Construction and Demolition |
| CAA | Clean Air Act |
| CAAA | Clean Air Act Amendments |
| CAL | Confined Area Landings |
| CAST | Combined Arms Staff Trainer |

| | |
|---|---|
| CATEX | Categorical Exclusion |
| $CBOD_5$ | Chemical Biological Oxygen Demand – Five Day |
| CCU | Consolidated Commission on Utilities |
| CDC | Center for Disease Control |
| CDF | Confined Disposal Facility |
| CDL | Clandestine Drug Labs |
| CDNL | C-weighted DNL |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Act Information Systems |
| CESQG | Conditionally Exempts Small Quantity Generators |
| CEQ | Council on Environmental Quality |
| CFA | Controlled Firing Area |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| CG | Guided Missile Cruiser |
| CGC | Coast Guard Cutter |
| CGP | Construction General Permit |
| $CH_4$ | methane |
| CHC | Community Health Clinic |
| CHCRT | Currently Harvested Coral Reef Taxa |
| CIP | Capital Improvements Program |
| CLOMR | Conditional Letter of Map Revision |
| CLTC | Chamorro Land Trust Commission |
| cm | centimeter(s) |
| cm/s | centimeters per second |
| CMCC | Civil-Military Coordination Council |
| CMP | Coastal Management Program |
| CMUS | Crustacean Management Unit Species |
| CNM | Commander Navy Region Marianas |
| CNMI | Commonwealth of the Northern Mariana Islands |
| CNO | Chief of Naval Operations |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| COFA | Compact of Free Association |
| COMNAV | Commander Navy Region |
| COMPACFLT | Commander, U.S. Pacific Fleet |
| COMSCINST | Commander, Military Sealift Command Instruction |
| CONOPS | Concept of Operations |
| CONSENT | Superfund Consent Decrees |
| CONUS | Continental United States |
| CORRACTS | Corrective Action Sites |
| CPA | Commonwealth Ports Authority |
| CPF | Commander U.S. Pacific Fleet |
| CPI | Consumer Price Index |
| CQC | Close Quarters Combat |
| CREMUS | Coral Reef Ecosystem Management Unit Species |
| CRM | Coastal Resources Management |
| CRMO | Coastal Resources Management Office |
| CRMP | Coastal Resources Management Program |
| CRRC | Combat Rubber Raiding Craft |
| CSA | Customer Service Agreement |
| CSAR | Combat Search and Rescue |
| CSG | Carrier Strike Group |
| CSS | Commander Submarine Squadron |
| CT | Combustion Turbine |
| CUC | Commonwealth Utilities Corporation |
| CVN | Carrier Vessel Nuclear |
| CVW | Carrier Air Wing |
| CWA | Clean Water Act |
| CWCS | Comprehensive Wildlife Conservation Strategy |
| CY | cubic yard(s) |
| CZ | Clear Zone |
| CZMA | Coastal Zone Management Act |
| DAMOS | Disposal Area Monitoring System |
| DAR | Defense Access Road |
| dB | decibel(s) |
| dBA | A-weighted decibel(s) |
| dBC | C-weighted decibel(s) |
| DD | Destroyer |
| DDESB | Department of Defense Explosive Safety Board |
| DDESS | Dependent Elementary and Secondary Schools |
| DDG | Guided Missile Destroyer |
| DEH | Division of Environmental Health |
| DELISTED NPL | National Priority List Deletions |
| DEQ | Division of Environmental Quality |
| DERP | Defense Environmental Restoration Program |
| DISID | Department of Integrated Services for Individuals with Disabilities |
| DLM | Department of Land Management |
| DLNR | Department of Lands and Natural Resources |
| DM | Defensive Maneuvers |
| DMHSA | Department of Mental Health and Substance Abuse |
| DMM | Discarded Military Munitions |
| DMR | Discharge Monitoring Report |
| DNL | Day-Night Sound Level |
| DO | dissolved oxygen |
| DoC | Department of Corrections |
| DoD | Department of Defense |
| DoDEA | Department of Defense Education Activity |
| DOE | Department of Energy |
| DOI | Department of the Interior |
| DOJ | Department of Justice |
| DoN | Department of the Navy |
| DOPAA | Description of Proposed Action and Alternatives |
| DOT | Department of Transportation |

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|---|---|
| DOT OPS | Department of Transportation Office of Pipeline Safety Incident and Accident Data |
| DPHSS | Department of Public Health and Social Services |
| DPL | Department of Public Lands |
| DPRI | Defense Policy Review Initiative |
| DPS | Department of Public Safety |
| DPW | Department of Public Works |
| DRMO | Defense Reutilization and Marketing Office |
| DRS | Demand Response Service |
| DSAY | Discount Service Acre Year |
| DSMOA | DoD & State/Territorial Memorandum of Agreement |
| DU | dwelling unit |
| DU/ac | dwelling units per acre |
| DYA | Department of Youth Affairs |
| E&ECR | Erosion and Sediment Control Regulation |
| EA | Environmental Assessment |
| EAC | Economic Adjustment Committee |
| EC | Electronic Combat |
| ECM | earth-covered magazine |
| ECO | Environmental Compliance Officer |
| EC-OPS | Electronic Combat Operations |
| ECHO | Enforcement and Compliance History Online |
| ECP | entry control point |
| EDR | Environmental Data Resources |
| EET | Energy Efficient Transport |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| EJ | Environmental Justice |
| EMI | Electromagnetic Interference |
| EMR | Electromagnetic Radiation |
| EMUA | Exclusive Military Use Area |
| ENSO | El Niño Southern Oscillation |
| EO | Executive Order |
| EOD | Explosive Ordnance Disposal |
| EPACT | Energy Policy Act of 2005 |
| EPCRA | Emergency Planning & Community Right-To-Know Act |
| EPP | Environmental Protection Plan |
| ERA | Ecological Reserve Area |
| ERNS | Emergency Response Notification System |
| ER-L | Effects Range-Low |
| ER-M | Effects Range-Median |
| ESA | Endangered Species Act |
| ESAL | Equivalent Single Axle Loading |
| ESG | Expeditionary Strike Group |
| ESQD | Explosive Safety Quantity Distance |
| ESS | Explosive Safety Submission |
| FAA | Federal Aviation Administration |
| FACSFAC | Fleet Area Control and Surveillance Facility |
| FAM | Familiarization and Instrument Flight |
| FARP | Forward Arming and Refueling Point |
| FAS | Freely Associated States of Micronesia |
| FCLP | Field Carrier Landing Practice |
| FDC | Fire Direction Center |
| FDM | Farallon de Medinilla |
| FEMA | Federal Emergency Management Agency |
| FEP | Fishery Ecosystem Plan |
| FEPCA | Federal Pesticide Control Act |
| FFCA | Federal Facilities Compliance Act |
| FHWA | Federal Highway Administration |
| FINDS | Facility Index System |
| FIFRA | Federal Insecticide, Fungicide and Rodenticide Act |
| FIP | Flight Information Public |
| FIREX | Firing Exercise |
| FIRM | Flood Insurance Rate Map |
| FMP | Fishery Management Plan |
| FONSI | Finding of No Significant Impact |
| FOC | Full Operational Capability |
| FPPA | Farmland Protection Policy Act |
| FR | Federal Register |
| FSM | Federated States of Micronesia |
| ft | foot/feet |
| $ft^2$ | square foot/feet |
| FTA | Federal Transit Administration |
| FTE | full time equivalent |
| FTTS | FIFRA/TSCA Tracking System |
| FTX | Field Training Exercise |
| FUDS | Formerly Used Defense Sites |
| FWCA | Fish and Wildlife Coordination Act |
| FY | Fiscal Year |
| GAIN | Guam Animals in Need |
| GALC | Guam Ancestral Lands Commission |
| GAR | Guam Administrative Regulations |
| GBB | Gershman, Brickner, & Bratton, Inc. |
| GBSP | Guam Bureau of Statistics and Plans |
| GCA | Guam Code Annotated |
| GCC | Guam Community College |
| GCE | Ground Combat Element |
| GCMP | Guam Coastal Management Plan |
| GCR | General Conformity Rule |
| GCWCS | Guam Comprehensive Wildlife Conservation Strategy |
| GDAWR | Guam Division of Aquatic and Wildlife Resources |
| GDISID | Guam Department of Integrated Services for Individuals with Disabilities |
| GDLM | Guam Department of Land Management |
| GDMHSA | Guam Department of Mental Health and Substance Abuse |
| GDoC | Guam Department of Corrections |
| GDoL | Guam Department of Labor |
| GDP | Guam Police Department |
| GDPHSS | Guam Department of Public Health and Social Services |

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|---|---|
| GDPR | Guam Department of Parks and Recreation |
| GDPW | Guam Department of Public Works |
| GDYA | Guam Department of Youth Affairs |
| GEDA | Guam Economic Development Authority |
| GEPA | Guam Environmental Protection Agency |
| GFD | Guam Fire Department |
| GHG | greenhouse gas |
| GHMP | Guam Hazard Mitigation Plan |
| GHPO | Guam Historic Preservation Office |
| GHRA | Guam Hotel and Restaurant Association |
| GIAA | Guam International Airport Authority |
| GIMDP | Guam Integrated Military Development Plan |
| GIP | Gross Island Product |
| GIS | Geographic Information System |
| GJMMP | Guam Joint Military Master Plan |
| GLUC | Guam Land Use Commission |
| GLUP | Guam Land Use Plan |
| GMH | Guam Memorial Hospital |
| GMHA | Guam Memorial Hospital Authority |
| GNWR | Guam National Wildlife Refuge |
| GoJ | Government of Japan |
| GovGuam | Government of Guam |
| GPA | Guam Power Authority |
| gpcd | gallons per capita per day |
| gpd | gallons per day |
| GPD | Guam Police Department |
| GPLS | Guam Public Library System |
| gpm | gallons per minute |
| GPSS | Guam Public School System |
| GRHP | Guam Register of Historic Places |
| GRN | Guam Road Network |
| GRT | Gross Receipts Tax |
| GSCSCR | Government of Guam Soil Erosion And Sediment Control Regulations |
| GSF | gross square feet |
| GSM | gross square meters |
| GTP | 2030 Guam Transportation Plan |
| GTR | Ground Threat Reaction |
| GUNEX | Gunnery Exercise |
| GVB | Guam Visitors Bureau |
| GW | groundwater |
| GWA | Guam Waterworks Authority |
| GWMPZ | ground water management protection zone |
| GWP | global warming potential |
| GWQS | Guam Water Quality Standards |
| GWUDI | groundwater under the direct influence of surface water |
| ha | hectare(s) |
| HACCP | Hazard Analysis and Critical Control Points |
| HAP | Hazardous Air Pollutant(s) |
| HAPC | Habitat Area of Particular Concern |
| HC | hydrocarbon |
| HCF | hydroflurocarbon |
| HCM | Highway Capacity Manual |
| HDPE | high-density polyethylene |
| HDD | Horizontal Directional Drilling |
| HE | high explosive |
| HEA | Habitat Equivalency Analysis |
| HERO | Hazards of Electromagnetic Radiation to Ordnance |
| HERP | Hazards of Electromagnetic Radiation to Personnel |
| HFC | hydrofluorocarbons |
| HIE | Helicopter Insertion/Extraction |
| HIV | Human Immunodeficiency Virus |
| HMIRS | Hazardous Materials Information Reporting System |
| HMMP | Hazardous Materials Management Plan |
| HMMWV | High Mobility Multi-Purpose Wheeled Vehicle |
| HMU | Habitat Management Unit |
| HPO | Historic Preservation Office(r) |
| HPV | high-priority violation |
| HQ | Headquarters |
| hr | hour(s) |
| HSC | Helicopter Sea Combat Squadron |
| HSIP | Highway Safety Improvement Program |
| HSV | High Speed Vessel |
| HSWA | Hazardous and Solid Waste Amendments |
| HUBZone | Historically Underutilized Business Zone |
| HVAC | heating, ventilation, and air conditioning |
| HWMP | Hazardous Waste Management Program |
| Hz | hertz |
| IAP | International Airport |
| IAS | invasive alien species |
| IBB | International Broadcasting Bureau |
| ICC | information coordination central |
| ICIS | Integrated Compliance Information System |
| ICRMP | Integrated Cultural Resources Management Plan |
| IGPBS | Integrated Global Presence and Basing Strategy |
| IFR | Instrument Flight Rules |
| IMP | Integrated Management Practice |
| IMS | invasive marine species |
| in | inch(es) |
| INRMP | Integrated Natural Resources Management Plan |
| INST CONTROLS | Sites with Institutional Controls |
| IOC | Initial Operational Capability |
| IPCC | Intergovernmental Panel on Climate Change |
| IPMP | Integrated Pest Management Plan |
| IPP | Independent Power Producers |
| IRIS | Integrated Risk Information System |
| IRP | Installation Restoration Program |
| ISA | Inter-Service Agreement |
| ISO | International Organization for Standardization |
| ISR | Intelligence, Surveillance, and Reconnaissance |
| ISWMP | Integrated Solid Waste Management Plan |

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|---|---|
| ITC | International Trade Center |
| IWPS | Island-Wide Power System |
| JBIC | Joint Bank of International Cooperation |
| JGPO | Joint Guam Program Office |
| JSDF | Japanese Self-Defense Force |
| JRC | Joint Region Commander |
| JRM | Joint Region Marianas |
| KD | known distance |
| kg | kilogram |
| kg/day | kilograms per day |
| km | kilometer(s) |
| $km^2$ | square kilometer(s) |
| knots | nautical miles per hour |
| kph | kilometers per hour |
| kV | kilovolts |
| kW | kilowatt(s) |
| kW/hr | kilowatts per hour |
| L | liter(s) |
| LAER | Lowest Achievable Emission Rate |
| LandGEM | Landfill Gas Emissions Model |
| LAV | Light Armored Vehicle |
| lb | pound(s) |
| LBA | Leaseback Area |
| LBP | lead-based paint |
| LCAC | Landing Craft Air Cushion |
| LCE | Logistic Combat Element |
| LCU | Landing Craft Utility |
| LEDPA | Least Environmentally Damaging Practicable Alternative |
| LEED | Leadership in Energy and Environmental Design |
| $L_{eq}$ | equivalent sound level |
| LF | linear feet |
| LFG | Landfill Gas |
| LHA/LHD | Amphibious Assault Ship |
| LID | Low Impact Development |
| LIDAR | Light Detection and Ranging |
| LLDP | linear low-density polyethylene |
| $L_{max}$ | Maximum Sound Level |
| LNG | Liquefied Natural Gas |
| LOS | Level of Service |
| LPD | Amphibious Transport Dock |
| lpm | liters per minute |
| LQG | large quantity generator |
| LSD | Dock Landing Ship |
| LSI | Less than significant impact |
| LUCIS | Land Use Control Information Systems |
| LZ | Landing Zone |
| m | meter(s) |
| $m^2$ | square meter(s) |
| $m^3$ | cubic meters(s) |
| M | million |
| MAGC | Marine Air Control Group |
| MAGTF | Marine Air Ground Task Force |
| MALS | Marine Aviation Logistics Squadron |
| MAP | Military Access Point |
| Marine Corps | United States Marine Corps |
| MARFORPAC | Marine Forces Pacific |
| MAW | Marine Aircraft Wing |
| MBP | Micronesia Biosecurity Plan |
| MBTA | Migratory Bird Treaty Act |
| MCB | Marine Corps Base |
| MCMEX | Mine Counter Measures Exercise |
| MC | Munitions Constituents |
| MCCS | Marine Corps Community Service |
| MCL | Maximum Concentration Level |
| MCMEX | Mine Counter Measures Exercise |
| MCO | Marine Corps Order |
| MCP | Mariana Islands Concept Plan |
| MCTL | Marine Corps Task List |
| MDA | Missile Defense Agency |
| MEB | Marine Expeditionary Brigade |
| MEC | Munitions and Explosives of Concern |
| MEF | Marine Expeditionary Force |
| MEU | Marine Expeditionary Unit |
| MFP/CPF | Marine Forces Pacific/Commander Pacific Fleet |
| MFR | multi-family residential |
| MG | million gallons |
| $mg/cm^2$ | milligrams per square centimeter |
| MGd | million gallons per day |
| mg/L | milligrams per liter |
| mi | mile(s) |
| $mi^2$ | square miles |
| MILCON | Military Construction |
| MIP | Medically Indigent Program |
| MIRC | Mariana Islands Range Complex |
| MISSILEX | Missile Exercise |
| ML | million liters |
| MLA | Military Lease Area |
| MLd | million liters per day |
| MLG | Marine Logistic Group |
| MLLW | mean lower low water |
| MLTS | Material Licensing Tracking System |
| mm | millimeter(s) |
| MMPA | Marine Mammal Protection Act |
| MMR | Military Munitions Rule |
| MMRP | Military Munitions Response Program |
| MMT | Marine Monitoring Team |
| MOA | Memorandum of Agreement |
| MOS | Military Occupational Specialty |
| MOU | Memorandum of Understanding |
| MOUT | Military Operations in Urban Terrain |
| MP | Military Police |
| MPA | microscopic particulate analyses |
| MPA | Marine Protected Area |
| mph | miles per hour |
| MPLA | Marianas Public Land Authority |
| MPPEH | material potentially presenting an explosive hazard |
| MPRSA | Marine Protection, Research, and Sanctuaries Act |

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| MRA | Munitions Response Area |
| MRC | Marine Research Consultants |
| MRP | Marine Resource Preserve |
| MRS | Munitions Response Sites |
| MSA | Munitions Storage Area |
| M-SA | Magnuson-Stevens Fishery Conservation and Management Act |
| MSAT | Mobile Source Air Toxics |
| MSC | Military Sealift Command |
| msl | mean sea level |
| MSM | modular storage magazine |
| MSWLF | Municipal Solid Waste Landfill Facility |
| MTVR | Medium Tactical Vehicle Replacement |
| MUS | Management Unit Species |
| MUSE | Mobile Utilities Support Equipment |
| MUTCD | Manual on Uniform Traffic Control Devices |
| MVA | mega volt ampere |
| MW | megawatts |
| MWDK | Military Working Dog Kennel |
| MWR | Morale, Welfare, and Recreation |
| $N_2O$ | nitrous oxide |
| NA | not applicable |
| NAA | Non-Attainment Area |
| NAAQS | National Ambient Air Quality Standards |
| NAC | Noise Abatement Criteria |
| NATA | National Air Toxics Assessment |
| NAV | Navy Ashore Vision |
| NAVCAMS | Naval Communication Area Master Station |
| NAVFAC | Naval Facilities Engineering Command |
| NC | New Construction |
| NCP | National Contingency Plan |
| NCTMS | Naval Computer and Telecommunications Main Station |
| NCTS | Naval Computer and Telecommunications Station |
| ND | Neighborhood Development |
| NDAA | National Defense Authorization Act |
| NDWWTP | Northern District Wastewater Treatment Plant |
| NELHA | National Energy Laboratory of Hawaii Authority |
| NEO | Noncombatant Evacuation Operations |
| NEPA | National Environmental Policy Act |
| NEW | net explosive weight |
| NEXRAD | Next Generation Weather Radar |
| NFIP | National Flood Insurance Program |
| NFRAP | No Further Remedial Action Planned List |
| NGL | Northern Guam Lens |
| NGLA | Northern Guam Lens Aquifer |
| NGO | Non-Governmental Organization |
| NHL | National Historic Landmark |
| NHPA | National Historic Preservation Act |
| NHP | National Historic Park |
| NI | No impact |
| NIOSH | National Institute for Occupational Safety and Health |
| NISC | National Invasive Species Council |
| NITTS | Noise Induced Temporary Threshold Shift |
| NLNA | northern land navigation area |
| nm | nautical mile(s) |
| $nm^2$ | square nautical mile(s) |
| NMC-DET | Navy Munitions Command Detachment |
| NMFS | National Marine Fisheries Service |
| NMS | Naval Munitions Site |
| NNPP | Naval Nuclear Propulsion Program |
| $NO_2$ | nitrogen dioxides |
| $NO_X$ | nitrogen oxides |
| NOA | notice of availability |
| NOAA | National Oceanic and Atmospheric Administration |
| NOI | Notice of Intent |
| NOPH | notice of public hearing |
| NOSSA | Naval Ordnance Safety and Security Activity |
| NOTAM | Notice to Airmen |
| NOTMAR | Notice to Mariners |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| NPS | National Park Service |
| NRC | Nuclear Regulatory Commission |
| NRCHC | Northern Region Community Health Center |
| NRCS | Natural Resources Conservation District |
| NRHP | National Register of Historic Places |
| NRMC | Navy Regional Medical Center |
| NSR | New Source Review |
| NSV | North San Vitoris |
| NTU | nephelometric turbidity unit |
| NW | nearshore waters |
| NWF | Northwest Field |
| NWI | National Wetland Inventory |
| NWR | National Wildlife Refuge |
| $O_3$ | ozone |
| O&M | Operations and Maintenance |
| ODMDS | Ocean Dredged Material Disposal Site |
| OEA | Overseas Environmental Assessment |
| OEIS | Overseas Environmental Impact Statement |
| OHA | Overseas Housing Allowance |
| OIA | Office of Insular Affairs |
| OPA | Oil Pollution Act |
| OPNAVINST | Office of the Chief of Naval Operations Instruction |
| OSD | Office of the Secretary of Defense |
| OSHA | Occupational Safety and Health Administration |
| OTEC | Ocean Thermal Energy Conversion |
| P2 | Pollution Prevention |
| PA | Programmatic Agreement |
| PAC-3 | Patriot Advanced Capability-3 |

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|---|---|
| PACAF | Pacific Air Forces |
| PACOM | U.S. Pacific Command |
| PAG | Port Authority of Guam |
| PAH | polynuclear aromatic hydrocarbon |
| Pb | lead |
| PCB | polychlorinated biphenyl |
| PCE | perchloroethylene |
| PE | private entity |
| PFC | perfluorocarbon |
| PHCRT | potentially harvested coral reef taxa |
| PHL | Potential Hearing Loss |
| PI | potential impact |
| PK-15 | Unweighted Peak, 15% Metric |
| PL | Public Law |
| PLS | Public Library System |
| PM | particulate matter |
| $PM_{2.5}$ | particulate matter less than 2.5 microns in diameter |
| $PM_{10}$ | particulate matter less than 10 microns in diameter |
| PMO | Personnel Management Office |
| PMUS | Pelagic Management Unit Species |
| POL | petroleum, oil, and lubricants |
| POV | privately-owned vehicle |
| PPA | Pollution Prevention Act |
| PPE | personal protective equipment |
| ppm | parts per million |
| ppt | parts per thousand |
| PSD | Prevention of Significant Deterioration |
| psi | pounds per square inch |
| PUC | Public Utilities Commission |
| pv | photovoltaic |
| PVC | polyvinyl chloride |
| PYE | person years of employment |
| PWC | Public Works Center |
| QDR | Quadrennial Defense Review |
| QOL | Quality of Life |
| RA | Restricted Area |
| RAATS | RCRA Administrative Action Tracking System |
| RAB | Restoration Advisory Board |
| RADINFO | Radiation Information Database |
| RCRA | Resource Conservation and Recovery Act |
| RCRIS | Resource Conservation and Recovery Act Information System |
| REA | Rapid Ecological Assessment |
| REC | Regional Environmental Coordinator |
| REDHORSE | Rapid Engineer Deployable Heavy Operations |
| Req'd | required |
| RHA | Rivers and Harbors Act |
| RHIB | Rigid Hull Inflatable Boat |
| RIA | Regulatory Impact Analysis |
| RO | reverse osmosis |
| ROD | Record of Decision |
| ROI | region of influence |
| RORO | roll-on roll-off |
| ROW | right-of-way |
| RPM | revolutions per minute |
| RSE | Repair Squadron Engineer |
| RTA | Range Training Area |
| SAFETEA-LU | Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users |
| SAIA | Sikes Act Improvement Act |
| SARA | Superfund Amendments and Reauthorization Act |
| SAR | Second Assessment Report |
| SARNAM | Small Arms Range Noise Assessment Model |
| SAS | Special Aquatic Sites |
| SAT | Stationary Armor Target |
| SBHSR | Ship-Borne Hazardous Substance Regulations |
| SCC | Security Consultative Committee |
| SCH | school |
| SCR | Selective Catalytic Reduction |
| SCS | Soil Conservation Service |
| SCUBA | self-contained underwater breathing apparatus |
| SDWA | Safe Drinking Water Act |
| SDZ | Surface Danger Zone |
| SEABEE | Construction Battalion |
| SECNAV | Secretary of the Navy |
| SEI | Sea Engineering Inc. |
| SEL | Sound Exposure Level |
| $SF_6$ | sulfur hexafluoride |
| SFR | single-family residential |
| SHSP | Strategic Highway Safety Plan |
| SHPO | State Historic Preservation Office |
| SI | Significant impact |
| SIAS | Socioeconomic Impact Assessment Study |
| SI-M | Significant impact mitigable to less than significant |
| SINKEX | Sink Exercise |
| SIP | State Implementation Plan |
| SIT | Stationary Infantry Target |
| SLAMRAAM | Surface-Launched Advanced Medium-Range Air-to-Air Missile |
| SLC | Submarine Learning Center |
| SMMP | Site Management and Monitoring Plan |
| SNC | Significant Non-Compliance |
| SNU | Skilled Nursing Unit |
| SO | stipulated order |
| $SO_2$ | sulfur dioxide |
| SOC | species of concern |
| SOFA | Status of Forces Agreement |
| SOGCN | Species of Greatest Conservation Need |
| SOP | Standard Operating Procedure |
| SPAWAR | Space and Naval Warfare Systems Command |
| SPCC | Spill Prevention, Control and Countermeasure |

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|---|---|
| SPE | Special Purpose Entity |
| SPS | Sewage Pump Station |
| SQG | small quantity generator |
| SRBM | Short-range Ballistic Missile |
| SRCHC | Southern Region Community Health Center |
| SRF | Ship Repair Facility |
| S-S | surface-to-surface |
| SSTS | Section Seven Tracking System |
| STD | sexually transmitted disease |
| STOM | Ship-to-Objective Maneuver |
| STP | sewage treatment plant |
| SUA | Special Use Airspace |
| SW | surface water/stormwater |
| SWMD | Solid Waste Management Division |
| SWMP | Stormwater Management Plan |
| SWMU | solid waste management unit |
| SWPPP | Stormwater Pollution Prevention Plan |
| T&D | Transmission and Distribution |
| T-AKE | Auxiliary Dry Cargo/Ammunition Ship |
| T-AKR | Sealift Ship |
| TAOC | Tactical Air Operations Center |
| TB | tuberculosis |
| TBD | To Be Determined |
| TBP | To Be Provided |
| TBT | tribulyl tin |
| TCE | trichloroethylene |
| TCP | Training Concept Plan |
| TDS | total dissolved solids |
| TEC JV | TEC Inc. Joint Venture |
| TERF | Terrain Flights |
| THAAD | Terminal High-Altitude Area Defense |
| TJS | Tactical Jamming System |
| TMDL | Total Maximum Daily Load |
| TMP | Traffic Management Plan |
| TNAP | Traffic Noise Abatement Policy |
| TNM | Traffic Noise Model |
| TOC | total organic carbon |
| TORPEX | Torpedo Exercise |
| TPFD | Time-Phased Force Deployment |
| TPY | tons per year |
| TRIS | Toxic Release Inventory System List |
| TSCA | Toxic Substance Control Act |
| TSS | total suspended solids |
| TTIP | Territorial Transportation Improvement Plan |
| TTLC | total threshold limit concentration |
| UAV | Unmanned Aerial Vehicle |
| UD | unknown distance |
| UF | usage factor |
| UFC | Unified Facilities Criteria |
| UFW | Unaccounted for Water |
| µg/L | micrograms per liter |
| UoG | University of Guam |
| UNFCC | United Nations Framework Convention on Climate Change |
| U.S. | United States |
| USACE | U.S. Army Corps of Engineers |
| USC | U.S. Code |
| USCG | U.S. Coast Guard |
| USCRTF | U.S. Coral Reef Task Force |
| USDA | U.S. Department of Agriculture |
| USDA-APHIS | U.S. Department of Agriculture Animal and Plant Health Inspection Service |
| USDA-WS | U.S. Department of Agriculture-Wildlife Services |
| US ENG CONTROLS | Engineering Controls Site List |
| USEPA | U.S. Environmental Protection Agency |
| USFS | U.S. Forest Service |
| USFWS | U.S. Fish and Wildlife Service |
| USGBC | U.S. Green Building Council |
| USGS | U.S. Geological Service |
| USLE | Universal Soil Loss Equation |
| UST | underground storage tank |
| UXO | unexploded ordnance |
| v | volt(s) |
| VA | Veterans Affairs |
| v/c | volume to capacity |
| VCO | Volunteer Conservation Officer |
| VCP | vitrified clay pipe |
| VFR | Visual Flight Rules |
| VHF | very high frequency |
| VHT | vehicle hours traveled |
| VIF | Vehicle Inspection Facility |
| VMT | vehicle miles traveled |
| VOC | volatile organic compound |
| vpd | vehicles per day |
| VQCF | Vehicle Queuing Control Facility |
| VWP | Visa Waiver Program |
| WA | Warning Area |
| WPC | Watershed Planning Committee |
| WPCP | Water Pollution Control Program |
| WPRFMC | Western Pacific Regional Fisheries Management Council |
| WQC | Water Quality Certification |
| WQMP | Water Quality Monitoring Plan |
| WRDA | Water Resource Development Acts |
| WRMP | Water Resources Master Plan |
| WTE | Waste-to-Energy |
| WTP | Water Treatment Plant |
| WWII | World War II |
| WL | wetlands |
| WWTP | Wastewater Treatment Plant |
| yd | yard |
| ZID | zone of initial dilution |

Final

# 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**

July 2010


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# Guam and CNMI Military Relocation EIS

# Volume 5: Army Air and Missile Defense Task Force

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# CHAPTER 1. PURPOSE OF AND NEED FOR ACTIONS

## 1.1 INTRODUCTION

***Chapter 1:***

*1.1 Introduction*

*1.2 Purpose and Need*

On December 16, 2002, National Security Presidential Directive -23 (Bush 2002) directed the Department of Defense to establish a capability to protect the United States (U.S.) homeland, forces, and its allies from ballistic missile attacks starting in 2004. Although there has not yet been a final determination of whether the Army will be given the ballistic missile mission on Guam, this Final Environmental Impact Statement (EIS) analyzes how that mission would be conducted. The ultimate decision on whether to establish the AMDTF will be made at some time after the Record of Decision (ROD) regarding the Marine Corps relocation.

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 actions in Volume 5, the purpose is to provide a land-based terminal air 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 that their location must be in the proximity of the protected assets. The need for the proposed actions 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.

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# CHAPTER 2.
# PROPOSED ACTION AND ALTERNATIVES

## 2.1 OVERVIEW

***Chapter 2:***



The proposed action consists of development of facilities and infrastructure on Guam to support relocating approximately 600 military personnel and their 900 dependents to establish and operate an Army Air and Missile Defense Task Force (AMDTF). The proposed Army 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 weapon 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 estimated $242 million for funding projected for Fiscal Year (FY)-14 and FY-15 for construction of the required facilities (including the weapons emplacement sites).

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

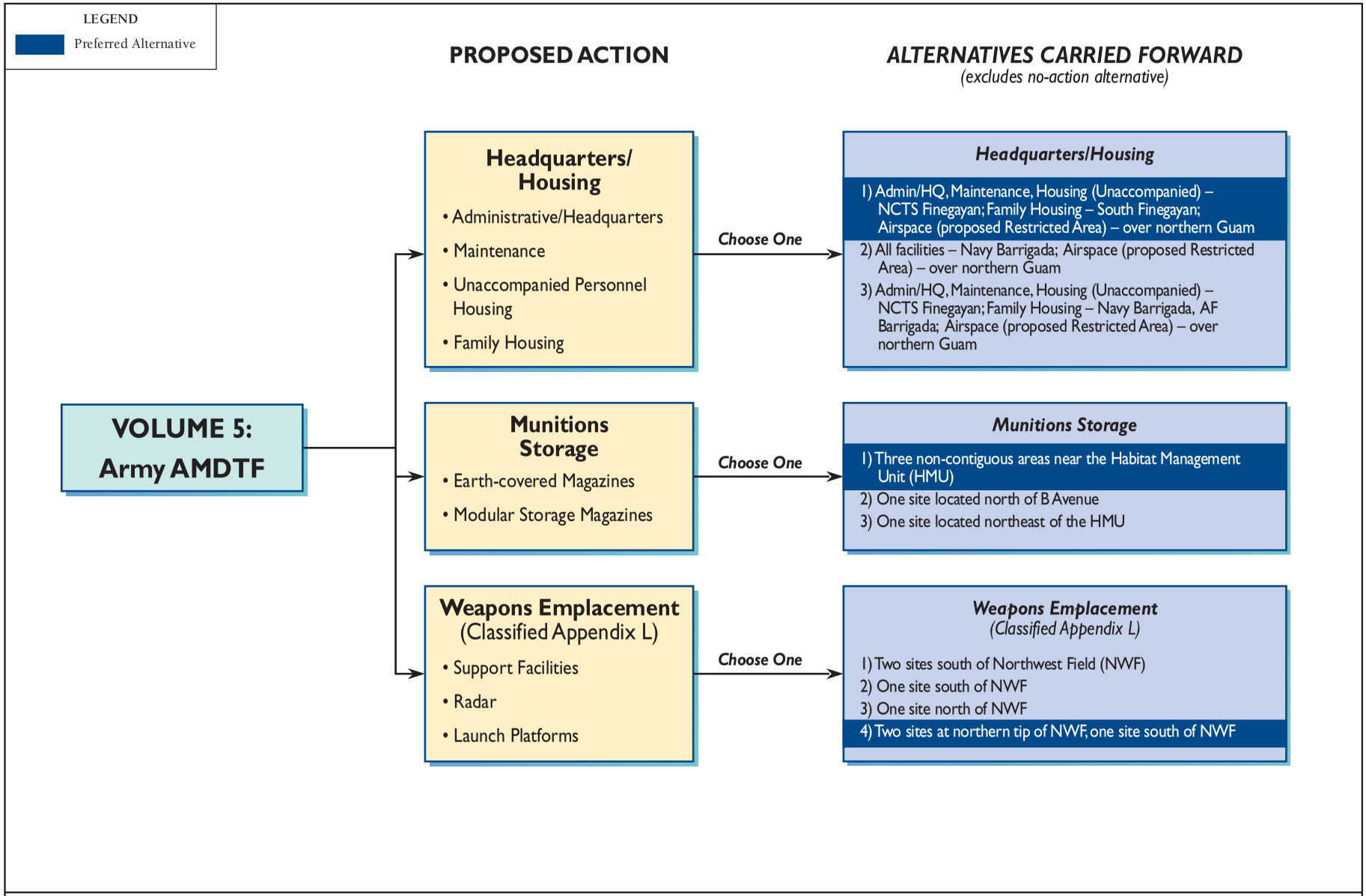


Figure 2.1-1
Summary of Proposed Action and Alternatives Carried Forward for the Army Air and Missile Defense Task Force, Guam

## 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 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. 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 2010.

### 2.3.2 Facilities

Facilities associated with the Army AMDTF would include: administration/HQ and maintenance facilities, munitions storage, weapons emplacement sites, enlisted barracks (referred to as bachelor quarters in Volume 2 of the EIS), and family housing and associated quality of life (QOL) facilities. Figure 2.4-1 shows the footprint of proposed housing areas for the three alternatives.

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). The 28 ac (11 ha) footprint also includes some open space areas that is not part of the facilities.

**Table 2.3-2. Army AMDTF Facility Requirements**

| *List of Structures* | *Total Floor Area ($ft^2$)* | *Floors per Building* | *Building Footprint ($ft^2$)* | *Parking Area Needed. ($ft^2$)* |
|---|---|---|---|---|
| 1. Battalion HQ | 18,010 (1,682 $m^2$) | 2 | 10,985 (1,020 $m^2$) | 16,380 (1,820 $m^2$) |
| 2. Company Facilities | 71,600 (6,652 $m^2$) | 2 | 61,546 (5,7182,934 $m^2$) | 109,725 (10,194 $m^2$) |
| 3. Tactical Equipment Maintenance Facilities | 57,031 (1,614 $m^2$) | 2 | 46,200 (4,2922,649 $m^2$) | 39,5923 (3,678 $m^2$) |
| 4. Central Vehicle Wash Facilities | 255,697 (23,755 $m^2$) (includes water collection components) | 2 | 75,100 (6,968 $m^2$) | |
| 5. Organizational Storage | 7,000 (650 $m^2$) | 2 | 7,000 (650 $m^2$) | 1,750 (624 $m^2$) |
| 6. Organizational Parking | | Paved | | 373,950 (34,741$m^2$) |
| 7. Housing | Enlisted and Officer housing would be required for 1,580 personnel and dependents. | | | |
| 8. Oil Storage Building | 1,800 (167 $m^2$) | | 1,800 (167 $m^2$) | |
| 9. Organizational Storage Building/Supply Support Activities Warehouse | 17,370 (1,614 $m^2$) | 1 | 17,370 (1,614 $m^2$) | 3,200 (297 $m^2$) |
| 10. Hazardous Materials Storage | 860 (80 $m^2$) | 1 | 860 (80 $m^2$) | NA |
| Vehicle Storage Shed | 9,220 (857 $m^2$) | 1 | 9,220 (857 $m^2$) | NA |

*Legend:* $ft^2$ = square foot, $m^2$ = square meter, NA = not applicable.

#### 2.3.2.2 Munitions Storage

Eight new climate-controlled, earth–covered magazines (ECMs) and/or 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 include special design features that meet Anti-Terrorism/Force Protection requirements.

One THAAD launcher storage module ECM, two Patriot launcher storage module ECMs, one SLAMRAAM/Avenger launcher storage module ECM, and four missile MSMs would be constructed (see table 2.3-3). The ECMs would be covered with a minimum of 2 feet(ft) (0.6 meters [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.

Explosive Safety Quantity Distance (ESQD) arcs are an important operational component of munitions storage. 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. ESQD arcs for existing munitions storage facilities in Andersen AFB Munitions Storage Area 1 (MSA 1) encompass much of the land in central Andersen AFB. Due to the hazards associated with the munitions to be stored in them, the ESQD arc for the proposed new munitions storage facilities would extend to 1,250 ft (381 m) from each magazine. The ESQD arcs for the new magazines would extend beyond the area of existing ESQD arcs; in effect, the existing arcs would expand (Figure 2.4-2).

#### 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 2.4-3. Proposed configurations within the areas are classified. These locations, their total facility footprints, and their respective potential environmental impacts are described in a Classified Appendix to this EIS, 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* |
|---|---|
| Weapons Emplacement Facilities and Equipment | |
| 1. THAAD – Launchers (3) | 100 ft × 50 ft = 5,000 $ft^2$ (30 m × 15 m = 465 $m^2$) |
| 2. THAAD – THAAD Fire Control and Communications (TFCC) | 197 ft × 164 ft = 32,292 $ft^2$ (60 m × 50 m = 3,000 $m^2$) |
| 3. THAAD – Radar (Antenna Equipment Unit, Prime Power Unit, Electronic Equipment Unit and Cooling Equipment Unit). | 197 ft × 164 ft = 32,292 $ft^2$<br>(60 m × 50 m = 3,000 $m^2$) |
| 4. THAAD – Missile Reload | 82 ft × 82 ft = 6,724$ft^2$ (2 5m × 25 m = 625 $m^2$) |
| 5. THAAD – Personnel Operations Area | 82 ft × 82 ft = 6,724 $ft^2$ (25 m × 25 m = 625 $m^2$) |
| 6. THAAD – Readiness Building | 70 ft × 50 ft = 3,510 $ft^2$ (15 m × 21 m = 326 $m^2$)<br>For 24/7 manning<br>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 × 148 ft = 19,375 $ft^2$<br>(45m × 40 m = 1,800 $m^2$) |
| 12. Patriot – Fuel Tankers | 50 ft × 100 ft = 5,000 $ft^2$<br>(15 m × 30 m = 465 $m^2$) |
| 13. Patriot – Readiness Building | 70 ft × 50 ft = 3,510 $ft^2$ (15 m × 21 m = 326 $m^2$)<br>For 24-hour/7-day manning<br>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 $m^2$) |
| 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 $m^2$) |
| Total Footprint Weapons Emplacement Facilities | 242,000 $ft^2$ (22,482 $m^2$; 5.6 ac; 2.25 ha) |
| Munitions Storage Facilities | |
| 1. THAAD Launcher Storage (ECM) (1) | 60’ × 66’ = 3,960 $ft^2$ (18 m × 20 m = 368 $m^2$) |
| 2. Patriot/Avenger/ SLAMRAAM Launcher Storage (ECM) (3) | 80’ × 66’ = 5,280 $ft^2$ (24 m × 20 m = 490 $m^2$) |
| 3. Guided Missile Magazines (MSM) (4) | 85’ × 30’ = 2,550 $ft^2$ (26 m × 9 m = 237 $m^2$) |
| Total Footprint Munitions Storage Facilities | 30,000 $ft^2$ (2,787$m^2$; 0.7ac; 0.28 ha) |

#### 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).

### 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, oil, 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 Fire Units 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. 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.

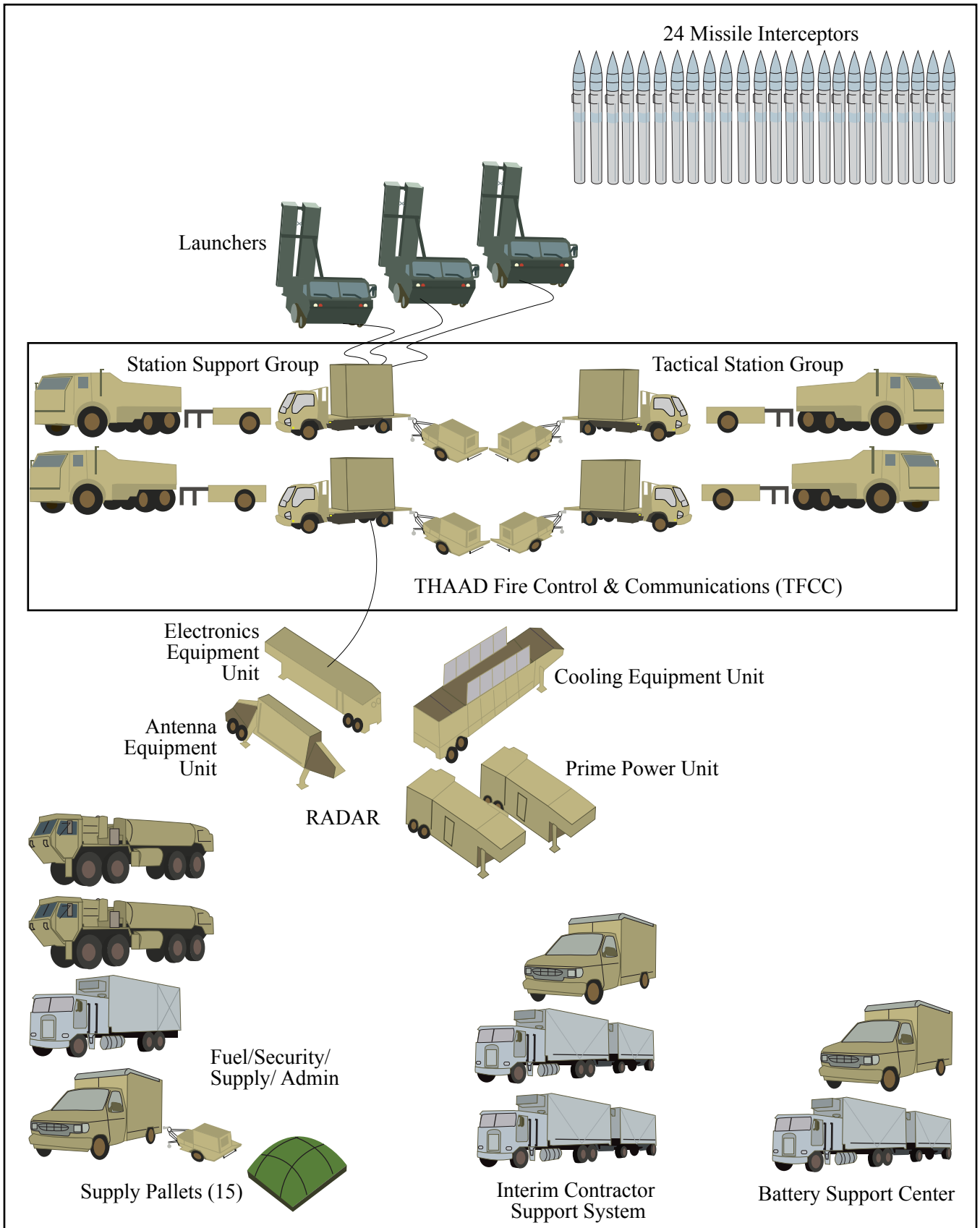


**Figure 2.3-1**
**THAAD Conceptual Configuration**

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

- Radar – provides a broad range of surveillance services that perform target search, acquisition, identification, and tracking functions. Analysis of electromagnetic radiation associated with radars is provided in a Classified Appendix (Appendix L).
- 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 simulated 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 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. There would be no restrictions to off-base ground activities (e.g., use of public roadways) during these preventive maintenance operations.

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

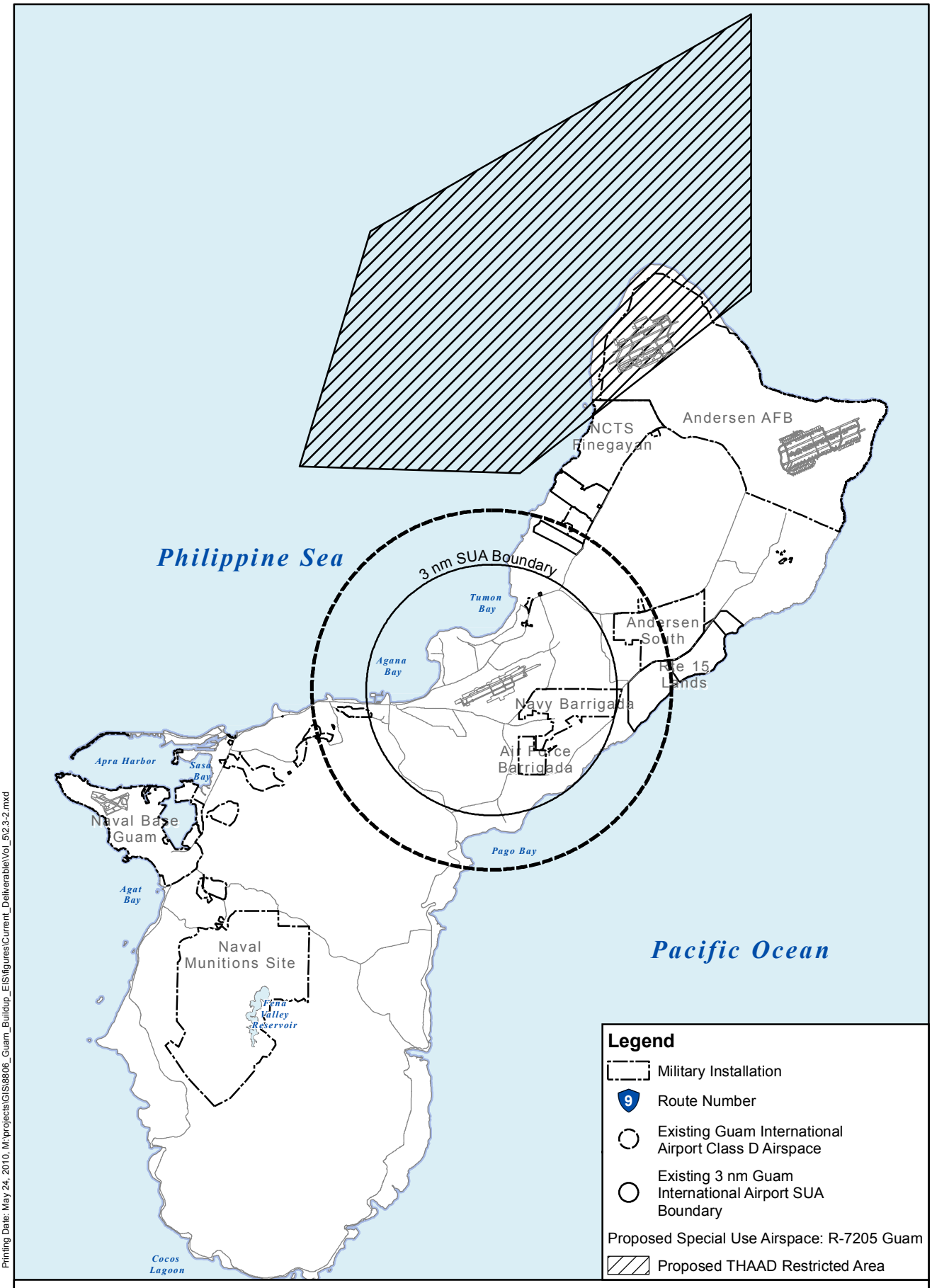


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**Figure 2.3-2**
**New Special Use Airspace Requirements for the Proposed Action**

## 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)

This alternative was selected as the preferred alternative because it is compatible with the Marine Corps preferred alternative, Alternative 2. Requirements for the facilities are addressed in the Marine Corps Main Cantonment component as the Army and Marine Corps would be sharing these facilities. Shared facilities would minimize impact from additional construction. The reasons for selection of Alternative 2 as the Marine Corps preferred alternative are described in Section 2.2.3 of Volume 2. See Section 2.2 for additional details on the alternatives analysis methodology.

Headquarters/Housing Alternative 1 consists of the following components:

- 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

Headquarters/Housing Alternative 2 consists of the following components:

- 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). Army Headquarters/Housing Alternative 2 would not be viable if Marine Corps Main Cantonment Alternatives 3 is implemented.

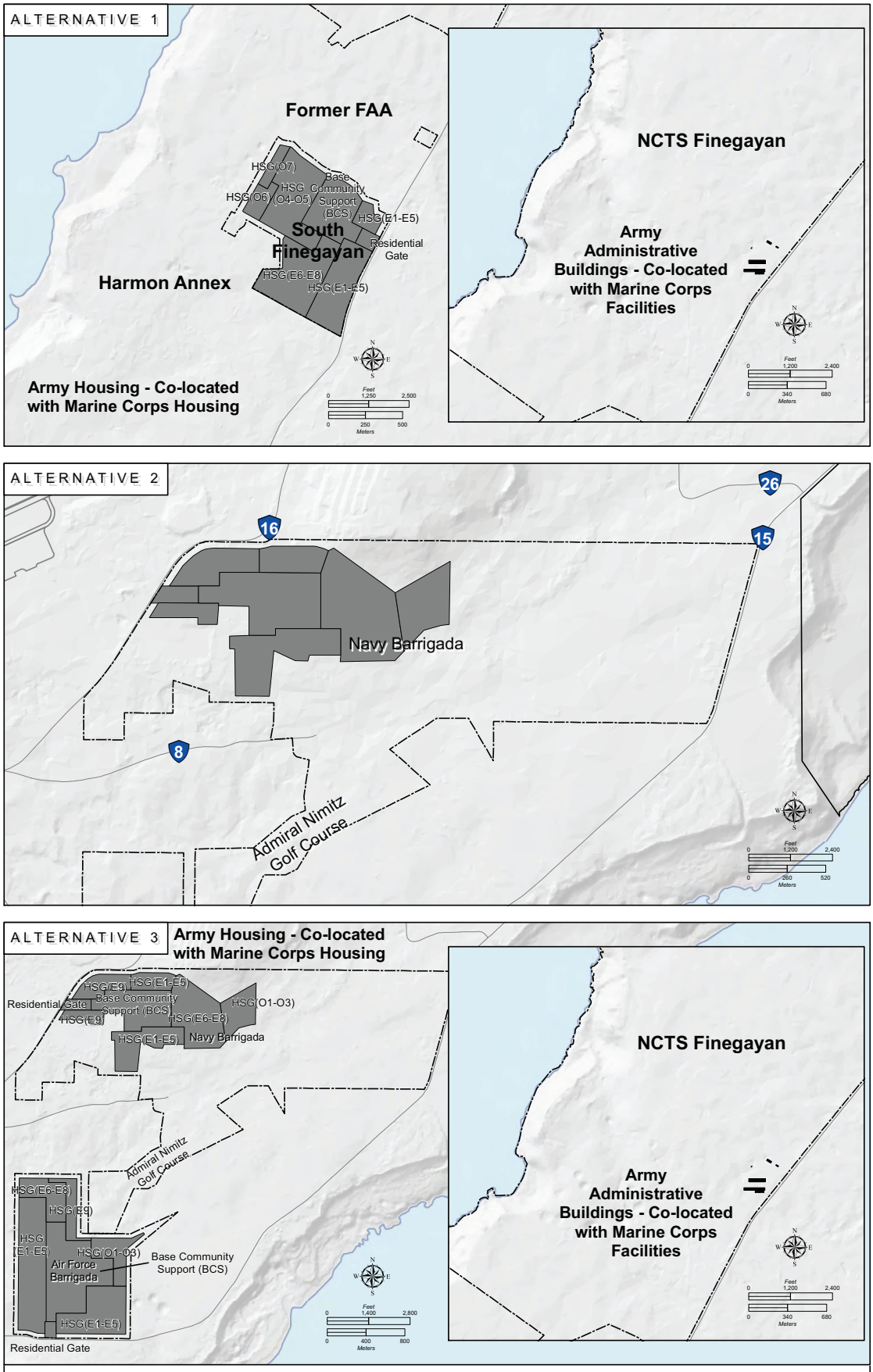



**Figure 2.4-1**
**Army AMDTF Headquarters/Housing Alternatives**

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

Headquarters/Housing Alternative 3 consists of the following components:

- 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)

The three munitions storage alternatives are roughly equal with regard to operational requirements and potential environmental constraints. However, Alternative 1 was selected as the preferred alternative for the following reasons: more space available than the other alternatives, it makes greatest use of existing locations compatible with proposed munitions storage (two of the three parcels for Alternative 1 are currently used for inert storage), it has the least amount effects in previously undisturbed areas, and the location is most compatible with current and planned military use, as coordinated with representatives from the Army, Air Force, Marine Corps, and the Navy. See Section 2.2 for additional details on the alternatives analysis methodology.

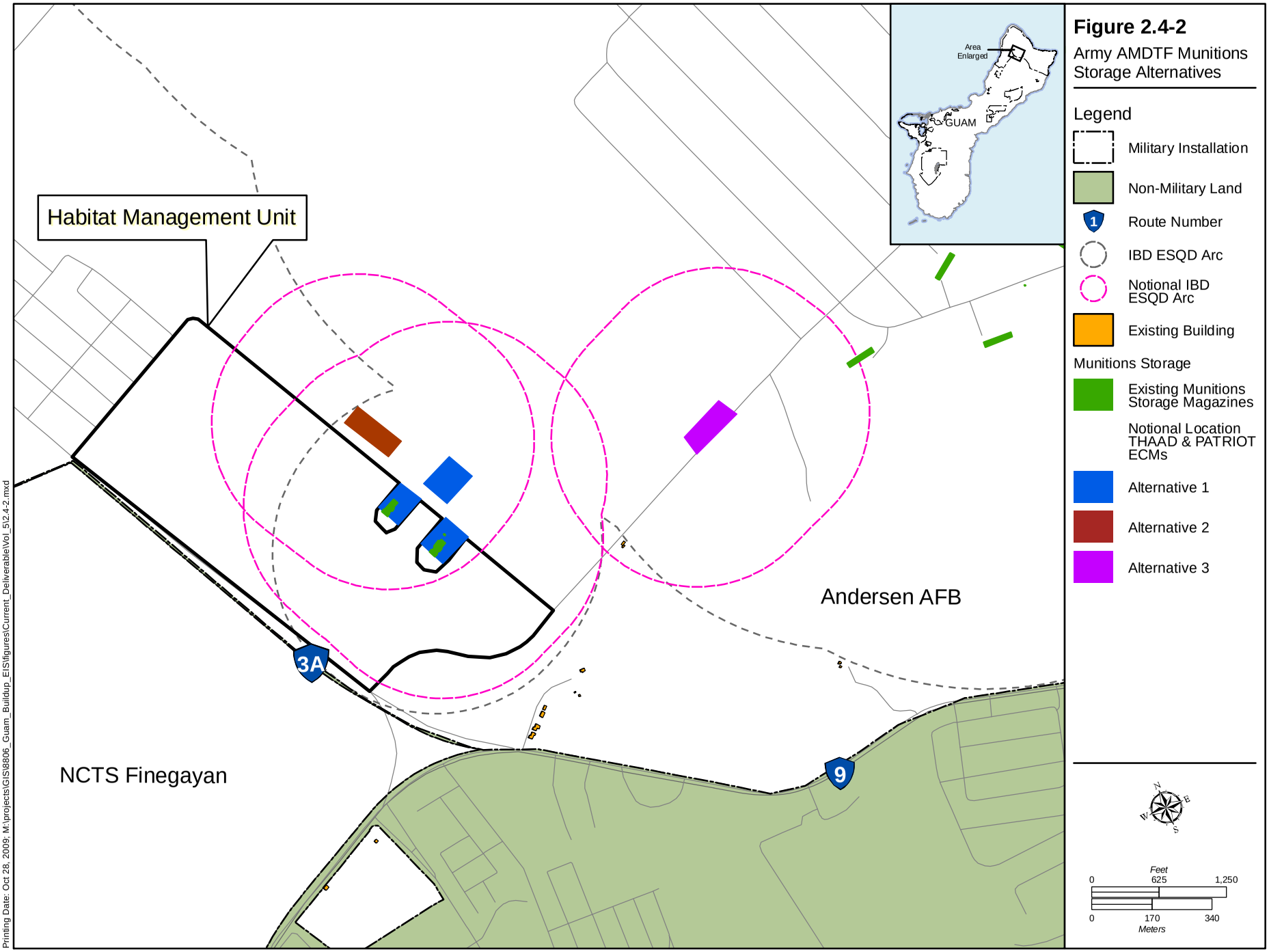
Munitions storage would be in three non-contiguous areas near the Habitat Management Unit (HMU) (Figure 2.4-2). The HMU boundaries specifically exclude two magazine storage areas on 0.7 ac (0.3 ha). Existing magazines at these areas are currently being used by Andersen AFB for inert munitions storage. 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 is estimated to be 6.2 ac (2.5 ha). The existing inert munitions storage facilities may need to be relocated elsewhere within MSA 1; however, an exact location has not been determined at this time. The existing MSA 1 ESQD arc(s) would be expanded approximately 400 ft (122 m) to the north to accommodate the new munitions storage facilities (Figure 2.4-2).

#### 2.4.2.2 Munitions Storage Alternative 2

The proposed munitions storage magazines would be consolidated at one site that is located north of B Avenue (see Figure 2.4-2). The area of ground disturbance including a buffer is estimated to be 2.3 ac (0.9 ha). The existing MSA 1 ESQD arc(s) would be expanded approximately 1,100 ft (330 m) the north to accommodate the new munitions storage facilities (Figure 2.4-2).

#### 2.4.2.3 Munitions Storage Alternative 3

The proposed 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 2.3 ac (0.9 ha). The existing MSA 1 ESQD arc(s) would be expanded approximately 200 ft (60 m) the south to accommodate the new munitions storage (Figure 2.4-2).


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
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Existing Building
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Existing Munitions Storage Magazines
Notional Location THAAD & PATRIOT ECMs
Alternative 1
Alternative 2
Alternative 3
N
W
E
S
Feet
0
625
1,250
0
170
340
Meters
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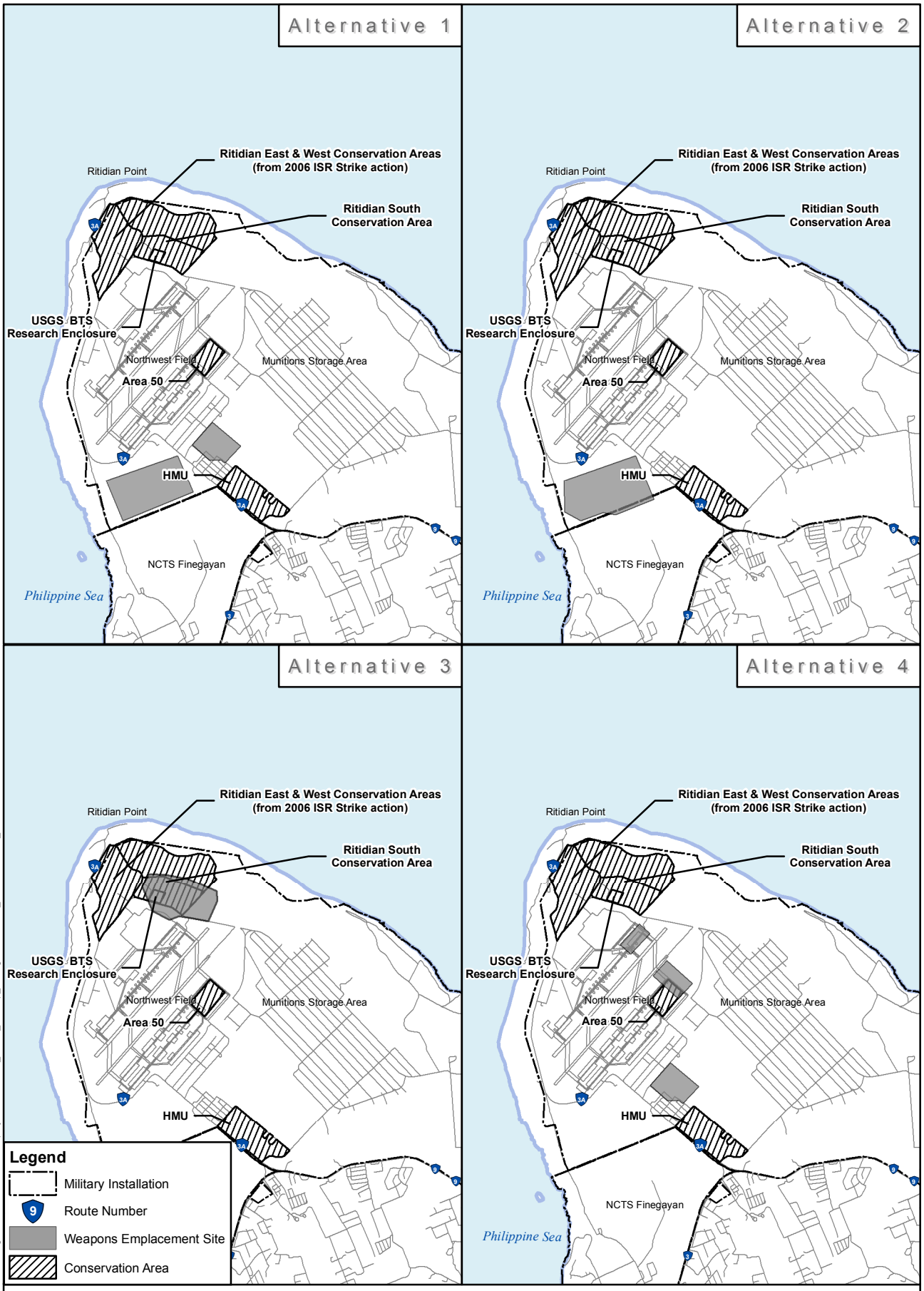


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**Figure 2.4-3**
**Army AMDTF Weapons Emplacement Alternatives in the Classified Appendix**

### 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. The Weapons Emplacement Sites would be constructed to accommodate THAAD and Patriot launcher operations. Associated facilities would include hardstands, readiness buildings, missile and launcher facilities, and inclement weather storage. The Avenger/SLAMRAAM operations are mobile units. 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.

#### 2.4.3.1 Weapons Emplacement Alternative 1

This alternative consists of two general areas south of Andersen AFB Northwest Field (NWF) totaling 368 acres (149 ha).

#### 2.4.3.2 Weapons Emplacement Alternative 2

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

#### 2.4.3.3 Weapons Emplacement Alternative 3

This alternative consists of one general area north of NWF totaling 228 acres (92 ha).

#### 2.4.3.4 Weapons Emplacement Alternative 4 (Preferred Alternative)

This alternative was selected as the preferred alternative for the following reasons: it is compatible with proposed Marine Corps activities (refer to Volume 2) and existing Air Force activities at Andersen AFB, it (along with Alternative 3) has the least potential EMI conflicts (Defense Information Systems Agency, Joint Spectrum Center 2009), it involves the least amount of vegetation removal in identified recovery habitat for threatened and endangered wildlife species, and it involves the least amount of construction in previously undisturbed areas. The Classified Appendix (Appendix L) has additional details on the alternatives analysis methodology.

Alternative 4 consists of three general areas (two sites at the northern tip of NWF and one site south of NWF) 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 geological 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 proposed 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 (EIS).

Light Detection and Ranging (LIDAR) Contour Data was used to identify potential sinkholes on proposed sites. 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

- Impervious surface increase resulting in increased soil erosion
- Vehicle movements on unpaved surfaces resulting in increased soil erosion and compaction
- Troop movements on unpaved surfaces resulting in increased soil erosion
- Munitions impacts resulting in soil and subsurface contamination
- Fires resulting in reduced vegetation and increased soil erosion

The potential effects of these activities and their significance within the areas of occurrence under the alternative actions are described below. The analysis of potential impacts to geology and soils considers both direct and indirect impacts. Such disturbance may cause increased erosion and loss of productive soil. Direct impacts result from physical soil disturbances or topographic alterations, while indirect impacts include risks to individuals from geologic hazards, as well as impacts to water or marine biological resources away from the construction/operation site. Factors considered in determining whether an impact would be significant include the potential for substantial change in soil or slope stability. An impact to geological 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.

Many effects are associated with the training operations activities. Increases in runoff due to the removal of ground cover may increase sedimentation. Siltation and formation of sediment plumes and heavy metals and hazardous materials may be leached from munitions and explosives of concern.

Indirect groundwater impacts associated with the construction and operational activities include direct contamination of groundwater resources through percolation from surface runoff. Stormwater runoff can contribute to groundwater contamination. Water impacts are addressed in Chapter 4.

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, Chapter 10, Terrestrial Biological Resources, and Chapter 11, Marine 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).

An Environmental Protection Plan (EPP) is required for projects at the discretion of the GEPA Administrator**.** EPPs are specifically identified in 22 Guam Annotated Regulations, Division II, Chapter 10, Section 10103.C.5 (d). EPPs would include nonpoint source control management measures including erosion and sedimentation control, vegetation, wildlife resource protection measures, fugitive dust control, solid and hazardous waste management and disposal procedures, nutrient management plan, integrated pest management strategy/plan, confined animal facilities management plan, irrigation water management plan, personnel safety procedures, work site maintenance, and typhoon contingency plans, as necessary, depending on the work, project, activity and facility function.

Seismic, liquefaction, and ground shaking are reduced by following Unified Facilities Criteria (UFC) 3-31-04 (U.S. Army Corps of Engineers [USACE] 2007), that provides the Department of Defense (DoD) requirements for:

- Earthquake-resistant design for new buildings
- Evaluating and rehabilitating existing buildings for earthquake resistance
- Guidance on applying seismic design principles to specialized structural and non-structural elements

The new UFC adopts the seismic design provisions of the 2003 *International Building Code* for use in DoD building design.

#### 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 by regulatory standards. An impact to geological resources would be considered significant if the proposed action would have the potential to disrupt geologic features, or if the proposed action would be affected by potential geologic hazards. To be considered a significant impact, the following factors are considered for each project area:

- Any increase in rate of erosion and soil loss from physical disturbance
- Reduced amounts of productive soils
- Alteration of surrounding landscape and effect on important geologic features (including soil or rock removal that would adversely affect site drainage)
- Diminished slope stability
- Increased vulnerability to a geologic hazard (e.g., seismic activity, tsunami, 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)

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.* 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. Construction SOPs would include requirements for stormwater compliance and Best Management Practices (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. Indirect impacts to geological resources, water resources, and marine biological resources from soil erosion would be prevented by implementation of BMPs. Therefore, Alternative 1 impacts to soil erosion, compaction, and loss of agriculturally productive soil would be less than significant.

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, changes to the landscape associated with Alternative 1 would result in less than significant impacts to unique geological resources.

There are at least ten sinkholes in the vicinity of the proposed Main Cantonment area. Known sinkholes in the Army AMDTF project area would be avoided and a buffer zone of vegetation would be left around all sinkholes as a proposed mitigation measure to prevent further erosion or expansion. As a result of the proposed mitigation, these sinkholes would not be affected by construction activities. A survey by a licensed geologist is required prior to construction to ensure that all sinkholes have been identified. If additional sinkholes are discovered, significant impacts to these sinkholes would be determined and projects would be designed in consideration of these sinkholes as appropriate. Any known sinkholes, along with any others found in proximity to the planned headquarters/housing area that are deemed hazardous would be fenced off and signs put in place to warn of the potential danger. With the proposed mitigation, 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. Sinkholes that are deemed to be hazardous would be avoided and a buffer zone of vegetation would be left around all sinkholes as a proposed mitigation measure to prevent further erosion or expansion, with fences 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, with proposed mitigation, Alternative 1 would result in less than significant impacts to unique geological resources and it would not result in erosion or compaction.

NCTS Finegayan is located in a potentially active seismic zone. 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. Hazards associated with earthquakes and fault ruptures would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings

(USACE 2007). 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. Indirect impacts to geological resources, water resources, and marine biological resources from soil erosion would be prevented by implementation of BMPs. 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, changes to the landscape associated with Alternative 1 would result in less than significant impacts to unique geological resources.

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 geological resources and it would not result in erosion or compaction.

South Finegayan is located in a potentially active seismic zone. 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. Hazards associated with earthquakes and South fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). 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 Proposed Mitigation Measures

Known sinkholes would be avoided and a buffer zone of vegetation would be left around them as a mitigation measure to prevent further erosion or expansion. As a result of mitigation, the sinkholes would not be affected by construction activities. A survey by a licensed geologist would be required prior to construction to ensure that all sinkholes have been identified. If additional sinkholes are discovered, significant impacts to these sinkholes would be determined and projects would be designed in consideration of these sinkholes as appropriate. Any known sinkholes, along with any others found, that are deemed hazardous would be fenced off and signs put in place to warn of the potential danger. With the proposed mitigation, less than significant impacts would occur.

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 Navy Barrigada is shown in Table 3.2-1.

Soil types disturbed would not be agriculturally productive soils. 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. Indirect impacts to geological resources, water resources, and marine biological resources from soil erosion would be prevented by implementation of BMPs. Therefore, Alternative 2 impacts to soil erosion, compaction, and loss of agriculturally productive soil would be less than significant.

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. There are no known sinkholes at Navy Barrigada. Therefore, changes to the landscape associated with Alternative 2 would result in less than significant impacts to unique geological resources.

Navy Barrigada is located in a potentially active seismic zone; however, there are no known bedrock faults in Navy Barrigada. The predominant limestone bedrock is not vulnerable to liquefaction. The Alternative 2 proposed developments would be located on a relatively level plateau that would not be subject to slope instability. During project design and construction, 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 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 geological resources and would not result in significant erosion or compaction.

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. 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 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 Proposed Mitigation Measures

Because 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. During the operations phase of the proposed action, BMPs such as sound stormwater management practices would minimize impacts to these resources.

#### 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 impacts for NCTS Finegayan would be the same as those for Alternative 1.

*Operation.* The impacts for NCTS Finegayan would be the same as those for Alternative 1.

*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 impacts would be the same as those for Alternative 2 at Navy Barrigada.

*Operation.* Impacts would be the same as those for Alternative 2 at Navy Barrigada.

*Air Force Barrigada*

*Construction.* The proposed Alternative 3 at Air Force 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.

Soil types disturbed would not be agriculturally productive soils. 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. Indirect impacts to geological resources, water resources, and marine biological resources from soil erosion would be prevented by implementation of BMPs. Therefore, Alternative 3 impacts to soil erosion, compaction, and loss of agriculturally productive soil would be less than significant.

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. There are no known sinkholes at Air Force Barrigada. Therefore, changes to the landscape associated with Alternative 3 would result in less than significant impacts to unique geological resources.

Air Force Barrigada is located in a potentially active seismic zone. However, there are no known bedrock faults at Air Force Barrigada. The predominant limestone bedrock is not vulnerable to liquefaction. The Alternative 3 proposed developments would be located on a relatively level plateau that would not be subject to slope instability. During project design and construction, 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 3. The topography is level, thus slope stability would not be diminished. There are no known sinkholes at Air

Force Barrigada. 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 geological resources and would not result in significant erosion or compaction.

Although Air Force Barrigada is located in a potentially active seismic zone, the Alternative 3 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. Hazards associated with earthquakes and fault rupture would be minimized during project design and construction by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007); therefore, Alternative 3 would result in less than significant impacts associated with geologic hazards.

Alternative 3 Proposed Mitigation Measures

Known sinkholes at NCTS Finegayan would be avoided and a buffer zone of vegetation would be left around them as a mitigation measure to prevent further erosion or expansion. As a result of proposed mitigation, the sinkholes would not be affected by construction activities. A survey by a licensed geologist would be required prior to construction to ensure that all sinkholes have been identified. If additional sinkholes are discovered, significant impacts to these sinkholes would be determined and projects would be designed in consideration of these sinkholes as appropriate. Any known sinkholes, along with any others found, that are deemed hazardous would be fenced off and signs put in place to warn of the potential danger. With proposed mitigation, less than significant impacts would occur.

### 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 2.4-2). Proposed construction would disturb 6.6 ac (2.7 ha) of soil during construction. Erosion potential for soils found at Andersen Air Force Base (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 SOPs would be implemented to minimize impacts.

Soil types disturbed near the HMU during construction of the munitions storage facilities 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 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. Indirect impacts to geological resources, water resources, and marine biological resources from soil erosion would be prevented by implementation of BMPs. 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, demolition of existing road pavement, earthwork, and planting vegetation. Temporary loss of vegetation would occur; however, replanting and ground maintenance would promote regrowth. Therefore, changes to the landscape associated with Alternative 1 would result in less than significant impacts to unique geological resources.

Sinkholes are common in Northern Guam. Known sinkholes would be avoided and a buffer zone of vegetation would be left around all sinkholes as a mitigation measure to prevent further erosion or expansion. As a result of mitigation, the sinkholes would not be affected by construction activities. A survey by a licensed geologist would be required prior to construction to ensure that all sinkholes have been identified. If additional sinkholes are discovered, significant impacts to these sinkholes would be determined and projects would be designed in consideration of these sinkholes as appropriate. Any known sinkholes, along with any others found, that are deemed hazardous would be fenced off and signs put in place to warn of the potential danger. With proposed mitigation, less than significant impacts are expected.

Andersen AFB is located in a potentially active seismic zone. The predominant limestone bedrock is not vulnerable to liquefaction. The Alternative 1 proposed magazine construction would be located on a relatively level plateau that would not be subject to slope instability. During project design and construction, hazards associated with earthquakes and fault rupture would be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007) and applicable military requirements for munitions storage facilities. 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 because 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 earth-covered magazines and would be maintained (e.g., periodically mowed) to minimize fire hazard. Storage operations would not directly or indirectly 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 3.2-1. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3**

| *Alternative 1* | *Alternative 2* | *Alternative 3* |
|---|---|---|
| **Construction** | | |
| LSI<br>• Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings<br>• Less than significant impacts to topography and slope stability<br>• Less than significant impacts to soil erosion and compaction through use of construction SOPs and BMPs | LSI<br>• The impacts would be the same as for Alternative 1; additionally impacts to sinkholes would be less than significant as there are no known sinkholes at Navy Barrigada | LSI<br>• The impacts would be the same as for Alternative 1 |
| SI-M<br>• Potential for erosion of sinkholes and/or collapse of unstable karst bedrock. With proposed mitigation, less than significant impacts to sinkholes would occur under Alternative 1 | | SI-M<br>• The impacts would be the same as for Alternative 1 |
| **Operation** | | |
| LSI<br>• Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings<br>• Less than significant impacts to topography and slope stability<br>• Less than significant impacts to soil erosion and compaction | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 |
| SI-M<br>• Potential for erosion of sinkholes and/or collapse of unstable karst bedrock. With proposed mitigation, less than significant impacts to sinkholes would occur under Alternative | | SI-M<br>• The impacts would be the same as for Alternative 1 |

*Legend:* LSI = Less than significant impact; SI-M = Significant impact mitigable to less than significant

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

| *Alternative 1* | *Alternative 2* | *Alternative 3* |
|---|---|---|
| **Construction** | | |
| LSI<br>• Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings and applicable military requirements for munitions storage facilities<br>• Less than significant impacts to topography and slope stability<br>• Less than significant impacts to soil erosion and compaction through use of construction SOPs and BMPs | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 |
| SI-M<br>• Potential for erosion of sinkholes and/or collapse of unstable karst bedrock. With proposed mitigation, less than significant impacts to sinkholes would occur under Alternative 1 | SI-M<br>• The impacts would be the same as for Alternative 1 | SI-M<br>• 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<br>• Less than significant impacts topography and slope stability<br>• Less than significant impacts to soil erosion and compaction | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 |

*Legend:* LSI = Less than significant impact; SI-M = Significant impact mitigable to less than significant

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

| *Alternative 1* | *Alternative 2* | *Alternative 3* | *Alternative 4* |
|---|---|---|---|
| **Construction** | | | |
| LSI<br>• Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings and applicable military requirements for munitions storage facilities<br>• Less than significant impacts to topography and slope stability<br>• Less than significant impacts to soil erosion and compaction through use of construction SOPs and BMPs | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 |
| **Operation** | | | |
| LSI<br>• Less than significant impacts due to seismic hazards through adherence to UFC 3-310-04 Seismic Design for Buildings<br>• Less than significant impacts topography and slope stability<br>• Less than significant impacts to soil erosion and compaction | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• 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. There are at least ten sinkholes in the vicinity of the proposed Main Cantonment area. Sinkholes are also common in northern Guam in the areas proposed for the munitions storage areas. Known sinkholes would be avoided and a buffer zone of vegetation would be left around all sinkholes as a proposed mitigation measure to prevent further erosion or expansion. A survey by a licensed geologist would be required prior to construction of Headquarters/Housing Alternatives 1 and 3, and the munitions storage areas, to ensure that all sinkholes have been identified. If additional sinkholes are discovered, significant impacts to these sinkholes would be determined and projects would be designed in consideration of these sinkholes as appropriate. Any known sinkholes, along with any others found, that are deemed hazardous would be fenced off and signs put in place to warn of the potential danger. Through the use of proposed mitigation measures, the sinkholes would not be affected by construction activities of Headquarters/Housing Alternatives 1 and 3, or by the construction associated with the munitions storage area alternatives and the

weapons emplacement sites. There are no known sinkholes in the location of Headquarters/Housing Alternative 2. Therefore, changes to the landscape and topography associated with the proposed action would result in less than significant impacts to unique geological resources.

Andersen AFB, Finegayan, 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). In addition, munitions storage areas and the weapons emplacement sites would be constructed in accordance with applicable military requirements. These measures would result in less than significant impacts associated with geologic hazards.

Soil types disturbed during construction of the headquarters/housing facilities, munitions storage areas, and weapons emplacement sites at would not be agriculturally productive soils. Construction SOPs would be followed to minimize soil erosion. Indirect impacts to geological resources, water resources, and marine biological resources from soil erosion would be prevented by implementation of BMPs. Replanting and ground maintenance would promote regrowth of vegetation; therefore, changes to the landscape associated with the constructing the munitions storage facilities would result in less than significant impacts to unique geological resources.

Operation

Topography and landscape features would not be changed substantively by the proposed action. Operational activities associated with the Headquarters/Housing Alternatives would be residential/recreational and administrative and would not involve activities such as excavation that would have a potential to diminish slope stability. For Headquarters/Housing Alternatives 1 and 3, the action area is located in an area with karst geologic features that are of concern for the operation of these facilities. Under either of those alternatives operations would not occur over unstable karst features. If deemed hazardous, any sinkholes found in the headquarters/housing area would be fenced off and signs put in place to warn of the potential danger. With proposed mitigation, less than significant impacts relative to sinkholes are expected. Headquarters/Housing activities would not disturb or compact soil or cause an increase in soil erosion. Therefore, the proposed action would result in less than significant impacts due to erosion, compaction, or changes to unique geological resources.

Andersen AFB, Finegayan, 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) and applicable military requirements for munitions storage facilities. This 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 earth-covered magazines and would be maintained (e.g., periodically mowed) to minimize fire hazard. Munitions storage operations would be minimal and 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 Proposed Mitigation Measures

Table 3.2-5 summarizes the proposed mitigation measures.

**Table 3.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Topography** | | |
| • None | • None | • None |
| **Geology** | | |
| • Known sinkholes would be avoided and a buffer zone of vegetation would be left around them to prevent further erosion or expansion. Any sinkholes discovered would be evaluated to determine significant impacts and projects would be designed in consideration of these sinkholes as appropriate. With proposed mitigation, less than significant impacts to sinkholes would occur. | • The mitigation measures would be the same as those proposed for the Headquarters/ Housing Alternatives | • None |
| **Geologic Hazards** | | |
| • None | • None | • None |

Adaptive program management of construction is another mitigation measure intended for implementation by DoD to potentially reduce and avoid environmental impacts associated with the proposed expansion of the military mission on Guam overall. Adaptive program management of construction (reducing the number of concurrent construction projects) would reduce concurrent disturbance of soil and topography and therefore lessen the amount of erosion resulting from construction at a given time.

# CHAPTER 4. WATER RESOURCES

## 4.1 INTRODUCTION

Water resources as defined in this Environmental Impact Statement (EIS) 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 on Guam. Consistent with the definition contained in 22 Guam Administrative Regulations 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 Facilities Criteria 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 DoD policy in response to recent executive orders and acts (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. The potential for impacts to groundwater quality was assessed by examining the 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 as a result of the proposed action. The groundwater quality impact analysis was performed by comparing existing groundwater quality data with possible increases in water quality contaminants in 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. Saltwater intrusion can also occur if over-pumping the water supply wells draws seawater into the aquifer.

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 training sites.

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 any 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:

- The impact of the proposed action upon water quality with respect to public health requirements, drinking water regulations, and applicable water quality standards.
- The estimated 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.

- Bulldozing jungles during construction 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.
- Identifying 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 temporary increases in stormwater runoff, erosion, and sedimentation, a Construction General Permit (CGP) would be obtained and followed and a Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implemented in accordance with construction NPDES permitting program. The SWPPP would identify site-specific Best Management Practices (BMPs) (Volume 2, Chapter 4, Table 4.2-1) that would be implemented as part of Alternative 1 to reduce the potential for erosion, runoff, sedimentation, and subsequent water quality impacts. No buildings/structures would be constructed in the 100-year flood zone; however, some stormwater detention basins could be constructed in the 100-year flood zone. In some of these areas, these open, grassed stormwater detention basins could also be utilized for additional uses, for example, as recreational fields. 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 Northern Guam Lens Aquifer (NGLA) groundwater. By adhering to the provisions of the CGP and implementing BMPs associated with the site- and activity-specific water resource protection needs through BMPs, such as protection of sinkholes and proper storage of hazardous materials, stormwater pollutant loading potential would be minimized and protect 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 fronting Haputo Beach, and 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 for impacting nearshore water quality. However, by adhering to the provisions of the CGP and all applicable orders, laws, and

regulations relating to water quality and implementing BMPs associated with site- and project-specific BMPs, pollutant loading to surface runoff would be reduced and potential indirect impacts to nearshore waters would be subsequently lessened. 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. Existing stormwater infrastructure or stormwater infrastructure improvements included as part of the proposed action would incorporate LID measures and post-construction BMPs to ensure stormwater retention would be consistent with local and federal requirements and thus minimize potential impacts to surface water quality. 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 goal of LID is to closely match the post-development topography and stormwater runoff hydrology to the pre-development conditions. 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 by removing pollutants prior to infiltrating to the underlying aquifer. LID designs focus on small scale, close to the source stormwater management, where such techniques can achieve the water quality goals. As indicated in Volume 2, Chapter 4, Table 4.2-2, IMPs utilized by LID 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- and post-development 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 Draft Comprehensive Drainage and Low Impact Development Implementation Study prepared for the potential Main Cantonment site at Finegayan provides design recommendations for capturing,

treating, and routing the 95% exceedance stormwater flows (NAVFAC Pacific 2010). For storms greater than the 95% exceedance storm and up to the 50-year, 24-hour storm event, stormwater would travel through IMP/BMP treatment trains before being directed to underground and open-air detention basins that would allow infiltration to groundwater. For each subbasin, water quality treatment strategies were selected based on the effectiveness of IMPs/BMPs to treat identified pollutants of concern from proposed land uses within that subbasin. The selected water quality treatment strategies resulted in estimated total suspended solids (TSS) reductions of 83.7% to 90.3%, total phosphorous reductions of 9.4% to 49.9%, and total nitrogen reductions of 11.2% to 62.6% for the representative subbasins (NAVFAC Pacific 2010). These results illustrate that use of IMPs/BMPs can achieve significant reductions to non-point source pollutant loads. The combination of LID technologies and compliance with federal and GovGuam regulations would ensure less than significant 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 levels of 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 stormwater management plans (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 Spill Prevention, Control and Countermeasure (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 surface 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. Specifically, implementation of LID measures and the provisions of the SWPPP and associated erosion control activities would ensure that the surface water flowing into the groundwater recharge wells and infiltration basins would be of acceptable quality and therefore, would reduce the pollutant loading potential 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. Chloride concentrations in the subbasins would be carefully monitored to detect possible saltwater intrusion into the aquifer. If unacceptable chloride concentrations are detected, there is capability to shift

pumping to wells further from impacted subbasins. Thus, any potential negative impacts on the groundwater resource from increased pumping would be reduced. 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 also monitored; if 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 effects 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 following surface water protection measures identified in the surface water section above and by complying with all applicable orders, laws, and regulations. In addition, the planning process would be conducted in conjunction with the Watershed Planning 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 temporary increases, a CGP would be obtained and followed and a SWPPP would be prepared and implemented. The SWPPP would identify site-specific BMPs (Volume 2, Chapter 4, Table 4.2-1) that would be implemented as part of Alternative 1 to reduce the potential for erosion, runoff, sedimentation, and subsequent water quality impacts. No buildings/structures would be constructed in the 100-year flood zone; however, some stormwater detention basins could be constructed in the 100-year flood zone. In some of these areas, these open, grassed stormwater detention basins could also be utilized for additional uses, for example, as recreational fields. 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. By adhering to the provisions of the CGP and implementing BMPs associated with the site- and activity-specific water resource protection needs through BMPs, such as protection of sinkholes and proper storage of hazardous materials, stormwater pollutant loading potential would be minimized and protect 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. However, by adhering to the provisions of the CGP and applicable orders, laws, and regulations relating to water quality and

implementing BMPs associated with site and project specific water resource protection needs, pollutant loading to surface runoff would be reduced and potential indirect impacts to nearshore waters would be subsequently lessened. 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. However, existing stormwater infrastructure or stormwater infrastructure improvements included as part of the proposed action would incorporate LID measures and BMPs to ensure stormwater retention would be consistent with local and federal requirements and thus minimize potential impacts to surface water quality. Stormwater flow paths would continue to mimic area topography. Examples of stormwater infrastructure LID measures are described below.

Alternative 1 at South Finegayan would incorporate 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 follow the surface water protection measures identified above in the surface water section, which would serve to protect groundwater quality. Specifically, implementation of LID measures, and the provisions of the SWPPP and associated erosion control activities, as well as compliance with compliance with federal and GovGuam regulations would ensure that the surface water flowing into the groundwater recharge wells and infiltration basins would be of acceptable quality.

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 effects 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 following surface water protection measures identified in the surface water section above and 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 Proposed Mitigation Measures

Through implementation of the BMPs and Standard Operating Procedures (SOPs) discussed above in Section 4.2.2.1, impacts to water resources would be less than significant. Note that BMPs and SOPs are not considered "mitigation measures," so there are no mitigation measures proposed 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 temporary increases, a CGP would be obtained and followed and a SWPPP would be prepared and implemented. The SWPPP would identify site-specific BMPs (Volume 2, Chapter 4, Table 4.2-1) that would be implemented as part of Alternative 2 to reduce the potential for erosion, runoff, sedimentation, and subsequent water quality impacts. No buildings/structures would be constructed in the 100-year flood zone; however, some stormwater detention basins could be constructed in the 100-year flood zone. In some of these areas, these open, grassed stormwater detention basins could also be utilized for additional uses, for example, as recreational

fields. 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. By adhering to the provisions of the CGP and implementing site and project specific BMPs associated water resource protection needs, such as protection of sinkholes and proper storage of hazardous materials, stormwater pollutant loading potential would be minimized and protect 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 of this classification, Alternative 2 has the potential for impacting nearshore water quality. However, by adhering to the provisions of the CGP and all applicable orders, laws, and regulations relating to water quality and implementing BMPs associated with site and project-specific water resource protection needs, pollutant loading to surface runoff would be reduced and potential indirect impacts to nearshore waters would be subsequently lessened. 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 cause minor increase in impervious area, which would result in an associated relatively minor increase in stormwater discharge intensities and volume. Existing stormwater infrastructure or stormwater infrastructure improvements included as part of the proposed action would incorporate LID measures and BMPs to ensure stormwater retention would be consistent with local and federal requirements and thus minimize potential impacts to surface water quality. Stormwater flow paths would continue to mimic area topography. Examples of stormwater infrastructure LID measures are described below.

Alternative 2 at Navy Barrigada would incorporate 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 follow the surface water protection measures identified above in the surface water section, which would serve to protect groundwater quality. Specifically, implementation of LID measures, and the provisions of the SWPPP and associated erosion control activities, as well as compliance with compliance with federal and GovGuam regulations would

ensure that the surface water flowing into the groundwater recharge wells and infiltration basins would be of acceptable 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. Chloride concentrations in the subbasins would be carefully monitored to detect possible saltwater intrusion into the aquifer. If unacceptable chloride concentrations are detected, there is capability to shift pumping to wells further from impacted subbasins. Thus, any potential negative impacts on the groundwater resource from increased pumping would be reduced. 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 also monitored; if 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 effects 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 following surface water protection measures identified in the surface water section above and 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 Proposed Mitigation Measures

Through implementation of the BMPs and SOPs discussed above in Section 4.2.2.1, impacts to water resources would be less than significant. Note that BMPs and SOPs are not considered "mitigation measures," so there are no mitigation measures proposed 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 temporary increases, a CGP would be obtained and followed and a SWPPP would be prepared and implemented. The SWPPP would identify construction-specific BMPs (Volume 2, Chapter 4, Table 4.2-1) that would be implemented as part of Alternative 3 to reduce the potential for erosion, runoff, sedimentation, and subsequent water quality impacts. No buildings/structures would be constructed in the 100-year flood zone; however, some stormwater detention basins could be constructed in the 100-year flood zone. In some of these areas, these open, grassed stormwater detention basins could also be utilized for additional uses, for example, as

recreational fields. 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. By adhering to the provisions of the CGP and implementing site and project specific BMPs associated water resource protection needs, such as protection of sinkholes and proper storage of hazardous materials, stormwater pollutant loading potential would be minimized and protect 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 more than 0.5 miles (0.8 kilometers) from the coastline. However, the entire island of Guam is classified as a coastal zone under the CZMA. As a result of this classification, Alternative 3 at Air Force Barrigada could potentially indirectly impact nearshore water resources. However, by adhering to the provisions of the CGP and all applicable orders, laws, and regulations relating to water quality and implementing BMPs associated with addressing site and project-specific water resource protection needs, pollutant loading to surface runoff would be reduced and potential indirect impacts to nearshore waters would be subsequently lessened. Therefore, construction activities associated with Alternative 3 at Air Force Barrigada would result in less than significant impacts to nearshore waters.

*Wetlands.* Implementation of Alternative 3 would result in direct impacts to 2.4 ac (1.0 ha) of potentially jurisdictional wetland areas (Volume 2, Chapter 4, Figure 4.2-5). If the wetland areas identified at Air Force Barrigada are determined jurisdictional by the USACE, and therefore subject to Section 404 requirements, the DoD would first attempt to avoid impacts. If avoidance is not possible, then the DoD would obtain a permit from the USACE to fill the wetlands and comply with mitigation measures outlined in the permit. During construction, potential indirect effects to other nearby down-gradient wetland areas (i.e., Wetland Areas B-02 and B-03) would be minimized by adhering to the provisions of the CGP and implementing BMPs (see Volume 2, Chapter 4, Table 4.2-1) associated with addressing site- and activity-specific water resource protection needs. Therefore, with implementation of the mitigation measures identified below, construction activities associated with Alternative 3 would result in less than significant impacts to wetlands.

Operation

*Surface Water/Stormwater.* The operations under Alternative 3 at Air Force Barrigada would cause minor increases in impervious areas that would result in an associated relatively minor increase in stormwater discharge intensities and volume. Existing stormwater infrastructure or stormwater infrastructure improvements included as part of the proposed action would incorporate LID measures and BMPs to ensure stormwater retention would be consistent with local and federal requirements and thus minimize potential impacts to surface water quality. 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 incorporate LID into the final planning, design, and permitting of the stormwater runoff and drainage design, as described in detail in Section 4.2.1.1. 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 follow the surface water protection measures identified above in the surface water section, which would serve to protect groundwater quality. Specifically, implementation of LID measures, and the provisions of the SWPPP and associated erosion control activities, as well as compliance with compliance with federal and GovGuam regulations would ensure that the surface water flowing into the groundwater recharge wells and infiltration basins would be of acceptable 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 effects 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 following surface water protection measures identified in the surface water section above and 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 following construction, 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 Proposed Mitigation Measures

If the wetland areas identified at Air Force Barrigada are determined jurisdictional by the USACE, and therefore subject to Section 404 requirements, the DoD would first attempt to avoid impacts. If avoidance is not possible, then the DoD would obtain a permit from the USACE to fill the wetlands. The DoD would minimize potential impacts and unavoidable impacts would be mitigated by creating new wetlands, restoring or enhancing existing wetlands or preserving existing wetland areas on Guam to, at a minimum, replace the area filled. If this alternative is chosen, the Navy understands that a LEDPA determination must be made as part of the permitting process.

### 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 Munitions Storage Area 1 on Andersen AFB in the northern portion of Guam: Alternatives 1, 2, and 3 (refer to Chapter 2, Figure 2.4-2). Natural conditions influencing water resources, such as rainfall, topography, surface drainage, soil and bedrock and porosity, and groundwater flow are similar at all three alternative locations. Therefore, potential impacts from implementing Alternatives 1, 2, or 3 would be nearly identical. 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 temporary increases, a CGP would be obtained and followed and a SWPPP would be prepared and implemented. The SWPPP would identify construction-specific BMPs (Volume 2, Chapter 4, Table 4.2-1) that would be implemented as part of Alternative 2 to reduce the potential for erosion, runoff, sedimentation, and subsequent water quality impacts. No buildings/structures would be constructed in the 100-year flood zone; however, some stormwater detention basins could be constructed in the 100-year flood zone. In some of these areas, these open, grassed stormwater detention basins could also be utilized for additional uses, for example, as recreational fields. Therefore, construction activities associated with Alternative 1 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 NGLA groundwater. By adhering to the provisions of the CGP and implementing BMPs associated with addressing site and project-specific water resource protection needs, there would be a reduction in stormwater pollutant loading potential and thus a reduction in pollution loading potential to the underlying groundwater subbasins. Therefore, construction activities associated with Alternative 1 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 CZMA. Due this classification, Alternative 1 has the potential to indirectly impact nearshore water resources. However, by adhering to the provisions of the CGP and all applicable orders, laws, and regulations relating to water quality and implementing BMPs associated with site and project-specific water resource protection needs, pollutant loading to surface runoff would be reduced and potential indirect impacts to nearshore waters would be subsequently lessened. Therefore, construction activities associated with Alternative 1 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 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. Existing stormwater infrastructure or stormwater infrastructure improvements included as part of the proposed action would incorporate LID measures and BMPs to ensure stormwater retention would be

consistent with local and federal requirements and thus minimize potential impacts to surface water quality. 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) SWPPP, SWMP, and SPCC 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 Joint Region 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 at Andersen AFB would result in less than significant impacts to surface water.

*Groundwater*

Under Alternative 1, operations would be in compliance with the surface water protection measures identified in the surface water section above during operation, which would therefore also protect the quality of the underlying NGLA groundwater. Specifically, implementation of LID measures and the provisions of the SWPPP and associated erosion control activities would ensure that the surface water flowing into the groundwater recharge wells and infiltration basins would be of acceptable quality. Therefore, operations associated with Alternative 1 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 effects 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 following surface water protection measures identified in the surface water section above and 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 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 at Andersen AFB would result in no impacts to wetlands.

Alternative 1 Proposed Mitigation Measures

Through implementation of the BMPs and SOPs discussed above, impacts to water resources would be less than significant. Note that BMPs and SOPs are not considered "mitigation measures," so there are no mitigation measures proposed for Alternative 1.

#### 4.2.3.2 Munitions Storage Alternative 2

Alternative 2 Proposed Mitigation Measures

*Andersen AFB*

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

Through implementation of the BMPs and SOPs discussed above in Section 4.2.3.1, impacts to water resources would be less than significant. Note that BMPs and SOPs are not considered "mitigation measures," so there are no mitigation measures proposed for Alternative 2.

#### 4.2.3.3 Munitions Storage Alternative 3

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

Alternative 3 Proposed Mitigation Measures

Through implementation of the BMPs and SOPs discussed above in Section 4.2.3.1, impacts to water resources would be less than significant. Note that BMPs and SOPs are not considered "mitigation measures," so there are no mitigation measures proposed for 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 Army 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 Army 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 Army 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 Army 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 Army 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 Army 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 Army 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 and therefore, are monitored by federal and Guam agencies to protect wetland areas. Not constructing the Army AMTDF on Guam would not 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<br>• Temporary increase in stormwater runoff, erosion, and sedimentation minimized through use of CGP, SWPPP, and construction and roadway specific BMPs<br>GW: LSI<br>• Increased potential for NGLA groundwater contamination<br>NW: LSI<br>• Minor increase in runoff volume and pollutant loading potential<br>WL: NI<br>• There would be no impacts to wetlands | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>NW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 1 | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>NW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: SI-M<br>• Direct impact (fill) of 2.4 ac (1.0 ha) potentially jurisdictional wetland areas |
| **Operation** | | |
| SW: LSI<br>• Increase in stormwater volume and intensity and potential for non-point source pollution minimized through use of LID, SWPPP, SWMP, and SPCC Plan<br>GW: LSI<br>• Increased potential for local groundwater contamination; increase in annual groundwater withdrawal of 0.30 MGd (1.14 mld)<br>NW: LSI<br>• Minor increase in runoff volume and pollutant loading potential<br>WL: NI<br>• There would be no impacts to wetlands | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>NW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 1 | SW: LSI<br>• The impacts would be the same as for Alternative 1<br>GW: LSI<br>• The impacts would be the same as for Alternative 1<br>NW: LSI<br>• The impacts would be the same as for Alternative 1<br>WL: NI<br>• The impacts would be the same as for Alternative 1 |

*Legend:* LSI = Less than significant impact; NI = No impact; SI-M = Significant impact mitigable to less than significant; 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<br>• Temporary increase in stormwater runoff, erosion, and sedimentation minimized through use of CGP, SWPPP, and construction and roadway specific BMPs<br>GW: LSI<br>• Increased potential for NGLA groundwater contamination<br>NW: LSI<br>• Minor increase in runoff volume and pollutant loading potential<br>WL: NI<br>• There would be no impacts to wetlands | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>NW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 1. | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>NW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 2 |
| **Operation** | | |
| SW: LSI<br>• Increase in stormwater volume and intensity and potential for non-point source pollution minimized through use of LID, SWPPP, SWMP, and SPCC Plan<br>GW: LSI<br>• Increased potential for NGLA groundwater contamination<br>NW: LSI<br>• Minor increase in runoff volume and pollutant loading potential<br>WL: NI<br>• There would be no impacts to wetlands | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>NW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 1. Additionally there would be no impacts to delineated wetlands | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>NW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 2 |

*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<br>• Temporary increase in stormwater runoff, erosion, and sedimentation minimized through use of CGP, SWPPP, and construction and roadway specific BMPs<br>GW: LSI<br>• Temporary increased potential for groundwater contamination due to proximity of proposed injection control wells would be minimized through use of construction BMPs<br>WL: NI<br>• There would be no impacts to wetlands | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: NI<br>• There would be no impacts to groundwater<br>WL: NI<br>• The impacts would be the same as Alternative 1 | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 1 | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | | |
| SW: LSI<br>• Increase in stormwater volume and intensity and potential for non-point source pollution minimized through use of LID, SWPPP, SWMP, and SPCC Plan<br>GW: LSI<br>• Increased potential for groundwater contamination due to proximity of proposed injection control wells would be minimized through use of a SWPPP<br>WL: NI<br>• There would be no impacts to wetlands | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• There would be no impacts to groundwater<br>WL: NI<br>• The impacts would be the same as Alternative 1 | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• The impacts would be the same as Alternative 1 | SW: LSI<br>• The impacts would be the same as Alternative 1<br>GW: LSI<br>• The impacts would be the same as Alternative 1<br>WL: NI<br>• 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; 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. However, a combination of CGP, SWPPPs, SWMPs, SPCCCs, BMPs (Volume 2, Chapter 4, Table 4.2-1 and Volume 7) LID measures, and monitoring plans would be implemented as a part of the proposed action to reduce the potential for erosion, runoff, sedimentation, and subsequent water quality impacts. 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 existing stormwater infrastructure or

stormwater infrastructure improvements, stormwater flow paths would continue to mimic area topography; therefore, there would be no increase in flooding risk. No buildings/structures would be constructed in the 100-year flood zone; however, some stormwater detention basins could be constructed in the 100-year flood zone. In some of these areas, these open, grassed stormwater detention basins could also be utilized for additional uses, for example, as recreational fields. 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 as a result of increased pumping. 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 Joint Region 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 proposed mitigation measures for each action alternative.

**Table 4.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Construction** | | |
| • Mitigation for Alternative 3 would compensate for the fill of the 2.4 ac (1.0 ha) potentially jurisdictional wetland areas by creating new wetlands or restoring, enhancing, or preserving existing wetland areas on Guam to, at a minimum, replace the area filled | • None Identified | • None Identified |
| **Operation** | | |
| • None Identified | • None Identified | • None Identified |

Volume 7, Chapter 2 describes two additional mitigation measures that could be applied to the proposed action overall: adaptive program management of construction and force flow reduction. Implementing either of these mitigation measures could further reduce impacts to water resources. Adaptive program management of construction (slowing the construction tempo) would decrease the amount of grading and ground disturbance occurring at one time and further reduce the potential for erosion and stormwater runoff. Force flow reduction may minimally reduce the impacts on surface and nearshore water by reducing the wastewater effluent discharged into the ocean.

## 4.3 LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE

This section focuses on compliance with the Section 404(b)(1) guidelines of the CWA. Specifically, Section 404(b)(1) of the CWA stipulates that no discharge of dredged or fill material into waters of the U.S., which include wetlands, shall be permitted if there is a practicable alternative which would have less

adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences. Furthermore, an alternative is considered practicable if it is available and capable of being implemented after taking into consideration cost, existing technology, and logistics in light of overall project purposes. Section 404 permitting is applicable to the proposed training actions on Tinian. Permitting decisions are based on guidelines ("404(b)(1) Guidelines") developed jointly with the USEPA that are now part of the Code of Federal Regulations (40 CFR 230). This analysis is to show that the screening and selection process used in the development of this EIS has identified the *least environmentally damaging practicable alternative* (LEDPA) consistent with the Section 404(b)(1) guidelines.

Since none of the three Munitions Storage Alternatives and four Weapons Emplacement 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 LEDPA for these components as defined in the CWA.

The discussion below provides a brief comparative summary of the three Headquarters/Housing Alternatives carried forward for analysis in this EIS and highlights the reasons why Alternatives 1 and 2 are considered the LEDPA. The Navy and the Army have determined that Alternative 1 is the preferred alternative for the proposed action. Alternative 1 is preferred because it is compatible with the Marine Corps preferred alternative, Alternative 2. Requirements for the facilities are addressed in the Marine Corps Main Cantonment component as the Army and Marine Corps would be sharing these facilities. Shared facilities would minimize impact from additional construction. The proposed action includes Administrative/HQ, maintenance operations, and housing facilities for unaccompanied and accompanied personnel.

Sections 2.4-1 of this Volume provide an overview of the background, planning criteria, proposed action elements, and alternatives. The overall purpose of the proposed actions is to relocate and site military forces within the Western Pacific Region based on U.S. policy, international agreements, and treaties.

### 4.3.1 Alternatives Comparison Summary

#### 4.3.1.1 Alternative 1 (Preferred)

Wetlands Differences

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

#### 4.3.1.2 Alternative 2

Wetlands Differences

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

#### 4.3.1.3 Alternative 3

Wetlands Differences

No wetlands are located in or near the construction or operations areas associated with Alternative 3 at NCTS Finegayan and Navy Barrigada. However, construction activities associated with Alternative 3 at Air Force Barrigada would result in direct impacts to 2.4 ac (1.0 ha) of potentially jurisdictional wetland

areas (Volume 2, Chapter 4, Figure 4.2-5). If the wetland areas identified at Air Force Barrigada are determined jurisdictional by the USACE, and therefore subject to Section 404 requirements, the DoD would first attempt to avoid impacts. If avoidance is not possible, then the DoD would obtain a permit from the USACE to fill the wetlands and comply with mitigation measures outlined in the permit. Therefore, with implementation of the mitigation measures identified in Section 4.2.2.3, construction activities associated with Alternative 3 would result in less than significant impacts to wetlands.

### 4.3.2 Conclusion

Based on the above discussion, Alternatives 1 and 2 are considered the LEDPA and as previously noted, Alternative 1 is the Marine Corps' preferred alternative. The environmental differences between Alternatives 1 and 2 are small; however, Alternative 3 would directly impact 2.4 ac (1.0 ha) of potentially jurisdictional wetland areas. Therefore, Alternatives 1 and 2 are the LEDPA.

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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 regions of influence (ROI) – North and Central – where air quality resources may be impacted by the Army Air and Missile Defense Task Force (AMDTF) component of the proposed action. A description of the air quality resources in the North and Central ROIs is provided in Section 5.1 of Volume 2 (Marine Corps Relocation – Guam), including a regulatory overview, stationary sources, mobile sources, ambient air quality modeling, climate, and greenhouse gas (GHG) emissions. GHGs are discussed cumulatively as carbon dioxide ($CO_2$) equivalent emissions at the global scale in Volume 7, Section 4.4, as the change in climate conditions caused by the burning of fossil fuels is a global effect, requiring that the air quality impact analysis be assessed on a global or regional scale, not at the local scale such as for an island.

## 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 $CO_2$ 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 (EIS) 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.

A maximum sulfur content of 0.5% was conservatively used to predict sulfur dioxide ($SO_2$) and particulate matter (PM) emissions for diesel-powered equipment and vehicles based on USEPA's Heavy-Duty Standards/Diesel Fuel Regulatory Impact Analysis (RIA) (USEPA 2000). Based on the RIA, data observed in 1992 shows that No. 2 diesel fuel imports actually had sulfur content ranging from 0.39% to 0.5%. Therefore, using the actual highest sulfur content observed in 1992 (0.5 %) for vehicles in this analysis is considered appropriate and conservative and is also coincident with the highest sulfur content fuel input available both in the NONROAD and Mobile6 models. It should also be noted that with the introduction of the Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (40 Code of Federal Regulations Parts 69, 80, and 86) in 2006, refiners were required to start producing diesel fuel for use in highway vehicles with a sulfur content of no more than 15 parts per million. Therefore, the sulfur content of fuels since 1992 has decreased in general although Guam has been granted an exemption from using low sulfur fuel (see Volume 6, Section 7.2). Department of Defense (DoD) is currently examining the potential use of ultra low sulfur fuel for construction activities and highway diesel vehicles on Guam, so that the actual sulfur content used may be far lower than the results provided here. 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 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 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 particulate matter.

### 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.

<u>North</u>

*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 emissions at both NCTS and South Finegayan were considered together and added with the emissions from construction of earth-covered magazines (ECMs) for the munitions storage component. The emissions presented in Table 5.2-1 represent the total construction emissions for Headquarters/Housing Alternative 1 and Munitions Storage Alternative 1. 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 – Headquarters/Housing and 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, there would be no impact to air quality.

*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, there would be no impacts to air quality.

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

Alternative 1 Proposed Mitigation Measures

No mitigation measures are proposed for this action, as emissions are below criteria levels. Mitigation measures proposed for summary of impacts of all components considered in this EIS 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, therefore, there would be no impact to air quality.

*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, therefore, there would be no impact to air quality.

*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 detailed 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, there would be no impacts to air quality.

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

Alternative 2 Proposed 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 no emissions mitigation measures are proposed.

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, there would be no impacts to air quality.

*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 Proposed 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 no emissions mitigation measures are proposed.

### 5.2.3 Munitions Storage Alternatives

#### 5.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Eight 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 (186 square meters) of physical capacity and dimensions of 80 feet (ft) (24 meters [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 ECMs and/or modular storage magazines (MSMs) described in Chapter 2, Section 2.3.2.2 were estimated together with the construction emissions for both NCTS and South Finegayan. The emissions presented in Table 5.2-1 represent the total for all three areas and the detailed 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. Construction emissions resulting from Munitions Storage Alternative 1 would be below the

significance criterion of 250 tons per year (TPY) for air pollutants adopted in the EIS. Therefore, air quality impacts due to construction would be less than significant.

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<br>• Less than significant adverse impacts to air quality. Construction emissions from all components would be well below significance criteria |
| **Operation** |
| LSI<br>• 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<br>• Less than significant adverse impacts to air quality. Construction emissions from all components would be well below significance criteria |
| **Operation** |
| LSI<br>• 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<br>• Less than significant adverse impacts to air quality. Construction emissions from all components would be well below significance criteria |
| **Operation** |
| LSI<br>• 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, as detailed in Volume 7, Chapter 3. 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. It should be noted however, 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 including greenhouse gas emissions, under the proposed action.

### 5.2.7 Summary of Proposed Mitigation Measures

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. Thus no mitigation measures are proposed, as summarized in Table 5.2-7.

**Table 5.2-7. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Construction** | | |
| • No mitigation measures proposed | • No mitigation measures proposed | • No mitigation measures proposed |
| **Operation** | | |
| • No mitigation measures proposed | • No mitigation measures proposed | • No mitigation measures proposed |

Force flow reduction and adaptive program management of construction are two mitigation measures intended for implementation by DoD to potentially reduce and avoid environmental impacts associated with the proposed expansion of the military mission on Guam overall. Force flow reduction (delaying the date at which military personnel arrive on Guam until the peak construction period has passed) would delay military operations. This would reduce the amount of air emissions from military operations that would be generated at the same time as emissions from construction activities. Adaptive program management of construction (reducing the construction tempo) would reduce air quality impacts by lowering the amount of air emissions generated at any given time.

# 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 noise receptors (residences, hospitals, libraries, etc.), 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 noise 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 6.1-4 in Volume 2 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 vehicular 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. Figure 6.1-1 shows typical intensity levels for common sounds.

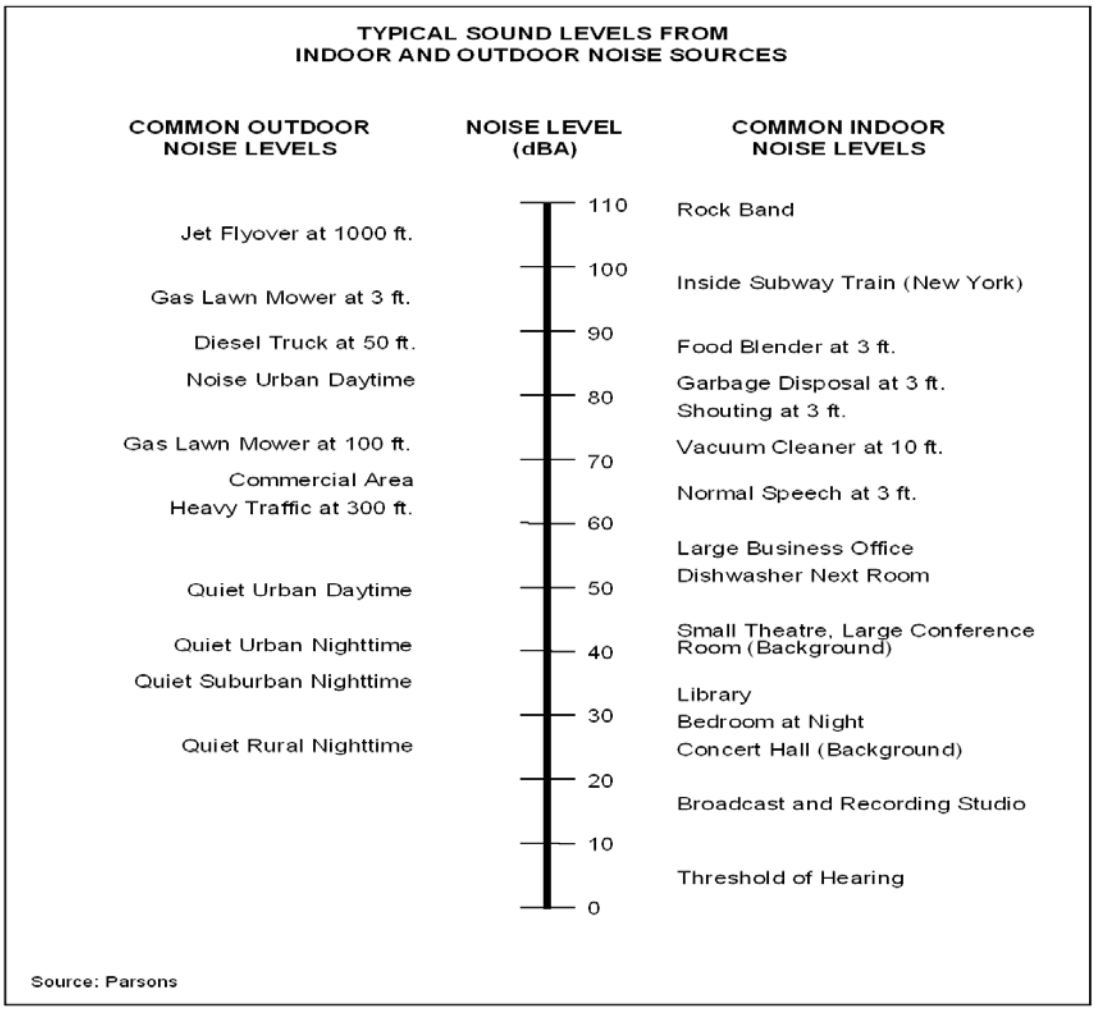


**Figure 6.1-1 Typical A-Weighted Sound Levels of Common Sounds**

For this Environmental Impact Statement (EIS), noise is evaluated for both construction and operation activities. Maintenance activities would not noticeably contribute to the noise environment due to their intermittent nature and short duration. The threshold level of significant impacts for construction is: noise resulting in an hourly equivalent sound level ($L_{eq}$) of 75 A-weighted decibels (dBA, a unit of measure used to evaluate noises related to transportation and small-arms fire), based on United States (U.S.)

Environmental Protection Agency (USEPA) data for construction noise at a sensitive noise 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)

Under Alternative 1, the Army administration/headquarters (HQ) and maintenance facility would be co-located with the Marine Corps in the northern portion of 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.

<u>North</u>

*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, heavy equipment would be used sporadically throughout the daytime hours. Generally, heavy equipment would generate the highest noise levels during the construction phase. This noise would be temporary would diminish with distance from the construction site. Although some heavy equipment would be used for the entire construction period, the noisiest heavy equipment is associated with site preparation and their use would lessen 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 overall 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 feet (ft) (15 meters [m]) from the source. The proposed construction site would be approximately 200 ft (610 m) from Route 3. Off-base sensitive noise 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 noise receptors and approximately 76 dBA for on-base receptors. These levels are considered significant; however, proposed mitigation measures including adaptive program management of construction, (project sequencing) and/or use of sound barriers, would reduce noise impacts to a less than significant level. Outdoor noise levels would be further 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 the same as those described above for NCTS Finegayan; however, sensitive noise receptors would be much closer to the construction activities. Although the area across Route 3 is low density residential, sensitive noise 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 by implementing proposed mitigation measures that include adaptive program management of construction, (project sequencing) and/or use of sound barriers. Through implementation of these proposed mitigation measures, the impacts from noise 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.

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 Proposed Mitigation Measures

Mitigation measures proposed for the housing construction portion of the AMDTF facilities for this alternative include adaptive program management of construction, (project sequencing) and/or use of sound barriers.

The proposed mitigation measures would be implemented to reduce noise to a less than significant impact. As an adaptive program construction practice, sequencing the project work such that fewer pieces of heavy equipment are working adjacent to sensitive on-base and off-base noise receptors at the same time would reduce the noise levels to below the USEPA standard. However, this proposed mitigation measure would extend the length of the construction period overall. 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.

During operations, noise impacts due to roadway traffic noise could be abated through sound barriers where determined to be feasible (based on engineering considerations) and reasonable in accordance with Guam's Traffic Noise Abatement Policy following identification of noise receptors within project corridors and preparation of noise studies. This measure would fall within DoD, FHWA, and GovGuam authority to implement.

#### 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 noise 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. Proposed mitigation measures, including adaptive program management of construction, (project sequencing) and/or use of sound barriers, would further 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 reach 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 2 Proposed Mitigation Measures

The proposed mitigation measures for Alternative 2 would be the same as those for Alternative 1.

### 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 impacts at NCTS Finegayan would be the same as those described for Alternative 1 in Section 6.2.2.1. Implementation of proposed mitigation measures 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.

*South Finegayan*

*Construction.* Under Alternative 3, no construction activities would occur at South Finegayan. Due to the distance between sensitive noise receptors and the proposed project area, 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 proposed mitigation measures 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 would be the same as those described above for Navy Barrigada, in Section 6.2.2.2. The proposed mitigation measures, which include adaptive program management of construction, (project sequencing) and/or use of sound barriers, 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 Proposed Mitigation Measures

The proposed mitigation measures for Alternative 3 would be the same as those for Alternative 1.

Munitions Storage Alternatives

6.2.2.4 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

Proposed construction for munitions storage in earth-covered magazines (ECMs) and/or modular storage magazines (MSMs) would be at the Andersen Air Force Base (AFB) Munitions Storage Area (MSA) 1. The proposed ECMs and/or MSMs would be located away from any inhabited facility in accordance with required explosive safety distances. Noise generated by construction of the ECMs and/or MSMs would be barely audible to any off-base noise receptor and would be considered less than significant.

Operation

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

6.2.2.5 Munitions Storage Alternative 2

Existing conditions do not vary between the three munitions storage alternatives at MSA 1. Nnoise 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.

#### 6.2.2.6 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.

### 6.2.3 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.

### 6.2.4 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. Therefore, there would be no noise impacts from implementation of the no-action alternative.

### 6.2.5 Summary of Impacts

Tables 6.2-1, 6.2-2, and 6.2-3 summarize the 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** | | |
| SI-M<br>• Construction noise levels at NCTS Finegayan would be 72 dBA for off-base receptors and as high as 76 dBA for on-base receptors. Proposed mitigation measures would reduce to noise impacts to a less than significant level<br>• At South Finegayan construction noise levels would be just over 75 dBA. Proposed mitigation measures would reduce the impacts to a less than significant level | SI-M<br>• Construction noise levels for Navy Barrigada would be approximately 74 dBA; therefore, noise impacts would be less than significant. Proposed mitigation measures would further reduce noise levels | SI-M<br>• The impacts for Navy Barrigada and Air Force Barrigada would be the same as for Alternative 2<br>• The impacts for NCTS Finegayan would be the same as for Alternative 1 |
| NI<br>• There would be no impacts for Navy Barrigada and Air Force Barrigada | NI<br>• There would be no impacts for NCTS and South Finegayan | NI<br>• There would be no impacts for South Finegayan |
| **Operation** | | |
| SI-M<br>• Operational noise is discussed in Volume 6 | SI-M<br>• The impacts would be the same as Alternative 1 | SI-M<br>• The impacts would be the same as Alternative 1 |

*Legend:* SI-M = Significant impact mitigable to less than significant; 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<br>• Construction of the ECMs would be well away from any sensitive receptor, and therefore, would be less than significant impacts | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | |
| LSI<br>• Operations at the ECMs would be well away from any sensitive receptor, and therefore, would be less than significant impacts | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• 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<br>• 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<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | | |
| LSI<br>• 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<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• 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 mitigation measures, such as project sequencing and sound barriers. During operations, noise impacts due to roadway traffic noise could be abated through sound barriers where they are determined to be feasible on an engineering basis, and reasonable through identification of sensitive noise receptors and preparation of noise studies.

### 6.2.6 Summary of Proposed Mitigation Measures

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

**Table 6.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Construction** | | |
| • Adaptive program management of construction (project sequencing)<br>• Sound barriers | • No mitigation measures are proposed | • No mitigation measures are proposed |
| **Operation** | | |
| • Sound barriers where determined to be feasible and reasonable | • Sound barriers where determined to be feasible and reasonable | • Sound barriers where determined to be feasible and reasonable |

# 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 islandwide 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 in 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 were addressed. These concerns 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 SUA includes all components of the proposed action, and would be the same for all the alternatives. The SUA would consist of a proposed restricted area to accommodate hazards associated with Terminal High Altitude Area Defense (THAAD) radar operations. The proposed SUA (Restricted Area R-7205) would be located along and off the northwest coast of Guam. The THAAD radar radio frequency hazard area for military aircraft with electro-explosive devices would exist 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 would exist 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 would exist 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 would exist. Planned preventive maintenance would require a minimum continuous period of operation for 45 minutes daily Monday through Friday. Training and certification periods would be processed to the FAA for approval to utilize the pre-approved R-7205 airspace. There would be no restrictions to off-base ground activities (e.g. use of public roadways) during these preventive maintenance operations.

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 the proposed action 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 (a form of controlled airspace at airports) surrounding Andersen Air Force Base (AFB) would fall partially within the existing Class D airspace surrounding Andersen AFB. Current Class D airspace would be re-designed 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 islandwide. A text summary is provided below.

**Table 7.2-1. Summary of Army AMDTF Impacts**

| *All Alternatives* |
|---|
| **Construction** |
| NI<br>• No impacts to airspace from construction. |
| **Operation** |
| LSI<br>• No change to enroute airways or IFR procedures.<br>• No restrictions on access to and no effect on the use of civilian airports or airfields available for public use.<br>• No direct adverse impacts on general aviation air traffic flying out of GIA.<br>• No additional impacts on the FAA's capabilities, no expected decrease in aviation safety, and no adverse effect on commercial or general aviation activities.<br>• 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 weapons emplacement 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. Current Class D airspace would be re-designed to exclude the proposed SUA, but this would not require any changes to existing arrival and departures from GIA. There are no existing enroute low-altitude airways that might be potentially affected. 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 evade hazards. Through use of existing aviation rules and procedures, the impact of this airspace action on air traffic control and airspace users is anticipated to be less than significant.

### 7.2.5 Summary of Proposed Mitigation Measures

The proposed action would result in less than significant impacts to airspace. Therefore no mitigation measures are proposed.

# 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

### 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. Coastal Zone Management Act consistency determination assessments would be prepared for each construction phase. The coastal zone consistency determination for construction projects occurring in fiscal years 2010 and 2011 is being prepared and would be submitted to the Bureau of Statistics and Plans for review.

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. The basic premise is that a release of federal lands/submerged lands to GovGuam or

individuals have beneficial impacts on the new landowners. Conversely, the acquisition of land by the federal government may be considered a beneficial or an adverse impact depending on the perspective of the individual landowner. Owners who are interested in selling land to the federal government would presumably perceive the federal acquisition as a beneficial impact, whereas owners who are not interested in selling would presumably perceive the federal acquisition as an adverse impact. Owners who do not want to sell their property (or relocate) are likely to consider an involuntary acquisition or relocation as an adverse impact even though they are properly compensated. Until the land acquisition negotiations are concluded, the impact analysis assumes a significant adverse impact on an individual landowner. There are exceptions to this rule, such as in the case of acquisition of non-possessory affirmative easements for utilities or other rights-of-way.

The Navy is required to comply with federal land acquisition law and regulations, which includes the requirement to offer just compensation to the owner, to provide relocation assistance services and benefits to eligible displaced persons, to treat all owners in a fair and consistent manner, and to attempt first, in all instances, acquisition through negotiated purchase. A more detailed discussion of the land acquisition process is described in Volume 9, Appendix F, Socioeconomic Impact Assessment Study, Section 5.2.6.

Land Use Category

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

- Consistency with current or documented planned land and submerged land use
- Access restriction on DoD lands

*Land Use Criterion 1: 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 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.

*The land use impact analysis is based on operational impacts. The assumption is that land use impacts are long-term, although they would be initiated in the short-term construction phase. The construction staging and disturbed area would be situated on previously disturbed land or within the project footprint. The construction phase impacts for land ownership and use are described as not applicable. Land Use Criterion 2: 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.

Farmland Protection Policy ActThe Farmland Protection Policy Act (FPPA) (Public Law 97-98, 7 USC 4201 and 7 CFR 658) is intended for federal agencies to: 1) identify and take into account the potential adverse effects of federal programs on the preservation of farmland land; and 2) consider alternative actions, as appropriate, that could lessen such adverse effects; and assure that such federal programs, to the extent practicable, are compatible with state, unit of local government, and private programs and policies to protect farmland. The FPPA addresses prime and important farmlands. Consistency with FPPA was a land use significance criterion in the Draft EIS, but was removed for the Final EIS. In the interval between the two EISs, the Navy determined that the Guam and CNMI Military Relocation is exempt from FPPA regulations because the action is undertaken by a Federal Agency for national defense purposes (section 1547[b] of the Act, 7 U.S.C. 4208[b]). Although consistency with FPPA is not a criterion for analysis, impacts to agricultural use are assessed in this EIS in conjunction with impacts to other land uses, such as residential or urban.

#### 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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*Operation.* Existing DoD land would be used so there would be no change in land ownership. The proposed land use is consistent with 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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*Operation.* Existing DoD land would be used, therefore, there would be no change in land ownership. The proposed land use is consistent with 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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*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 Proposed 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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*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 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. 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 Proposed 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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*Operation.* Existing DoD land would be used; therefore, there would be no change in land ownership. The proposed land use is consistent with 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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*Operation.* Existing DoD land would be used; therefore, there would be no change in land ownership. 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.* The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

*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 Proposed 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 (ECMs) and/or modular storage magazines (MSMs) DoD land within the Munitions Storage Area (MSA) 1 at Andersen AFB.

Construction

The land use and land ownership impacts could be discussed under construction or operation. Since the impacts would be long-term, the changes in land use and ownership are described under operation.

Operation

Existing DoD land would be used; therefore, there would be no change in land ownership. 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). Adacent USFWS and private properties on the north and west coast would not be impacted by the weapons emplacement. 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. The land use impact analysis is based on operational impacts. The assumption is that land use impacts are long-term, although they would be initiated in the short-term construction phase. The construction staging and disturbed area would be situated on previously disturbed land or within the project footprint. The construction phase impacts for land ownership and use are described as not applicable.

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

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

*Legend:* NI = No impact, NA = Not applicable

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

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

*Legend:* NI = No impact, NA = Not applicable

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

| *Alternative 1* | *Alternative 2* | *Alternative 3* | *Alternative 4* |
|---|---|---|---|
| **Construction** | | | |
| NA | NA | NA | NA |
| **Operation** | | | |
| NI<br>• No impact to land or submerged land ownership or use | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 |

*Legend:* NI = No impact, NA = Not applicable

The proposed land ownership and uses under each alternative are within DoD lands and 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 Proposed Mitigation Measures

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

**Table 8.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Construction** | | |
| • No mitigation proposed | • No mitigation proposed | • No mitigation proposed |
| **Operation** | | |
| • No mitigation proposed | • No mitigation proposed | • No mitigation proposed |

# 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 (EIS), 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. 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, the proposed action would cause a significant impact to recreational resources if it:

- Impedes access to recreational resources
- Substantially reduces 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.

For information on impacts due to population growth from the influx of foreign workers please see Volume 2, Chapter 9, section 9.2.2.2.

#### 9.2.2.1 Headquarters/Housing Alternative 1 (Preferred Alternative)

<u>North</u>

*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. Indirect impacts in the form of increased travel time on affected roads may occur, but direct 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 (ERA) 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 islandwide. 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 direct 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 AMDTF 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. To alleviate this impact, quality of life (QOL) facilities offering a range of recreational alternatives would be constructed along with the new Army Headquarters/Housing facilities. Impacts for the new QOL facilities during the operational period are addressed in Volume 2, Chapter 9. Cumulative impacts to recreational resources are addressed in Volume 7. Under Alternative 1, comparable and/or alternate recreational options would be presented to the potential users near where the new Army population would live at Navy Barrigada. Therefore, under Alternative 1 impacts to the recreational resources at Navy Barrigada would be less than significant.

*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 Proposed Mitigation Measures

Proposed 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 are proposed.

#### 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.* Under Alternative 2, housing would be located in Navy Barrigada, where the Admiral Nimitz Golf Course is the only recreational resource present. Army personnel and their dependents inhabiting the proposed housing would have to travel elsewhere to pursue recreational activities other than golf. Navy Barrigada is situated near the east coast of Guam and adjoining villages in central and southern Guam, so there are comparable and/or alternate forms of recreational resources similar to those of NCTS Finegayan that are available as viable options. However, 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.* The proposed new AMDTF housing at Navy Barrigada would be located near the Admiral Nimitz Golf Course. An increased permanent population near the sole on-base recreational resource may bring more users (e.g. walk-on golfers) to the course as a result of the proposed action. Similar to the effects described under Alternative 1, the potential impacts, such as reduced availability of tee times may be minimized by alternate forms of recreational activities. As also discussed under Alternative 1, this need would be met by the proposed QOL features that would be constucted at Navy Barrigada along with the Headquarters/Housing facilities. Therefore, Alternative 2 would result in less than significant impacts to recreational resources at Navy Barrigada. Impacts for the new QOL facilities during the operational

period are addressed in Volume 2, Chapter 9. Cumulative impacts to recreational resources are addressed in Volume 7.

*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 Proposed Mitigation Measures

No mitigation measures are proposed.

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.* The proposed new AMDTF housing at Navy Barrigada would be located near the Admiral Nimitz Golf Course. An increased permanent population near the sole on-base recreational resource may bring more users (e.g. walk-on golfers) to the course as a result of the proposed action. Similar to the effects described under Alternative 1, the potential impacts, such as reduced availability of tee times may be minimized by alternate forms of recreational activities. As discussed under Alternative 1, 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. Impacts for the new QOL facilities during the operational period are addressed in Volume 2, Chapter 9. Cumulative impacts to recreational resources are addressed in Volume 7.

Alternative 3 Proposed Mitigation Measures

No mitigation measures are proposed.

Munitions Storage Alternatives

9.2.2.4 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

The construction for the proposed earth covered magazines and or modular storage magazine would take place inside Andersen AFB munitions storage area (MSA) 1, about one mile (1.6 km) north of the intersection of Routes 9 and 3A. There are no recreational resources 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). These areas are about four miles (six km) north of the proposed Alternative 1 location. There would be additional vehicle traffic along Route 3A during construction. Increased time traveling on affected roads may occur; however, impacts to recreational resources are 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 a increased use 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. Persons involved with the proposed action do not represent a significant increase in the number of recreational users islandwide. Nevertheless, some overcrowding 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 Andersen AFB.

#### 9.2.2.5 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.

#### 9.2.2.6 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.

### 9.2.3 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.

### 9.2.4 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.

### 9.2.5 Summary of Impacts

Tables 9.2-1, 9.2-2, and 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<br>• There would be no impacts from construction | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | |
| LSI<br>• Increase in the number of recreational users at NCTS Finegayan is likely. Users may experience crowding | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 |
| LSI<br>• Increase in the number of users and reduced availability of tee times is expected for Admiral Nimitz Golf Course at Navy Barrigada | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 |
| NI<br>• There would be no impacts to recreation at South Finegayan and Air Force Barrigada | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• 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<br>• There would be no impacts from construction | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | |
| LSI<br>• Increase in the number of recreational resource users is likely. Users may experience overcrowding at resources | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• 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<br>• The existing recreational resources are not in proximity to the proposed location | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 |
| **Operation** | | | |
| LSI<br>• The existing recreational resources are not in proximity to the proposed location | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• 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 are not expected. Therefore, the proposed action would result in no impacts to recreational resources.

Operation

Implementation of the Headquarters/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 Headquarters/Housing Alternative 2, all proposed actions would be confined to Navy Barrigada. Similar to Alternative 1, QOL facilities would be close to housing areas; by providing alternate forms of recreational resources, potential impacts to the sole existing recreational resource at Navy Barrigada (the Admiral Nimitz Golf Course) may be offset. Installations offering different or additional recreational resources, such as NCTS Finegayan and Andersen AFB, would experience an increase in user numbers. Headquarters/Housing Alternative 3 would result in permanent population increases at both NCTS Finegayan and Navy Barrigada. QOL facilities with alternate recreational options would be provided at both locations to offset 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.

### 9.2.6 Summary of Proposed Mitigation Measures

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

**Table 9.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Construction** | | |
| • No mitigation measures proposed | • No mitigation measures proposed | • No mitigation measures proposed |
| **Operation** | | |
| • No mitigation measures proposed | • No mitigation measures proposed | • No mitigation measures proposed |

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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 action and alternatives during the construction and operation phases. Impacts may be either temporary or permanent. 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 non-native, 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 recovery habitat for special-status species.
- Introduction of new non-native, invasive species or increased dispersal of existing invasive species on Guam.
- Dispersal of existing non-native, invasive species from Guam to the Commonwealth of the Northern Mariana Islands (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 Endangered Species Act (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 U.S. Fish and Wildlife Service (USFWS) recovery plans, Navy and Air Force Integrated Natural Resources Management Plans (INRMPs), or the Guam Comprehensive Wildlife Conservation Strategy (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.

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. Note that impacts to vegetation types other than primary limestone forest could also be determined significant if these areas were habitat for protected wildlife or special-status species (as evaluated below).

Wildlife

Impacts would be determined significant if native wildlife species are present and the proposed project would result in more than minimal changes in population sizes or distributions of regionally important native animal species. These wildlife species include those designated as Species of Greatest Conservation Need by the Guam Division of Aquatic and Wildlife Resources [GDAWR] in the Guam CWCS (2006; excluding special-status species which are addressed separately below). Invasive species impacts that exceed the criteria specified above are evaluated. Historical impacts from non-native, invasive species have been severe, particularly from the brown tree snake (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 with proposed 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 Code of Federal Regulations [CFR] Part 21).

The Department of Defense (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 Executive Order (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 identified recovery habitat, 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 indirect impacts would also include disturbing ESA- and Guam-listed species due to noise, lighting, or human activity. If unoccupied but recovery habitat is affected by operational 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.

The baseline area for Overlay Refuge on Guam is 21,690 acres (ac) (8,778 hectares [ha]) according to USFWS (2008) with slight modifications made to correspond to the present Naval Computer and Telecommunications Station (NCTS)-Former Federal Aviation Administration parcel boundary (see Figure 10.1-2 in Volume 2). The area of identified recovery habitat on Guam is 28,655 ac (11,596 ha) for the Mariana fruit bat and Guam Micronesian kingfisher, 27,124 ac (10,977 ha) for the Mariana crow, 49,564 ac (20,058 ha) for the Guam rail, and 11,668 ac (4,722 ha) for the *Serianthes* tree (USFWS 2010).

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 consultation requirements under section 7 of the ESA, a Biological Assessment (BA) has been prepared by the Navy to analyze the potential impacts on ESA-listed and critical habitat under the jurisdiction of the USFWS.

The Biological Opinion (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. The BO mayl provide an Incidental Take Statement that will list the amount or extent of take anticipated. Based on that take the BO 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 may 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.

#### 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 CNMI from the introduction of non-native, invasive species due to increased traffic among the islands from the movement of personnel and materials. Such species include the BTS, flatworms, various insects, and some plants. The EIS 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.
- Potential impact on flora and fauna from placement of facilities at Navy Barrigada.

### 10.2.2 Headquarters/Housing Alternatives

#### 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 proposed Marine Corps Main Cantonment at NCTS Finegayan. These impacts are addressed in Volume 2, Alternative 2, along with associated figures, as part of the proposed Marine Corps Cantonment and are not separated. Impacts to wildlife would be less than significant. Impacts to special-status species would be significant.

*Operation.* Under Alternative 1, the Army AMDTF and housing would be co-located with the proposed Marine Corps cantonment at NCTS Finegayan. These impacts are addressed in Volume 2, Alternative 2 as part of the proposed Marine Corps cantonment and are not separated. Impacts to special status species would be significant but would be mitigated to less than significant.

*South Finegayan*

*Construction.* Under Alternative 1, the Army AMDTF and housing would be co-located with the proposed Marine Corps cantonment at South Finegayan. These impacts are addressed in Volume 2, Alternative 2, along with associated figures, as part of the proposed Marine Corps cantonment and are not separated. Impacts to all terrestrial biological resources would be less than significant.

*Operation.* Under Alternative 1, the Army AMDTF and housing would be co-located with the proposed Marine Corps cantonment at South Finegayan. These impacts are addressed in Volume 2, Alternative 2 as part of the proposed Marine Corps cantonment and are not separated. Impacts to all terrestrial biological resources would be less than significant.

Central

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

Alternative 1 Proposed Mitigation Measures

Mitigation measures proposed for Alternative 1 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. There would be no impacts at NCTS Finegayan.

*South Finegayan*

Under Alternative 2, the Army AMDTF would be co-located with the proposed Marine Corps Main Cantonment at Navy Barrigada. There would be no impacts at South Finegayan.

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 10.2-1a). Approximately 153 ac (62 ha) of 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* (federiko), and some large native breadfruit. There is degradation of this forest as indicated by the presence of a significant, although not dominant, non-native, invasive component including vitex, limeberry, tangantangan, and papaya, particularly around the perimeter of the forested area. 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. Impacts to Vegetation at Navy Barrigada with Implementation of Alternative 2 (ac [ha])**

| *Vegetation Type* | *Primary Limestone Forest* | *Vitex-Closed Canopy* | *Shrub/ Grasslands* | *Developed Land* |
|---|---|---|---|---|
| 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 reduce the recharge rate. 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, invasive species such as the Pacific golden plover, yellow bittern, island collared dove, 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 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, significant 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 significant diminished population sizes or significant changes in distributions of migratory birds or regionally important native animal species. Therefore, impacts to wildlife would be less than significant.

Construction activities 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 habitat nearby. Therefore, indirect impacts to wildlife from construction would be less than significant.

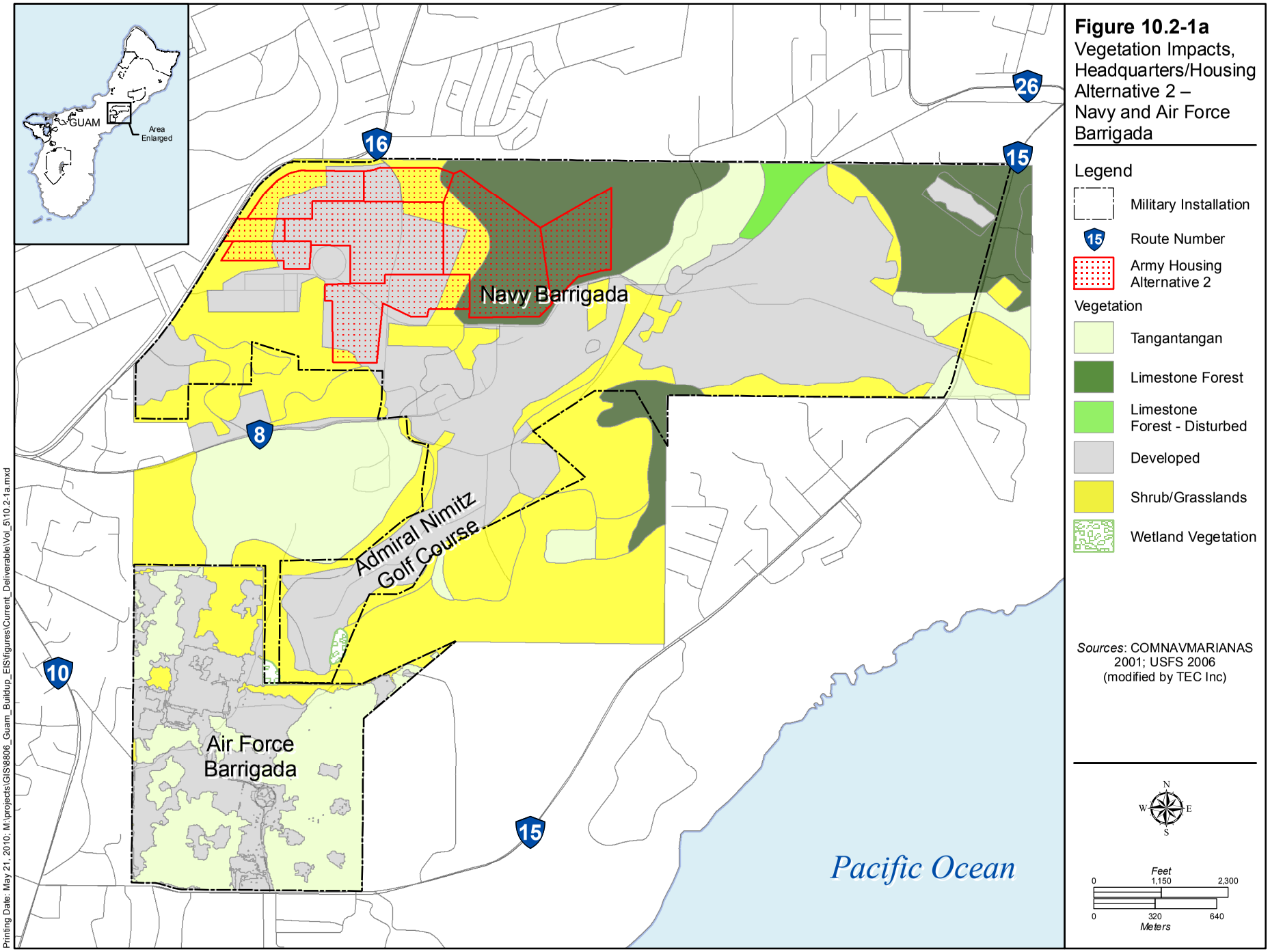


**Figure 10.2-1a**
Vegetation Impacts, Headquarters/Housing Alternative 2 – Navy and Air Force Barrigada

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*Special-Status Species*

MARIANA FRUIT BAT. The Mariana fruit bat has been reported historically and is occasionally seen in the area. No recovery habitat has been identified by USFWS in this region. Impacts would be less than significant.

GUAM RAIL. Except for an experimental, non-essential population that has been introduced to Rota, the rail survives only in captivity at this time and does not occur in the wild on Guam. Proposed construction activities would include the loss of shrub/grassland habitat that is potential foraging and nesting habitat for the Guam rail. A total of 243 ac (98 ha) of recovery habitat would be removed for construction of all facilities at Navy Barrigada. Numerous proposed mitigation measures (described in Volume 2, Chapter 10, Section 10.2.2.6) would be implemented to improve the likelihood that this species could eventually be reintroduced successfully to recovery habitat on Guam. Based on these measures and the presence of large areas of recovery habitat for the species throughout much of Guam, the proposed construction at Navy Barrigada would result in a less than significant impact to the species.

GUAM TREE SNAIL. 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 (Figure 10.2-1b). The distribution and numbers of tree snails at the site are unknown. Proposed construction activities would remove primary limestone forest, the habitat of the Guam tree snail, and would result in direct mortality of individuals. Proposed mitigation would include the relocation of snails to another suitable location in consultation with USFWS and Guam DAWR. With implementation of this proposed mitigation, impacts would be less than significant.

*Navy Barrigada – Operation*

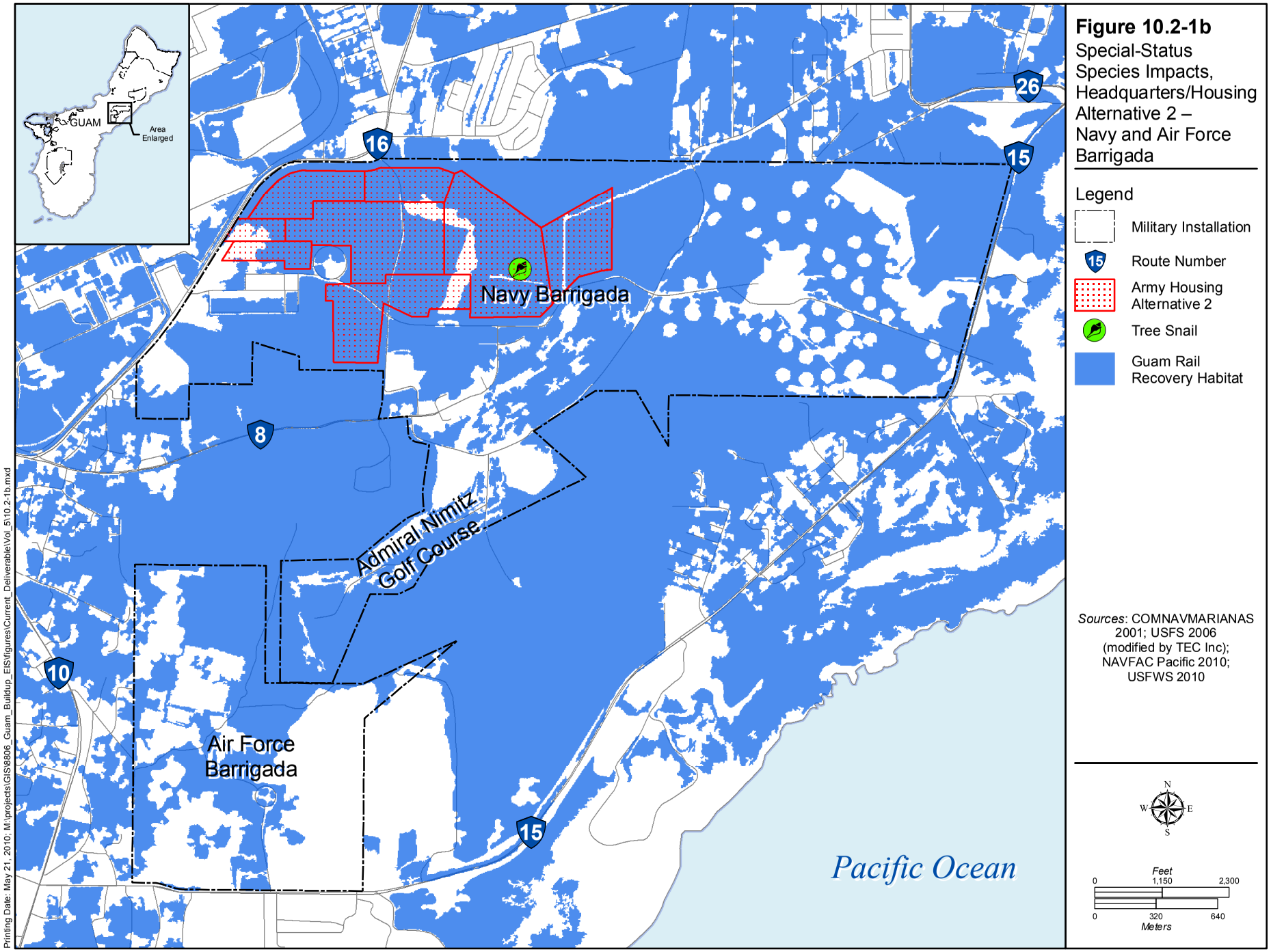
*Vegetation*. There would be less than significant impacts to vegetation because operations would not remove any additional forest and most of the surrounding primary limestone forest would have been removed during construction.

*Wildlife*. There would be no direct impacts to wildlife since operations would occur in previously cleared areas. However, operational activities would generate noise throughout the area. 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 records this would be very infrequently. Impacts to special-status species would be less than significant.

*Air Force Barrigada – Construction and Operation*

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 or operation.


GUAM
Area Enlarged
Navy Barrigada
Admiral Nimitz Golf Course
Air Force Barrigada
Pacific Ocean
16
26
15
8
10
15
Figure 10.2-1b
Special-Status Species Impacts, Headquarters/Housing Alternative 2 – Navy and Air Force Barrigada
Legend
Military Installation
Route Number
Army Housing Alternative 2
Tree Snail
Guam Rail Recovery Habitat
Sources: COMNAVMARIANAS 2001; USFS 2006 (modified by TEC Inc); NAVFAC Pacific 2010; USFWS 2010
N
W
E
S
Feet
0
1,150
2,300
0
320
640
Meters
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Alternative 2 Proposed Mitigation Measures

A plan to translocate Guam tree snails to another site on DoD lands would be developed and implemented after approval by the USFWS and Guam DAWR. Additional proposed 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*

*Construction*. Under Alternative 3, the Army AMDTF headquarters would be co-located with the proposed Marine Corps Main Cantonment at NCTS Finegayan and housing co-located with the Marine Corps at Navy and Air Force Barrigada. These impacts are addressed in Volume 2 as part of the proposed Marine Corps Main Cantonment and are not separated. These impacts and associated figures are shown in Volume 2. Impacts to wildlife would be significant but would be mitigated to less than significant. Impacts to special-status species would be significant.

*Operation.* Under Alternative 3, the Army facilities would be co-located with the Marine Corps. These impacts are addressed in Volume 2 as part of the proposed Marine Corps cantonment and are not separated. Impacts to special status species would be significant but would be mitigated to less than significant.

*South Finegayan*

*Construction.* Under Alternative 3, the Army housing would be co-located with the Marine Corps housing at Navy and Air Force Barrigada. These impacts are addressed in Volume 2 as part of the Marine Corps action and cannot be separated. These impacts and associated figures are shown in Volume 2. Impacts to all terrestrial biological resources would be less than significant.

*Operation.* Under Alternative 3, the Army facilities would be co-located with the Marine Corps. These impacts are addressed in Volume 2, Alternative 2 as part of the proposed Marine Corps cantonment and are not separated. Impacts to all terrestrial biological resources would be less than significant.

Central

*Navy Barrigada*

Under Alternative 3, the Army housing would be co-located with the Marine Corps housing at Navy Barrigada. These impacts are addressed in Volume 2 Alternative 3, along with associated figures, as part of the Marine Corps action and cannot be separated. Impacts to vegetation would be significant. Impacts to special-status species would be significant but would be mitigated to less than significant.

*Air Force Barrigada*

Under Alternative 3, the Army housing would be co-located with the Marine Corps housing at Air Force Barrigada. These impacts are addressed in Volume 2 Alternative 3, along with associated figures, as part of the Marine Corps action and cannot be separated. All impacts to terrestrial biological resources would be less than significant.

Alternative 3. Proposed Mitigation Measures

Mitigation measures proposed for 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 (Table 10.2-2 and Figure 10.2-2). Impacts to vegetation would be less than significant because no primary limestone forest would be removed. The vegetation to be removed also serves as potential habitat for special-status species and that impact is addressed separately below.

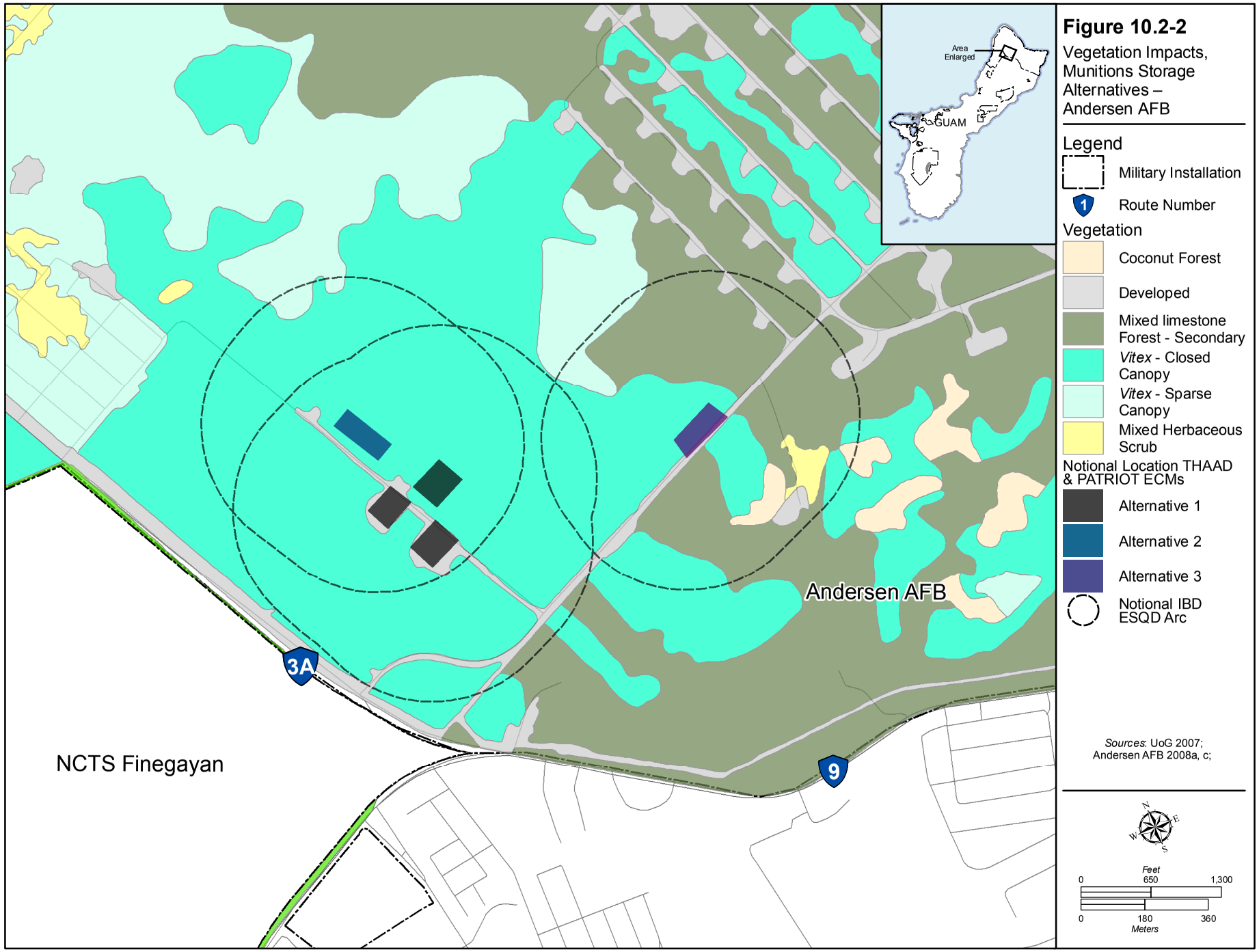
**Table 10.2-2. Impacts to Vegetation at Andersen AFB with Implementation of Munitions Storage Alternative 1 (ac [ha])**

| *Area* | *Vitex-Closed Canopy* | *Developed Land* |
|---|---|---|
| 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 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 significant diminished population sizes or significant changes in 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.


Area Enlarged
GUAM
Andersen AFB
NCTS Finegayan
3A
9
Figure 10.2-2
Vegetation Impacts, Munitions Storage Alternatives – Andersen AFB
Legend
Military Installation
Route Number
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
Sources: UoG 2007; Andersen AFB 2008a, c;
N
W
E
S
Feet
0
650
1,300
0
180
360
Meters
Printing Date: Apr 29, 2010; M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_5\10.2-2.mxd

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 to some of the area when construction is complete. Effects would be short-term. There would be no significant diminished population sizes or significant changes in 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 (Table 10.2-3; Figure 10.2-3a, b). A total of 6.6 ac (2.7 ha) of Overlay Refuge would be developed.

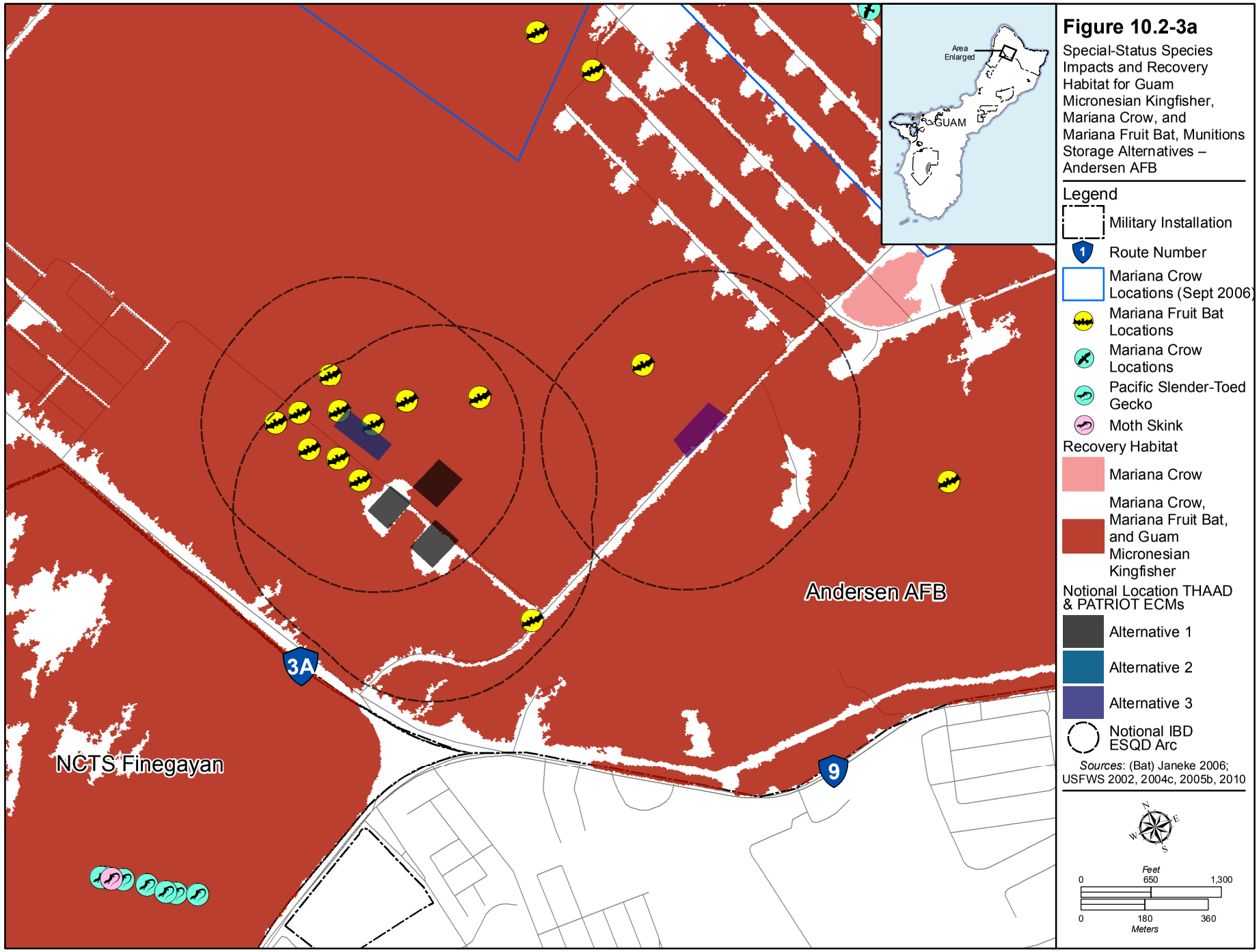
MARIANA FRUIT BAT. Proposed construction activities would include the loss of disturbed limestone forest that is potential foraging and roosting habitat for the Mariana fruit bat population on the base. A total of 2.9 ac (1.2 ha) of recovery habitat would be removed for construction of the munitions storage area. Removal of this small area of habitat due to construction would not result in a significant impact. However, it should be noted that in conjunction with other habitat areas removed under the proposed action, impacts could be significant. Noise and activity associated with the proposed construction may significantly impact isolated roosting fruit bats in the vicinity of the proposed activities. Construction activities would generate noise. Monitoring for the fruit bat would be conducted before construction and if detected near construction areas the work would be halted until the animal departed. With this measure, indirect impacts from noise and activity associated with construction would result in less than significant impacts to fruit bats.

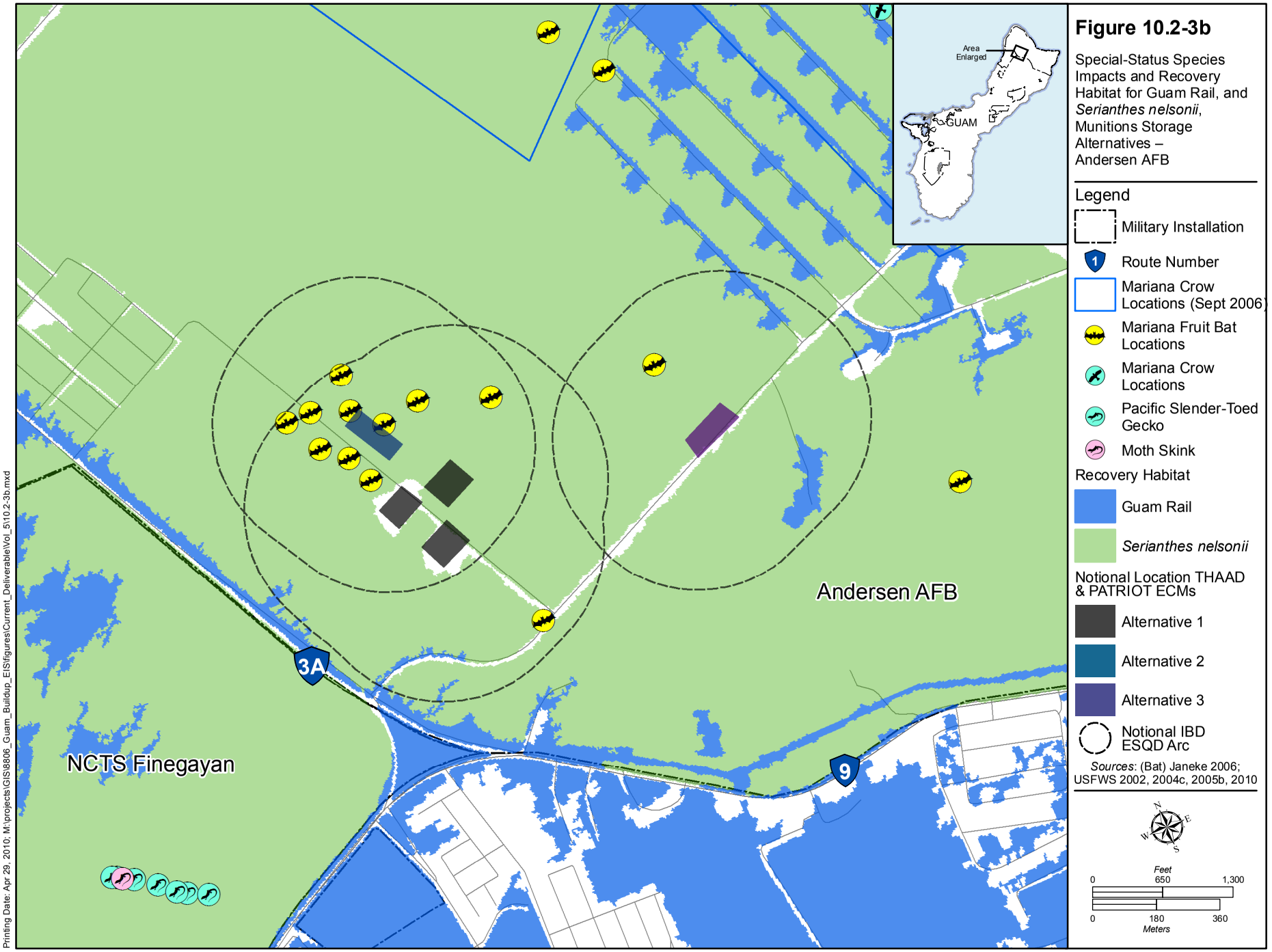
**Table 10.2-3. Potential Impacts to Special-Status Species Habitat with Implementation of Munitions Storage Alternative 1 (ac[ha])**

| *Parcel and Activity* | *Overlay Refuge* | *Recovery Habitat – Bat &Kingfisher* | *Recovery Habitat – Crow* | *Recovery Habitat – Rail* | *Recovery Habitat – Serianthes* |
|---|---|---|---|---|---|
| **Direct Impacts – Habitat Removed** | | | | | |
| Munitions Storage Area | 6.6 (2.7) | 2.9 (1.2) | 2.3 (0.9) | 0 | 2.9 (1.2) |
| **Total Habitat Removed** | 6.6 (2.7) | 2.9 (1.2) | 2.3 (0.9) | 0 | 2.9 (1.2) |
| Total Habitat Area - DoD Lands | 21, 690 (8,778) | 16,105 (6,517) | 16,087 (6,510) | 8,976 (3,632) | 9,082 (3,654) |
| Total Habitat Area - Non-DoD Lands | 0 | 12,550 (5,079) | 11,037 (4,467) | 40,588 (16,425) | 2,640 (1,068) |
| % of Habitat Area on Guam that is Removed (DoD and Non-DoD Lands) | 0.03% | 0.01% | 0.01% | NA | 0.02% |

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

GUAM MICRONESIAN KINGFISHER. The kingfisher survives only in captivity at this time. Proposed construction activities would include the loss of limestone forest that is potential foraging and nesting habitat for a potential future re-introduction of the kingfisher. A total of 2.9 ac (1.2 ha) of recovery habitat would be removed for construction of the munitions storage area (Table 10.2-3). Removal of this small area of habitat due to construction would not result in a significant impact. However, it should be noted that in conjunction with other habitat areas removed under the proposed action, impacts could be significant.


Area Enlarged
GUAM
Andersen AFB
NCTS Finegayan
3A
9
Figure 10.2-3a
Special-Status Species Impacts and Recovery Habitat for Guam Micronesian Kingfisher, Mariana Crow, and Mariana Fruit Bat, Munitions Storage Alternatives – Andersen AFB
Legend
Military Installation
Route Number
Mariana Crow Locations (Sept 2006)
Mariana Fruit Bat Locations
Mariana Crow Locations
Pacific Slender-Toed Gecko
Moth Skink
Recovery Habitat
Mariana Crow
Mariana Crow, Mariana Fruit Bat, and Guam Micronesian Kingfisher
Notional Location THAAD & PATRIOT ECMs
Alternative 1
Alternative 2
Alternative 3
Notional IBD ESQD Arc
Sources: (Bat) Janeke 2006; USFWS 2002, 2004c, 2005b, 2010
N
W
E
S
Feet
0
650
1,300
0
180
360
Meters
Printing Date: Apr 29, 2010; M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_5\10.2-3a.mxd


Area Enlarged
GUAM
Andersen AFB
NCTS Finegayan
3A
9
Figure 10.2-3b
Special-Status Species Impacts and Recovery Habitat for Guam Rail, and *Serianthes nelsonii*, Munitions Storage Alternatives – Andersen AFB
Legend
Military Installation
Route Number
Mariana Crow Locations (Sept 2006)
Mariana Fruit Bat Locations
Mariana Crow Locations
Pacific Slender-Toed Gecko
Moth Skink
Recovery Habitat
Guam Rail
*Serianthes nelsonii*
Notional Location THAAD & PATRIOT ECMs
Alternative 1
Alternative 2
Alternative 3
Notional IBD ESQD Arc
*Sources*: (Bat) Janeke 2006; USFWS 2002, 2004c, 2005b, 2010
N
E
S
W
Feet
0
650
1,300
0
180
360
Meters
Printing Date: Apr 29, 2010; M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_5\10.2-3b.mxd

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 2.9 ac (1.2 ha) of recovery habitat would be removed for construction of the munitions storage area (Table 10.2-3). Removal of this small area of habitat due to construction would not result in a significant impact. However, it should be noted that in conjunction with other habitat areas removed under the proposed action, impacts could be significant. A suite of proposed mitigation measures is described in Volume 2, Section 10.2.2.6 for all impacts to special-status species. Construction could result in a significant impact from noise and activity. Monitoring for the Mariana crow and halting construction when nesting or roosting crows are in the project areas would reduce the impact to less than significant.

GUAM RAIL. The rail survives only in captivity at this time. Proposed construction activities would not include loss of any identified recovery habitat for the Guam rail. Impacts would be less than significant.

*SERIANTHES* TREE. A total of 2.9 ac (1.2 ha) of recovery habitat for this tree species would be removed for construction of the munitions storage facilities (Table 10.2-3). This represents about 0.02% of the recovery habitat identified by USFWS for the species. Based on the low amount of habitat impacted compared to the total habitat remaining for this tree species, impacts would be less than significant.

ALL SPECIAL-STATUS SPECIES. Other indirect effects on all species may occur as a result of the proposed construction. Movement of construction personnel, equipment, and supplies could result in the movement and spread of non-native, invasive plant and animal species to Guam, within Guam, and to other locations from Guam. Non-native, invasive species would affect special-status species or degrade habitat, thus are potential indirect impacts resulting from actions proposed in Alternative 1. Special status species impacts could be significant but numerous proposed mitigation measures, as specified under proposed mitigation in Volume 2, Section 10.2.2.6, would be implemented to reduce non-native, invasive species impacts to less than significant.

Operation

*Vegetation*

There would be less than significant impacts to vegetation. Munitions storage sites are near roads and other maintained areas.

*Wildlife*

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

*Special-Status Species*

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

Alternative 1 Proposed Mitigation Measures

Proposed mitigation measures would include monitoring the project area before and during construction for the presence of the Mariana fruit bat and Mariana crow. If either species was detected during monitoring and potentially impacted by construction noise or activity, the construction would be halted until the species left the area. In addition, a suite of additional mitigation measures that are proposed for the entire set of actions proposed in this EIS, including those mentioned above, are described in Volume 2, Chapter 10, Section 10.2.2.6. Actions proposed in this EIS include development of a Micronesia

### 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). Impacts to vegetation would be less than significant because no primary limestone forest would be removed. The vegetation to be removed also serves as potential habitat for special-status species and that impact is addressed separately below.

*Wildlife*

Impacts would be the same as for Alternative 1, 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 10.2-4). A total of 2.7 ac (1.1 ha) of Overlay Refuge would be developed.

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 Andersen AFB. A total of 2.3 ac (0.9 ha) of recovery habitat would be removed for construction of the munitions storage area. The amount of recovery habitat impacted is similarly to Alternative 1 and overall impacts and mitigation proposed would be the same as those described in Alternative 1.

**Table 10.2-4. Potential Impacts to Special-Status Species Habitat with Implementation of Munitions Storage Alternative 2 (ac[ha])**

| *Parcel and Activity* | *Overlay Refuge* | *Recovery Habitat – Bat &Kingfisher* | *Recovery Habitat – Crow* | *Recovery Habitat – Rail* | *Recovery Habitat – Serianthes* |
|---|---|---|---|---|---|
| **Direct Impacts – Habitat Removed** | | | | | |
| Munitions Storage Area | 2.7 (1.1) | 2.3 (0.9) | 2.3 (0.9) | 0 | 2.3 (0.9) |
| **Total Habitat Removed** | 2.7 (1.1) | 2.3 (0.9) | 2.3 (0.9) | 0 | 2.3 (0.9) |
| Total Habitat Area - DoD Lands | 21, 690 (8,778) | 16,105 (6,517) | 16,087 (6,510) | 8,976 (3,632) | 9,082 (3,654) |
| Total Habitat Area - Non-DoD Lands | 0 | 12,550 (5,079) | 11,037 (4,467) | 40,588 (16,425) | 2,640 (1,068) |
| % of Habitat Area on Guam that is Removed (DoD and Non-DoD Lands) | 0.01% | 0.01% | 0.01% | < 0.01% | 0.02% |

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

GUAM MICRONESIAN KINGFISHER. The kingfisher survives only in captivity at this time. Proposed construction activities would include the loss of 2.3 ac (0.9 ha) of limestone forest that is identified as potential recovery habitat for the potential future re-introduction of the kingfisher. The amount of recovery habitat impacted is similar to Alternative 1 and overall impacts and proposed mitigation measures would be the same as those described in Alternative 1.

MARIANA CROW. Proposed construction activities would include the loss 2.3 ac (0.9 ha) of disturbed limestone forest that is identified as potential recovery habitat for the crow. This recovery habitat is also designated as Overlay Refuge. The amount of recovery habitat impacted is similar to Alternative 1 and overall impacts and proposed mitigation would be the same as those described in Alternative 1.

GUAM RAIL. The rail survives only in captivity at this time. Proposed construction activities would not include loss of any identified recovery habitat for the Guam rail. Impacts would be less than significant.

*SERIANTHES* TREE. A total of 2.3 ac (0.9 ha) of identified potential recovery habitat for this tree species would be removed for construction of the munitions storage facilities (Table 10.2-2). This represents about 0.02% of the recovery habitat identified by USFWS for the species. Based on the low amount of habitat impacted compared to the total habitat remaining for this tree species, impacts would be less than significant.

Operation

Impacts would be the same as for Alternative 1, less than significant.

Alternative 2 Proposed Mitigation Measures

Mitigation measures would be the same as proposed 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, less than significant, because the vegetation type is the same.

*Wildlife*

Impacts would be the same as for Alternative 2, less than significant.

*Special-Status Species*

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

Operation

Impacts would be the same as those described for Munitions Storage Alternative 1.

Alternative 3 Proposed Mitigation Measures

Mitigation measures would be the same as proposed for 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 construction and operation of headquarters/housing area, munitions storage areas, and weapons emplacement sites, respectively, on terrestrial biological resources.

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

| *Alternative 1* | *Alternative 2* | *Alternative 3* |
|---|---|---|
| **Construction** | | |
| SI<br>• Alternative 1 would have the Army AMDTF headquarters/housing co-located with the proposed Marine Corps cantonment at NCTS and South Finegayan. These impacts are addressed in Volume 2, Alternatives 1 or 2 as part of the proposed Marine Corps cantonment and are not separated. Impacts to special-status species would be significant. | SI<br>• 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. | SI<br>• Alternative 3 would have the Army AMDTF headquarters/housing co-located with the Marine Corps cantonment at Navy and Air Force Barrigada. These impacts are addressed in Volume 2, Alternative 3 as part of the proposed Marine Corps cantonment and are not separated. Impacts to special-status species would be significant. |
| **Operation** | | |
| SI-M<br>• Alternative 1 would have the Army AMDTF headquarters/housing co-located with the proposed Marine Corps cantonment at NCTS and South Finegayan. These impacts are addressed in Volume 2, Alternatives 1 or 2 as part of the proposed Marine Corps cantonment and are not separated. Impacts to special-status species would be significant but mitigable. | LSI<br>• Noise and activity from operations would be less than significant to wildlife and special-status species. | SI-M<br>• Alternative 3 would have the Army AMDTF headquarters/housing co-located with the proposed Marine Corps cantonment at Navy and Air Force Barrigada. These impacts are addressed in Volume 2, Alternative 3 as part of the proposed Marine Corps cantonment and are not separated. Impacts to special-status species would be significant but mitigable. |

*Legend:* SI = Significant impact; SI-M = Significant impact mitigable to less than significant; LSI = Less than significant impact

Impacts to special-status species would be significant under Alternatives 1 and 3 due to the removal during construction of large areas of recovery habitat for several endangered species. Under Alternative 2 impacts to most special-status species affected under Alternatives 1 and 3 would not occur but impacts to the Guam tree snail that are mitigable would occur. Also under Alternative 2 primary limestone forest would be removed, resulting in a significant impact to vegetation.

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

| *Alternative 1* | *Alternative 2* | *Alternative 3* |
|---|---|---|
| **Construction** | | |
| LSI<br>• Impacts to vegetation and wildlife would be less than significant.<br>SI-M<br>• There would be significant impacts to special-status species (the endangered Mariana fruit bat, Micronesian kingfisher, and Mariana crow) from possible disturbance to special-status species and from introduction of non-native, invasive species, mitigated to less than significant. | LSI<br>• Impacts to vegetation and wildlife would be less than significant.<br>SI-M<br>• The impacts on special-status species would be the same as Alternative 1. | LSI<br>• Impacts to vegetation and wildlife would be less than significant.<br>SI-M<br>• The impacts on special-status species would be the same as Alternative 1. |
| **Operation** | | |
| LSI<br>• Impacts to vegetation, wildlife and special-status species would be less than significant | LSI<br>• The impacts would be the same as for Alternative 1. | LSI<br>• 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

Impacts to special-status species would be significant from construction under all alternatives due to possible disturbance of endangered species and introduction of non-native, invasive species but would be mitigated to less than significant.

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

| *Alternative 1* | *Alternative 2* | *Alternative 3* | *Alternative 4 (preferred)* |
|---|---|---|---|
| **Construction** | | | |
| SI<br>• There would be significant impacts from loss of recovery habitat for five special-status species (Mariana fruit bat (328 ac [133 ha]), Guam Micronesian kingfisher (328 ac [133 ha]), Mariana crow (328 ac [133 ha]), Guam rail (36 ac [15 ha], and *Serianthes* tree (328 ac [133 ha]<br>• Impacts to 368 ac (149 ha) of Overlay Refuge.<br>• Possible disturbance to special-status species during construction, mitigated to less than significant | SI<br>• There would be significant impacts from loss of recovery habitat for five special-status species (Mariana fruit bat (288 ac [117 ha]), Guam Micronesian kingfisher (288 ac [117 ha]), Mariana crow (288 ac [117 ha]), Guam rail (45 ac [18 ha], and *Serianthes* tree (288 ac [117 ha]<br>• Impacts to 333 ac (135 ha) of Overlay Refuge.<br>• Possible disturbance to special-status species during construction, mitigated to less than significant | SI<br>• There would be significant impacts from loss of recovery habitat for five special-status species (Mariana fruit bat (178 ac [72 ha]), Guam Micronesian kingfisher (178 ac [72 ha]), Mariana crow (178 ac [72 ha]), Guam rail (47 ac [19 ha], and *Serianthes* tree (174 ac [70 ha]<br>• Impacts to 228 ac (92 ha) of Overlay Refuge.<br>• Possible disturbance to special-status species during construction, mitigated to less than significant. There would be a significant impact due to the loss of forest recovery conservation areas (ungulate enclosures) near Ritidian Point, per section 7 consultation for a previous Air Force action | SI<br>• There would be significant impacts from loss of recovery habitat for five special-status species (Mariana fruit bat (150 ac [61 ha]), Guam Micronesian kingfisher (150 ac [61 ha]), Mariana crow (150 ac [61 ha]), Guam rail (9.2 ac [3.7 ha], and *Serianthes* tree (153 ac [62 ha]<br>• Impacts to 187 ac (76 ha) of Overlay Refuge.<br>• Possible disturbance to special-status species during construction, mitigated to less than significant<br>• Removal of 13 ac (5.3 ha) of the existing fenced Area 50 experimental site |
| **Operation** | | | |
| NI<br>• There would be no impacts to vegetation<br>LSI<br>• There would be less than significant impacts to wildlife.<br>SI<br>• There would be significant indirect impacts to special-status species recovery habitat due to noise, lighting, and operations. | NI<br>• The impacts would be the same as for Alternative 1<br>LSI<br>• The impacts would be the same as for Alternative 1<br>SI<br>• The impacts would be the same as for Alternative 1 | NI<br>• The impacts would be the same as for Alternative 1<br>LSI<br>• The impacts would be the same as for Alternative 1<br>SI<br>• The impacts would be the same as for Alternative 1 | NI<br>• The impacts would be the same as for Alternative 1<br>LSI<br>• The impacts would be the same as for Alternative 1 |

*Legend:* SI = Significant impact; LSI = Less than significant impact; NI = No impact

Impacts to special-status species would be significant under all Alternatives due to the removal during construction of large areas of recovery habitat for several endangered species. Operations would also result in significant impacts for several endangered species because of indirect impacts due to noise, lighting, and operations of the facilities.

### 10.2.7 Summary of Proposed Mitigation Measures

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

**Table 10.2-8. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Vegetation** | | |
| • Proposed mitigation measures for Alternatives 1 and 3 are included under the Marine Corps action described in Volume 2 (Alternatives 1 or 2). Proposed mitigation for the Army AMDTF action cannot be determined independently from the mitigation proposed for the Marine Corps action.<br>• Mitigation of Alternative 2 would include a suite of mitigation actions as described in Volume 2, Section 10.2.2.6.<br>• | • No mitigation measures are proposed. | • No mitigation measures are proposed. |
| **Wildlife and Special-status Species** | | |
| • Proposed mitigation measures for Alternatives 1 and 3 are included under the Marine Corps action described in Volume 2 (Alternatives 1 or 2). Proposed mitigation for the Army AMDTF action cannot be determined independently from the mitigation proposed for the Marine Corps action. Actions include development of a Micronesia Biosecurity Plan (MBP) and implementation of interim measure to address non-native, invasive species issues.<br>• Under Alternative 2 mitigation would also include translocation of Guam tree snails to another site on DoD lands. | • Proposed mitigation for all alternatives would be conducted as described in Volume 2, Section 10.2.2.6. | • Proposed mitigation for all alternatives would be conducted as described in Volume 2, Section 10.2.2.6. |

# 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. Indirect impacts associated with stormwater runoff into the marine environment are addressed collectively for all resources in Section 4.15 of Volume 1. 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). Because the EIS is also used for Section 106 consultation, this section uses the term, Area of Potential Effects (APE) as defined under the NHPA. The APE is "the geographic area or areas within which the undertaking (project) may directly or indirectly cause changes to the character or use of historic properties, if they exist" (36 CFR 800.16(d)). This would include areas affected by setting (visual or audible), ground disturbance, or public access. The APE was defined during the consultation process early in the planning stages of this EIS in consultation with the Guam SHPO. Maps of the APEs for projects on Guam are included in Volume 9, Appendix G, Chapter 4, Cultural Resources. 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 APE 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).

Under the NHPA, a significant resource is a cultural resource listed or eligible for listing on the NRHP or a historic property. A project affects a historic property 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 historic properties considers both direct and indirect impacts. Direct impacts are those that may occur from the project, such as the destruction of the property" (NPS 1997:1). Indirect impacts "may be visual, audible, or atmospheric changes which effect the setting of the property" (NPS 1997:1). Cumulative impacts on historic properties under NEPA result from the incremental impact of the action when added to other past, present, and future actions. Cumulative impacts are discussed in Volume 7.

Vandalism is considered to be a significant impact because it damages the integrity of the site, which is the major determinant of NRHP-eligibility. Physical evidence left in historic properties is finite and cannot be replaced 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 impact, especially if vandalism to historic properties in the vicinity occurs. Determination of Significance under NEPA

A historic property is a property that is listed on, or eligible for 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 or listed on, or eligible for 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-listed or eligible 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 12.1-4 and 12.1-5. Acceptable training on Andersen Air Force Base (AFB) and Andersen South are described in Volume 2. Lands managed by the Army would comply with all cultural resources requirements in accordance with Army Regulation 200-4, Cultural Resources Management.As part of the Section 106 consultation process for this EIS, a proposed PA for all military training activities, construction, and operations proposed under the proposed action, which includes additional mitigation measures and procedures is being prepared. Proposed signatories to this PA are: the Department of Defense (DoD) (Joint Region Marianas; DoD Representative Guam, Commonwealth of the Northern Mariana Islands[CNMI], Federated States of Micronesia, and Republic of Palau; Marines; Navy; Army; Air Force), other federal agencies (Federal Highway Administration, Advisory Council on Historic Preservation [ACHP], and the National Park Service [NPS]), and local government agencies (Guam State Historic Preservation Officer [SHPO], CNMI HPO). Stipulations in the proposed 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. Newly discovered properties would be avoided where possible.
- 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) unless this demolition is required for the project.
- 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.

In recognition of the significance of many historic properties within the 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 proposed 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.

#### 12.2.1.2 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. A general account of these comments including issues other than cultural resource are as follows:

- Access to cultural sites
- Construction impacts to cultural resources
- The need to conduct thorough and adequate data collection
- Public participation in the planning process relating to cultural resources

Other cultural issues indentified included:

- Access to traditional plant and fishing areas
- Curation of artifacts off island and storage issues associated with the Guam Museum

### 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)

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. Bachelor quarters would also be located within NCTS Finegayan. Family 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.

<u>North</u>

*NCTS Finegayan*

*Construction.* The activities associated with Alternative 1 are partially located within the 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. All of NCTS Finegayan has been surveyed for archaeological, architectural, and traditional cultural properties (Griffin et al. 2009; Welch 2010). 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 an area where historic properties have not been recorded, and no construction impacts would occur (Figure 12.2-1). Construction of the bachelor quarters facilities hasthe potential to have significant adverse impacts to two NRHP-eligible sites: sites 08-2299 (artifact scatter) and 08-2300 (four defensive structures).

Construction at Finegayan also has the potential to remove natural resources of cultural concern. However, acces to these resources is currently limited to the public; therefore, no impact would result from their loss.

*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 accidental or inadvertent damage to historic properties..

*South Finegayan*

*Construction.* The Army housing would be shared with Marine Corps housing at South Finegayan. Site 08-0414 (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 accidental or inadvertent damage to historic properties. Indirect significant adverse impacts could occur to site 08-0414 (Latte Stone Park).

Central

*Navy Barrigada*

As no construction or operations at Navy Barrigada would occur under Alternative 1, there would be no impact to historic properties

*Air Force Barrigada*

As no construction or operations at Air Force Barrigada would occur under Alternative 1, there would be no impact to historic properties

BMPs implemented to protect cultural resources include:

- For post review discoveries an assessment would be made for National Register of Historic Places eligibility in consultation with the State Historic Preservation Office.

Alternative 1 Proposed Mitigation Measures

Alternative 1 would have significant adverse impacts to two historic properties. Direct impacts to 08-2299 and 08-2300 would be mitigated through data recovery as these sites are eligible under Criterion D and recovery efforts would follow the ACHP guidance, Resolving Adverse Effects through Recovery of Significant Information from Archeological Sites (ACHP 1999). A table with the area, site number, impact, NRHP criteria of significance, and potential mitigation measures for each resource is included in Volume 9, Appendix G, Cultural Resources.

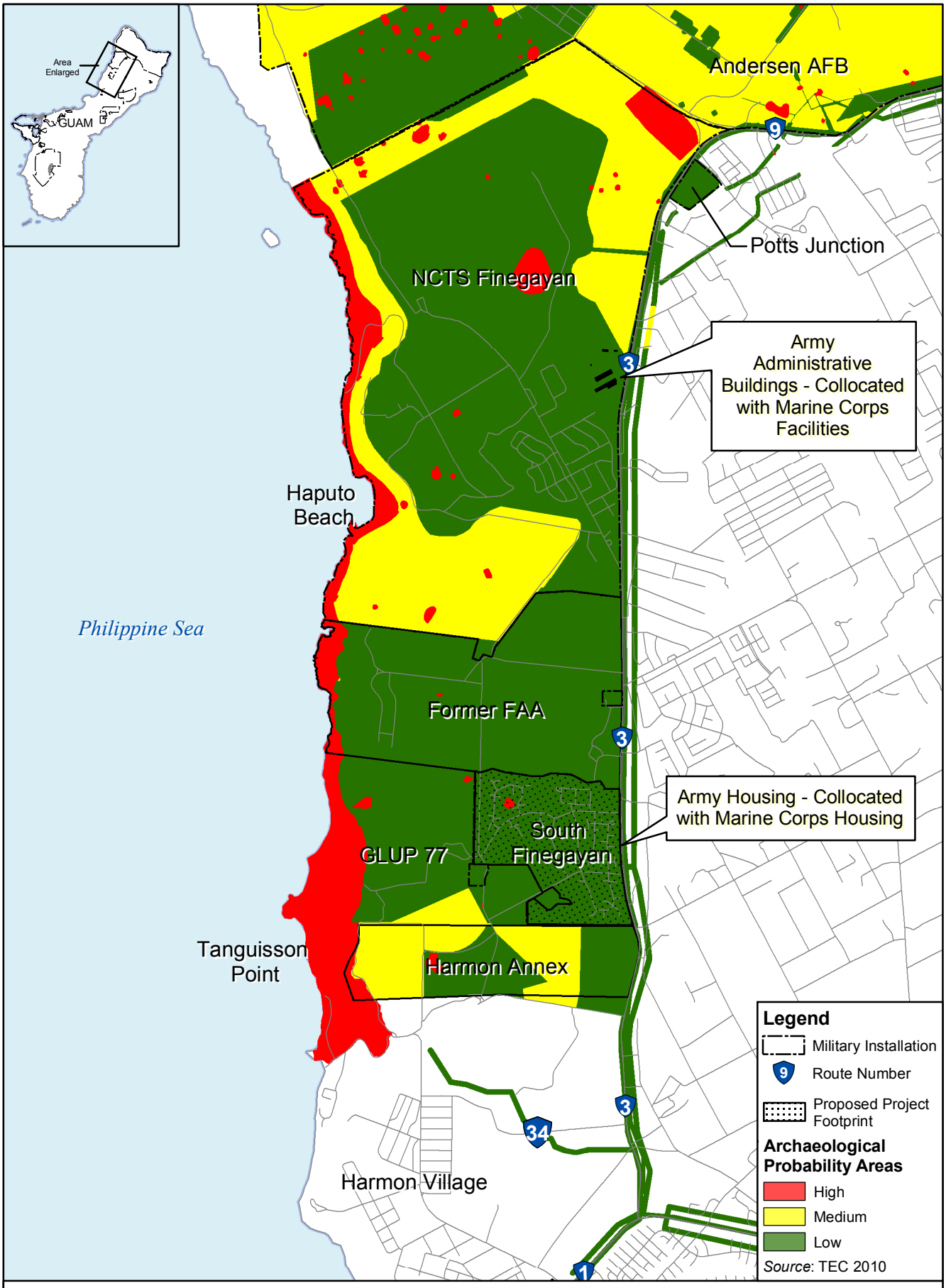


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**Figure 12.2-1**
**Army AMDTF Headquarters/Housing Alternative 1**

DOD recognizes that mitigation associated with data recovery efforts for archaeological sites impacted by the Undertaking, would result in an increase in archaeological materials that need to be curated. This increased level of archaeological materials will require appropriate curatorial facilities as well as clearly defined procedures for the disposition of artifacts and, if encountered, the respectful and proper handling of human remains. DoD is committed to working with local, state and federal partners to maintain DoD archeological material collections on CNMI in facilities that meet federal standards and have appropriate capacity. Further, DoD is committed to ensuring the proper handling and disposition of human remains in accordance with federal statutes. For non-DoD archaeological material collections, DoD will follow local regulations regarding the handling and repatriation of cultural materials or human remains to the extent such local regulations are consistent with federal law and regulations on the subject. DoD is currently working on a capacity analysis of its current collections in Guam and CNMI, and will use that information to develop a plan for the initial and long-term curation needs associated with the Undertaking.

Potential operational impacts would be mitigated through historic properties awareness training of DoD employees to avoid impacts to archaeological sites.

Potential mitigation measures associated with the proposed actionin general include the production of a Guam Synthesis, which would provide a public document on the surveys and special studies conducted for the EIS. Data would be compiled and synthesized into one document written for the public. This disseminates information to the public and mitigates for loss of cultural resources.Other general mitigation include the production of aCultural Landscape Report for Northern Guam. The Cultural Landscape Report would focus on installations affected by the relocation in the Northern Limestone Plateau and include Finegayan, Andersen AFB, the Route 15 Range areas, Andersen South, and Barrigada.

A Curation Assessment could be prepared. The curation of cultural material/artifacts from DoD properties would be in a facility that meets 36 CFR 79 requirements. The Curation Assessment would help in making the determination of where DoD collections are curated. Artifacts from non-DoD properties follow local regulations regarding the handling and repatriation of cultural materials or human remains.

Natural resources of cultural concernwould be avoided if possible. In places where impacts could not be avoided, the DoD would work with consulting parties to contact traditional artisans. Artisans would be given an opportunity to harvest and collect these resources for carving and canoe building. If *suruhanus* request access for medicinal plant collection the DoD will generally look favorably on affording access to these plants for individuals that practice traditional healing methods if the plants collected are not threatened or endangered species and where security requirements are not prohibitive.

Although the area where Latte Stone Park (08-0141) is located is slated for development, the site would be avoided. However, possible accidental or unintentional damage to the site would be mitigated by signage, and the plaque for the sign would be corrected and upgraded to enhance the interpretation of the site.

#### 12.2.2.2 Headquarters/Housing Alternative 2

Under Alternative 2, all AMDTF projects would occur on Navy Barrigada.

North

*NCTS Finegayan*

As no construction or operations would occur at NCTS Finegayan under Alternative 2, there would be no impact to historic properties.

*South Finegayan*

As no construction or operations would occur at South Finegayan under Alternative 2, there would be no impact to historic properties.

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 33 ac (13 ha), and the HSG, QOL facilities, bachelor quarters combine to occupy 481 total ac (195 ha). All of Navy Barrigada has been surveyed for archaeological, architectural, and traditional cultural properties (Athens 2009; Dixon, Walker, and Carson 2009; Griffin et al. 2009). Although no archaeological or architectural historic properties are located in Navy Barrigada, Mount Barrigada is considered to be a traditional cultural property because of its association with Chamorro creation myths.

No historic properties are recorded in the area where the majority of the construction would occur (Figure 12.2-2). Construction at the northern boundary of Navy Barrigada would occur at the southwestern corner of Mount Barrigada or Mount Tuyan, a traditional cultural property. Location of the construction could have a significant adverse visual impact to this traditional cultural property. Construction at Navy Barrigada also has the potential to require the removal of natural resources of cultural concern.

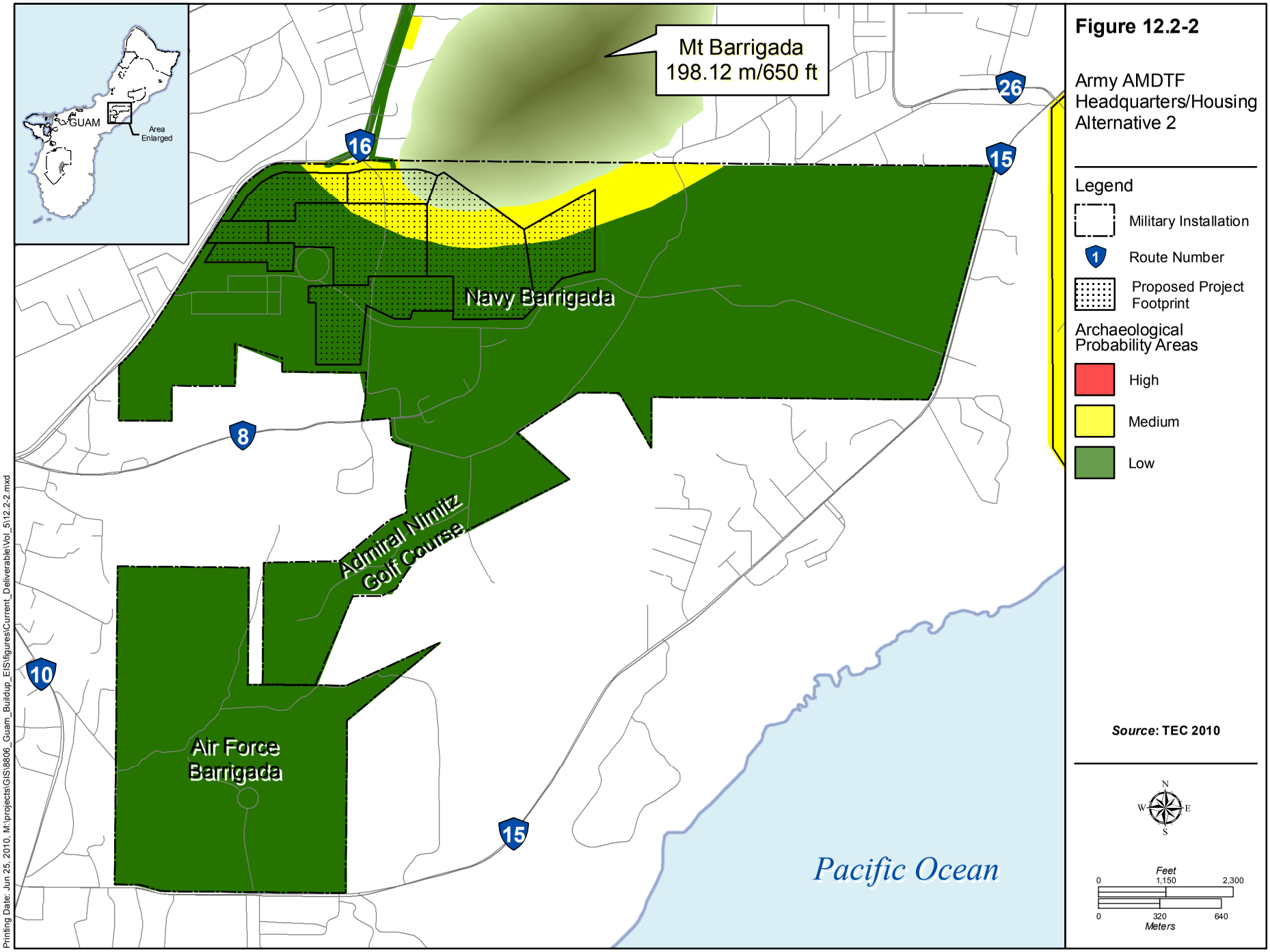
No NRHP- listed or eligible architectural resources would be impacted by Alternative 2.

*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 accidental or inadvertest disturbance to historic properties. However, historic properties have not been recorded in this area. Access to Mount Barrigada would not be restricted by operations. Therefore, operations due to Alternative 2 would have a less than significant impact to cultural resources.

*Air Force Barrigada*

As no construction or operations at Air Force Barrigada would occur under Alternative 2, there would be no impact to historic properties.

BMPs implemented to protect cultural resources would be the same as those described for Alternative 1.



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Alternative 2 Proposed Mitigation Measures

Alternative 2 would have significant adverse impacts to one traditional cultural property. Design and construction of new facilities and overall landscape would be undertaken in a manner that reduces adverse effects on the viewshed of Mount Barrigada. The current natural shape of Mount Barrigada would be maintained. As under Alternative 1, all general mitigation measures (a Guam Synthesis, Cultural Landscape Report for Northern Guam and Curation Assessment, historic property awareness training for DoD personnel and access to natural resources with cultural significance) will be implemented as part of the mitigation plan.

12.2.2.3 Headquarters/Housing Alternative 3

Under Alternative 3, AMDTF project placement would occur in NCTS Finegayan, Navy Barrigada, and Air Force Barrigada.

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 at NCTS Finegayan.

Construction of the bachelor quarters facilities has the potential to have significant adverse impacts to two NRHP-eligible sites: sites 08-2299 (artifact scatter) and 08-2300 (four defensive structures). Construction of HSG and education facilities would avoid site 08-0141 (Latte Stone Park), a traditional cultural property.

Construction at NCTS Finegayan has the potential to require the removal of natural resources of cultural concern.

*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 accidental or inadvertent disturbance to historic properties.

*South Finegayan*

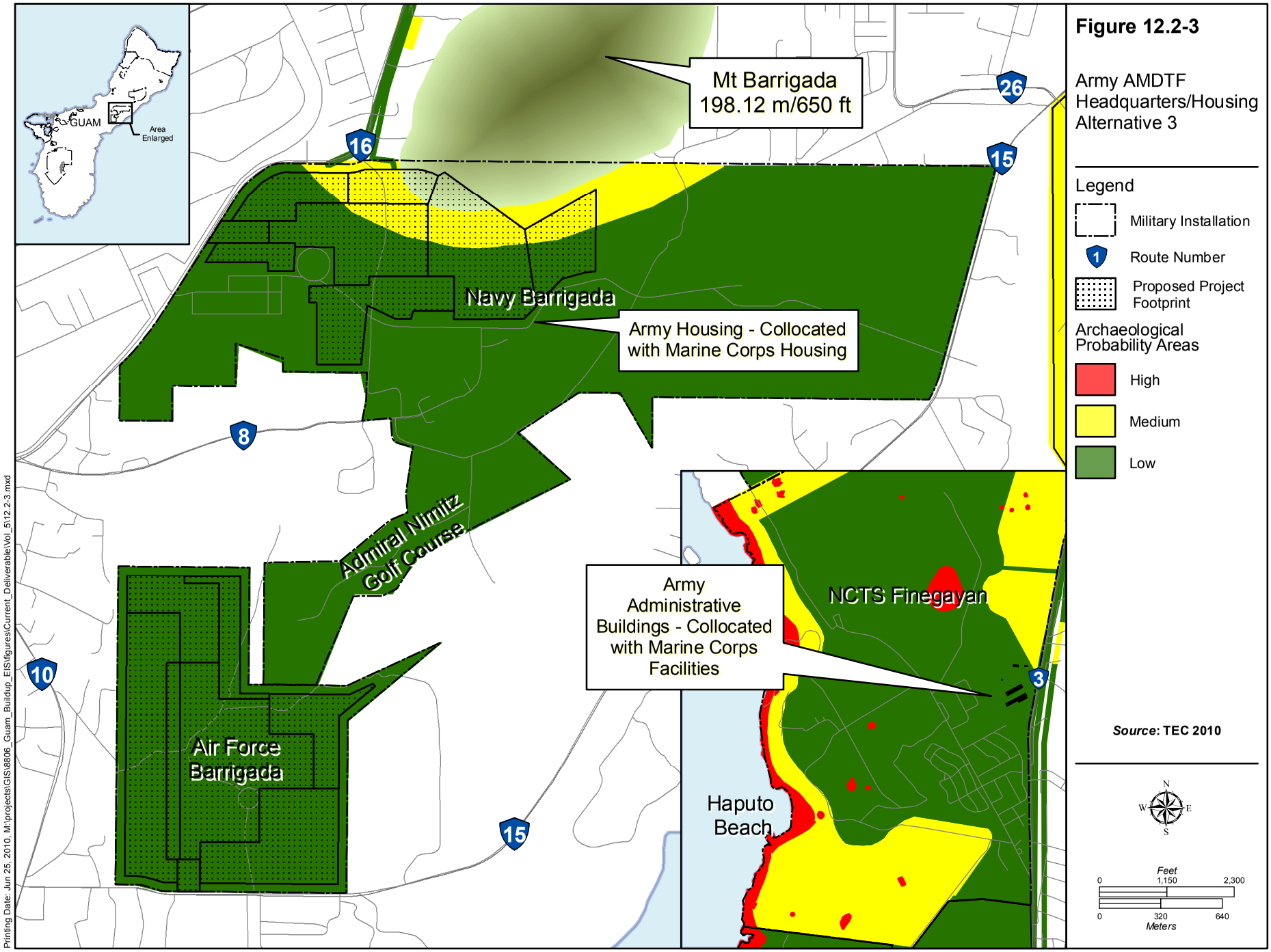
As no construction or operations at South Finegayan would occur under Alternative 3, there would be no impact. to historic properties.

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.* No historic properties have been recorded within the project APE. However, the proposed action would take place partially near the foot of Mount Barrigada. Location of the construction could have a significant adverse visual impact to this traditional cultural property. Construction at Navy Barrigada also has the potential to require the removal of natural resources of cultural concern. No NRHP- listed or eligible architectural resources would be impacted by Alternative 3.

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*Operation.* Operations at the AMDTF would include the use of housing by Army personnel. However, no historic properties are recorded within the project APE. Therefore, operations due to Alternative 3 at Navy Barrigada would have a no impact to cultural resources.

*Air Force Barrigada*

*Construction.* The activities associated with Alternative 3 are partially located within the Air Force Barrigada site, which has been completely surveyed for cultural resources. No historic properties are recorded for Air Force Barrigada. Therefore, no NRHP-listed or eligible archaeological, architectural, or traditional cultural properties 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, historic properties are recorded in the APE. Therefore, operations due to Alternative 3 at Air Force Barrigada would have no impact to cultural resources.

BMPs implemented to protect cultural resources would be the same as those described for Alternative 1.

Alternative 3 Proposed Mitigation Measures

Alternative 3 would have significant adverse impacts to two cultural resources. Data recovery would be conducted at NRHP-eligible sites 08-2299 and 08-2300; both of these sites are eligible for listing in the NRHP under Criterion D. ACHP (1999) guidelines for data recovery would be followed.

Although the area where Latte Stone Park (Site 808-0141) 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.

As under Alternative 1, all general mitigation measures (a Guam Synthesis, Cultural Landscape Report for Northern Guam and Curation Assessment, historic property awareness training for DoD personnel, and access to natural resources with cultural significance) will be implemented as part of the mitigation plan.

Natural resources of cultural concern would be avoided if possible as described under Alternative 1.

### 12.2.3 Munitions Storage Alternatives

Proposed construction for munitions storage in earth-covered magazines (ECMs) and/or modular storage magazines (MSMs) would be located at the Andersen Air Force Base (AFB) Munitions Storage Area (MSA) 1. The APEs associated with all of the alternatives have been surveyed for archaeological, architectural, and traditional cultural properties (Griffin et al. 2009; Dixon et al. 2010). One historc property, site T-3-1, is located within the APE.

#### 12.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Construction

No historic properties are recorded in the APE for Alternative 1. NRHP-listed or eligible archaeological sites are not located in this area; therefore, there would be no impact to archaeological sites. 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 have no impact to historic properties.

Alternative 1 Proposed Mitigation Measures

Because Alternative 1 would not impact historic properties , no mitigation measures are required.

12.2.3.2 Munitions Storage Alternative 2

Construction

No historic properties are recorded in the APE for Alternative 2.in

Operation

Operations of the munitions storage facilities would have no impact to historic properties .

Alternative 2 Proposed Mitigation Measures

Because Alternative 2 would not impact historic properties, no mitigation measures are required.

12.2.3.3 Munitions Storage Alternative 3

Construction

Ground excavation and soil removal associated with buildings and utilities construction would adversely impact a NRHP-eligible archaeological resource, site T-3-1 (artifact scatter) (see Figure 12.2-4).

Operation

Operation of the munitions storage facilities would bring additional personnel into the area. However, disturbance to adjacent sites in this area is unlikely due to restricted access. Operations of the munitions storage facilities would have less than significant impacts to historic properties.

Alternative 3 Proposed Mitigation Measures

If avoidance is not possible, data recovery would take place at site T-3-1, an archaeological resource eligible under Criterion D and recovery efforts would follow the ACHP guidance, Resolving Adverse Effects through Recovery of Significant Information from Archeological Sites (ACHP 1999). A table with the area, site number, impact, NRHP criteria of significance, and potential mitigation measures for each resource is included in Volume 9, Appendix G.

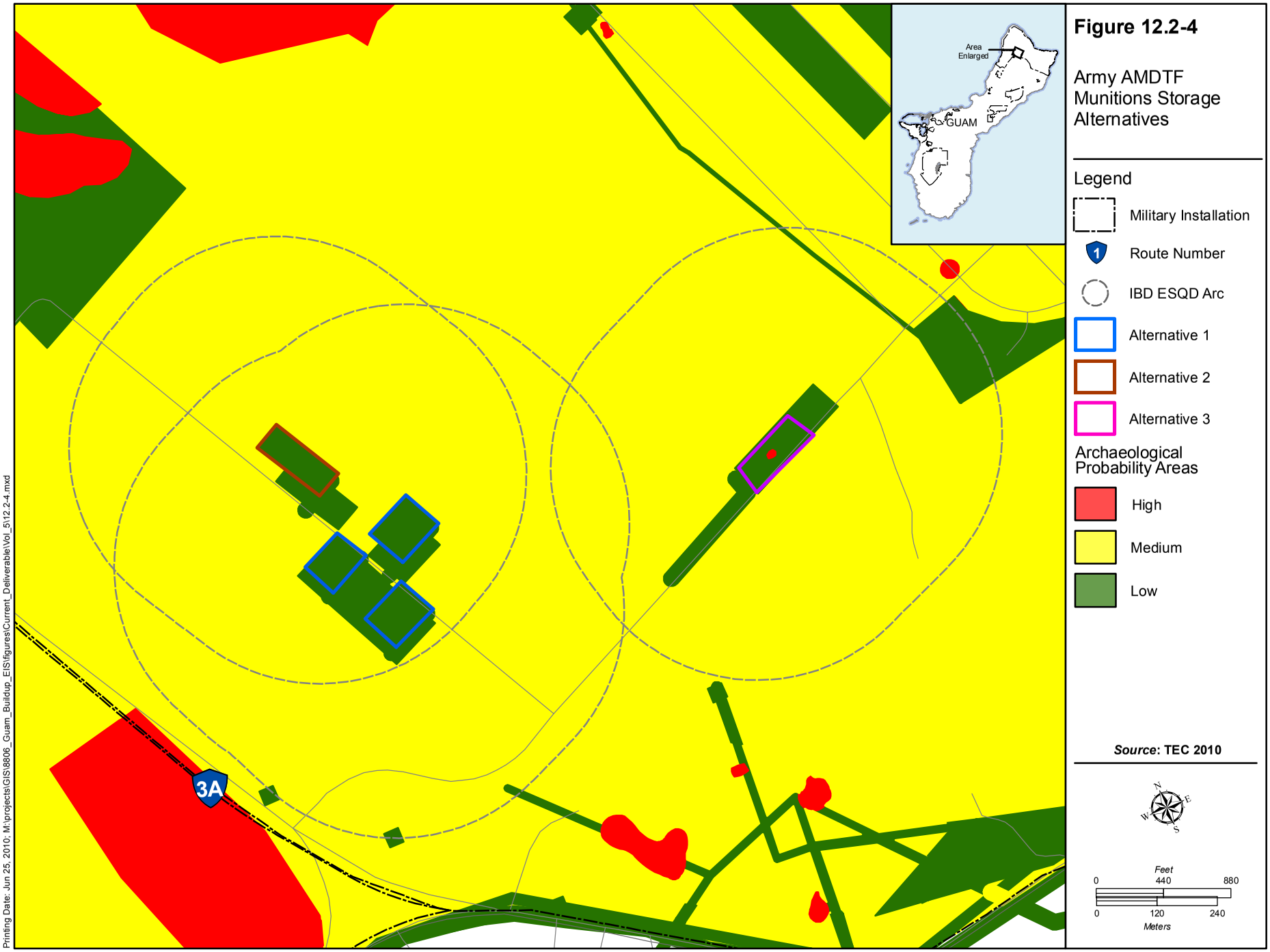
### 12.2.4 Weapons Emplacement Alternatives

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 here. All of the APEs for all alternatives have been surveyed for archaeological, architectural, and tradtional cultural properties (Dixon et al. 2010; Griffin et al. 2009).

Construction

Weapons Emplacement Alternative 1 would cause significant adverse impacts to 28 NRHP-eligible archaeological sites, including sites with pre-Contact and historic components. Alternative 2 would impact 29 NRHP-eligible archaeological sites, including sites with pre-Contact and historic components. Alternative 3 would cause significant adverse impacts to 33 NRHP-eligible archaeological sites. Alternative 4 would cause significant adverse impacts to 4 NRHP-eligible archaeological sites.

Construction of any of the Weapons Emplacement alternatives has the potential to require the removal of natural resources of cultural concern.


Area Enlarged
GUAM
3A
Figure 12.2-4
Army AMDTF Munitions Storage Alternatives
Legend
Military Installation
Route Number
IBD ESQD Arc
Alternative 1
Alternative 2
Alternative 3
Archaeological Probability Areas
High
Medium
Low
Source: TEC 2010
N
W
E
S
Feet
0
440
880
0
120
240
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Operation

Operation of any of the Weapons Emplacement alternatives would bring additional personnel into the area. However, given the heavy vegetation in most areas and that personnel would be primarily within a fenced area, indirect effects to sites outside of the fenced area would be minimal.

Proposed Mitigation Measures

Data Recovery of sites directly within the footprints of the facilities, utilities or other ground disturbance activities would mitigate direct impacts to NRHP-eligible archaeological sites. As all archaeological sites are eligible for listing on the NRHP under Criterion D and ACHP guidelines on data recovery would be followed, significant impacts would be reduced to less than significant levels. No NRHP-eligible architectural resources or traditional cultural properties would be impacted by the weapons emplacement areas.

Natural resources of cultural concern would be avoided if possible; however, in places where impacts could not be avoided, the DoD would work with consulting parties to contact traditional artisans. Artisans would be given an opportunity to harvest and collect these resources for carving and canoe building.

### 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<br>• 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<br>• Direct significant adverse impacts to one traditional cultural property at Navy Barrigada mitigated to less than significant through redesign and vegetation cover | SI-M<br>• Direct significant adverse impacts to one traditional cultural property at Navy Barrigada mitigated to less than significant through redesign and vegetation cover<br>• Direct and indirect impacts to areas with two NRHP-eligible archaeological sites on NCTS Finegayan mitigated to less than significant through data recovery |
| **Operation** | | |
| SI-M<br>• Indirect significant adverse impacts to one traditional cultural property on South Finegayan | LSI<br>• Less than significant impacts to one traditional cultural property at Navy Barrigada | LSI<br>• Less than significant impacts to one traditional cultural property at Navy Barrigada<br>• Indirect significant adverse impacts to one traditional cultural property on NCTS Finegayan |

*Legend:* SI-M = Significant impact mitigable to less than significant; LSI = Less than significant impact

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

| *Alternative 1* | *Alternative 2* | *Alternative 3* |
|---|---|---|
| **Construction** | | |
| NI<br>• No impacts to cultural resources | NI<br>• No impacts to cultural resources | SI-M<br>• Direct adverse impacts to NRHP eligible archaeological site T-3-1 |
| **Operation** | | |
| NI<br>• No impacts to cultural resources | NI<br>• No impacts to cultural resources | LSI<br>• Less than significant impacts to cultural resources |

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

**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<br>• Significant adverse impacts to NRHP-eligible archaeological sites mitigated to less than significant through data recovery | SI-M<br>• Significant adverse impacts to NRHP-eligible archaeological sites mitigated to less than significant through data recovery | SI-M<br>• Significant adverse impacts to NRHP-eligible archaeological sites mitigated to less than significant through data recovery | SI-M<br>• Significant adverse impacts to NRHP-eligible archaeological sites mitigated to less than significant through data recovery |
| **Operation** | | | |
| NI<br>• There would be no impacts due to operations | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• 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 direct 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 historic properties. However, these impacts would be mitigated through preparation of additional cultural resources documentation as listed on Table 12.2-4, avoidance, data recovery and historic property awareness training.

Construction of Headquarters/Housing Alternative 2 at Navy Barrigada would result in significant impacts to one traditional cultural property. However, this impact could be mitigated through reduction of visual impacts to Mount Barrigada.

Construction of Headquarters/Housing Alternative 3 would result in significant direct impacts to two historic properties 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 historic properties. Construction of the alternative in this area would change the setting of one traditional cultural property. Mitigation would include preparation of additional cultural resources documentation as listed on Table 12.2-4, avoidance, data recovery and reduction of visual impacts to Mount Barrigada.

Construction and operation of AMDTF munitions storage facilities in MSA 1 under Alternative 3 would result in significant impacts to one NRHP-eligible archaeological site. Alternatives 1 and 2 would have no impacts to cultural resources. Construction and operation of the weapons emplacement facilities would have significant direct impacts to four NRHP-eligible archaeological sites under Alternative 4 (the preferred alternative) and between 28 and 33 NRHP-eligible sites under alternatives 1, 2, and 3. Mitigation for both the storage and emplacement facilities would include avoidance, and data recovery.

### 12.2.7 Summary of Proposed Mitigation Measures

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

**Table 12.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Archaeological Resources** | | |
| • Preparation of a Guam Synthesis<br>• Preparation of a Cultural Landscape Report for Northern Guam Preparation of a Curation Assessment.<br>• Data recovery of sites 08-2299 and 08-2300<br>• Historic property awareness training for DoD personnel<br>• Allow traditional artisans and suruhanus to collect resources | • Preparation of a Guam Synthesis<br>• Preparation of a Cultural Landscape Report for Northern Guam<br>• Preparation of a Curation Assessment<br>• Data recovery of site T-3-1 (Alternative 3)<br>• Historic property awareness training for DoD personnel | • Preparation of a Guam Synthesis<br>• Preparation of a Cultural Landscape Report for Northern Guam Plateau<br>• Preparation of a Curation Assessment<br>• Data recovery of NRHP-eligible archaeological sites<br>• Historic property awareness training training for DoD personnel<br>• Allow traditional artisans and suruhanus to collect resources |
| **Architectural Resources** | | |
| • None | • None | • None |
| **Submerged Resources and Objects** | | |
| • None | • None | • None |
| **Traditional Cultural Properties** | | |
| • Visual impacts to Mount Barrigada would be reduced by vegetation<br>• Preserve site and upgrade signage for site 08-0141 (Latte Stone Park) | • None | • None |

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# 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 (EIS), 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 April 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)

Under Alternative 1, the Army administration/headquarters (HQ) and maintenance facility would be co-located with the Marine Corps in the Naval Computer and Telecommunications Station (NCTS) Finegayan. Bachelor quarters would also be located within NCTS Finegayan. Family housing facilities would be co-located with the Marine Corps 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.* 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.* Development of the Army AMDTF HQ and bachelor quarters (unaccompanied housing) in NCTS Finegayan 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). The Army AMDTF facilities would be compatible with proposed surrounding Marine Corps land uses. Refer to Volume 2, Chapter 13, Section 13.2 Environmental Consequences for an illustration of how this area would look when the proposed buildings are finished.

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 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 proposed mitigation.

Haputo Point Overlook could be negatively impacted. Negative impacts to this overlook could be lessened to a level of less than significant with proposed 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 family housing facilities would be co-located with the Marine Corps housing in South Finegayan. Recreational and QOL facilities would be co-located within and adjacent to the housing areas. South Finegayan would be completely transformed into a densely developed 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 South Finegayan, it would be expected to be less than significant. Most of the property is already under Department of Defense ownership and few, if any, sensitive views or receptors currently exist there. Refer to Volume 2, Chapter 13, Section 13.2, an illustration of how this area would look when the proposed buildings are finished.

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 Proposed 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.

#### 13.2.2.2 Headquarters/Housing Alternative 2

Under Alternative 2, the Army AMDTF Headquarters/Housing would be located within Navy Barrigada and would not be co-located with Marine Corps facilities.

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, large areas of this central portion remain heavily vegetated and exhibit 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 Army AMDTF development would be comparable to other existing 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 proposed 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 Proposed 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

Under Alternative 3, the Arny AMDTF Headquarters/Housing would be co-located with the Marine Corps in NCTS Finegayan, Navy Barrigada, and Air Force Barrigada.

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 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 proposed 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 developed area would be comparable to other land uses in the nearby vicinity (residential neighborhoods). Nevertheless, the Army AMDTF 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 proposed 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 proposed mitigation measures in place.

Alternative 3 Proposed 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.

### 13.2.3 Munitions Storage Alternatives

#### 13.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Proposed construction for munitions storage in earth-covered magazines (ECMs) and/or modular storage magazines (MSMs) would be at the Andersen Air Force Base Munitions Storage Area (MSA) 1. The proposed ECMs and/or MSMs would be located away from any inhabited facility in accordance with required explosive safety distances.

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 ECMs and/or MSMs proposed within MSA 1 would add similar features to a landscape dominated by numerous other ECMs. Thus, proposed ECMs and/or MSMs 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 and/or MSMs.

#### 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 and 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<br>• Construction-related activities would be short-term in duration and minimal in their impacts | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | |
| SI-M<br>• Few, if any, sensitive views or receptors currently exist in NCTS Finegayan and South Finegayan. 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 proposed mitigation<br>NI<br>• There would be no impact to visual resources at Navy and Air Force Barrigada | SI-M<br>• Development at Navy Barrigada would replace naturally-appearing landscape with suburban growth in areas with potentially sensitive receptors, impacts would be less than significant with proposed mitigation<br>NI<br>• There would be no impact to visual resources at NCTS Finegayan, South Finegayan, or Air Force Barrigada | SI-M<br>• Few, if any, sensitive views or receptors currently exist in NCTS Finegayan. 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 proposed mitigation<br>SI-M<br>• 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 proposed mitigation<br>NI<br>• 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<br>• Construction-related activities would be short-term in duration and minimal in their impacts | LSI<br>• The impacts would be the same as Alternative 1 | LSI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | |
| NI<br>• Proposed ECMs and/or MSMs would be in keeping with the current features of the area. Furthermore, this area is away from any public views or sensitive receptors | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• 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<br>• The existing scenic points do not lend viewing ability towards the project area | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | | |
| NI<br>• The existing scenic points do not lend viewing ability towards the project area | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• 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 adjacent to the norther portion of 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 proposed mitigation measures in place. Proposed 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 Proposed Mitigation Measures

Table 13.2-4 summarizes proposed mitigation measures for each action alternative.

**Table 13.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Construction** | | |
| • No significant impacts were identified therefore no mitigation measures are proposed | • No significant impacts were identified therefore no mitigation measures are proposed | • No significant impacts were identified therefore no mitigation measures are proposed |
| **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).<br>• 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.<br>• Create a buffer area and screen development on NCTS between the Haputo Point Overlook and adjacent proposed development. | • No significant impacts were identified therefore no mitigation measures are proposed | • No significant impacts were identified therefore no mitigation measures are proposed |

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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 islandwide in nature with little difference in effects among the 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 (Volume 9 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 (Volume 9 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 Bureau 2000a) and Guam Department of Labor (GDoL) interviews (Volume 9 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 Bureau 2000a) and GDoL interviews (Volume 9 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 Bureau 2000a) |
| 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 Bureau 2000a) and GDoL interviews (Volume 9 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 Bureau 2000a) and GDoL interviews (Volume 9 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 |

*Note:* 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 and into the future 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.

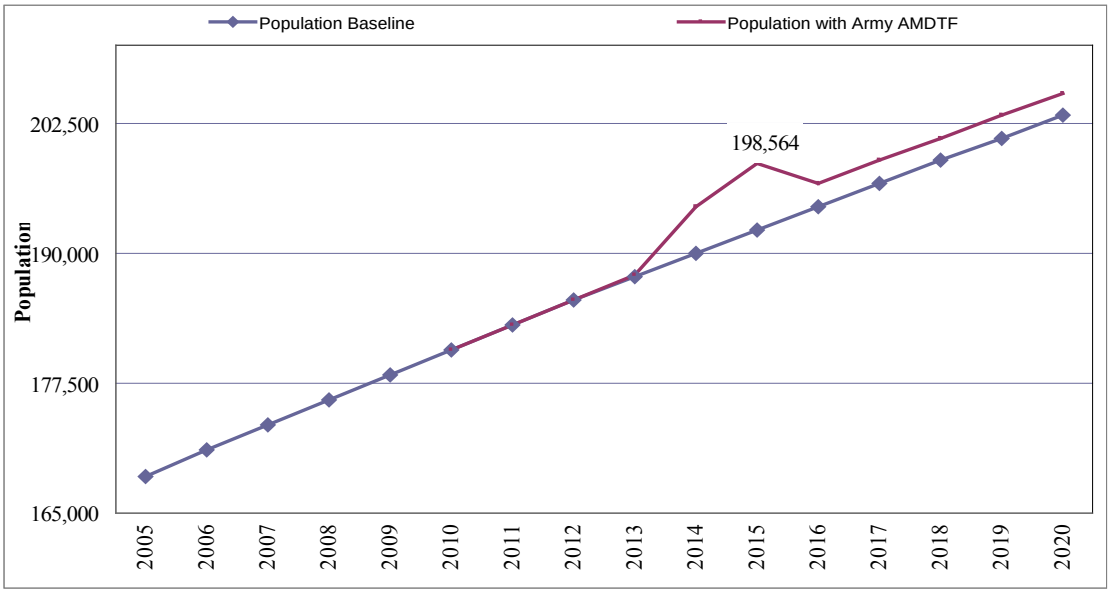


**Figure 16.2-1. Population With and Without Proposed Action**

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.

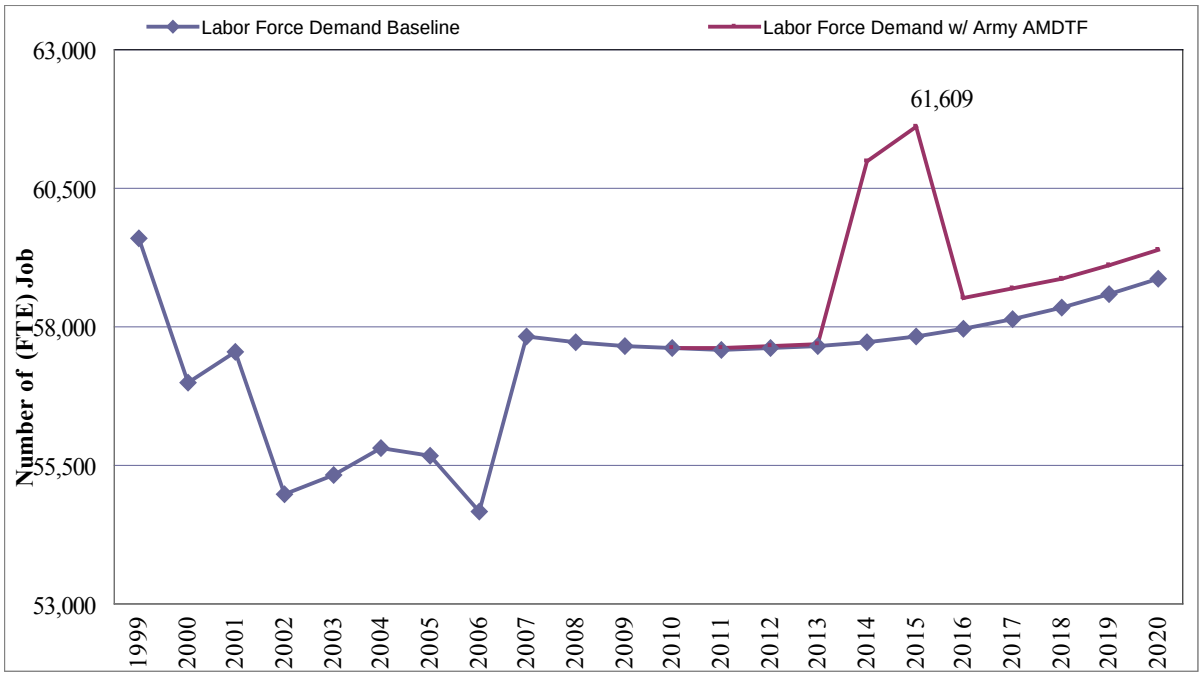


**Figure 16.2-2. Labor Force Demand (FTE Jobs) With and Without Proposed Action**

*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 |
| CNMI | 0 | 0 | 0 | 0 | 41 | 41 | 0 |
| Other U.S. Pacific Islands | 0 | 0 | 0 | 0 | 158 | 158 | 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.

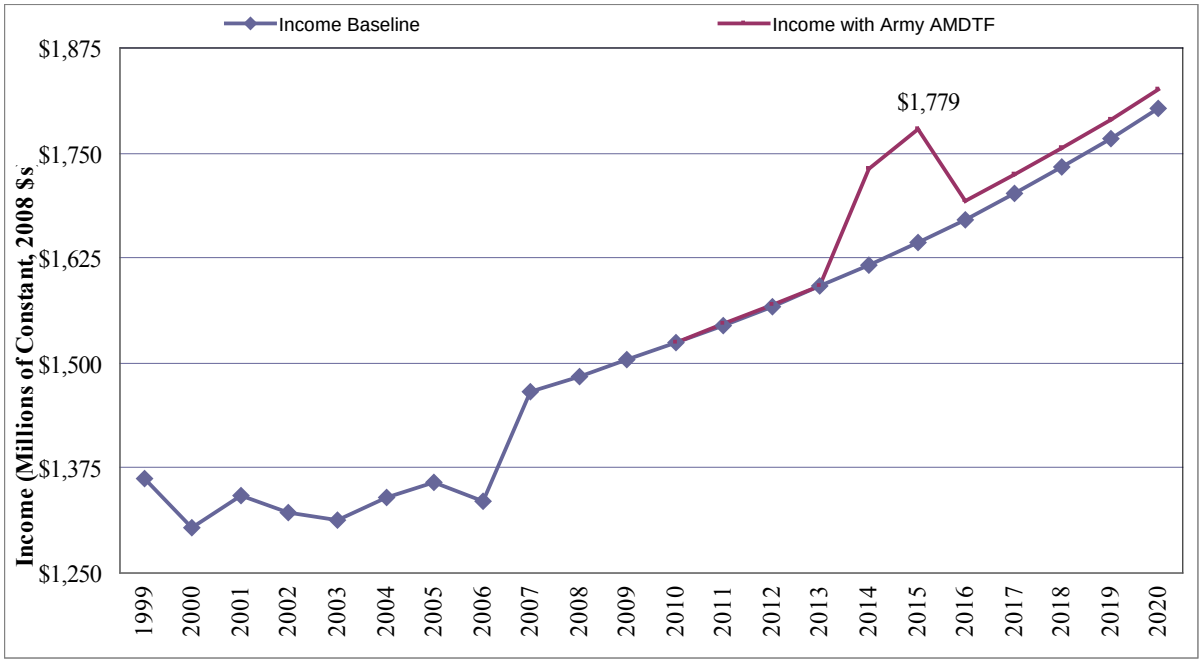


**Figure 16.2-3. Labor Force Income (Millions of 2008 $s) With and Without Proposed Action**

*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.

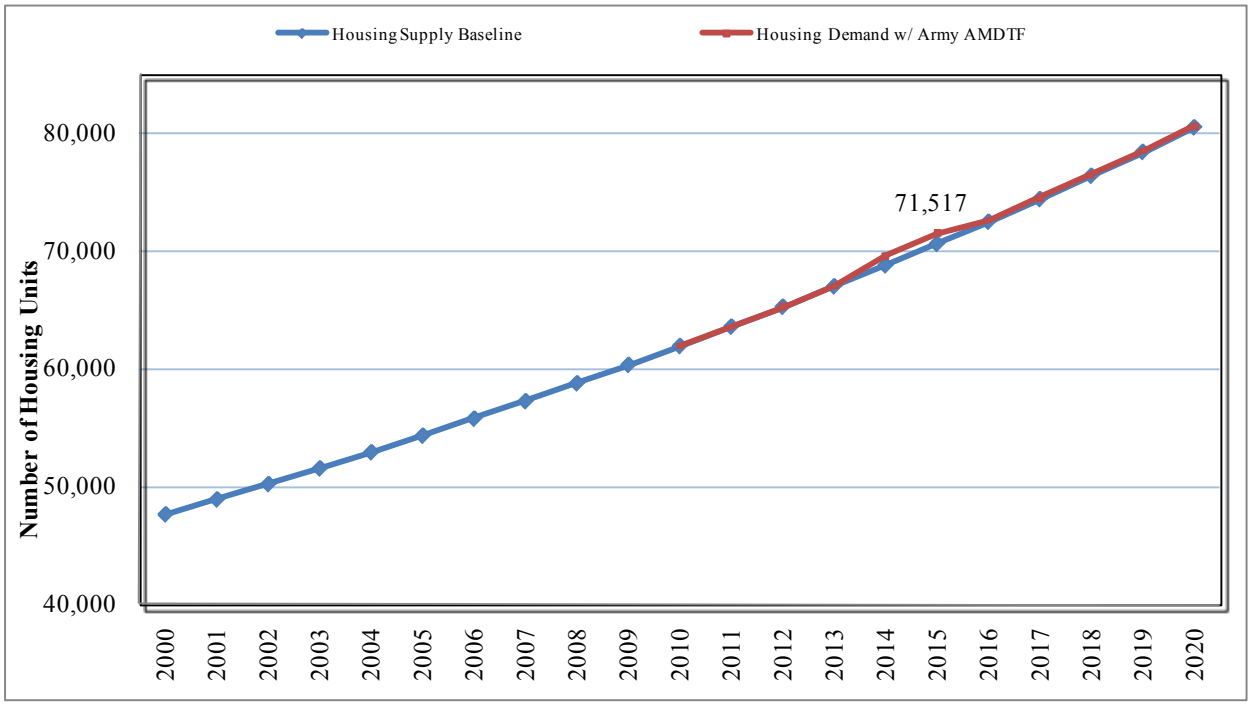


**Figure 16.2-4. Housing Demand with Army AMDTF and Housing Supply**

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.

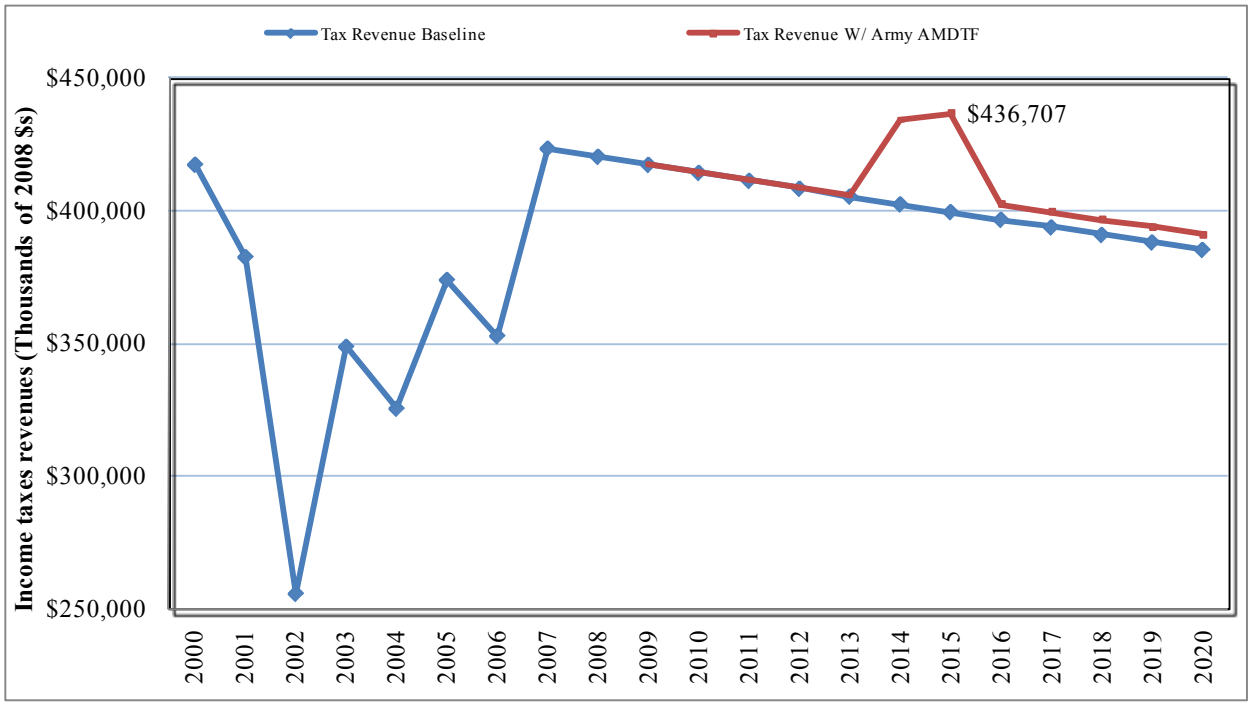


**Figure 16.2-5. GovGuam Tax Revenue With and Without Proposed Action**

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 $5.5 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.

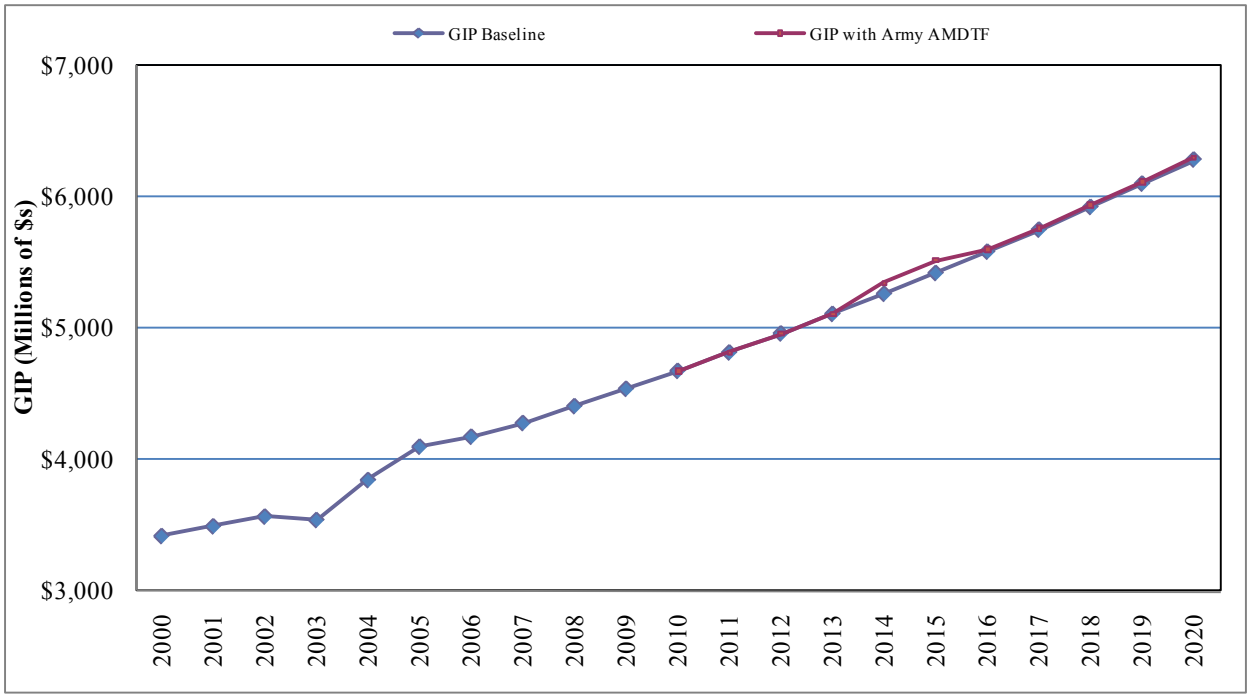


**Figure 16.2-6. GIP (Millions of 2008 $s) With and Without Proposed Action**

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 the Army AMDTF 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 16.2-12 provides an overview of the proposed action's impacts on GPSS staffing for the action's peak year and steady-state. The peak requirement in 2015, when the full effects of the proposed action are added to ongoing construction, requires a 2% increase over reported baseline staffing levels for GPSS. This increase falls to less than 1% after the peaks. The analysis indicates less than significant impacts in the long term to GPSS due to the proposed action alone, except in conjunction with other aspects of the aggregate action.

**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. The peak requirement in 2015, when the full effects of the proposed action are added to ongoing construction, requires between a 2 and 3% increase over reported baseline staffing levels for agencies. This increase falls to less than 1% after the peak. The analysis indicates less than significant impacts in the long term to higher education agencies due to the proposed action alone, except in conjunction with other aspects of the aggregate action.

**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. The peak requirement in 2015, when the full effects of the proposed action are added to ongoing construction, requires between a 3% and 4.5% increase over reported baseline staffing levels for agencies. This increase falls to less than 1% for most agencies after the peak. The analysis indicates less than significant impacts to public health and human services agencies in the long term due to the proposed action alone, except in conjunction with other aspects of the aggregate action.

**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 Communicable Disease Prevention Professionals | 33 | 2015 | 1 | 3% | <1 | 1% |
| GDPHSS – Bureau of Family Health and Nursing Services 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 | 39,813 | 2015 | 1,922 | 5% | 1,105 | 3% |

Table 16.2-18 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. The peak requirement in 2015, when the full effects of the proposed action are added to ongoing construction, requires between a 2% and 5% increase over reported baseline staffing levels for agencies. This increase falls to less than 1% for most agencies after the peak. The analysis indicates less than significant impacts to public safety agencies in the long term, due to the proposed action alone, except in conjunction with other aspects of the aggregate action.

**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 | 4 | 5% | 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. The peak requirement in 2015, when the full effects of the proposed action are added to ongoing construction, requires between a 3% and 3.5% increase over reported baseline staffing levels for agencies. This increase falls to 1% after the peak. The analysis indicates less than significant impacts in the long term to these agencies due to the proposed action alone, except in conjunction with other aspects of the aggregate action.

**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 Guam Department of Land Management (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.

* The Programmatic Agreement (further described in the Cultural Resources chapter) helps the HPO with staffing issues by streamlining the Section 106 process. Because staffing requirements to meet federal regulations will be reduced by this agreement, freeing up current staff to work on non-federal projects, the staffing requirements noted in this table may not be as high.

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.

Political and 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 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 national and international economic situation is weak.

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 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 adversely impact the various service agencies because of budget cuts, and would probably represent an 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 attention given to some contentious issues linked to public perceptions and concerns of the proposed action would likely recede. 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. However, the current incentives for providing support for those populations, both on Guam and the Micronesian states themselves, would also be lessened, with detrimental implications for those populations.

### 16.2.4 Summary of Impacts

Socioeconomic impacts are anticipated to be largely islandwide 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 peak year 2015 and a subsequent more stable estimated 2,150 residents in the following years.

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.

#### 16.2.4.2 Economic Impacts

Most long-term economic benefits would be beneficial though less than significiant. The construction activity for the Army AMDTF would contribute to economic expansion, but also to 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, 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 peak year 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 peak year 2015 and by nearly $17 million a year from 2016 on.

#### 16.2.4.3 Public Service Impacts

GovGuam's public service agencies would 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 25 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 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. GDLM, Guam Environmental Protection Agency, 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** |
| Population Impacts<br>• Significant impact due to increase of about 6,300 in Guam's population during the construction phase<br><br>Economic Impacts<br>• Beneficial impact due to economic expansion fueled by increased population<br>• Beneficial impacts to civilian labor force demand due to provision of construction-related jobs on Guam<br>• Beneficial impacts to civilian labor force incomes due to infusion of income into the Guam economy<br>• Beneficial impacts due to increase in local government revenue<br>• Beneficial impacts to Gross Island Product due to increased GIP during the construction phase.<br>• Beneficial impacts to local business opportunities due to increased military service contract opportunities for local Guam businesses.No impacts to tourism<br>• No impacts to the standard of living<br><br>Public Service Impacts<br>• Significant impacts to public service agencies, most of which would need to expand their services and staff over 2% of the current reported baseline numbers during the 2014-2015 peak (raising issues of availability of qualified workers), then cut them back as construction ends.<br>• 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.<br><br>Sociocultural Impacts<br>• No impacts to community cohesion<br>• No impacts to political and chamorro issues<br>• No impacts to crime and social order |

**Table 16.2-22. Summary of Impacts of Army AMDTF Proposed Actions**

| *Summary of Impacts* |
|---|
| **Operation** |
| Population Impacts<br>• Less than significant impact due to steady addition of about 2,150 in Guam's population during the operations phase<br><br>Economic Impacts<br>• Less than significant beneficial impact due to economic expansion fueled by increased population<br>• Less than significant beneficial impacts to civilian labor force demand due to operations related jobs on Guam<br>• Less than significant beneficial impacts to civilian labor force incomes due to infusion of income into the Guam economy<br>• Less than significant beneficial impacts due to increase in local government revenue<br>• Less than significant beneficial impact to Gross Island Product due to increased GIP during the operations phase<br>• Less than significant beneficial impacts to local business opportunities due to increased military service contract opportunities for local Guam businesses No impacts to tourism<br>• Less than significant direct and indirect impact of demand for civilian housing units peaking with permanent operational demand for 147 civilian housing units from 2016 on. No impacts to the standard of living<br><br>Public Service Impacts<br>• Less than significant impacts to public service agencies, most of which would need to expand their services and staff only slightly to accommodate increased demand for services. No significant lapse or decline in services would be expected.<br><br>Sociocultural Impacts<br>• No impacts to community cohesion<br>• No impacts to political and chamorro issues<br>• No impacts to crime and social order |

*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 Proposed Mitigation Measures

A review of the above impacts shows that the proposed action will largely have no significant or beneficial socioeconomic impacts on Guam.

During the construction phase, public service agencies will experience some strain. There is an acknowledged existing sub-standard condition of key public social service on Guam and documented historical difficulty in addressing and funding these conditions. Thus any increase in service population due to the proposed action will further strain these services, and significant impact was assessed as a 2% or greater increase in professional staffing levels required by the proposed action.

While this issue is more fully addressed in Volume 2 Chapter 16, the table below summarizes proposed mitigation measures to assist in decreasing any adverse impact to Guam's public service agencies.

Table 16.2-23 summarizes the proposed mitigation measures.

**Table 16.2-23. Summary of Proposed Mitigation Measures**

| *Impact Area* | *Mitigation Measures* |
|---|---|
| Public Service and Growth Permitting and Regulatory Agencies | Continue to support existing DoD programs that contribute and/or donate excess equipment to local agencies.<br><br>DoD would continue to participate in CMTF to address community health needs such as facilitating information sharing between military and civilian health agencies, including health service needs data and health services utilization rates.<br><br>DoD would coordinate with the Governor's Office of Community Affairs to facilitate volunteer opportunities at Guam public service agencies for military personnel and their dependents.<br><br>DoD would assist by leading a federal inter-agency effort to identify other federal programs and funding sources for GovGuam addressing the following:<br>a) Enhancement of GovGuam Tax Revenue Collection efficacy. For example, improved revenue could be used to enhance recruitment and retention of GovGuam work force and contractual support;<br>b) Examination of currently existing caps on benefits such as Medicaid and Medicare, and the non-provision of benefits such as Supplemental Security Income benefits, and the appropriateness of these caps and limits for Guam;<br>c) Increase the number of Guam-based offices for the distribution of federal social service support, and to support the work of GovGuam public service agencies;<br>d) Review and implementation of programs to assist GovGuam's public agencies in adapting to peaks in service population growth;<br>e) Provision of technical assistance for the development and implementation of a system of interpreters and translators available for the interpreting and translating needs of GovGuam public service agencies, to facilitate timely and appropriate provision of services for the English as a Second Language service population;<br>f) The development of AmeriCorps, Teach for America, National Health Service Corps programs, and other similar programs on Guam;<br>g) Improving the grant-writing capabilities within GovGuam agencies to improve possibilities of attracting federal support programs;<br>h) Support for the recruitment of professionals during the construction phases of the proposed action for GovGuam public agency positions;<br>i) Support for the use of the Interagency Personnel Act to support identified GovGuam agency personnel requirements, and/or<br>j) Provision to GovGuam of technical assistance for, and development and implementation of, comprehensive data collection systems focused on the following topics:<br>1. GovGuam public services provided to FAS citizens, in order to facilitate GovGuam access to Compact Impact and other related funding.<br>2. GovGuam agency services provided to military individuals, in order to facilitate GovGuam access of TRICARE and other related funding<br>3. GovGuam public health agency patient information, records, and services accessed, in order to facilitate appropriate care administered in a timely manner<br>4. GovGuam public agency billing systems, in order to facilitate GovGuam collection of payment for services |

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# 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 management plans and programs for hazardous substance handling, storage, transportation, and disposal, 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 establishment of the Army AMDTF 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 regional 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, expected or potential impacts and environmental consequences of the proposed action and alternatives. 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 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 human health and/or 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

As part of the analysis, concerns relating to hazardous substances that were mentioned by the public, including regulatory stakeholders, during the public scoping meetings were addressed.

These include:

- Address management practices for hazardous substances including hazardous wastes, toxic substances, hazardous materials, and munitions and explosives of concern (MEC).
- 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 emplacement alternatives 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. There is a possibility that some of these planned construction project footprints could encounter sites contaminated with hazardous substances and/or MEC. If relocation of various construction projects that may encounter hazardous substances and/or MEC is not possible, several Best Management Practices (BMPs) and Standard Operating Procedures (SOPs) (see Volume 7) would be used including, but are not limited to: development of site-specific health and safety plans, the use of engineering controls (e.g., dust suppression, etc.) and administrative controls, and the use of personal protective equipment (PPE).

Hazardous Materials

Proposed construction activities for the proposed action would result in an increase 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 Reutilization and Marketing Office (DRMO) Guam hazardous

material disposal data. Human health, welfare, and the environment would be protected through use of BMPs and SOPs to:

- Protect human health and the environment
- Prevent, contain, and/or clean up spills, releases, and leaks
- Provide personnel training and operational protocol and procedures
- Ensure DRMO has the ability to properly manage and dispose of anticipated hazardous materials
- Properly identify manage, and dispose of MEC associated with construction and operation of the expanded mission facilities

Due to the the projected increase in the volume of hazardous material, Alternative 1 would have the potential to result in a 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 (Volume 7) in accordance with all federal and local regulations, as well as with Department of Defense (DoD) requirements. Therefore, the impacts from the increase in hazardous material would be less than significant. Note that BMPs and SOPs are not considered "mitigation measures" thus no mitigation measures are proposed. The BMPs and SOPs that would be used include, but are not limited to those listed on Table 17.2-1 below. A complete listing is contained in Volume 7.

**Table 17.2-1. Summary of BMPs and SOPs**

| *All Components and Alternatives, Except as Noted With ** |
|---|
| **For Soils, Water, Air, and Biota Relative to Transportation, Construction, and Operations Functions** |
| • Update/implement hazardous materials management plans (HMMPs) and hazardous waste management plans (HWMPs).<br>• Update/implement Facility Response Plans<br>• Update/implement spill prevention, control and countermeasure (SPCC) plans (training, spill containment and control procedures, clean up, notifications, etc.).<br>• Update/implement stormwater pollution prevention plans (SWPPPs)<br>• Ensure all DoD personnel and contractors are trained in accordance with the Guam public law (PL) 29-26 regarding the importation, handling, use, and application of pesticides (e.g., during maintenance, pre and post construction, and general operations activities). In addition, DoD will develop and implement a comprehensive Integrated Pest Management Plan (IPMP). This IPMP will encompass all activities regarding the importation, handling, storage, use, and application of pesticides as well as address prevention of the introduction of potential invasive species to Guam.<br>• Ensure all DoD personnel and contractor 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.<br>• Perform all maintenance activities off-range at existing DoD maintenance shops.<br>• Implement aggressive hazardous waste and hazardous material minimization plans that substitute hazardous waste for non-hazardous or less toxic waste as applicable, maximize recycling, and use Leadership in Energy and Environmental Design (LEED) green building criteria.<br>• Ensure that DRMO has sufficient hazardous substance storage, transportation, and disposal capacity prior to any expected increases. Note that a Joint Military Master Plan provides specific details regarding several new facilities (e.g., operations and maintenance facilities, bilge and oily wastewater pump station, fuel storage areas, petroleum, oils, and lubricant (POL) storage areas, warehousing facilities, munitions magazine storage facilities, hazardous waste storage facilities, waste storage facilities, hazardous material storage, etc.). These new facilities will be required to store, handle, and dispose of the estimated increases in hazardous substances that would occur from the potential DoD unit transfers to Guam.<br>• Verify through surveillances and inspections full compliance with federal, state and local regulations and adherence to DoD requirements. Implement corrective actions as necessary.<br>• Minimize the risk of uncontrolled leaks, spills, and releases through industry accepted methods for spill |

| *All Components and Alternatives, Except as Noted With ** |
|---|
| prevention, containment, control, and abatement.<br>• Implement land use controls, fencing, signage, periodic inspections, and other means to ensure no unauthorized access to MEC, former landfills, and/or hazardous substances.<br>• Implement public awareness education seminars and workshops regarding the dangers of MEC, the importance of staying off firing ranges, and what to do if possible MEC is found.<br>• Conduct site investigation(s) to define existing conditions of former Landfill Site # 1.*<br>• Ensure any work conducted in the area of former waste sites such as Landfill #1 is conducted in accordance with 29 CFR 1910.120 (hazardous waste operations and emergency response operations).*<br>• Minimize the use of contaminated sites for new construction. When new construction occurs on sites where contamination and/or MEC has been identified, ensure that the risk of human/ecological risk and exposure is minimized via the use of a site-specific health and safety plans, engineering and administrative controls, and PPE. These site-specific health and safety plans must specifically address how these controls will be implemented to ensure the protection of human health and the environment. Conduct Phase I and II Environmental Site Assessments prior to construction activities and ensure designs consider and address contaminated sites as appropriate. Also, these projects would be subject to regulatory oversight from Guam Environmental Protection Agency and/or U.S. Environmental Protection Agency (USEPA).<br>• Ensure that soils to be excavated are well characterized, properly handled, and disposed of in accordance with all applicable federal, state and local regulations and DoD requirements to minimize dispersal of any contaminants that may be present.<br>• Ensure that site planning and activities are conducted in accordance with Naval Ordnance Safety and Security Activity (NOSSA) Instruction 8020.15B Explosives Safety Review, Oversight, and Verification of Munitions Responses (DoN 2010). |

*Notes*:* Does not apply to Headquarters/Housing Alternative 2 at Navy Barrigada

Toxic Substances

Toxic substances being addressed on Guam regardless of any DoD expansion include: asbestos-containing materials (ACM), lead-based paint (LBP), polychlorinated biphenyls (PCBs), and radon. LBP and PCBs originating in Guam are transported by licensed transporters and disposed in permitted facilities in accordance with applicable federal, state, and local regulations and DoD requirements. ACM is disposed of at federal facilities in Guam.

The proposed action would not be expected to result in impacts from ACM, LBP, and PCBs. The USEPA banned most uses of PCBs in 1979 and banned LBP in 1978. In addition, ACM would not be used in new Army AMDTF facilities. PCBs, LBP, and/or ACM could be encountered during demolition of existing facilities, since older facility building materials may have contained theses substances. However, licensed contractors used for these projects would follow applicable testing, handling, and disposal protocol, procedures, and requirements if PCBs, LBP, and/or ACM are encountered. Therefore, impacts of PCBs, LBP, and/or ACM would be less than significant and no mitigation measures are proposed.

New facilities and/or structures could encounter radon gas 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. Therefore, the impacts from toxic substances would be less than significant.

Hazardous Waste

Proposed construction activities would result in an increase in the generation of hazardous waste. Construction activities would increase the use of pesticides, herbicides, 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.

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, state and and local regulations, as well as with DoD requirements. BMPs and SOPs that would be used include, but are not limited to: used include but are not limited to, those listed on Table 17.2-1 and in Volume 7. Therefore, the impacts from the increase in hazardous waste would be less than significant.

*Waste Sites*

As described in Volume 2, Section 17.1.3; Volume 9, Appendix G; and shown in the various associated Chapter 17 figures, there are waste sites undergoing characterization and/or restoration under various DoD environmental programs located within or in close proximity to the overall areas of the proposed expansion. Consideration and careful attention during project design phases must be given prior to construction to avoid overlap with these sites. If relocation of proposed construction projects that may overlap these waste sites is not possible, then various BMPs and construction operational protocol must be followed to protect human health and the environment. In addition, special design techniques and methodology will be required to ensure the long-term structural integrity of proposed construction projects.

Under Headquarters/Housing Alternatives 1 and 3, Army AMDTF facilities housing and administrative facilities would be co-located with Marine Corps facilities in the vicinity of several waste sites. As described in Volume 2 Section 17, through implementation of site planning and investigation, BMPs, SOPs and land use controls, hazardous waste impacts associated with the waste sites would be less than significant. Under Headquarters/Housing Alternative 2 there would be no Army AMDTF construction at Finegayan, thus there would be no hazardous waste impact associated with the waste sites in the Finegayan area as a result of the Army action alone.

*Explosives Safety Hazards*

The proposed expansion areas are likely to contain MEC (NAVFAC Marianas 2010). NOSSA Instruction 8020.15B establishes the Explosive Safety Submission (ESS) process to provide effective review, oversight, and verification of the explosives safety aspects of munitions responses. In order to comply with this instruction, an island wide ESS is being prepared (NAVFAC Marianas 2010). When the ESS has been endorsed by NOSSA and approved by the DoD Explosive Safety Board, SOPs and operational protocol would be developed for addressing explosive safety hazards of MEC in the proposed construction areas (NAVFAC Marianas 2010b).

#### 17.2.2.2 Operations

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 mitigation measures associated with the training activities.

Hazardous Materials

Army AMDTF training operations would require the use of military transport vehicles and thus increase the use of fuels and POLs. An estimated 1,600 lbs (726 kg) of hazardous materials would be generated from AMDTF operations annually. This estimate was based upon professional judgment and DRMO Guam hazardous material disposal data.

The projected increase in the volume of hazardous materials represents a potential impact to soils, surface water, groundwater, air, and biota. However, the increased volume of hazardous materials would be handled and disposed per BMPs and SOPs in accordance with all federal and local regulations, as well as with DoD requirements (see Table 17.2-1 and Volume 7). Therefore, the impacts from the increase in hazardous materials would be less than significant.

Toxic Substances

Activities associated with training operations would result in less than significant impacts from toxic substances (e.g., ACM, LBP, PCBs, or radon). BMPs and SOPs would be implemented as appropriate (see Volume Table 17.2-1 and Volume 7) making these potential impacts less than significant.

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 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.

The projected increase in the volume of hazardous waste represents a potential 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 Table 17.2-1 and Volume 7). Therefore, the impacts from the increase in hazardous waste would be less than significant.

#### 17.2.2.3 Summary of Impacts

The projected increase in the volume of hazardous material/waste represents a potential hazardous impact to soils, surface water, groundwater, air, and biota. However, the increased volume of hazardous materials/waste would be handled and disposed per BMPs, SOPs, and all applicable federal and local regulations, as well as DoD requirements (see Table 17.2-1 and Volume 7). Therefore, the impacts from the increase in hazardous materials/waste for all alternatives 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 existing conditions would remain unchanged. Therefore, there would be no environmental impacts or consequences under the no-action alternative. However, the DoD required mission would not be fulfilled.

### 17.2.4 Summary of Impacts

Tables 17.2-2, 17.2-3, and 17.2-4 summarize the potential impacts of each major component – headquarters/housing, munitions storage, and weapons emplacement, respectively. A text summary is provided below.

**Table 17.2-2. Summary of Headquarters/Housing Impacts – Alternatives 1, 2, and 3**

| *Alternatives 1 ,2 and 3* |
|---|
| **Construction** |
| LSI<br>• Less than significant adverse impacts would occur<br>• As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release<br>Less than significant impact to hazardous materials/waste management and disposal capacity due to expansion of facilities prior to expected increases |
| **Operation** |
| LSI<br>• Less than significant adverse impacts would occur<br>• As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release<br>• 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 Munitions Storage Impacts – Alternatives 1, 2, and 3**

| *Alternatives 1 ,2 and 3* |
|---|
| **Construction** |
| LSI<br>• Less than significant adverse impacts would occur<br>• As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release<br>• Less than significant impact to hazardous materials/waste management and disposal capacity due to expansion of facilities prior to expected increases |
| **Operation** |
| LSI<br>• Less than significant adverse impacts would occur<br>• As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release<br>• 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 17.2-4. Summary of Weapons Emplacement Impacts – Alternatives 1, 2, 3 and 4**

| *Alternatives 1 ,2, 3, and 4* |
|---|
| **Construction** |
| LSI<br>• As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release<br>• 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<br>• As with all operations using hazardous substances, there is a possibility for an inadvertent leak, spill, or release<br>• 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

There are several waste sites in the general area proposed for Army AMDTF housing/administrative facilities to be co-located with similar Marine Corps facilities at at Finegayan under Headquarters/Housing Alternatives 1 and 3. Through implementation of site planning and investigation, BMPs, SOPs and land use controls, hazardous waste impacts associated with the waste sites would be less than significant. Under Headquarters/Housing Alternative 2 there would be no Army AMDTF construction at Finegayan, thus there would be no potential hazardous waste impact resulting from the waste sites under Alternative 2.

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, and use of hazardous materials. 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 the generation of hazardous waste including pesticides, herbicides, solvents, corrosive or toxic liquids, and aerosols. Toxic substances (LBP, PCBs, ACM) would not contribute significantly to the expected waste increases. The increase in hazardous materials and waste would be handled and disposed per applicable BMPs and SOPs (see Table 17.2-1 and Volume 7). DRMO's hazardous material/hazardous waste management capacity would be expanded as needed prior to expected increases to ensure sufficient capacity to accommodate added volume. Therefore, the increase in hazardous material/waste would result in less than significant impacts. A Joint Military Master Plan provides specific information regarding new planned waste facilities to accomadate increases in hazardous substances regarding the potential Army AMDTF actions.

### 17.2.5 Summary of BMPs and SOPs

Table 17.2-1 summarizes BMPs and SOPs (also see Volume 7 for a comprehensive listing) that would be implemented relative to hazardous substances associated with potential construction and/or operations activities. Note that BMPs and SOPs are not considered "mitigation measures".

# 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 that were mentioned by the public, including regulatory stakeholders, during the public scoping meetings were addressed. A general account of these comments includes the following:

- Potential increases in diseases including:
  - Acquired Immune Deficiency Syndrome (AIDS)
  - Cholera
  - Dengue
  - Hepatitis C
  - Malaria
  - Measles
  - Rubella
  - Sexually Transmitted Diseases (STDs) other than AIDS
  - Tuberculosis (TB)

  - Typhoid Fever
- Potential increases in mental illness
- Potential increases in traffic incidents
- Potential contact with unexploded ordnance (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*

As discussed in Volume 5, Chapter 4, construction and operational activities associated with the Army AMDTF would be implemented in accordance with standard operating procedures (SOPs) and Best Management Practices (BMPs), and in accordance with applicable regulations to prevent impacts to water quality.

However, the Guam Waterworks Authority (GWA) water system infrastructure does not meet the basic flow and pressure requirements for all customers. These conditions can result in microbiological and other contaminants entering the distribution system potentially resulting in illness. GWA water distribution system problems also exist, which may result in customers receiving inadequate supply/service. The Department of Defense (DoD) acknowledges the existing sub-standard conditions of key public infrastructure systems on Guam and the interest to have DoD fund improvements to these systems. DoD's ability to fund infrastructure improvements is limited by Federal law. However, to minimize adverse impacts associated with the proposed military relocation program, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit the people of Guam. The DoD cannot repair GWA distribution system problems but would attempt to identify ways to address them via the federal interagency task force. While groundwater production 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 production would be less than the sustainable yield and monitoring of groundwater chemistry would ensure no harm to existing or beneficial use. However, since it is doubtful that GWA could fund and implement required upgrades to water system in time for the proposed military relocation, it is anticipated that public health and safety impacts from increased demand on potable water and potential water-related illnesses would be significant.

*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 pollutant emissions, which could result in health impacts to individuals on Guam that could increase the use of health care

services. 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 has been linked to certain types of cancer and damage to the immune, neurological, reproductive, and respiratory systems. Some groups of people are especially sensitive to common air pollutants such as particulates and ground-level ozone.

Because air emission increases would be less than significant, it is anticipated that Guam clinics and hospital would have adequate staffing handle air quality-related illnesses; therefore, less than significant impacts to health care services would be anticipated as a result of 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 Stormwater Pollution Prevention Plans.
- Implementing hazardous materials minimization plans.
- Ensuring DoD personnel and contractors are trained as to proper container labeling, storage, staging, and transportation requirements for hazardous materials.
- Ensuring that the Defense Reuse and Marketing Office 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. The DoD acknowledges the existing sub-standard conditions of health care services on Guam and the interest to have DoD fund improvements to these services. DoD's ability to fund these services is limited by Federal law. However, to minimize adverse impacts associated with the proposed Army AMDTF, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit health care services of Guam. 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 (2015) 2 additional doctors (3.5% increase) and 10 additional nurses (3% increase) would be required at Guam

Memorial Hospital 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

It is anticipated that Guam clinics and hospital would not be able to increase staffing to meet current health care service ratios and would not be capable of handling a potential increase in illnesses unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct these deficiencies. Therefore, because corresponding increases in doctors and nurses are not anticipated to occur to maintain existing service conditions, significant impacts to health care services are 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 (2015) 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. 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). The DoD acknowledges the existing sub-standard conditions of protective services on Guam and the interest to have DoD fund improvements to these services. DoD's ability to fund these services is limited by Federal law. However, to minimize adverse impacts associated with the proposed Army AMDTF, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit protective services of Guam. It is anticipated that GPD would not be able to increase staffing to meet current service ratios unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct these deficiencies. Therefore, because corresponding increases in GPD personnel are not anticipated to occur to maintain existing service conditions, significant impacts to police services 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 (2015) 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. 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. The DoD acknowledges the existing sub-standard conditions of protective services on Guam and the interest to have DoD fund improvements to these services. DoD's ability to fund these services is limited by Federal law. However, to minimize adverse impacts associated with the proposed

Army AMDTF, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit protective services of Guam. It is anticipated that GFD would not be able to increase staffing to meet current service ratios unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct these deficiencies. Therefore, because corresponding increases in GFD personnel are not anticipated to occur to maintain existing service conditions, significant impacts to fire services 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. In compliance with Guam Code Annotated (10 GCA 36-Mosquito Control), 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 1,580 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 and TB 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 and TB 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 DoD acknowledges the existing sub-standard conditions of health care services on Guam and the interest to have DoD fund improvements to these services. DoD's ability to fund these services is limited by Federal law. However, to minimize adverse impacts associated with the proposed Army AMDTF, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit health care services 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. Based on the potential for an increase in notifiable diseases, a significant impact

to health care services is anticipated unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct health care service deficiencies.

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 one. The potential increase in mental illness occurrences is low. The DoD acknowledges the existing sub-standard conditions of health care services on Guam and the interest to have DoD fund improvements to these services. DoD's ability to fund these services is limited by Federal law. However, to minimize adverse impacts associated with the Army AMDTF, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit the health care services of Guam. 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 61 to a total of 7,795 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 2,095. The annual number of traffic fatalities is not anticipated to increase. The DoD acknowledges the existing sub-standard conditions of key public infrastructure systems on Guam and the interest to have DoD fund improvements to these systems. DoD's ability to fund infrastructure improvements is limited by Federal law. However, to minimize adverse impacts associated with the proposed Army AMDTF, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit the infrastructure of Guam. 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. 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, and Materials Potentially Presenting an Explosive Hazard. Exposure to these Munitions and Explosives of Concern (MEC) would potentially result in death or injury to workers or to the public. To reduce the potential hazards related to exposure to MEC, in accordance with DoD Directive

6055.9 (DOD Ammunition and Explosive Safety Standard) and NOSSA Instruction 8020.15B, ESS documentation would be prepared that outlines specific measuers that would be implemented to ensure the safety of workers and the public. BMPs that would be implemented include having qualified UXO personnel 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 Proposed Mitigation Measures

Mitigation measures proposed for providing adequate public health and protective services resources would be for the federal inter-agency task force to succeed in finding funding and/or other assistance to help Guam upgrade capacity to care for increased incidence of illnesses and meet service ratios for police and fire services. Funding should be provided in a timely manner in order to effectively mobilize prior to the population increase created by the proposed Army actions (construction) and relocation.As a measure to decrease the rapid population increase associated with the operations phase, the DoD could prohibit dependents from accompanying military personnel until the construction phase has ended (described in Volume 1 Chapter 4). Another measure the DoD could implement is to reduce population impacts by lowering peak population levels during the construction period (described in Volumes 1 and 7).

#### 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.

Alternative 2 Proposed Mitigation Measures

The proposed mitigation measures would be the same as for Alternative 1.

#### 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.

Alternative 3 Proposed Mitigation Measures

The proposed mitigation measures would be the same as for Alternative 1.

### 18.2.3 Munitions Storage Alternatives

#### 18.2.3.1 Munitions Storage Alternative 1 (Preferred Alternative)

Proposed construction and infrastructure improvements related to the Army AMDTF would be consistent with established explosive safety quantity distance arcs. The new earth covered magazines and/or modular storage magazines would be designed and constructed in accordance with Air Force and Army criteria for explosives storage. Therefore, construction activity and subsequent operations would not result in any greater safety risk. Ordnance would be handled, stored, and transported in accordance with applicable Air Force and Army requirements and all munitions handling would be carried out by trained, qualified personnel. Thus, no impacts related to explosives safety are anticipated.

Potential impacts to public health and safety from implementation of Munitions Storage Alternative 1 would be similar to those of Headquarters/Housing Alternative 1. Therefore, Munitions Storage Alternative 1 would have significant impacts to water quality illness, health care services, protective services, and notifiable diseases; less than significant impacts to health and safety due to air quality illness, mental illness, and UXO; and no impacts to health and safety due to hazardous substances or traffic incidents.

Alternative 1 Proposed Mitigation Measures

Mitigation measures proposed for providing adequate public health and protective services resources would be for the federal inter-agency task force to succeed in finding funding and/or other assistance to help Guam upgrade capacity to care for and help prevent increased incidence of illnesses and meet service ratios for police and fire services. Funding should be provided in a timely manner in order to effectively mobilize prior to the population increase created by the proposed Army actions (construction) and relocation.

As a measure to decrease the rapid population increase associated with the operations phase, the DoD could prohibit dependents from accompanying military personnel until the construction phase has ended (described in Volume 1 Chapter 4). Another measure the DoD could implement is to reduce population impacts by lowering peak population levels during the construction period (described in Volumes 1 and 7).

#### 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 for Alternative 1.

Alternative 2 Proposed Mitigation Measures

The proposed mitigation measures would be the same as for Alternative 1.

#### 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 Alternative 1.

Alternative 3 Proposed Mitigation Measures

The proposed mitigation measures would be the same as for Alternative 1.

### 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 Proposed Mitigation Measures

No mitigation measures are proposed.

### 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 156 to a total of 827 cases. Young adults would be more likely to contract an STD. The number of cases of TB could increase by 15 to a total of 83 cases. The potential increase in notifiable diseases would occur from natural population increases on the island rather than from proposed military actions; 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 41 to a total of 218 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 1,083 to a total of 7,734 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 World War 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** | | |
| SI<br>• Significant impacts to water-related illness, health care services, protective services, and notifiable diseases<br>LSI<br>• Less than significant impacts to air quality, from UXO, and due to mental illness<br>NI<br>• No impacts to health and safety associated with hazardous substances and traffic incidents | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 |
| **Operation** | | |
| SI<br>• Significant impacts to water-related illness, health care services, protective services, and notifiable diseases<br>LSI<br>• Less than significant impacts to air quality, from UXO, and due to mental illness<br>NI<br>• No impacts to hazardous substances and traffic incidents | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 |

*Legend:* LSI = Less than significant impact; NI = No impact; SI = Significant impact

**Table 18.2-2. Summary of Munitions Storage Impacts – Alternatives 1, 2, and 3**

| *Alternative 1* | *Alternative 2* | *Alternative 3* |
|---|---|---|
| **Construction** | | |
| SI<br>• Significant impacts to water-related illness, health care services, protective services, and notifiable diseases<br>LSI<br>• Less than significant impacts to air quality, from UXO and due to mental illness<br>NI<br>• No impacts to health and safety due to hazardous substances and traffic incidents | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 |
| **Operation** | | |
| SI<br>• Significant impacts to water-related illness, health care services, protective services, and notifiable diseases<br>LSI<br>• Less than significant impacts to air quality, from UXO, and due to mental illness<br>NI<br>• No impacts to health and safety due to hazardous substances, traffic incidents, and explosives safety | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 | SI<br>• Significant impacts would be the same as for Alternative 1<br>LSI<br>• Less than significant impacts would be the same as for Alternative 1<br>NI<br>• No impacts would be the same as for Alternative 1 |

*Legend:* LSI = Less than significant impact; NI = No impact; SI = Significant 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<br>• Less than significant impacts due to construction hazards, UXO, and air quality | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1 |
| **Operation** | | | |
| LSI<br>• Impacts to public health and safety due to operational safety (explosives safety and EMR) would be less than significant<br><br>BI<br>• A beneficial impact to public safety would result from the increased level of protection provided by the AMTDF forces | LSI<br>• The impacts would be the same as for Alternative 1<br><br>BI<br>• The impact would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1<br><br>BI<br>• The impacts would be the same as for Alternative 1 | LSI<br>• The impacts would be the same as for Alternative 1<br><br>BI<br>• The impacts would be the same as for Alternative 1 |

*Legend:* LSI = Less than significant impact, BI = Beneficial impact.

The DoD acknowledges the existing sub-standard conditions of social services on Guam and the interest to have DoD fund improvements to these services. DoD's ability to fund these services is limited by Federal law. However, to minimize adverse impacts associated with the proposed military relocation program, the DoD is leading a federal inter-agency effort to identify other Federal programs and funding sources that could benefit the people of Guam. The potential increase in air quality emissions would be less than significant. The potential increase in disease occurrences as a result of proposed Army AMDTF activities would be low; however, it is anticipated that Guam clinics and hospital would not be able to increase staffing to meet current health care service ratios and would not be capable of handling potential increases in illnesses (e.g., water-related illnesses and notifiable diseases) unless the federal inter-agency task force succeeds in finding funding and/or other assistance to help upgrade the deficiencies in healthcare; therefore, significant impacts to health care services would be anticipated. It is anticipated that the GPD and GFD would not be able to increase staffing to meet current service ratios unless the federal inter-agency task force succeeds in finding funding and/or other assistance to help upgrade deficiencies; therefore, significant impacts to police and fire services are anticipated. No impacts to public health and safety are anticipated from management of hazardous substances. The potential increase in mental illness cases 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, in accordance with DoD Directive 6055.9 (DOD Ammunition and Explosive Safety Standard) and NOSSA Instruction 8020.15B, ESS documentation would be prepared that outlines specific measuers that would be implemented to ensure the safety of workers and the public. BMPs that would be implemented include

having qualified UXO personnel 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 Proposed Mitigation Measures

Mitigation measures proposed for providing adequate public health and protective services resources would be for the federal inter-agency task force to succeed in finding funding and/or other assistance to help Guam upgrade capacity to care for and help prevent increased incidence of illnesses and meet service ratios for police and fire services. Funding should be provided in a timely manner in order to effectively mobilize prior to the population increase created by the proposed Army actions (construction) and relocation.

As a measure to decrease the rapid population increase associated with the operations phase, the DoD could prohibit dependents from accompanying military personnel until the construction phase has ended (described in Volume 1 Chapter 4). Another measure the DoD could implement is to reduce population impacts by lowering peak population levels during the construction period (described in Volumes 1 and 7). Table 18.2-4 summarizes proposed mitigation measures for each action alternative.

**Table 18.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Construction** | | |
| • Identify funding and/or other assistance to help Guam upgrade their capacity to care for and help prevent increased incidence of illnesses and meet service ratios for police and fire | • Same as for Headquarters/Housing Alternatives | • Same as for Headquarters/Housing Alternatives |
| **Operation** | | |
| • Identify funding and/or other assistance to help Guam upgrade their capacity to care for and help prevent increased incidence of illnesses and meet service ratios for police and fire | • Same as for Headquarters/Housing Alternatives | • Same as for Headquarters/Housing Alternatives |

# CHAPTER 19. ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN

## 19.1 INTRODUCTION

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 region of influence (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.

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 United States [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 islandwide. 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, proposed mitigation measures would be expected to effectively mitigate potential environmental justice impacts. 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. If a resource area did not have significant impacts, or impacts were mitigable to less than significant, as analyzed in each individual chapter in Volume 5, then it was not further analyzed in this chapter. These resources are: geological and soil resources, water resources, air quality, noise, airspace, land and submerged land use, recreational resources, terrestrial and marine biological resources, cultural resources, visual resources, marine transportation, socioeconomics, hazardous materials and waste. Impacts associated with utilities (power, potable water, wastewater) and roadways are discussed in Volume 6.

## 19.2 ENVIRONMENTAL CONSEQUENCES

### 19.2.1 Approach to Analysis

#### 19.2.1.1 Methodology

Volume 5 of this EIS examines the potential impacts that each alternative for the Army AMDTF 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 and Protection of Children policies require a federal agency to analyze whether its proposed action would adversely affect minority, low-income, and child populations disproportionately to the rest of the community. The island of Guam is unique in that a majority of the population of Guam meet the criteria for being an Asian Pacific minority group in the context of the overall U.S. population. As a result, where the EIS identifies significant impacts for a particular resource, there would be a corresponding, island-wide adverse effect to minority populations on Guam, compared to the U.S. population. However, because of international agreements that require the proposed action to focus on Guam, and not other locations within the U.S., the evaluation of environmental justice would be on whether there are disproportionate adverse effects within the context of alternatives for facility location on Guam. Because of this, it would be impossible for there to be a disproportionate effect from an identified adverse impact based solely on the impact affecting a minority population. Therefore, the analysis for environmental justice on Guam must consider whether there is a disproportionate adverse effect on a low-income population or children. For example, if there is a low-income population that is being impacted by a potential reduction in Public Health and Social Services, that impact would be considered a significant impact because the population, as a given, is a minority population and it is being disproportionately affected because it is a low-income population. As a result, some resource areas may have effects on a minority population, but because they do not impact a low-income or child population in a disproportionate manner they will not be considered as causing an environmental justice adverse effect.
- The 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 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 for each significant impact identified in the relevant resource chapters. In some cases if the analysis shows that the requirements for the specific criteria have not been met, then a discussion on the next tier may not be required. For instance, if an applicable disadvantaged group is not disproportionately affected in Tier 2, then a discussion on significant effects under environmental justice would not be warranted.

- *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. Also discussed in Volume 2 Chapter 19 are public outreach efforts that were undertaken during the development of the EIS to ensure that racial and ethnic minority and low-income populations had the opportunity to provide comments on the proposed military relocation on Guam.

### 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 co-located with Marine Corps facilities at Naval Computer and Telecommunications Satation (NCTS) Finegayan and construction of Army housing co-located with Marine Corps housing at South Finegayan. Construction activities and operations would occur on base. The village located adjacent to NCTS Finegayan is Dededo.

Public Health Care Services

Volume 5, Chapter18 identifies potential significant impacts to health care services as a consequence of population growth associated with the Army AMDTF. An increased patient to health care provider ratio is predicted, and it is anticipated that Guam clinics and hospital would not be able to increase staffing to meet health care service needs, resulting in significant impacts to public health care services.

*Tier 1*: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

Dededo has a majority (97%) 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 (25%) than that of the U.S. (11%) (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; CNMI Department of Commerce 2005).

*Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?*

Low-income populations and children of low-income families would be more susceptible to the consequences of reduced availability of public health care services. This would result in disproportionately high and adverse effects on low-income populations resulting from potential impacts to the public health services.

*Tier 3*: *Would the disproportionate adverse effects be significant?*

Unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct deficiencies in public health services, disproportionate adverse effects on low-income populations and their children could be significant.

Public Safety Services

Volume 5, Chapter 18 identifies potential significant impacts to public safety services as a consequence of population growth associated with the Army AMDTF. Public safety agencies; Police, Fire, Corrections, and Youth Affairs, would require additional staff. During the construction phase, public service agencies would experience some strain. There is an acknowledged existing sub-standard condition of key public social service on Guam and documented historical difficulty in addressing and funding these conditions. Thus any increase in service population due to the proposed action would further strain these services.

*Tier 1*: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

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; CNMI Department of Commerce 2005).

*Tier 2: Are the applicable disadvantaged groups disproportionately affected by the negative environmental consequences of the proposed action(s)?*

All people of Guam would be affected in the same manner by potential impacts to the public safety services associated with Army AMDTF population growth. Such impacts would not disproportionately affect minority and low-income populations or children.

Alternative 1 Proposed Mitigation Measures

Proposed mitigation measures, listed in Chapters 16 and 18 of this Volume and Chapter 2 of Volume 7, to reduce potential impacts from the implementation of Alternative 1 would reduce impacts on low-income populations related to public health services.

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. Impacts associated with roadways are discussed in Chapter 4 of Volume 6.

Public Health Care Services

Impacts to public health care services would be the same for Headquarters/Housing Alternative 2 as described for Headquarters/Housing Alternative 1.

*Tier 1*: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

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)?*

Low-income populations and children of low-income families would be more susceptible to the consequences of reduced availability of public health care services. This would result in disproportionately high and adverse effects on low-income populations and their children resulting from potential impacts to the public health services.

*Tier 3*: *Would the disproportionate adverse effects be significant?*

Unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct deficiencies in public health services, disproportionate adverse effects on low-income groups and children of low-income families could be significant.

Public Safety Services

Impacts to public safety services would be the same for Headquarters/Housing Alternative 2 as described for Headquarters/Housing Alternative 1.

*Tier 1*: *Are there any racial minorities, low-income, or children populations adjacent to the proposed action site?*

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)?*

All people of Guam would be affected in the same manner by potential impacts to the public safety services associated with Army AMDTF population growth. Such impacts would not disproportionately affect minority and low-income populations or children.

Alternative 2 Proposed Mitigation Measures

The mitigation measures proposed for 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 quality of life facilities would be collocated 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.

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. There would be no additional significant impacts from construction of these facilities, and the impacts affecting environmental justice and the protection of children under Alternative 3 would be the same as described for NCTS Finegayan (Alternative 1) and Navy Barrigada (Alternative 2). According to Chapter 18 of this Volume, there would

be significant impacts to public health care services and public safety services as a result of population growth associated with the Army AMTDF Housing/Headquarters Alternative 3.

Impacts to public health care services and public safety services relative to environmental justice and protection of children would be the same for Headquarters/Housing Alternative 3 as described for Headquarters/Housing Alternatives 1 and 2.

Alternative 3 Proposed Mitigation Measures

The mitigation measures proposed for 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 Air Force Base (AFB). No new operations are proposed at Andersen AFB under Alternative 1. This alternative would not result in any disproportionately high and adverse 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 disproportionately high and adverse 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 disproportionately high and adverse 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).

No potential significant impacts of the weapons emplacement alternatives were identified; therefore, this alternative would not result in any disproportionately high and adverse impacts to racial or ethnic minorities, low-income populations, or children.

#### 19.2.4.1 Weapons Emplacement Alternative 2

Alternative 2 involves the same type of facility, construction, and operations as Alternative 1 and the impacts would be the same. Therefore, the environmental justice impacts for actions proposed in Alternative 2 are the same as those discussed under Alternative 1.

#### 19.2.4.2 Weapons Emplacement Alternative 3

Alternative 3 involves the same type of facility, construction, and operations as Alternative 1 and the impacts would be same. Therefore, the environmental justice impacts for actions proposed in Alternative 3 are the same as those discussed under Alternative 1.

#### 19.2.4.3 Weapons Emplacement Alternative 4 (Preferred Alternative)

Alternative 4 involves the same type of facility, construction, and operations as Alternative 1 and the impacts 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 significant impacts associated withthe no-action alternative; therefore, the no-action alternative would have no adverse environmental justice impacts on the villages of Dededo, Barrigada, and Mangilao and would not increase health and safety risks for children.

### 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<br>• Significant impact to low-income populations and children of low-income families from public health services impacts<br>NI<br>• No disproportionate impact to minority populations from public health services impacts<br>• No disproportionate impact to minority and low-income populations or children from public safety services impacts | SI<br>• Significant impact to low-income populations and children of low-income families from public health services impacts<br>NI<br>• No disproportionate impact to minority populations from public health services impacts<br>• No disproportionate impact to minority and low-income populations or children from public safety services impacts | SI<br>• Significant impact to minority and low-income populations and children from public health services impacts<br>NI<br>• No disproportionate impact to minority populations from public health services impacts<br>• No disproportionate impact to minority and low-income populations or children from public safety services impacts |
| **Operation** | | |
| SI<br>• Significant impact to low-income populations and children of low-income families from public health services impacts<br>NI<br>• No disproportionate impact to minority populations from public health services impacts<br>• No disproportionate impact to minority and low-income populations or children from public safety services impacts | SI<br>• Significant impact to low-income populations and children of low-income families from public health services impacts<br>NI<br>• No disproportionate impact to minority populations from public health services impacts<br>• No disproportionate impact to minority and low-income populations or children from public safety services impacts | SI<br>• Significant impact to low-income populations and children of low-income families from public health services impacts<br>NI<br>• No disproportionate impact to minority populations from public health services impacts<br>• No disproportionate impact to minority and low-income populations or children from public safety services impacts |

*Legend:* SI = Significant impact; 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<br>• No impacts to racial minorities.<br>• No impacts to low-income populations<br>• No impacts to children<br>• No impacts to cultural resources | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• The impacts would be the same as Alternative 1 |
| **Operation** | | |
| NI<br>• No impacts to racial minorities<br>• No impacts to low-income populations<br>• No impacts to children. | NI<br>• The impacts would be the same as Alternative 1 | NI<br>• 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** | | | |
| NI<br>• There would be no disproportionate impacts to low-income populations or children | NI<br>• The impacts would be the same as for Alternative 1<br>NI<br>• There would be no disproportionate impacts to low-income populations or children | NI<br>• The impacts would be the same as for Alternative 1<br>NI<br>• There would be no disproportionate impacts to low-income populations or children | NI<br>• The impacts would be the same as for Alternative 1<br>NI<br>• There would be no disproportionate impacts to low-income populations or children |
| **Operation** | | | |
| NI<br>• There would be no impacts from operations | NI<br>• There would be no impacts from operations | NI<br>• There would be no impacts from operations | NI<br>• There would be no impacts from operations |

*Legend:* NI = No impact

### 19.2.7 Summary of Proposed Mitigation Measures

Table 19.2-4 summarizes proposed mitigation measures for each component of the proposed action.

**Table 19.2-4. Summary of Proposed Mitigation Measures**

| *Headquarters/Housing Alternatives* | *Munitions Storage Alternatives* | *Weapons Emplacement Alternatives* |
|---|---|---|
| **Public Health Care and Safety Services** | | |
| • DoD would implement the proposed mitigation measures in Volume 5, Chapters 16 and 18 | • DoD would implement the proposed mitigation measures in Volume 5, Chapters 16 and 18 | • DoD would implement the proposed mitigation measures in Volume 5, Chapters 16 and 18 |

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