2 Description of Proposed Action and Alternatives

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2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The United States (U.S.) Department of the Navy's (Navy's) Proposed Action is to conduct training and testing activities, including the use of active sonar and explosives in the Mariana Islands Range Complex (MIRC), throughout the in-water areas around the MIRC, and in the transit corridor between the MIRC and the Hawaii Range Complex (HRC). The Proposed Action includes activities such as sonar maintenance and gunnery exercises that are conducted concurrently with ship transits and may occur outside the geographic boundaries of a Navy range complex. The Proposed Action also includes pierside sonar activity that is conducted as part of overhaul, modernization, maintenance, and repair activities, as well as land-based training activities on Guam and the Commonwealth of the Northern Mariana Islands (CNMI).

Through this Environmental Impact Statement (EIS)/Overseas EIS (OEIS), the Navy will:

- Reassess the environmental analyses of military training and testing activities contained in the *2010 Mariana Islands Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement* (U.S. Department of the Navy 2010). This reassessment supports the Navy's application for reauthorization of incidental takes of marine mammals under the Marine Mammal Protection Act (MMPA) and incidental takes of threatened and endangered marine and terrestrial species under the Endangered Species Act (ESA).
- Adjust baseline training and testing activities from current levels to the level needed to support military training and testing requirements proposed to begin in 2015. As part of the adjustment, the Navy proposes to account for other activities and sound sources not addressed in the previous analyses.
- Analyze the potential environmental impacts of training and testing activities in additional at-sea areas (areas not covered in previous documents) where training and testing historically occurs, including Navy ports, and the transit corridor.
- Update the environmental impact analyses in the previous documents to account for force structure changes, including those resulting from the development, testing, and use of weapons, platforms, and systems that will be operational by 2020.
- Implement enhanced range capabilities.
- Update environmental analyses with the best available science and most current acoustic analysis methods to evaluate the potential effects of training and testing activities on the marine environment.

In this chapter, the Navy will build upon the purpose and need to train and test by describing the Study Area and identifying the primary mission areas under which these activities are conducted. Each warfare community conducts activities that uniquely contribute to the success of a primary mission area (described in Section 2.2, Primary Mission Areas). Each primary mission area requires unique skills, sensors, weapons, and technologies to accomplish the mission. For example, in the primary mission area of anti-submarine warfare, surface, submarine, and aviation communities each utilize different skills, sensors, and weapons to locate, track, and eliminate submarine threats. The testing community contributes to the success of each mission area by anticipating and identifying technologies and systems that respond to the needs of the warfare communities. As each warfare community develops its basic skills and integrates them into combined units and strike groups, the intricacies of communication, coordination and planning, movement and positioning of naval forces and targeting/delivery of weapons become increasingly complex. This complexity creates a need for coordinated training and testing between the fleets and systems commands.

In order to address the activities needed to accomplish training and testing in this EIS/OEIS, the Navy has broken down each training and testing activity into basic components that are analyzed for their potential environmental impacts. The training and testing activities are captured in tables and the discussion that follows. Additionally, Chapter 2 provides detailed discussion of how the training and testing activities occur and the platforms, weapons, and systems that are required to complete the activities.

Chapter 2 is organized into eight sections.

- Section 2.1 outlines the area where these activities would occur.
- Section 2.2 outlines the primary mission areas.
- Section 2.3 provides information on sonar, ordnance and munitions, and targets utilized during training and testing activities.
- Section 2.4 outlines the proposed training and testing activities.
- Section 2.5 outlines the process to develop the alternatives to the Proposed Action.
- Sections 2.6, 2.7, and 2.8 outline the No Action Alternative and the Action Alternatives proposed in this EIS/OEIS.

The proposed activities are complex and therefore, the Navy has prepared several appendices that provide a greater level of detail. These appendices will be referenced in the appropriate chapters.

2.1 DESCRIPTION OF THE MARIANA ISLANDS TRAINING AND TESTING STUDY AREA

The Mariana Islands Training and Testing (MITT) Study Area is composed of the established ranges (at-sea ranges and land based training areas on Guam and CNMI), operating areas, and special use airspace in the region of the Mariana Islands that are part of the MIRC and its surrounding seas, and includes a transit corridor.[1] The transit corridor is outside the geographic boundaries of the MIRC and is a direct route across the high seas for Navy ships in transit between the MIRC and the HRC. The Proposed Action also includes pierside sonar maintenance and testing alongside Navy piers located in Inner Apra Harbor. The MITT Study Area is depicted in Figure 2.1-1.

[1] Vessel transit corridors are the routes typically used by Navy ships to traverse from one area to another. The route depicted in Figure 2.1-1 is a direct route between the MIRC and the HRC, making it a quick and fuel-efficient transit. The depicted transit corridor is notional and may not represent actual routes used. Actual routes navigated are based on a number of factors including, but not limited to, weather and training; however, the corridor represents the environment potentially impacted by the Proposed Action.

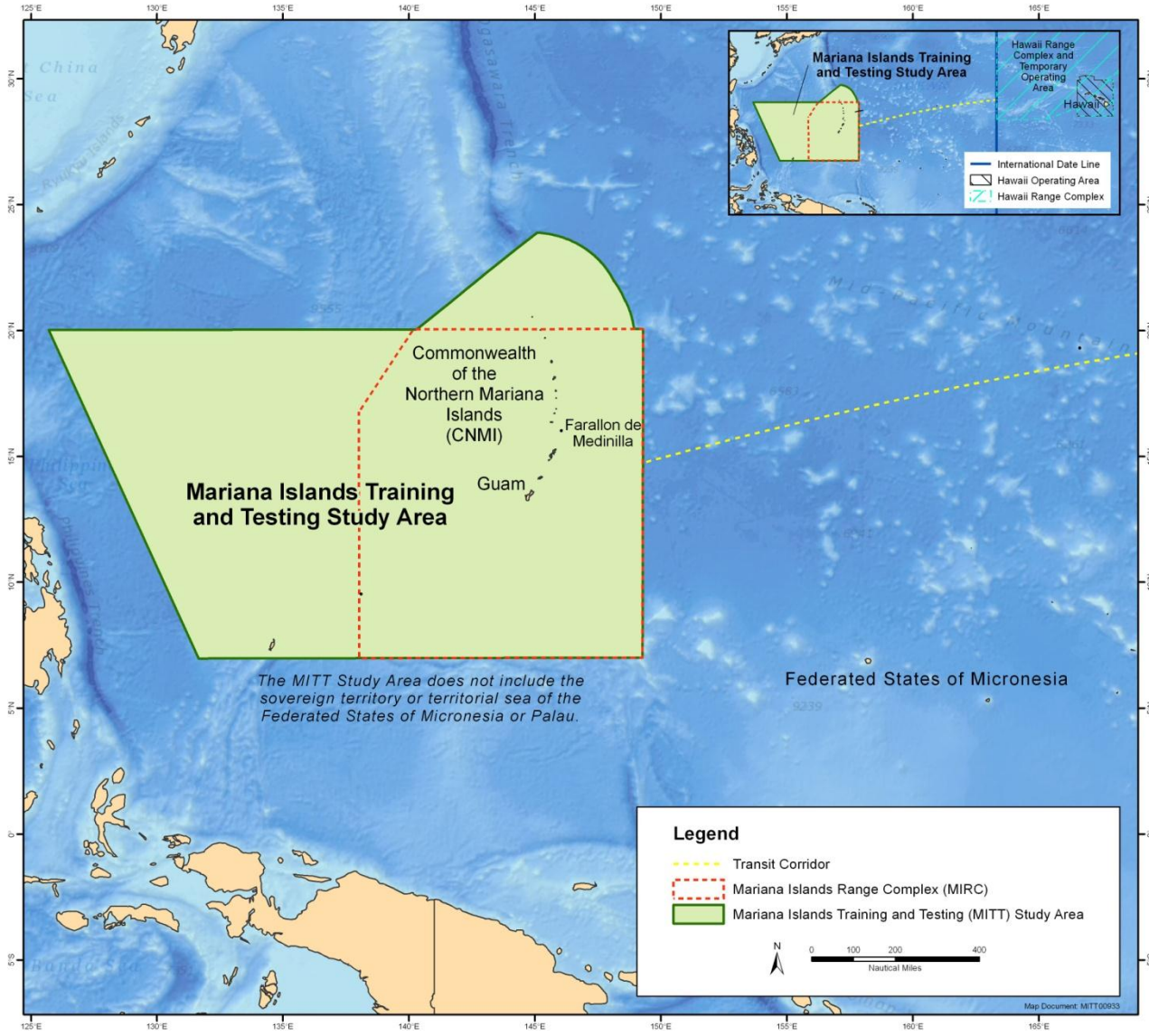

Figure 2.1-1: Mariana Islands Training and Testing Study Area

A range complex is a designated set of specifically bounded geographic areas that encompasses a water component (above and below the surface) and airspace, and may encompass a land component where training and testing of military platforms, tactics, munitions, explosives, and electronic warfare systems occurs. Range complexes include established ocean operating areas and special use airspace, which may be further divided to provide better control of the area and activities for safety reasons.

- **Operating Area.** An ocean area defined by geographic coordinates with defined surface and subsurface areas and associated special use airspace. Operating areas may include the following:
    - **Danger Zones.** A danger zone is a defined water area used for target practice, bombing, rocket firing, or other especially hazardous military activities. Danger zones are established pursuant to statutory authority of the Secretary of the Army and are administered by the Army Corps of Engineers. Danger zones may be closed to the public

on a full-time or intermittent basis (Title 33 Code of Federal Regulations [C.F.R.] Part 334).

- **Restricted Areas.** A restricted area is a defined water area for the purpose of prohibiting or limiting public access to the area. Restricted areas generally provide security for Government property and/or protection to the public from the risks of damage or injury arising from the Government's use of that area (33 C.F.R. 334).
- **Safety Zones.** A Safety Zone is a water area, shore area, or water and shore area to which, for safety or environmental purposes, access is limited to authorized persons, vehicles, or vessels. It may be stationary and described by fixed limits or it may be described as a zone around a vessel in motion. Safety zones are established pursuant to statutory authority of the U.S. Coast Guard. Safety zones may be closed to the public on a full-time or temporary basis (33 C.F.R. 165).
- **Surface Danger Zones.** A Surface Danger Zone is the surface and airspace designated within the range complex for vertical and lateral containment of projectiles, fragments, debris, and components resulting from the firing, launching, or detonation of weapon systems to include explosives and demolitions. The Surface Danger Zone is a depiction of the mathematically predicted area a projectile will return to earth either by direct fire or ricochet. Surface Danger Zones are calculated by the range operator using safety programs or tables for each unique live fire training event, and location; hence, they are not permanently charted.
- **Exclusion Zones.** The purpose of the Exclusion Zone is the protection of unauthorized personnel from blast overpressure and fragmentation hazards from ordnance disposal and explosive charges. It is the minimum separation distance between the exploding device or ordnance and unauthorized personnel. The range operator will delay conduct of a live-fire event until the Exclusion Zone has been cleared.

- **Special Use Airspace.** Airspace of defined dimensions where activities must be confined because of their nature or where limitations may be imposed upon aircraft operations that are not part of those activities (Federal Aviation Administration 2013). Types of special use airspace most commonly found in range complexes include the following:
  - **Restricted Areas.** Airspace where aircraft are subject to restriction due to the existence of unusual, often invisible hazards (e.g., release of ordnance) to aircraft. Some areas are under strict control of the Department of Defense (DoD), and some are shared with non-military agencies.
  - **Military Operations Areas.** Airspace with defined vertical and lateral limits established for the purpose of separating or segregating certain military training activities from instrument flight rules traffic and to identify visual flight rules traffic where these activities are conducted.
  - **Warning Area.** Areas of defined dimensions, extending from 3 nautical miles (nm) outward from the coast of the United States, which serve to warn nonparticipating aircraft of potential danger.
- **Air Traffic Control Assigned Airspace.** While not designated as special use airspace, Air Traffic Control Assigned Airspace (ATCAA) offers important capability for supporting training and testing activity. It is used to contain specified activities, such as military flight training, that are segregated from other instrument flight rules air traffic.

The MITT Study Area includes the MIRC land training areas and at-sea operating areas that were previously addressed in the MIRC EIS/OEIS (May 2010) with modifications to the special use air space that were addressed in the MIRC Airspace Environmental Assessment (EA)/Overseas EA (OEA) (U.S.

Department of the Navy 2013), and the seaward extensions to the northern and western edges of the MIRC, the transit corridor, and Navy pierside locations in the Apra Harbor Naval Complex.

2.1.1 MARIANA ISLANDS RANGE COMPLEX

The MIRC includes land training areas, ocean surface and subsurface areas, and special use airspace. These areas extend from the waters south of Guam to north of Pagan (CNMI), and from the Pacific Ocean east of the Mariana Islands to the Philippine Sea to the west, encompassing 501,873 square nautical miles (nm^2) of open ocean.

2.1.1.1 Special Use Airspace and Air Traffic Controlled Assigned Airspace

The MIRC is anticipated to include approximately 70,000 nm^2 of special use airspace and ATCAA (once Federal Aviation Administration [FAA] rule-making and non-rule making airspace changes are complete[2]). As depicted in Figure 2.1-2 and Figure 2.1-3, this airspace is almost entirely over the ocean (except ATCAA 6 and W-13A) and includes warning areas, ATCAAs, and restricted areas.

- Warning Area (W)-517 and W-12 include approximately 11,769 nm^2 of special use airspace (Figure 2.1-2 and Figure 2.1-3); W-11 (A/B) is approximately 10,467 nm^2 of special use airspace, and W-13 (A/B/C) is approximately 13,752 nm^2 of special use airspace.
- The ATCAAs of the MIRC account for more than 28,750 nm^2 of airspace and includes ATCAA 5 and ATCAA 6 (Figure 2.1-2).
- The restricted area airspace over or near land areas within the MIRC makes up 452 nm^2 of special use airspace and includes restricted areas (R)-7201 and R-7201A which extends in a 12 nm radius around Farallon de Medinilla (FDM) (Figure 2.1-2 and Figure 2.1-4).

2.1.1.2 Sea and Undersea Space

The MIRC includes the sea and undersea space from the ocean surface to the ocean floor. The MIRC includes designated sea and undersea space training sites to include designated drop zones, underwater demolition and floating mine exclusion zones, danger zones associated with live fire ranges, and training areas associated with military controlled beaches, harbors, and littoral areas.

W-517 (Figure 2.1-3) is special use airspace where the sea space underneath is also restricted from public access during hazardous training events. Portions of the Marianas Trench Marine National Monument, established in January 2009 by Presidential Proclamation under the authority of the Antiquities Act (16 U.S. Code §§431–433), lie within the MIRC. The prohibitions required by the Proclamation do not apply to activities and exercises of the Armed Forces (including those carried out by the U.S. Coast Guard).

[2] The MIRC Airspace EA/OEA tiered off from the MIRC EIS/OEIS; the Navy analyzed the potential impacts of redesignating ATCAAs in the MITT Study Area with Warning Areas and expanding the special use airspace around FDM. In that EA/OEA, no new training or testing events were proposed. The EA/OEA concluded that no significant impacts to the environment would occur as a result of the airspace redesignation and expansion. The FAA has rule-making and non-rule making authority for the airspace redesignation and expansion, and the MIRC Airspace EA/OEA supported the FAA in its rule-making and non-rule making process to establish special use airspace.

The MIRC Airspace EA/OEA proposed and analyzed a Danger Zone around FDM. The Army Corps of Engineers has rule-making authority for Danger Zone establishment. The pending Danger Zone rule for FDM extends out 12 nm from a center point on FDM and over a range hazard area of approximately 452 nm^2 (Figure 2.1-4).

2.1.1.3 Land

Commander Joint Region Marianas provides executive level installation management support to all DoD components and tenants through assigned regional installations on Guam and the Commonwealth of the Northern Mariana Islands in support of training in the Marianas, including coordination with Northern Mariana Islands Commonwealth Port Authority for logistic and operational support of DoD aircraft and vessels; acts as the interface between the Navy and the civilian community; ensures compliance with all environmental laws and regulations, safety procedures, and equal opportunity policy; and performs other functions and tasks as assigned.

Guam. The Navy has control of approximately 28 square miles ($mi.^2$) (72.5 square kilometers [km^2]) of land in noncontiguous properties on Guam. There are five Navy annexes: Main Base (which includes Apra Harbor Naval Complex and Main Base/Polaris Point) (Figure 2.1-5), Naval Base Guam Munitions Site (Figure 2.1-6); Hospital Annex/Nimitz Hill, Naval Base Guam Telecommunications Site (Figure 2.1-7), and Naval Base Guam Barrigada (Figure 2.1-8).

Andersen Air Force Base, one of the largest U.S. Air Force airfields, is located in the northern portion of the island of Guam. Andersen Air Force Base includes the main base and Northwest Field which covers 24.5 $mi.^2$ (63.5 km^2), Andersen South 3.2 $mi.^2$ (8.3 km^2), and Andersen Barrigada Annex 0.7 $mi.^2$ (1.8 km^2) (Figure 2.1-9).

Commonwealth of the Northern Mariana Islands. No DoD personnel are permanently stationed in the CNMI, with the exception of a U.S. Army Reserve unit located on Saipan.

- **FDM.** FDM is a rocky and uninhabited island, approximately 1.7 miles (mi.) (2.7 kilometer [km]) long and 0.3 mi. (0.5 km) wide (Figure 2.1-10). The DoD leases FDM for use as a live and inert gunnery, missile, and bombing range.
- **Tinian.** Tinian has a land area of approximately 39 $mi.^2$ (101 km^2). The DoD leases approximately 15,347 contiguous acres (6,210.7 hectares) of northern Tinian (the Military Lease Area) for field training (Figure 2.1-11). The Military Lease Area is further divided into the Exclusive Military Use Area and the Leaseback Area.
- **Saipan.** Approximately 0.28 $mi.^2$ (0.73 km^2) on Tanapag Harbor is leased by the DoD**.** The Army Reserve center is located in Garapan (Figure 2.1-11).
- **Rota.** Rota is approximately 11 mi. (17.7 km) long and 3 mi. (4.8 km) wide (Figure 2.1-12). Training on Rota is scheduled with Joint Region Marianas and coordinated with Rota officials for proposed training areas and activities. Training activities conducted on Rota typically include special warfare training and combat search and rescue training.

2.1.2 OCEAN OPERATING AREAS OUTSIDE THE BOUNDS OF THE MARIANA ISLANDS RANGE COMPLEX

In addition to the MIRC, the MITT Study Area is expanded for analysis in Alternative 1 and Alternative 2 and includes the area to the north of the MIRC that is within the Exclusive Economic Zone of the Commonwealth of the Northern Mariana Islands and the areas to the west of the MIRC (Figure 2.1-1). The MITT Study Area also includes a transit corridor, which is a direct route between the MIRC and the HRC.

Although not part of any defined range complex, the transit corridor is important to the Navy in that it provides adequate air, sea, and undersea space in which vessels and aircraft conduct training and some sonar maintenance and testing while in transit.

The transit corridor is defined by a great circle route (e.g., shortest distance) between the MIRC and the HRC. While in transit and along the corridor, vessels and aircraft would, at times, conduct basic and routine unit level training such as gunnery and sonar training as long as the training does not interfere with the primary objective of reaching their intended destination. Ships also conduct sonar maintenance, which includes active sonar transmissions.

2.1.3 PIERSIDE LOCATIONS AND APRA HARBOR

The Study Area includes pierside locations in the Apra Harbor Naval Complex where surface ship and submarine sonar maintenance testing occur. For purposes of this EIS/OEIS, pierside locations include channels and routes to and from the Navy port in the Apra Harbor Naval Complex, and associated wharves and facilities within the Navy port and shipyard (Figure 2.1-5).

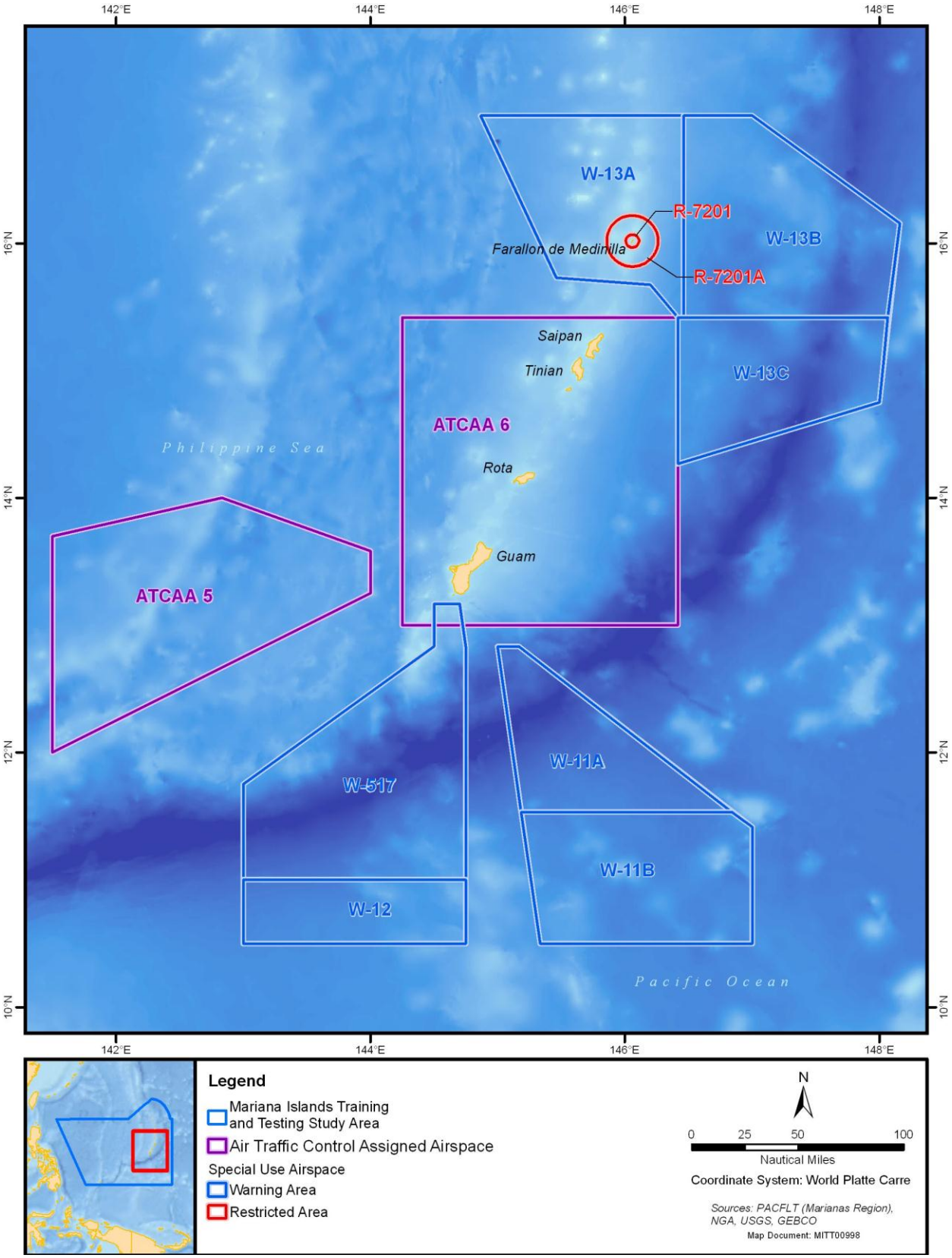

Figure 2.1-2: Mariana Islands Range Complex Airspace

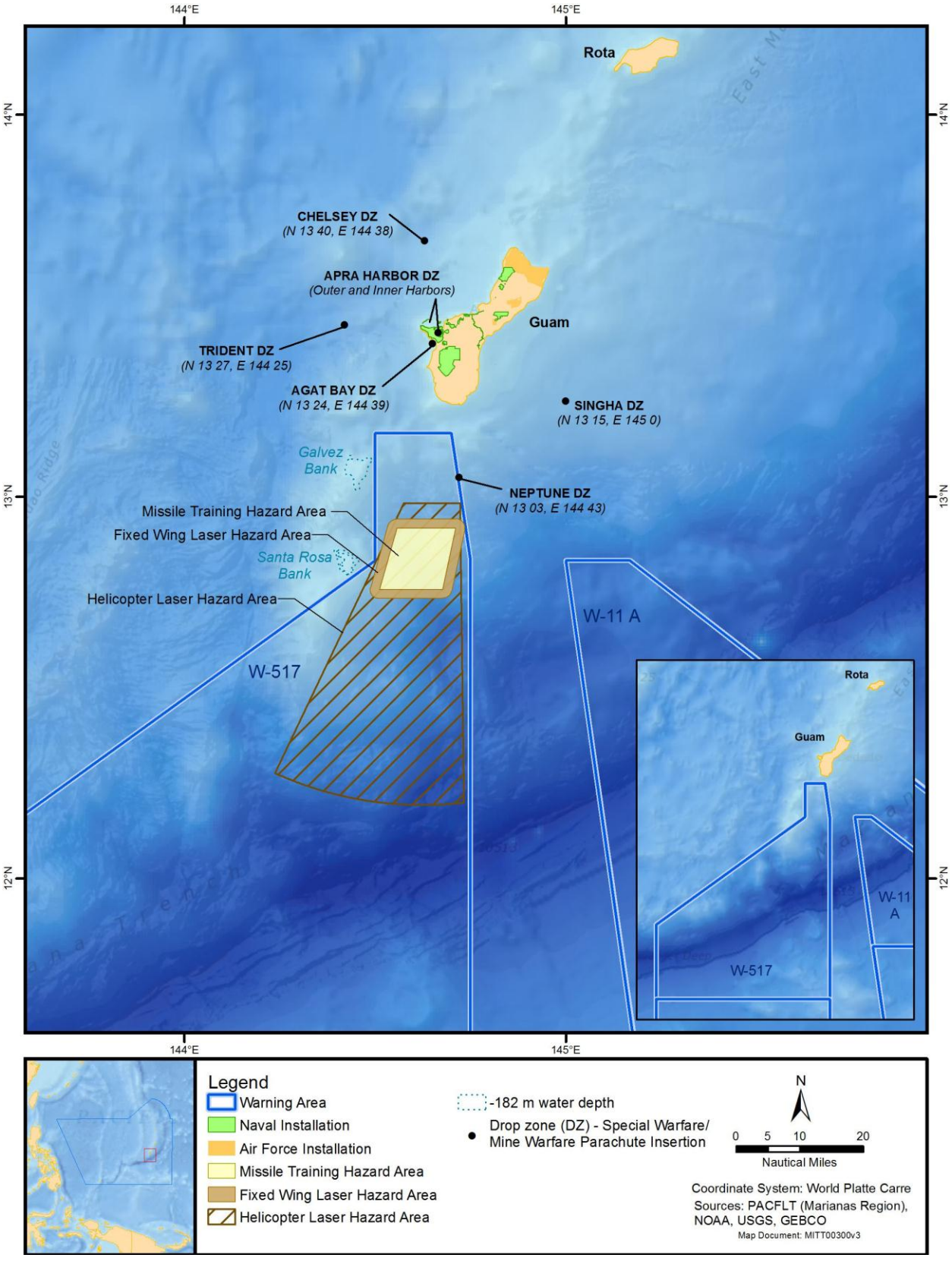

Figure 2.1-3: Warning Area 517

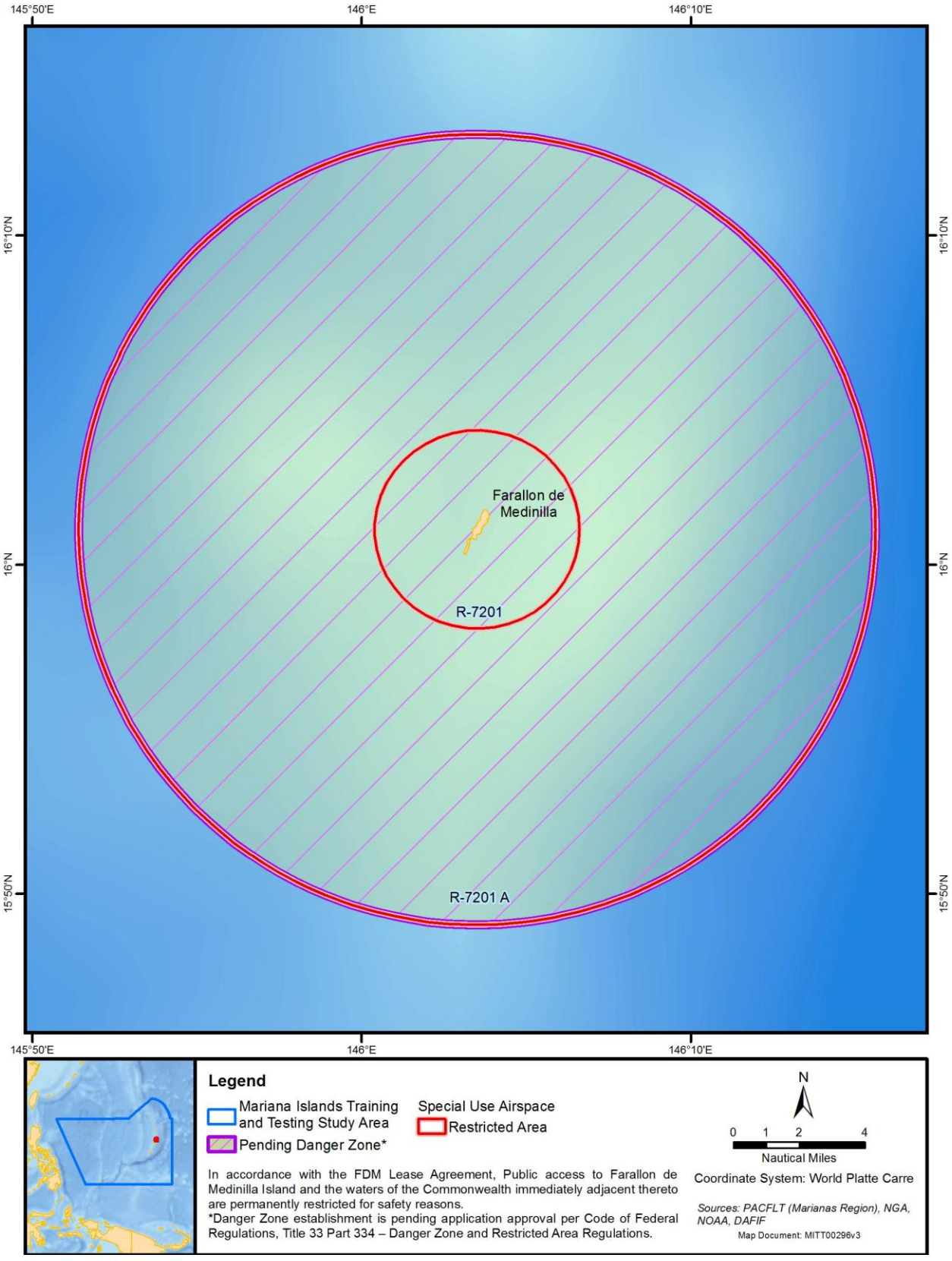

Figure 2.1-4: Farallon de Medinilla Restricted Area 7201, 7201A, and Danger Zone

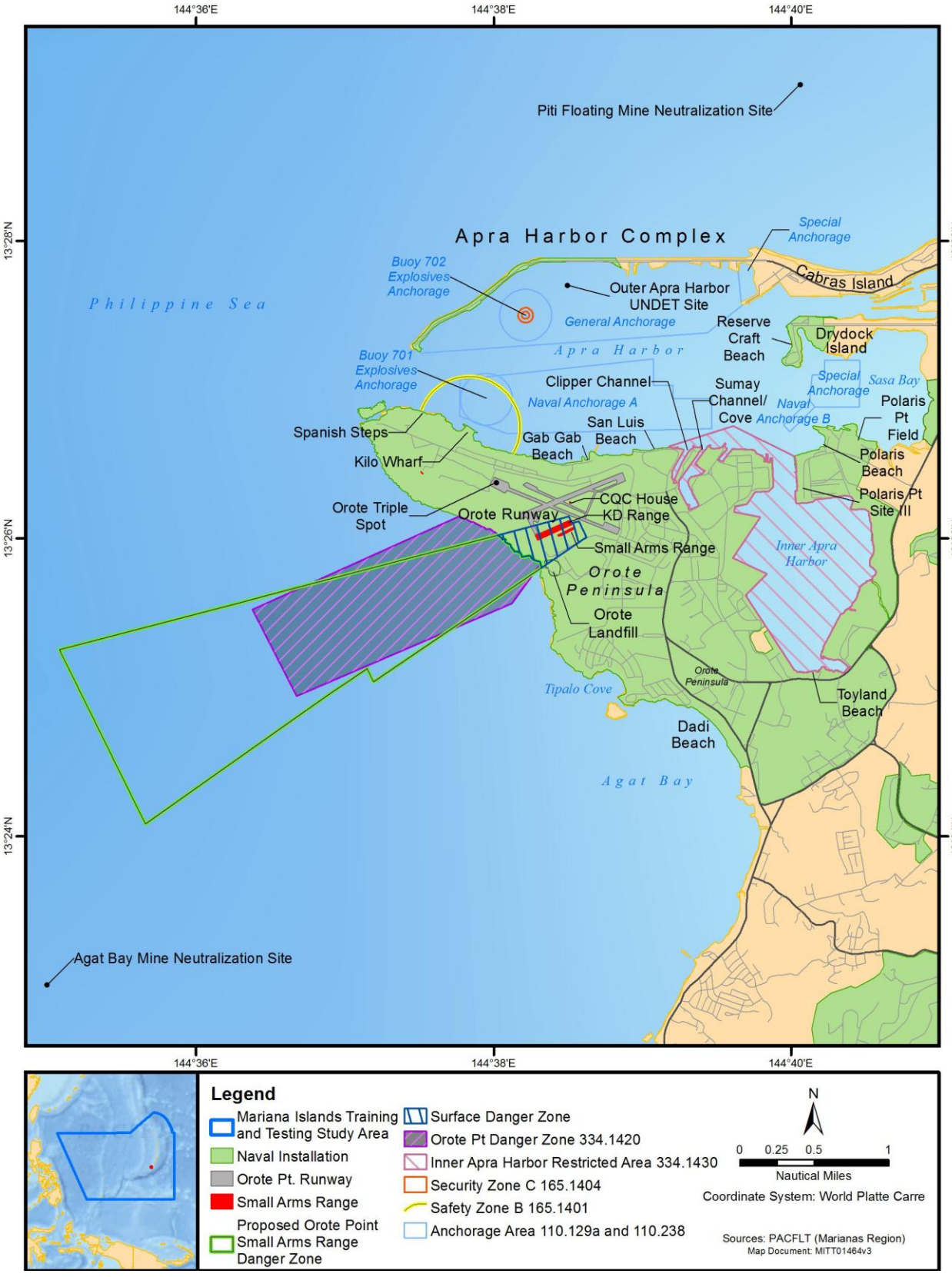

Figure 2.1-5: Apra Harbor Naval Complex (Main Base) and Main Base/Polaris Point

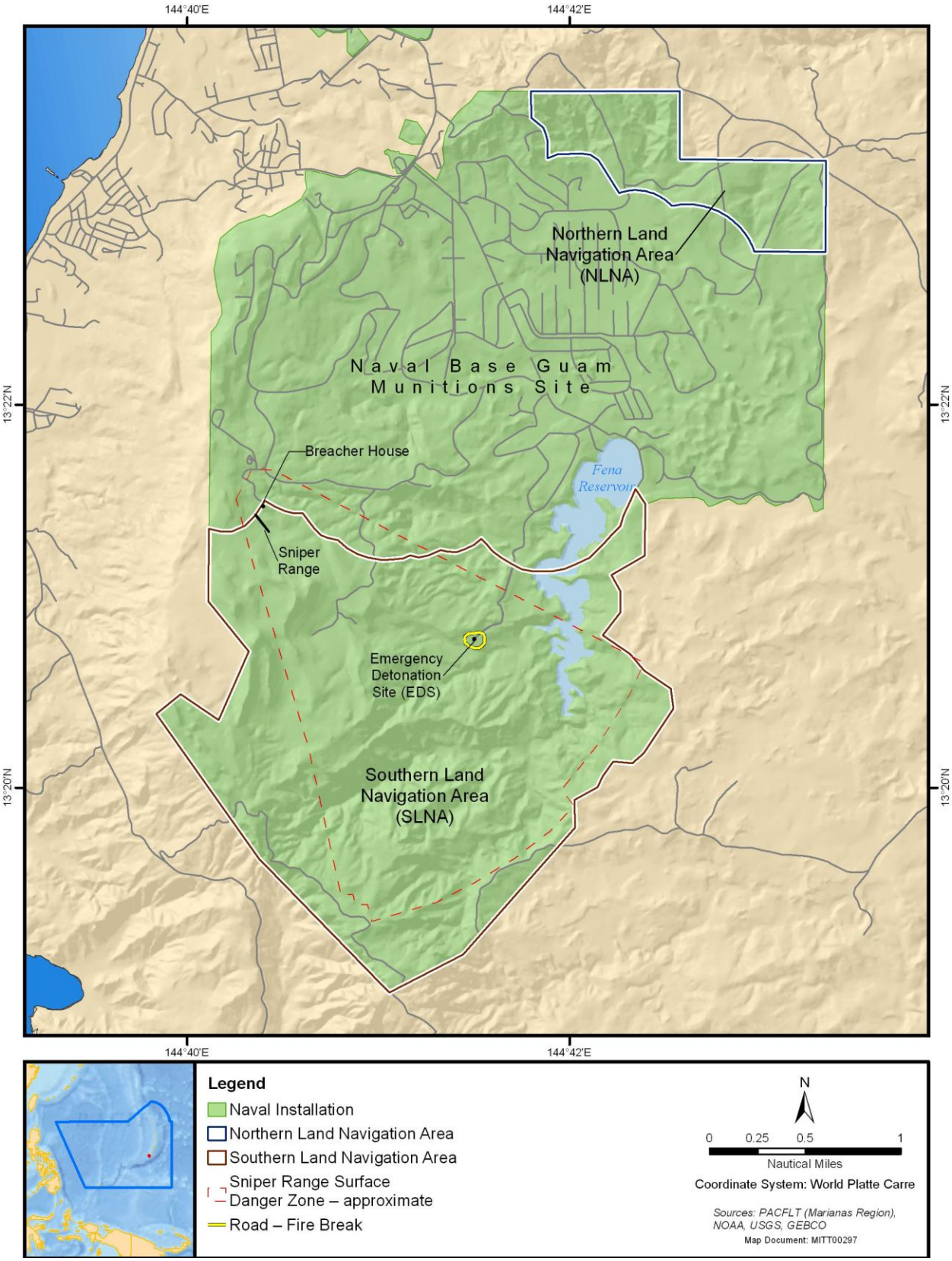

Figure 2.1-6: Naval Base Guam Munitions Site

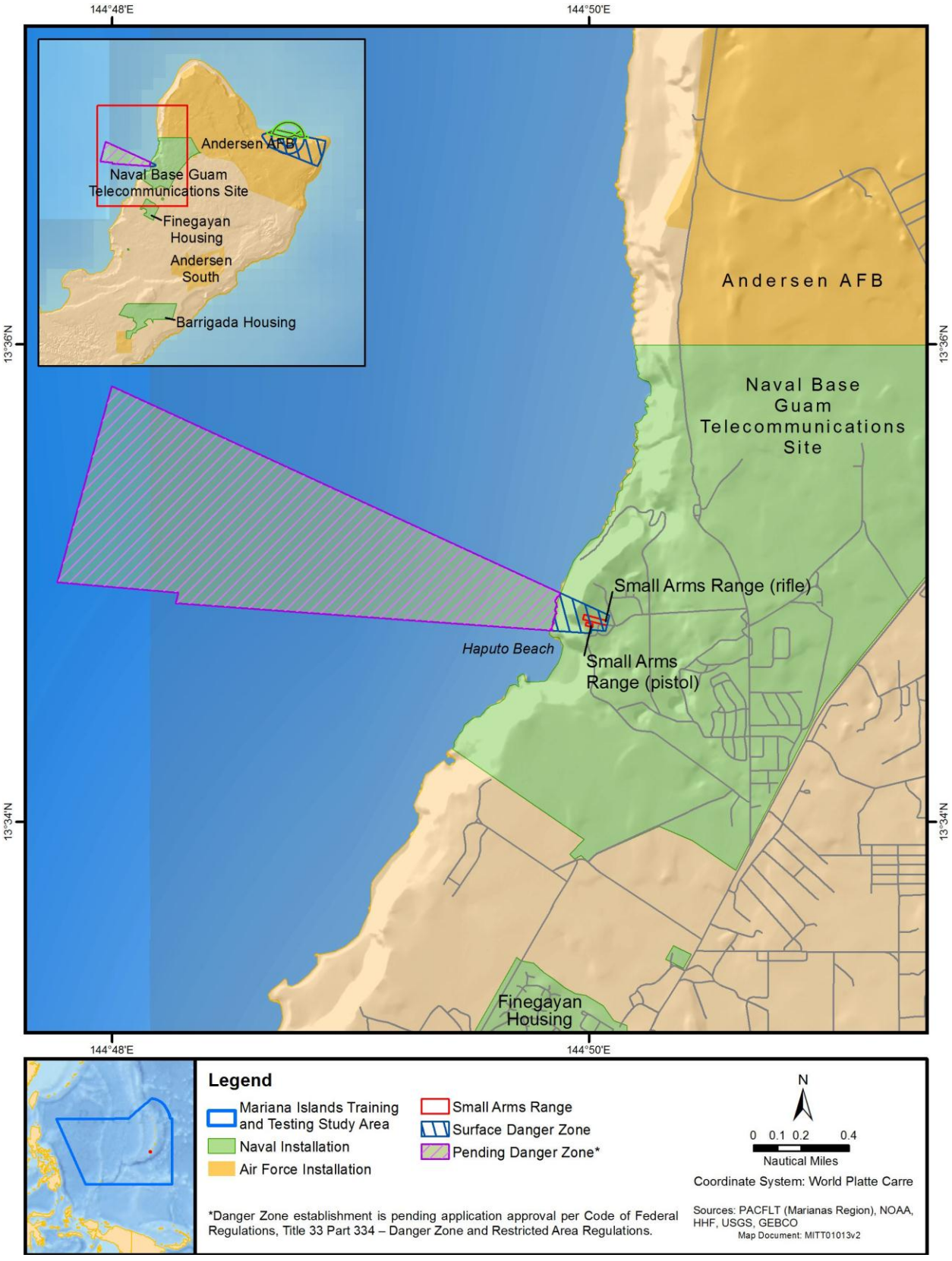

Figure 2.1-7: Naval Base Guam Telecommunications Site (Finegayan)

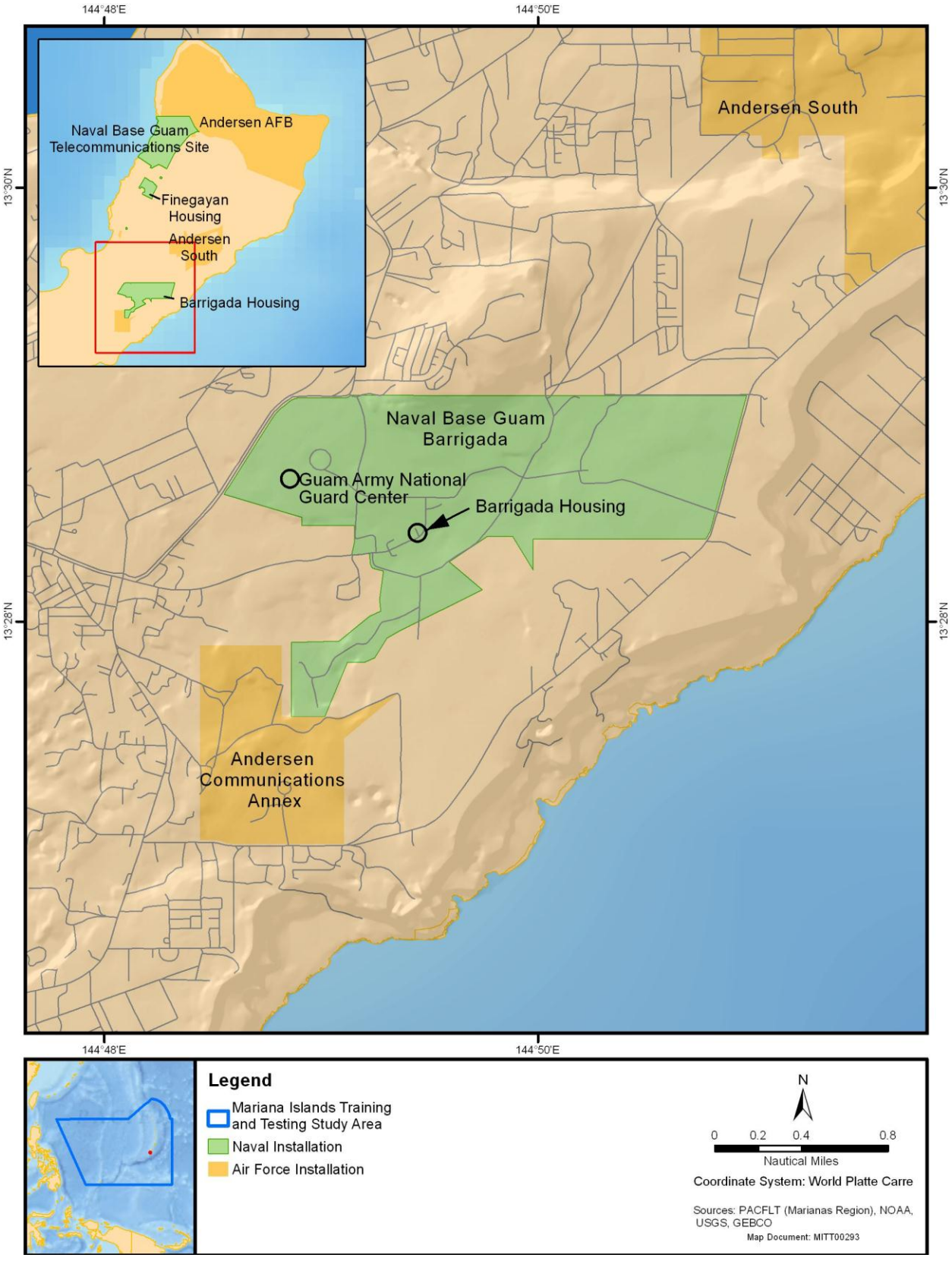

Figure 2.1-8: Naval Base Guam Barrigada

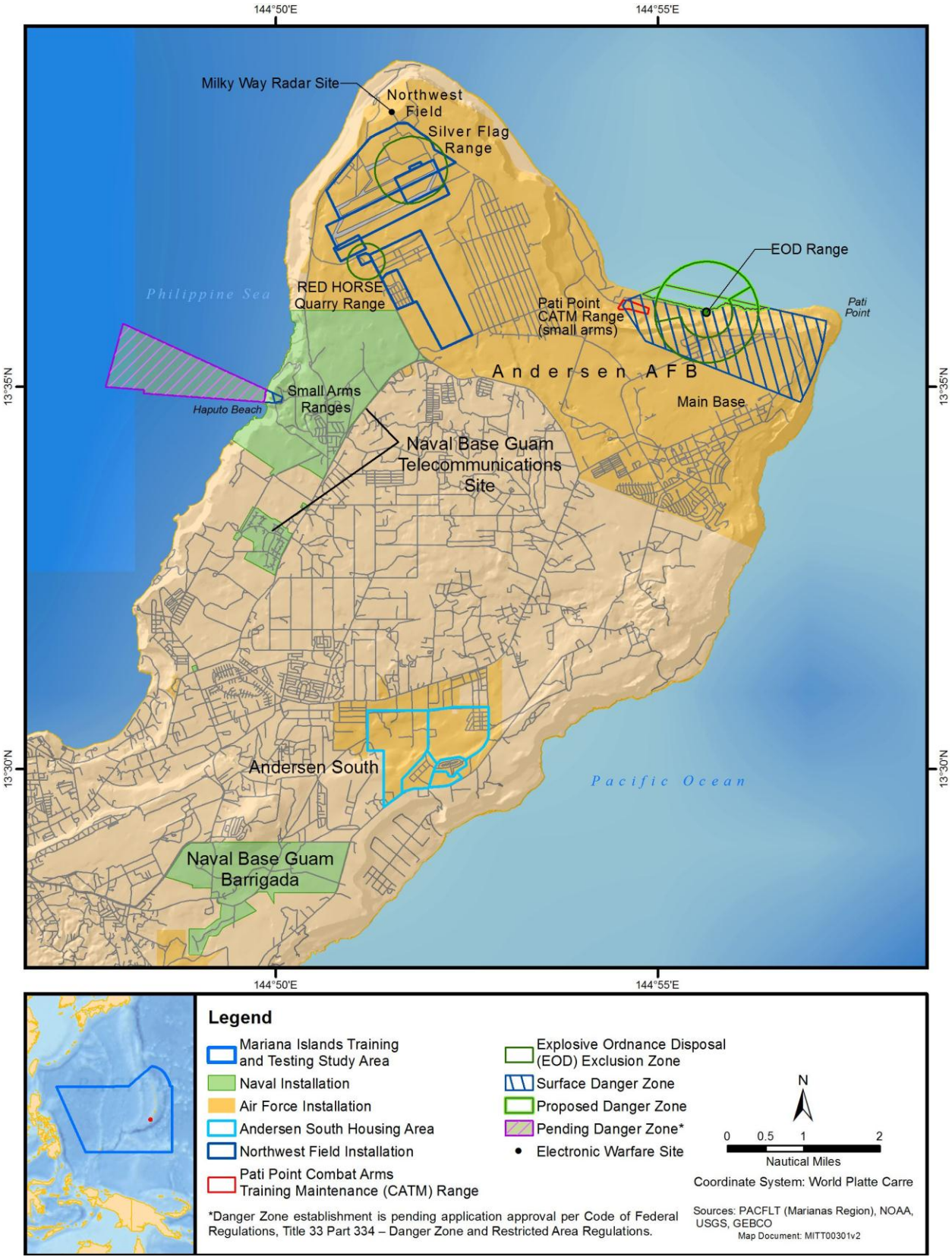

Figure 2.1-9: Andersen Air Force Base

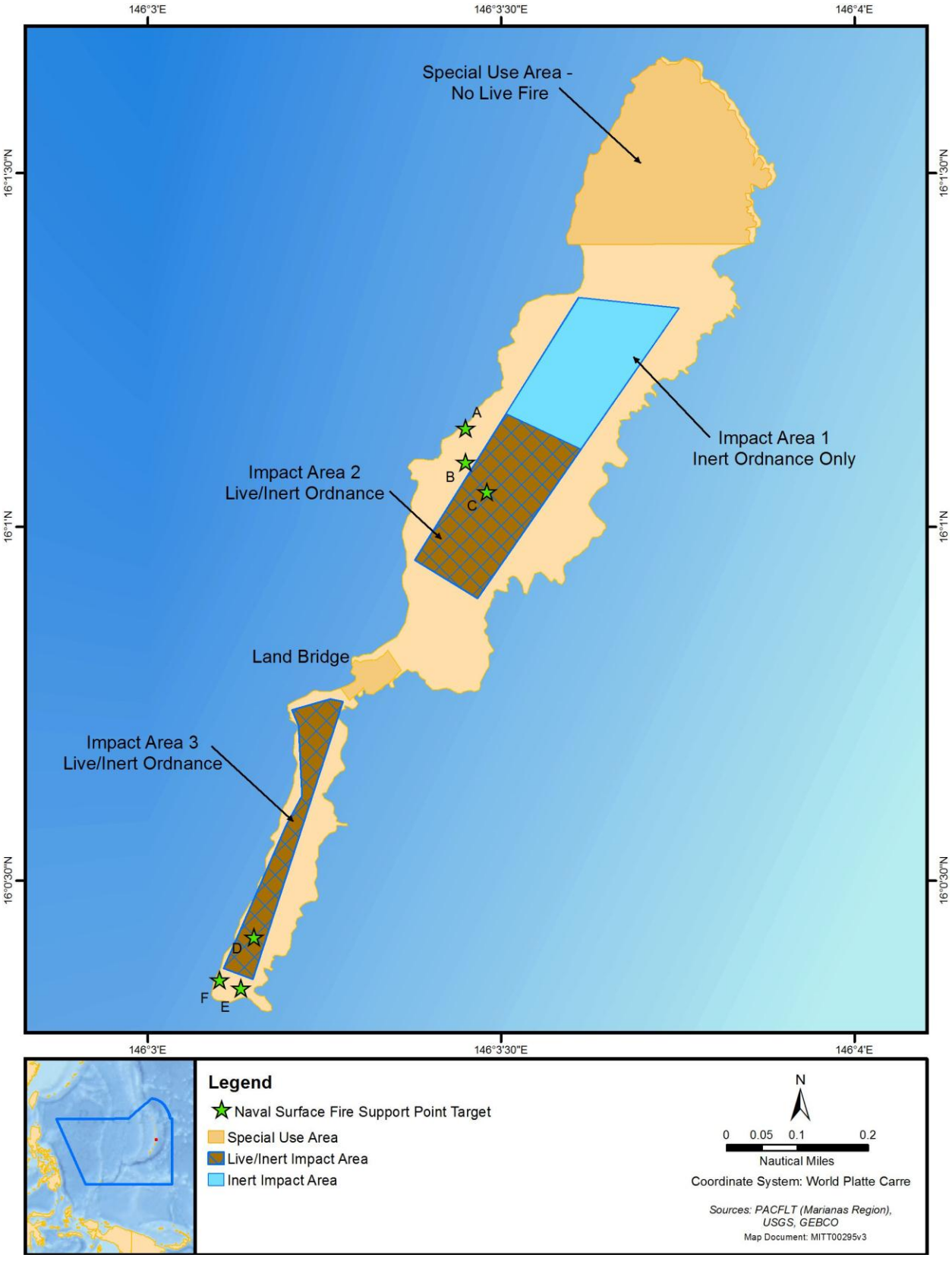

Figure 2.1-10: Farallon de Medinilla

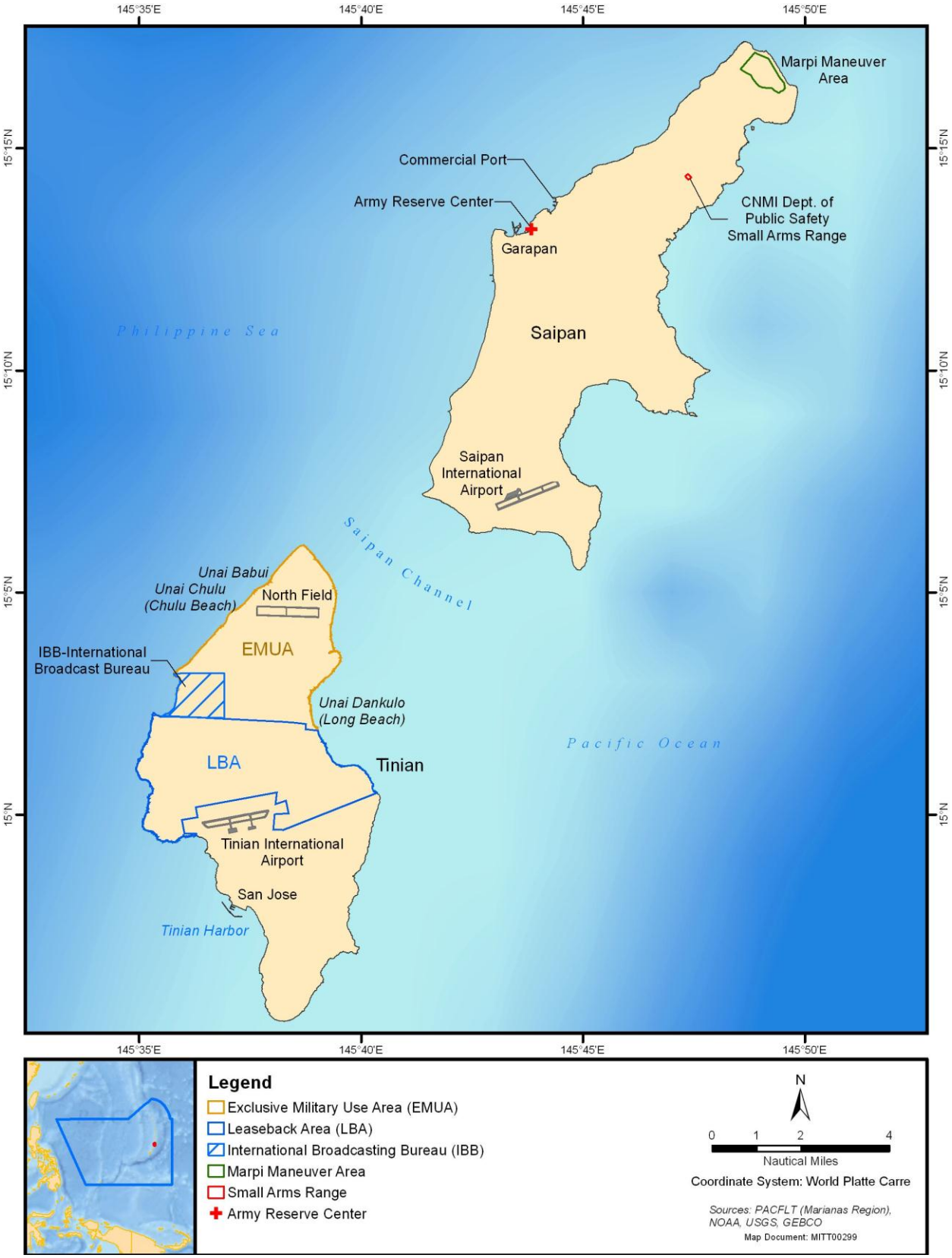

Figure 2.1-11: Tinian and Saipan

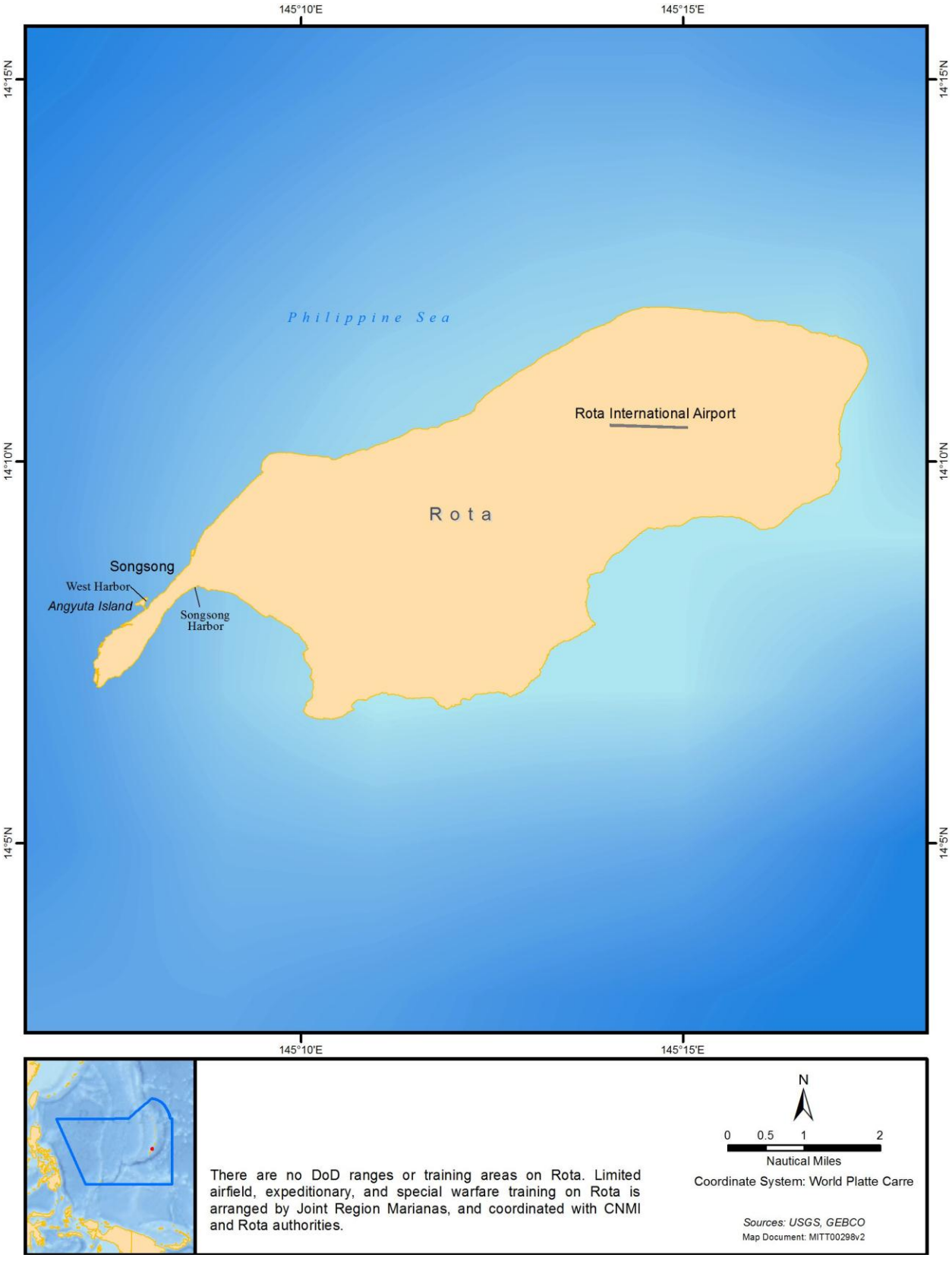

Figure 2.1-12: Rota

2.2 PRIMARY MISSION AREAS

The Navy categorizes training activities into functional warfare areas called primary mission areas. Training activities fall into the following eight primary mission areas:

- Anti-Air Warfare
- Amphibious Warfare
- Strike Warfare
- Anti-Surface Warfare
- Anti-Submarine Warfare
- Electronic Warfare
- Mine Warfare
- Naval Special Warfare

Most training activities addressed in this EIS/OEIS are categorized under one of these primary mission areas; those activities that do not fall within one of these areas are in a separate category. Each warfare community (surface, subsurface, aviation, and special warfare) may train in some or all of these primary mission areas. The research and acquisition community also categorizes some, but not all, of its testing activities under these primary mission areas.

The sonar, ordnance, munitions, and targets used in the training and testing activities are described in Section 2.3 (Descriptions of Sonar, Ordnance/Munitions, Targets, and Other Systems Employed in Mariana Islands Training and Testing Events). A short description of individual training and testing activities is provided in Tables 2.4-1 through 2.4-4. More detailed descriptions of the training and testing activities are provided in Appendix A (Training and Testing Activities Descriptions).

2.2.1 ANTI-AIR WARFARE

The mission of anti-air warfare is to destroy or reduce enemy air and missile threats (including unmanned airborne threats) and serves two purposes: to protect U.S. forces from attacks from the air and to gain air superiority. Anti-air warfare also includes providing U.S. forces with adequate attack warnings, while denying hostile forces the ability to gather intelligence about U.S. forces.

Aircraft conduct anti-air warfare through radar search, detection, identification, and engagement of airborne threats—generally by firing anti-air missiles or cannon fire. Surface ships conduct anti-air warfare through an array of modern anti-aircraft weapon systems such as aircraft detecting radar, naval guns linked to radar-directed fire-control systems, surface-to-air missile systems, and radar-controlled cannons for close-in point defense. Impacts of overland air activities were analyzed in previous documents and remain valid.

Testing of anti-air warfare systems is required to ensure the equipment is fully functional under the conditions in which it will be used. Tests may be conducted on radar and other early-warning detection and tracking systems, new guns or gun rounds, and missiles. Testing of these systems may be conducted on new ships and aircraft and on existing ships and aircraft following maintenance, repair, or modification. For some systems, tests are conducted periodically to assess operability. Additionally, tests may be conducted in support of scientific research to assess new and emerging technologies. Testing activities are often integrated into training activities and in most cases the systems are used in the same manner in which they are used for fleet training activities.

2.2.2 AMPHIBIOUS WARFARE

The mission of amphibious warfare is to project military power from the sea to the shore through the use of naval firepower and Marine Corps landing forces. It is used to attack a threat located on land by a military force embarked on ships. Amphibious warfare operations include small unit reconnaissance or raid missions to large-scale amphibious operations involving multiple ships and aircraft combined into a strike group.

Amphibious warfare training ranges from individual, crew, and small unit activities to large task force exercises. Individual and crew training include amphibious vehicles and naval gunfire support training. Such training includes shore assaults, boat raids, airfield or port seizures, and reconnaissance. Large-scale amphibious exercises involve ship-to-shore maneuver, naval fire support, such as shore bombardment, and air strike and close air support training.

2.2.3 STRIKE WARFARE

The mission of strike warfare is to conduct offensive attacks on land-based targets, such as refineries, power plants, bridges, major roadways, and ground forces to reduce the enemy's ability to wage war. Strike warfare employs weapons by manned and unmanned air, surface, submarine, and Navy special warfare assets in support of extending dominance over enemy territory (power projection).

Strike warfare includes training of fixed-wing attack aircraft pilots and aircrews in the delivery of precision-guided munitions, non-guided munitions, rockets, and other ordnance against land-based targets. Not all strike mission training activities involve dropping ordnance and instead the event is simulated with video footage obtained by onboard sensors.

2.2.4 ANTI-SURFACE WARFARE

The mission of anti-surface warfare is to defend against enemy ships or boats. In the conduct of anti-surface warfare, aircraft use cannons, air-launched cruise missiles, or other precision-guided munitions; ships employ torpedoes, naval guns, and surface-to-surface missiles; and submarines attack surface ships using torpedoes or submarine-launched, anti-ship cruise missiles.

Anti-surface warfare training includes surface-to-surface gunnery and missile exercises, air-to-surface gunnery and missile exercises, and submarine missile or exercise torpedo launch activities.

Testing of weapons used in anti-surface warfare is conducted to develop new technologies and to assess weapon performance and operability with new systems and platforms, such as unmanned systems. Tests include various air-to-surface guns and missiles, surface-to-surface guns and missiles, and bombing tests. Testing activities may be integrated into training activities to test aircraft or aircraft systems in the delivery of ordnance on a surface target. In most cases the tested systems are used in the same manner in which they are used for fleet training activities.

2.2.5 ANTI-SUBMARINE WARFARE

The mission of anti-submarine warfare is to locate, neutralize, and defeat hostile submarine threats to surface forces. Anti-submarine warfare is based on the principle of a layered defense of surveillance and attack aircraft, ships, and submarines all searching for hostile submarines. These forces operate together or independently to gain early warning and detection, and to localize, track, target, and attack hostile submarine threats.

Anti-submarine warfare training addresses basic skills such as detection and classification of submarines, distinguishing between sounds made by enemy submarines and those of friendly submarines, ships and marine life. More advanced, integrated anti-submarine warfare training exercises are conducted in coordinated, at-sea training activities involving submarines, ships, and aircraft. This training integrates the full spectrum of anti-submarine warfare from detecting and tracking a submarine to attacking a target using either exercise torpedoes or simulated weapons.

Testing of anti-submarine warfare systems is conducted to develop new technologies and assess weapon performance and operability with new systems and platforms, such as unmanned systems. Testing uses ships, submarines, and aircraft to demonstrate capabilities of torpedoes, missiles, countermeasure systems, and underwater surveillance and communications systems. Torpedo development, testing, and refinement are critical to successful anti-submarine warfare. At-sea sonar testing ensures systems are fully functional in an open-ocean environment prior to delivery to the fleet for operational use. Anti-submarine warfare systems on fixed wing aircraft and helicopters (including dipping sonar) are tested to evaluate the ability to search and track a submarine or similar target. Sonobuoys deployed from surface vessels and aircraft are tested to verify the integrity and performance of a group, or lot, of sonobuoys in advance of delivery to the fleet for operational use. The sensors and systems on board helicopters and maritime patrol aircraft are tested to ensure that tracking systems perform to specifications and meet operational requirements. Testing may be conducted as part of a large-scale fleet training event involving submarines, ships, fixed-wing aircraft, and helicopters. These integrated training activities offer opportunities to conduct research and acquisition activities and to train aircrew in the use of new or newly enhanced systems during a large-scale, complex exercise.

2.2.6 ELECTRONIC WARFARE

The mission of electronic warfare is to degrade the enemy's ability to use their electronic systems, such as communication systems and radar, to confuse or deny them the ability to defend their forces and assets. Electronic warfare is also used to recognize an emerging threat and counter an enemy’s attempt to degrade the electronic capabilities of the U.S. forces and assets.

Typical electronic warfare activities include threat avoidance training, signals analysis for intelligence purposes, and use of airborne and surface electronic jamming devices to defeat tracking and communications systems.

Testing of electronic warfare systems is conducted to improve the capabilities of systems and ensure compatibility with new systems. Testing involves the use of aircraft, surface ships, and submarine crews to evaluate the effectiveness of electronic systems. Typical electronic warfare testing activities include the use of airborne and surface electronic jamming devices and chaff and flares to defeat tracking and communications systems. Chaff tests evaluate newly developed or enhanced chaff, chaff dispensing equipment, or modified aircraft systems against chaff deployment. Flare tests evaluate deployment performance and crew competency with newly developed or enhanced flares, flare dispensing equipment, or modified aircraft systems against flare deployment.

2.2.7 MINE WARFARE

The mission of mine warfare is to detect, and avoid or neutralize (disable) mines to protect Navy ships and submarines and to maintain free access to ports and shipping lanes. Mine warfare also includes offensive mine laying to gain control of, or deny the enemy access to, sea space. Naval mines can be laid by ships (including purpose-built minelayers), submarines, or aircraft.

Mine warfare training includes exercises in which ships, aircraft, submarines, underwater vehicles, or marine mammal detection systems search for mines. Personnel train to destroy or disable mines by attaching and detonating underwater explosives to the mine. Other neutralization techniques involve impacting the mine with a bullet-like projectile or intentionally triggering the mine to detonate.

Testing and development of mine warfare systems is conducted to improve sonar, laser, and magnetic detectors intended to hunt, locate, and record the positions of mines for avoidance or subsequent neutralization. Mine warfare testing and development falls into two primary categories: mine detection and classification and mine countermeasure and neutralization. Mine detection and classification testing primarily involves the use of unmanned vehicles to support mine detection and classification testing. Mine countermeasure and neutralization testing includes the use of air, surface, and subsurface units and uses tracking devices, countermeasure and neutralization systems, and general purpose bombs to evaluate the effectiveness of neutralizing mine threats. Most neutralization tests use mine shapes, or non-explosive practice mines, to evaluate a new capability. Tests may also be conducted in support of scientific research to support new technologies. The majority of mine warfare systems are currently deployed by ships and helicopters; however, future mine warfare missions will increasingly rely on unmanned vehicles. Tests may also be conducted in support of scientific research to support these new technologies.

2.2.8 NAVAL SPECIAL WARFARE

The mission of naval special warfare is to conduct unconventional warfare, direct action, combat terrorism, special reconnaissance, information warfare, security assistance, counter-drug operations, and recovery of personnel from hostile situations. Naval special warfare operations are highly specialized and require continual and intense training.

Naval special warfare units are required to utilize a combination of specialized training, equipment, and tactics, including insertion and extraction operations using parachutes, submerged vehicles, rubber boats, and helicopters; boat-to-shore and boat-to-boat gunnery; underwater demolition training; reconnaissance; and small arms training.

2.3 DESCRIPTIONS OF SONAR, ORDNANCE/MUNITIONS, TARGETS, AND OTHER SYSTEMS EMPLOYED IN MARIANA ISLANDS TRAINING AND TESTING EVENTS

The Navy and other services use a variety of sensors, platforms, weapons, and other devices, including ones used to ensure the safety of personnel, to meet its mission. Training and testing with these systems may introduce acoustic (sound) energy and expended materials into the environment. The environmental impact of these activities will be analyzed in Chapter 3 (Affected Environment and Environmental Consequences) of this EIS/OEIS. This section presents and organizes sonar systems, ordnance, munitions, targets, and other systems in a manner intended to facilitate understanding of both the activities that use them and the environmental effects analysis that is later described in Chapter 3 of this EIS/OEIS.

2.3.1 SONAR AND OTHER ACOUSTIC SOURCES

2.3.1.1 What is Sonar?

Sonar, originally an acronym for “SOund Navigation And Ranging,” is a technique that uses underwater sound to navigate, communicate, or detect underwater objects (the term sonar is also used for the equipment used to generate and receive sound). There are two basic types of sonar: active and passive.

Active sonar emits sound waves that travel through the water, reflect off objects, and return to the receiver. Sonar is used to determine the distance to an underwater object by calculating the speed of sound in water and the time for the sound wave to travel to the object and back. For example, active sonar systems are used to track targets or to aid in navigation of the vessel by identifying known ocean floor features. Some whales, dolphins, and bats use echolocation, a similar technique, to identify their surroundings and to locate prey.

Passive sonar uses listening equipment, such as underwater microphones (hydrophones) and receiving sensors on ships, submarines, aircraft and autonomous vehicles, to pick up underwater sounds. The advantage of passive sonar is that it places no sound in the water, and thus does not reveal the location of the listening vessel. Passive sonar can indicate the presence, character, and direction of ships and submarines; however, passive sonar is increasingly ineffective as modern submarines become quieter. Passive sonar has no potential acoustic impact on the environment and, therefore, is not discussed further or analyzed within this EIS/OEIS. For more information on sonar, its uses, and the Navy's analysis of potential sonar impacts in this EIS/OIES, please refer to Section 3.0.4 (Acoustic and Explosives Primer).

2.3.1.2 Sonar Systems

Anti-Submarine Warfare. Systems used in anti-submarine warfare include sonar, torpedoes, and acoustic countermeasure devices. These systems are employed from a variety of platforms (surface ships, submarines, helicopters, and fixed-wing aircraft). Surface ships conducting anti-submarine warfare are typically equipped with hull-mounted sonar (passive and active) for the detection of submarines. Helicopters use dipping sonar or sonobuoys (passive and active) to locate submarines (or submarine targets during training and testing exercises). Fixed-wing aircraft deploy both active and passive expendable sonobuoys to assist in detecting and tracking submarines. Submarines are equipped with hull-mounted sonar to detect, localize, and track other submarines and surface ships. Submarines primarily use passive sonar; active sonar is used mostly for navigation. There are also unmanned vehicles currently under development that will be used to deploy anti-submarine warfare systems.

Anti-submarine warfare activities often use mid-frequency (i.e., 1 kilohertz (kHz) to 10 kHz) active sonar, though low-frequency and high-frequency active sonar systems are also used for specialized purposes (see Section 3.0.4, Acoustic and Explosives Primer, for more information on sonar frequencies). The Navy is currently developing and testing sonar systems that may utilize lower frequencies and longer duty cycles—albeit at lower source levels—than current systems. However, these new systems would be operational only if they significantly increase the Navy's ability to detect and identify quiet submarine threats.

The types of sonar systems and acoustic sensors used during anti-submarine warfare sonar training and testing exercises include the following:

- **Surface Ship Sonar Systems:** A variety of surface ships operate hull-mounted mid-frequency active sonar during training exercises and testing activities (Figure 2.3-1). Typically, only cruisers, destroyers, and frigates have surface ship sonar systems.

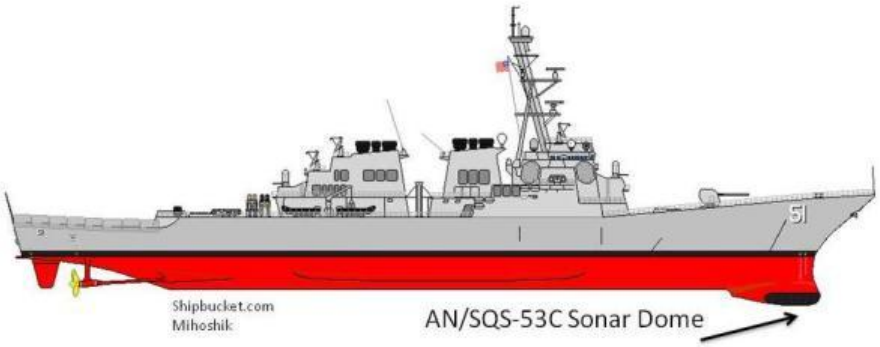

Figure 2.3-1: Guided Missile Destroyer with AN/SQS-53 Sonar

- **Submarine Sonar Systems:** Submarines are equipped with hull-mounted mid-frequency and high-frequency active sonar used to detect and target enemy submarines and surface ships (Figure 2.3-2). A submarine's mission relies on its stealth; therefore, a submarine uses its active sonar sparingly because each sound emission gives away the submarine's location.

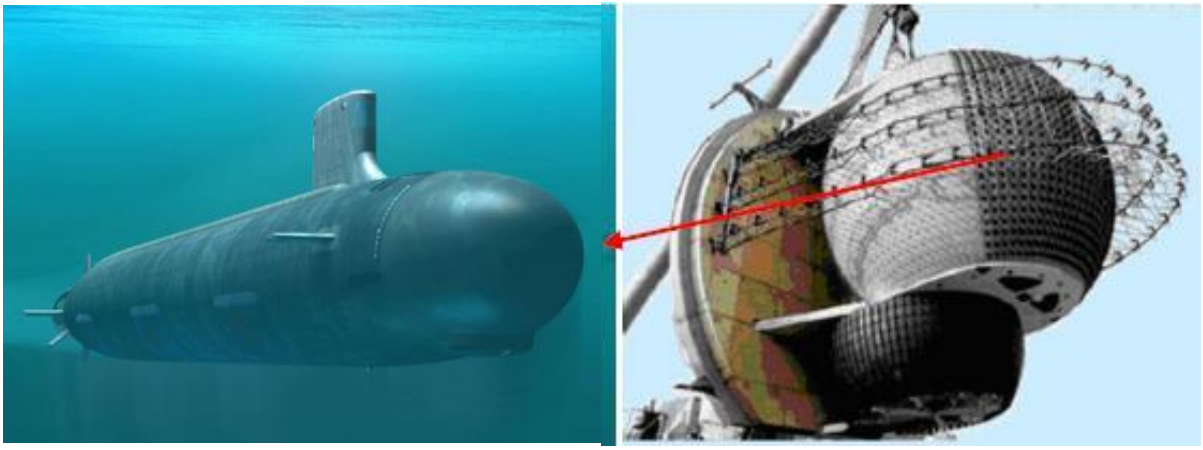

Figure 2.3-2: Submarine with AN/BQQ-10 Sonar Array

- **Aircraft Sonar Systems:** Aircraft sonar systems include sonobuoys and dipping sonar.
    - **Sonobuoys:** Sonobuoys are expendable devices that contain a transmitter and a hydrophone. The sounds collected by the sonobuoy are transmitted back to the aircraft for analysis. Sonobuoys are either active or passive and allow for short- and long-range detection of surface ships and submarines. These systems are deployed by both helicopter and fixed-wing patrol aircraft (Figure 2.3-3).

Figure 2.3-3: Sonobuoys (e.g., AN/SSQ-62)

    - **Dipping Sonar:** Dipping sonar systems are recoverable devices lowered into the water via cable from manned and unmanned helicopters. The sonar detects underwater targets and determines the distance and movement of the target relative to the position of the helicopter (Figure 2.3-4).

Figure 2.3-4: Helicopter Deploys Dipping Sonar

- **Exercise Torpedoes:** Torpedoes are equipped with sonar that helps the torpedoes find their targets. To understand how and when this torpedo sonar is used, the following description is provided. Surface ships, aircraft, and submarines primarily use torpedoes in anti-submarine warfare (Figure 2.3-5). Recoverable, non-explosive torpedoes, categorized as either lightweight

or heavyweight, are used during training and testing. Heavyweight torpedoes use a guidance system to operate the torpedo autonomously or remotely through an attached wire (guidance wire). The autonomous guidance systems operate either passively (listening for sounds generated by the target) or actively (pinging to search for the target). Torpedo training in the Study Area is mostly simulated—solid masses that approximate the weight and shape of a torpedo are fired, rather than fully functional torpedoes. Testing in the Study Area mostly uses fully functional exercise torpedoes.

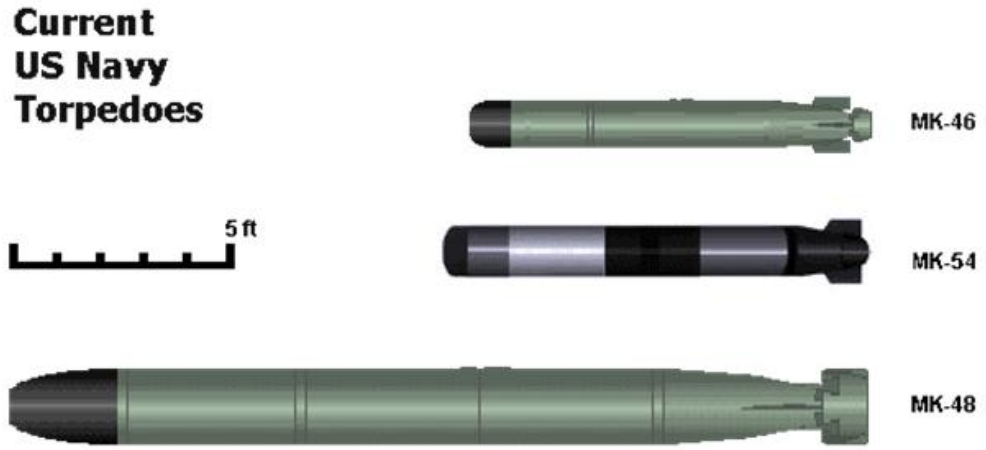

Figure 2.3-5: Navy Torpedoes

- **Acoustic Countermeasures:** Countermeasure devices are towed or free-floating noisemakers that alter the acoustic signature of a Navy ship or submarine, thereby avoiding detection, or act as an alternative target for an incoming threat (e.g., torpedo). Countermeasures are either expendable or recoverable (Figure 2.3-6).

Figure 2.3-6: Acoustic Countermeasures

- **Anti-Submarine Warfare Training Targets:** These targets are equipped with one or more sound producing capabilities that allow the targets to better simulate actual submarines. To understand how and when these sound sources are used, the following description is provided. Anti-submarine warfare training targets (Figure 2.3-7) are autonomous undersea vehicles used to simulate target submarines. The training targets are equipped with one or more of the

following devices: (1) acoustic projectors emitting sounds to simulate submarine acoustic signatures, (2) echo repeaters to simulate the characteristics of the echo of a sonar signal reflected from a submarine, and (3) magnetic sources that mimic those of a submarine.

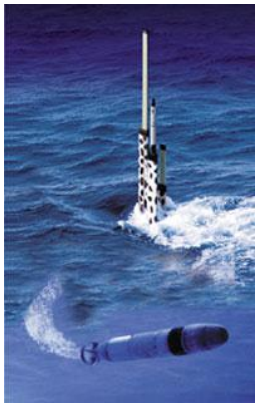

Figure 2.3-7: Anti-Submarine Warfare Training Targets

Portable Underwater Tracking Range. This is a portable instrumented range that allows near real-time tracking and feedback to all participants. The tracking range provides for both a shallow water and deep water operating environment. MK-84 range pingers are used in association with the Portable Underwater Tracking Range. Tracking range transponders are anchored to the seafloor with approximately 200-pound (lb.) concrete blocks or buckets filled with sand bags. The range can track up to four MK-84 range pingers. A typical tracking range configuration consists of ten transponders with three held in reserve, and is deployable from 400 meters (m) to 3,500 m depth. Signals from the transponders are uplinked to a range control for vessel for processing. The transponders can be released from their anchors by acoustic signal to float to the surface for recovery. The anchor blocks are not recovered.

Mine Warfare. Mine warfare training and testing activities use a variety of different sonar systems that are typically high-frequency and very high-frequency. These sonar systems (Figure 2.3-8) are used to detect, locate, and characterize moored and bottom mines. The majority of mine warfare sonar systems can be deployed by more than one platform (i.e., helicopter, unmanned underwater vehicle, submarine, or surface ship) and may be interchangeable among platforms. Surface ships and submarines use sonar to detect mines and objects and minesweeping ships use a specialized variable-depth mine detection and classification high-frequency active sonar system to detect mines.

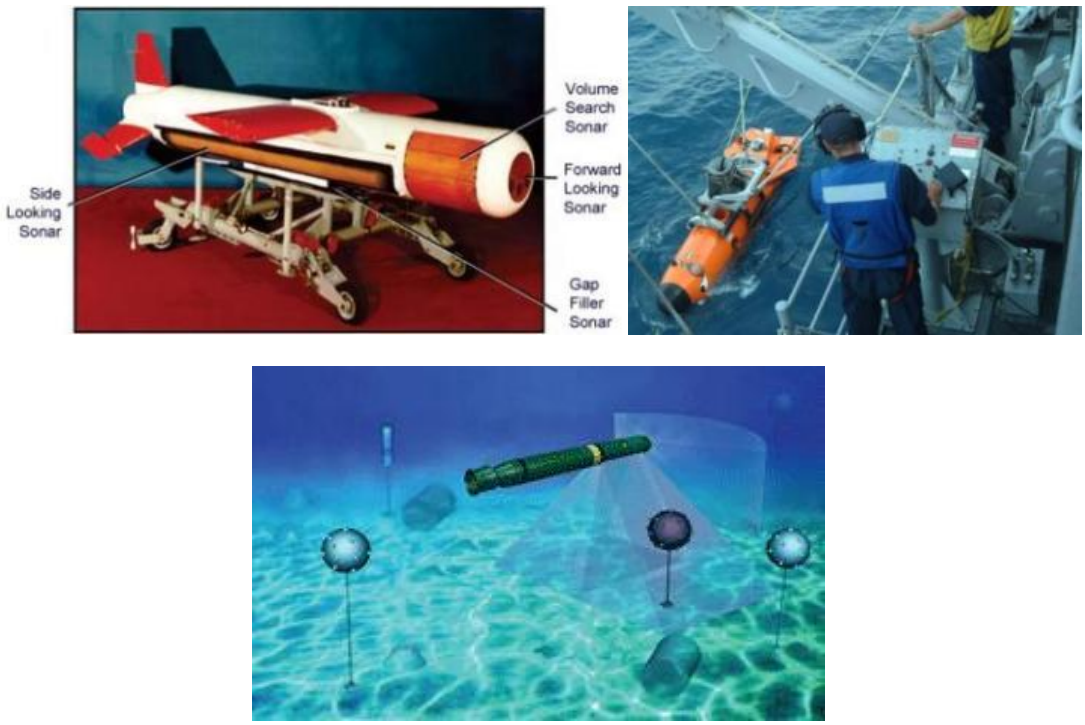

Figure 2.3-8: Mine Warfare Systems

Safety, Navigation, Communications, and Oceanographic Systems. Naval ships, submarines, and unmanned vehicles rely on equipment and instrumentation that uses active sonar during both routine operations and training and testing activities. Sonar systems are used to gauge water depth; detect and map objects, navigational hazards, and the ocean floor; and transmit communication signals.

Other Acoustic Sensors. The Navy uses a variety of other acoustic sensors to protect ships anchored or at the pier, as well as shore facilities. These systems, both active and passive, detect potentially hostile swimmers, broadcast warnings to alert Navy divers of potential hazards, and gather information regarding ocean characteristics (ocean currents, wave measurements). They are generally stationary systems in Navy harbors and piers. In addition, the Navy's research and acquisition community uses various sensors for tracking during testing activities and to collect data for test analysis.

Echolocation Systems. Navy marine mammals (Atlantic bottlenose dolphins [*Tursiops truncatus*] and California sea lions [*Zalophus californianus*]) are also used to detect hostile swimmers around Navy facilities. A trained animal is deployed under behavioral control of a handler to find an intruding swimmer. Upon finding the 'target' of the search, the animal returns to the boat and alerts the animal handlers and the animals are given a localization marker or leg cuff that they attach to the intruder. Swimmers that have been marked with a leg cuff are reeled-in by security support boat personnel via a line attached to the cuff.

2.3.2 ORDNANCE/MUNITIONS

Most ordnance and munitions used during training and testing activities fall into three basic categories: projectiles, missiles, and bombs. Ordnance can be further defined by Net Explosive Weight (NEW). NEW is the trinitrotoluene equivalent of energetic material, which is the standard measure of strength of bombs and other explosives. For example, a 2,000 lb. (907.2-kilogram [kg]) bomb may have a NEW of anywhere from 600 to 1,000 lb. (272.2 to 453.8 kg).

Projectiles. Projectiles are fired during gunnery exercises from a variety of weapons, including pistols and rifles to large-caliber turret mounted guns on the decks of Navy ships. Projectiles can be either explosive munitions (e.g., certain cannon shells) or non-explosive practice munitions (e.g., rifle/pistol bullets). Explosive rounds can be fused to either explode on impact or in the air (i.e., just prior to impact). Projectiles are broken down into three basic categories in this EIS/OEIS:

- **Small-Caliber Projectiles:** Includes projectiles up to .50 caliber (approximately 0.5-inch [in.] diameter). Small-caliber projectiles (e.g., bullets), are primarily fired from pistols, rifles, and machine guns (Figure 2.3-9). Most small-caliber projectiles are fired during training activities for an individual Sailor to become and remain proficient.

Figure 2.3-9: Shipboard Small Arms Training

- **Medium-Caliber Projectiles:** These projectiles are larger than .50 caliber, but smaller than 57 millimeters (mm) (approximately 2.24 in. diameter). The most common size medium-caliber projectiles are 20 mm, 25 mm, and 40 mm. Medium-caliber projectiles are fired from machine guns operated by one to two crewmen and mounted on the deck of a ship, wing-mounted guns on aircraft, and fully automated guns mounted on ships for defense against missile attack (Figure 2.3-10). Medium-caliber projectiles also include 40 mm grenades, which can be fired from hand-held grenade launcher or crew-served deck-mounted guns. Medium-caliber projectiles can be non-explosive practice munitions or explosive projectiles. Explosive projectiles are usually fused to detonate on impact; however, advanced explosive projectiles can detonate based on time, distance, or proximity to a target.

Figure 2.3-10: Shipboard Medium-Caliber Gun Systems

- **Large-Caliber Projectiles:** These include projectiles 57 mm and larger. The largest projectile currently in service has a 5 in. (12.7-centimeter [cm]) diameter (Figure 2.3-11), but larger weapons are under development. The most widely used large-caliber projectiles are 57 mm, 76 mm, 105 mm, and 5 in. The most common 5 in. (12.7 cm) projectile is approximately 26 in. (66 cm) long and weighs 70 lb. (32 kg). Large-caliber projectiles are fired from mounted guns located on ship decks or aircraft (e.g., AC-130 gunship) and can be used to fire on surface ships and boats, in defense against missiles and aircraft, or against land-based targets. Large-caliber projectiles can be non-explosive practice munitions or explosive munitions. Explosive projectiles can detonate on impact or in the air.

Figure 2.3-11: Large-Caliber Projectile Use (5-Inch)

Missiles. Missiles are rocket or jet-propelled munitions used to attack ships, aircraft, and land-based targets, as well as defend ships against other missiles. Guidance systems and advanced fusing technology ensure that missiles reliably impact on or detonate near their intended target. Missiles are categorized according to their intended target, as described below, and can be further classified according to NEW. Rockets are included within the category of missiles.

- **Anti-Air Missiles:** Anti-air missiles are fired from aircraft and ships against enemy aircraft and incoming missiles (Figure 2.3-12). Anti-air missiles are configured to explode near, or on impact with, their intended target. Missiles are the primary ship-based defense against incoming missiles.

Figure 2.3-12: Rolling Airframe Missile (left) and Air-to-Air Missile (right)

- **Anti-Surface Missiles:** Anti-surface missiles are fired from aircraft, ships, and submarines against surface ships (Figure 2.3-13). Anti-surface missiles are typically configured to detonate on impact.

Figure 2.3-13: Anti-Surface Missile Fired from MH-60 Helicopter

- **Strike Missiles:** Strike missiles are fired from aircraft, ships, and submarines against land-based targets. Strike missiles are typically configured to detonate on impact, or near their intended target. The AGM-88 High-speed Anti-Radiation Missile, which is used to destroy enemy radar

sites, is an example of a strike missile that is used during at-sea training, and is fired at a sea-borne target that replicates a land-based radar site.

Bombs. Bombs are unpowered munitions dropped from aircraft on land and water targets. Bombs are in two categories: general-purpose bombs and subscale practice bombs. Similar to missiles, bombs are further classified according to the NEW of the bomb.

- **General Purpose Bombs:** General-purpose bombs (Figure 2.3-14) consist of precision-guided and unguided full-scale bombs, ranging in size from 250 to 2,000 lb. (113 to 907 kg). Common bomb nomenclature used includes MK-80 series, which is the Navy's standard model; Guided Bomb Units and Joint Direct Attack Munitions, which are precision-guided (including laser-guided) bombs; and the Joint Standoff weapon, which is a long-range "glider" precision weapon.

Figure 2.3-14: F/A-18 Bomb Release (left) and Loading General Purpose Bombs (right)

- **Subscale Bombs:** Subscale bombs (Figure 2.3-15) are non-explosive practice munitions containing a spotting (smoke) charge to aid in scoring the accuracy of hitting the target during training and testing activities. Common subscale bombs are 25 lb. (11 kg) and less and are steel-constructed. Laser guided training rounds are another variation of a subscale practice bomb. They weigh approximately 100 lb. (45 kg) and are cost-effective non-explosive weapons used in training aircrew in laser-guided weapons employment.

Figure 2.3-15: Subscale Bombs for Training

Other Munitions. There are other munitions and ordnance used in naval at-sea training and testing activities that do not fit into one of the above categories, and are discussed below:

- **Demolition Charges:** Divers place explosive charges in the marine environment during some training and testing activities. These activities may include the use of timed charges, in which the charge is placed, a timer is started, and the charge detonates at the set time. Munitions typically composed of C-4 explosive, with the necessary detonators and cords, are used to support mine neutralization, demolition, and other warfare activities. All demolition charges are further classified according to the NEW of the charge.
- **Anti-Swimmer Grenades:** Maritime security forces use hand grenades to defend against enemy scuba divers.
- **Torpedoes:** Explosive torpedoes are required in some training and testing activities. Torpedoes are described as either lightweight or heavyweight and are further categorized according to the NEW.
- **Extended Echo Ranging Sonobuoys:** Extended Echo Ranging sonobuoys include Improved Extended Echo Ranging sonobuoys and mini sound-source seeker sonobuoys that use explosive charges as the active sound source instead of electrically produced sounds.

2.3.3 TARGETS

Training and testing require an assortment of realistic and challenging targets. Targets vary from items as simple and ordinary as an empty steel drum, used for small-caliber weapons training from the deck of a ship, to sophisticated, unmanned aerial drones used in air defense training. For this EIS/OEIS, targets are organized by warfare area.

- **Anti-Air Warfare Targets:** Anti-air warfare targets, tow target systems, and aerial targets are used in training and testing activities that involve detection, tracking, defending against, and attacking enemy missiles and aircraft. Aerial towed target systems include textile (nylon banner) and rigid (fiberglass shapes) towed targets used for gunnery activities. Aerial targets include expendable rocket-powered missiles and recoverable radio-controlled drones used for gunnery and missile exercises (Figure 2.3-16). Parachute flares are used as air-to-air missile targets. Manned high-performance aircraft may be used as targets—to test ship and aircraft defensive systems and procedures—without the actual firing of munitions.

Figure 2.3-16: Anti-Air Warfare Targets

- **Anti-Surface Warfare Targets:** Stationary and towed targets are used as anti-surface warfare targets during gunnery activities. Targets include floating steel drums, inflatable shapes or target balloons (e.g., Killer Tomato™, see Figure 2.3-17), fiberglass catamarans, and towed sleds. Remote-controlled, high-speed targets, such as jet skis and motorboats, are also used (Figure 2.3-18).

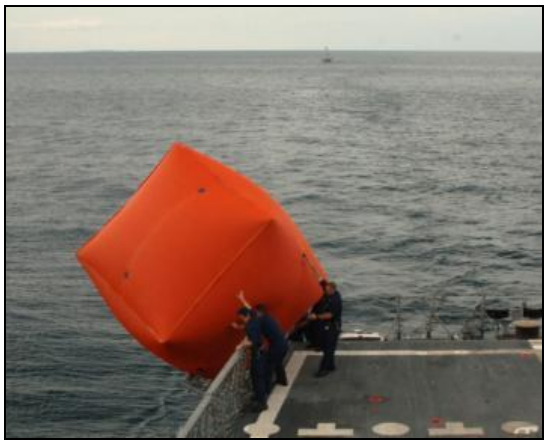

Figure 2.3-17: Deploying a "Killer Tomato™" Floating Target

Figure 2.3-18: Ship Deployable Surface Target (left) and High-Speed Maneuverable Seaborne Target (right)

- **Anti-Submarine Warfare Targets:** Anti-submarine warfare uses multiple types of targets including the following:
    - **Submarines:** Submarines may act as tracking and detection targets during training and testing activities.
    - **Motorized Autonomous Targets:** Motorized autonomous targets simulate the acoustic and magnetic characteristics of a submarine, providing realism for exercises when a submarine is not available. These mobile targets resemble torpedoes, with some models designed for recovery and reuse, while other models are expendable.
    - **Stationary Artificial Targets:** Stationary targets either resemble submarine hulls or are simulated systems with acoustic properties of enemy submarines. These targets either rest on the sea floor or are suspended at varying depths in the water column.

2.3.4 DEFENSIVE COUNTERMEASURES

Naval forces depend on effective defensive countermeasures to protect against missile and torpedo attack. Defensive countermeasures are devices designed to confuse, distract, and confound precision-guided munitions. While new measures to protect naval ships, aircraft, and personnel from detection and attack are being developed, most generally defensive countermeasures fall within three basic categories:

- **Chaff:** Chaff consists of reflective, aluminum-coated glass fibers used to obscure ships and aircraft from radar-guided systems. Chaff fibers, which are stored in canisters, are either dispensed from aircraft or fired into the air from the decks of surface ships when an attack is imminent. The glass fibers create a radar cloud which acts to mask the position of the ship or aircraft.
- **Flares:** Flares are pyrotechnic devices used to defend against heat seeking missiles, where the missile seeks out the heat signature from the flare rather than the aircraft's engines. Similar to chaff, flares are also dispensed from aircraft and fired from ships.
- **Acoustic Countermeasures:** Acoustic countermeasures are described above in Section 2.3.1.2 (Sonar Systems). Acoustic countermeasures are either released from ships and submarines or towed at a distance behind the ship.

2.3.5 MINE WARFARE SYSTEMS

Mine warfare systems are in two broad categories: mine detection and mine neutralization.

Mine Detection Systems. Mine detection systems are used to locate, classify, and map suspected mines. Once located, the mines can either be neutralized or avoided. These systems are specialized to either locate mines on the surface, in the water column, or on the sea floor.

- **Towed or Hull-Mounted Mine Detection Systems:** These detection systems use acoustic and laser or video sensors to locate and classify suspect mines (Figure 2.3-19). Helicopters, ships, and unmanned vehicles are used for towed systems, which can rapidly assess large areas.

Figure 2.3-19: Towed Mine Detection System

- **Unmanned/Remotely Operated Vehicles:** These vehicles use acoustic and video or lasers to locate and classify mines. Unmanned/remotely operated vehicles provide mine warfare capabilities in nearshore littoral areas, surf zones, ports, and channels.
- **Airborne Laser Mine Detection Systems:** Airborne laser detection systems work in concert with neutralization systems (Figure 2.3-20). The detection system initially locates mines and a neutralization system is then used to relocate and neutralize the mine.

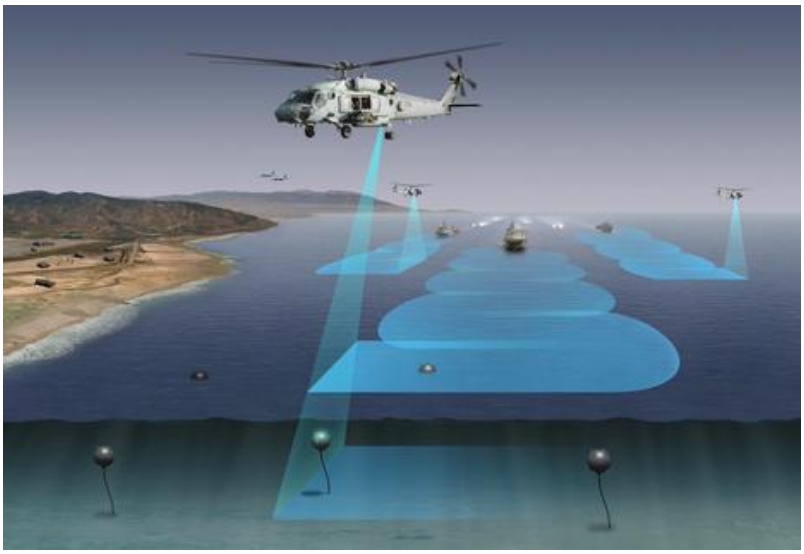

Figure 2.3-20: Airborne Laser Mine Detection System in Operation

- **Marine Mammal System:** Navy personnel and Navy marine mammals work together to detect specified underwater objects. The Navy deploys trained bottlenose dolphins and California sea lions as part of the marine mammal mine-hunting and object-recovery system.

Mine Neutralization Systems. These systems disrupt, disable, or detonate mines to clear ports and shipping lanes, as well as littoral, surf, and beach areas in support of naval amphibious operations. Mine neutralization systems can clear individual mines or a large number of mines quickly.

- **Towed Influence Mine Sweep Systems:** These systems use towed equipment that mimic a particular ship's magnetic and acoustic signature triggering the mine and causing it to explode (Figure 2.3-21).

Figure 2.3-21: Organic and Surface Influence Sweep

- **Towed Mechanical Mine Sweeping Systems:** These systems tow a sweep wire to snag the line that attaches a moored mine to its anchor and then uses a series of cables and cutters to sever those lines. Once these lines are cut, the mines float to the surface where Sailors can neutralize the mines.
- **Unmanned/Remotely Operated Mine Neutralization Systems:** Surface ships and helicopters operate these systems, which place explosive charges near or directly against mines to destroy the mine (Figure 2.3-22).
- **Projectiles:** Small- and medium-caliber projectiles, fired from surface ships or hovering helicopters, are used to neutralize floating and near-surface mine.
- **Diver Emplaced Explosive Charges:** Operating from small craft and aircraft, divers emplace explosive charges near or on mines to destroy the mine or disrupt its ability to function.

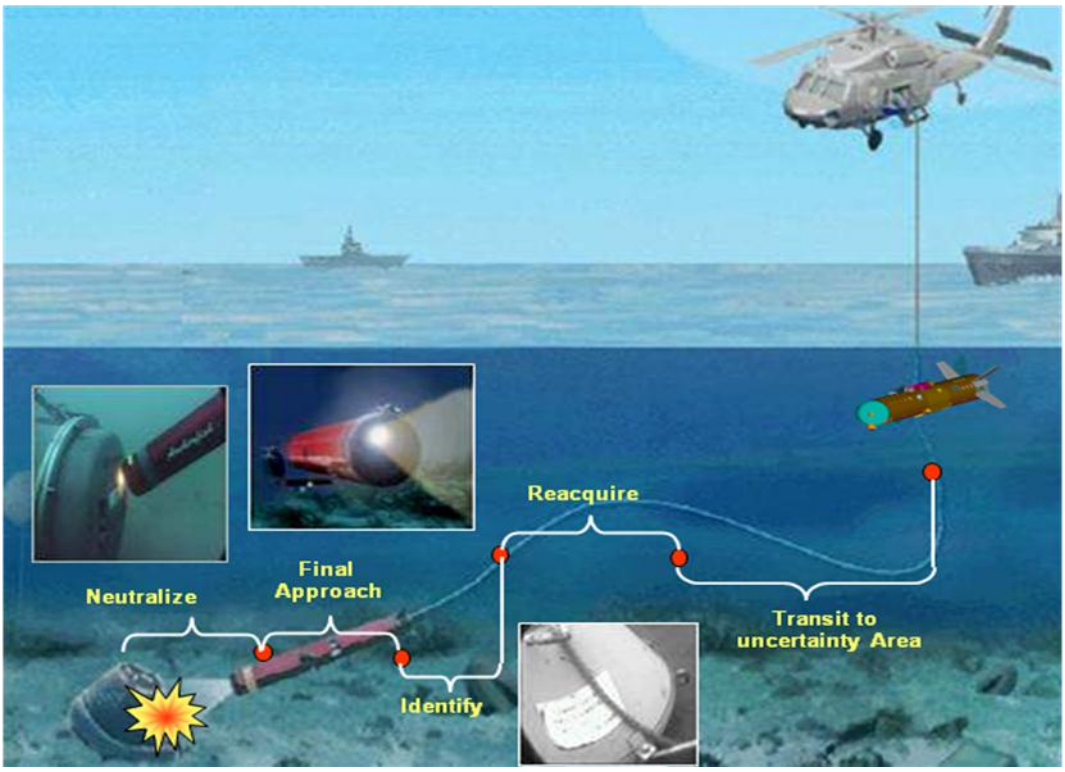

Figure 2.3-22: Airborne Mine Neutralization System

2.3.6 MILITARY EXPENDED MATERIALS

Navy training and testing activities introduce or expend various items, such as non-explosive munitions and targets, into the marine environment as a direct result of using these items for their intended purpose. In addition to the items described below, some accessory materials—related to the carriage or release of these items—are released. These materials, referred to as military expended materials, are not recovered, and potentially result in environmental impacts that are analyzed in detail in Chapter 3 (Affected Environment and Environmental Consequences) of this EIS/OEIS.

Military expended materials analyzed in this document include, but are not limited to, the following:

- **Sonobuoys:** Sonobuoys consist of parachutes and the sonobuoys themselves.
- **Torpedo Launch Accessories:** Torpedoes are usually recovered; however, materials such as parachutes used with air-dropped torpedoes, guidance wire used with submarine-launched torpedoes, and ballast weights are expended. Explosive-filled torpedoes expend torpedo fragments.
- **Decelerators/Parachutes:** Aircraft-launched sonobuoys, lightweight torpedoes (such as the MK-46 and MK-54), illumination flares, and targets use nylon decelerators/parachutes ranging in size from 18 to 48 in. (46 to 122 cm) in diameter.
- **Projectiles and Bombs:** Projectiles, bombs, or fragments from explosive projectiles and bombs are expended during training and testing exercises. These items are primarily constructed of lead (most small-caliber projectiles) or steel (medium- and large-caliber projectiles and all bombs).

- **Missiles:** Non-explosive missiles and missile fragments from explosive missiles are expended during training and testing events. Propellant, and any explosive material involved, is consumed during firing and detonation.
- **Rockets:** Non-explosive rockets and rocket fragments from explosive rockets are expended during training and testing events. Propellant, and any explosive material involved, is consumed during firing and detonation.
- **Countermeasures:** Countermeasures (acoustic, chaff, flares) are expended as a result of training exercises, with the exception of towed acoustic countermeasures.
- **Targets:** Some targets are designed to be expended; other targets, such as aerial drones and remote-controlled boats, are recovered for re-use when possible. Targets struck with ordnance will result in target fragments.
- **Ballast/Anchors:** Bottom mine shapes and other sea floor devices (e.g., portable underwater tracking range transponders) use ballast to sink to a pre-determined depth or to anchor to the bottom. These ballasts and anchors are generally not recovered.

2.4 PROPOSED ACTIVITIES

The Navy and other services have been conducting military readiness activities in the Study Area for decades. The tempo and types of training and testing activities have fluctuated because of the introduction of new technologies, the evolving nature of international events, advances in warfighting doctrine and procedures, and force structure (organization of ships, weapons, and personnel) changes. Such developments influenced the frequency, duration, intensity, and location of required training and testing activities. As discussed in Chapter 1 (Purpose and Need), training and testing activities were analyzed in the Tactical Theater Training Assessment Program Phase I documents, specifically in the environmental planning documents for MIRC. This EIS/OEIS (Phase II) accounts for those factors that cause training and testing fluctuations and has refined its proposed activities in two ways. First, at-sea training and testing activities have evolved to meet changes to military readiness requirements. Second, this EIS/OEIS includes additional at-sea geographic areas where training and testing activities historically occur.

2.4.1 PROPOSED TRAINING ACTIVITIES IN THE MARIANA ISLANDS TRAINING AND TESTING STUDY AREA

The training activities proposed by the services are described in Table 2.4-1. The table is organized according to primary mission areas and includes the activity name and a short description. Appendix A (Training and Testing Activities Descriptions) has more detailed descriptions of the activities.

Table 2.4-1: Typical Training Activities in the Mariana Islands Training and Testing Study Area

Activity Name	Activity Description
Anti-Air Warfare (AAW)	
Air Combat Maneuver (ACM)	Aircrews engage in flight maneuvers designed to gain a tactical advantage during combat.
Air Defense Exercise (ADEX)	Aircrew and ship crews conduct defensive measures against threat aircraft or missiles.
Air Intercept Control (AIC)	Aircrew and air controllers conduct aircraft intercepts of other aircraft.
Gunnery Exercise (Air-to-Air) (GUNEX [A-A])	Aircrews defend against threat aircraft with cannons (machine gun).
Missile Exercise (Air-to-Air) (MISSILEX [A-A])	Aircrews defend against threat aircraft with missiles.
Gunnery Exercise (Surface-to-Air) (GUNEX [S-A]) – Large-caliber	Surface ship crews defend against threat aircraft or missiles with guns.
Gunnery Exercise (Surface-to-Air) (GUNEX [S-A]) – Medium-caliber	Surface ship crews defend against threat aircraft or missiles with guns.
Missile Exercise (Surface-to-Air) (MISSILEX [S-A])	Surface ship crews defend against threat missiles and aircraft with missiles.
Strike Warfare (STW)	
Bombing Exercise Air-to-Ground (BOMBEX [A-G])	Fixed-wing aircraft drop non-explosive bombs against a land target.
Gunnery Exercise Air-to-Ground (GUNEX [A-G])	Helicopter crews fire guns at stationary land targets; fixed-winged aircraft also strafe land targets.
Missile Exercise (MISSILEX)	Missiles or rockets launched against a land target.
Combat Search and Rescue (CSAR)	CSAR units use helicopters, night vision and identification systems, and insertion and extraction techniques under hostile conditions to locate, rescue, and extract personnel.

Table 2.4-1: Typical Training Activities in the Mariana Islands Training and Testing Study Area (continued)

Activity Name	Activity Description
Amphibious Warfare (AMW)	
Naval Surface Fire Support Exercise-Land Based Target (FIREX [Land])	Surface ship crews use large-caliber guns to fire on land-based targets in support of forces ashore.
Amphibious Rehearsal, No Landing	Amphibious shipping, landing craft, and elements of the Marine Air Ground Task Force rehearse amphibious landing operations without conducting an actual landing on shore.
Amphibious Assault	Forces move ashore from ships at sea for the immediate execution of inland objectives.
Amphibious Raid	Small unit forces move swiftly from ships at sea for a specific short-term mission. Raids are quick operations with as few Marines as possible.
Urban Warfare Training	Forces sized from squad (approximately 13 Marines) to battalions (approximately 950) conduct training activities in mock urban environments.
Noncombatant Evacuation Operations	Military units evacuate noncombatants from hostile or unsafe areas or provide humanitarian assistance in times of disaster.
Humanitarian Assistance/Disaster Relief Operations	Military units evacuate noncombatants from hostile or unsafe areas or provide humanitarian assistance in times of disaster.
Unmanned Aerial Vehicles Ops (UAV OPS)	Military units employ unmanned aerial vehicles to launch, operate, and gather intelligence for specified amphibious missions.
Anti-Surface Warfare (ASUW)	
Gunnery Exercise (Air-to-Surface) – Small-caliber	Fixed-wing and helicopter aircrews, including embarked personnel, use small-caliber guns to engage surface targets.
Gunnery Exercise (Air-to-Surface) – Medium-caliber	Fixed-wing and helicopter aircrews, including embarked personnel, use medium-caliber guns to engage surface targets.
Missile Exercise (Air-to-Surface) – Rocket (MISSILEX [A-S] – Rocket)	Fixed-wing and helicopter aircrews fire precision-guided and unguided rockets against surface targets.
Missile Exercise (Air-to-Surface) – Missile (MISSILEX [A-S] – Missile)	Fixed-wing and helicopter aircrews fire precision-guided missiles against surface targets.
Laser Targeting (at sea)	Fixed-winged, helicopter, and ship crews illuminate enemy targets with lasers.
Bombing Exercise (Air-to-Surface) (BOMBEX [A-S])	Fixed-wing aircrews deliver bombs against surface targets.
Torpedo Exercise (Submarine-to-Surface)	Submarine attacks a surface target using exercise or live-fire torpedoes.
Missile Exercise (Surface-to-Surface) (MISSILEX [S-S])	Surface ship crews defend against threat missiles and other surface ships with missiles.

Table 2.4-1: Typical Training Activities in the Mariana Islands Training and Testing Study Area (continued)

Activity Name	Activity Description
Gunnery Exercise Surface-to-Surface (Ship) – Large-caliber (GUNEX-S-S [Ship])	Ship crews engage surface targets with ship's large-caliber guns.
Gunnery Exercise Surface-to-Surface (Ship) – Small- and Medium-caliber (GUNEX-S-S [Ship])	Ship crews engage surface targets with ship's small- and medium-caliber guns.
Sinking Exercise (SINKEX)	Aircraft, ship, and submarine crews deliver ordnance on a seaborne target, usually a deactivated ship, which is deliberately sunk using multiple weapon systems.
Gunnery Exercise Surface-to-Surface (Boat) (GUNEX-S-S [Boat])	Small boat crews engage surface targets with small- and medium-caliber weapons.
Maritime Security Operations (MSO)	Helicopter and surface ship crews conduct a suite of Maritime Security Operations (e.g., Vessel Search, Board, and Seizure; Maritime Interdiction Operations; Force Protection; and Anti-Piracy Operation).
Anti-Submarine Warfare (ASW)	
Tracking Exercise – Helicopter (TRACKEX/TORPEX – Helo)	Helicopter crews search, track, and detect submarines. Exercise torpedoes may be used during this event.
Tracking Exercise – Maritime Patrol Aircraft Extended Echo Ranging Sonobuoys	Maritime patrol aircraft crews search, detect and track submarines using explosive source sonobuoys or multistatic active coherent system.
Tracking Exercise – Maritime Patrol Aircraft (TRACKEX/TORPEX – MPA)	Maritime patrol aircraft crews search, detect, and track submarines. Recoverable air launched torpedoes may be employed against submarine targets.
Tracking Exercise – Surface (TRACKEX/TORPEX – Surface)	Surface ship crews search, track, and detect submarines. Exercise torpedoes may be used during this event.
Tracking Exercise – Submarine (TRACKEX/TORPEX – Sub)	Submarine crews search, detect, and track submarines and surface ships. Exercise torpedoes may be used during this event.

Table 2.4-1: Typical Training Activities in the Mariana Islands Training and Testing Study Area (continued)

Activity Name	Activity Description
Major Training Activities	
Joint Expeditionary Exercise	A 10-day at-sea and ashore exercise which brings different branches of the United States (U.S.) military together in a joint environment that includes planning and execution efforts as well as military training activities at sea, in the air, and ashore. More than 8,000 personnel may participate and could include the combined assets of a Carrier Strike Group and Expeditionary Strike Group, Marine Expeditionary Units, Army Infantry Units, and Air Force aircraft.
Joint Multi-Strike Group Exercise	A 10-day at-sea and ashore exercise in which up to three Carrier Strike Groups integrated with U.S. Air Force and U.S. Marine Corps forces would conduct at-sea training and strike warfare exercises simultaneously.
Fleet Strike Group Exercise	A 7-day at-sea and ashore exercise focused on sustainment training and strike warfare for the forward deployed Carrier Strike Group which integrates joint training activities with the U.S. Air Force and U.S. Marine Corps. The exercise focuses on integrated joint training among U.S. military forces in the maritime environment with an ASW threat.
Integrated Anti-Submarine Exercise	A 5-day at-sea exercise with multiple ships, aircraft and submarines integrating the use of their sensors, including sonobuoys, to search, detect, and track threat submarines.
Ship Squadron Anti-Submarine Warfare Exercise	A 5-day at-sea exercise where the overall objective is to sustain and assess surface ship Anti-Submarine Warfare readiness and effectiveness. The exercise typically involves multiple ships, submarines, and aircraft in several coordinated events, maximizing opportunities to collect high-quality data.
Marine Air Ground Task Force Exercise (Amphibious) – Battalion	A 10-day at-sea and shore exercise which conducts over the horizon, ship to objective maneuver for the elements of the Expeditionary Strike Group and the Amphibious Marine Air Ground Task Force. The exercise utilizes all elements of the Marine Air Ground Task Force (Amphibious), conducting training activities ashore with logistic support of the Expeditionary Strike Group and conducting amphibious landings.
Special Purpose Marine Air Ground Task Force Exercise	A 10-day at-sea and ashore exercise similar to Marine Air Ground Task Force (Amphibious) – Battalion, but task organized to conduct a specific mission (e.g., Humanitarian Assistance, Disaster Relief, Non-combatant Evacuation Operations).
Urban Warfare Exercise	A 7- to 21-day ashore exercise for Marine Expeditionary Unit level integrated urban warfare training conducted over a period of weeks. Enhances the skills needed for military training activities in an urban environment.

Note: Training activities that will be categorized as Major Training Exercises Reported (MTER) will be determined during the Marine Mammal Protection Act consultation process.

Table 2.4-1: Typical Training Activities in the Mariana Islands Training and Testing Study Area (continued)

Activity Name	Activity Description
Electronic Warfare (EW)	
Electronic Warfare Operations (EW OPS)	Aircraft, surface ship, and submarine crews attempt to control portions of the electromagnetic spectrum used by enemy systems to degrade or deny the enemy's ability to take defensive actions.
Counter Targeting – Flare Exercise (FLAREX) – Aircraft	Fixed-winged aircraft and helicopters crews defend against an attack by deploying flares to disrupt threat infrared (IR) missile guidance systems.
Counter Targeting Chaff Exercise (CHAFFEX) – Ship	Surface ships defend against an attack by deploying chaff, a radar reflective material, which disrupt threat targeting and missile guidance radars.
Counter Targeting Chaff Exercise (CHAFFEX) – Aircraft	Fixed-winged aircraft and helicopter crews defend against an attack by deploying chaff, a radar reflective material, which disrupt threat targeting and missile guidance radars.
Mine Warfare (MIW)	
Civilian Port Defense	Naval mine warfare activities conducted at various ports and harbors, in support of maritime homeland defense/security.
Mine Laying	Fixed-winged aircraft and vessel crews drop/launch non explosive mine shapes.
Mine Neutralization – Explosive Ordnance Disposal (EOD)	Personnel disable threat mines. Explosive charges may be used.
Limpet Mine Neutralization System/Shock Wave Generator	Navy divers place a small charge on a simulated underwater mine.
Submarine Mine Exercise	Submarine crews practice detecting mines in a designated area.
Airborne Mine Countermeasure (MCM) – Mine Detection	Helicopter aircrews detect mines using towed and laser mine detection systems (e.g., AN/AQS-20, Airborne Laser Mine Detection System).
Mine Countermeasure Exercise – Towed Sonar	Surface ship crews detect and avoid mines while navigating restricted areas or channels using towed active sonar.
Mine Countermeasure Exercise – Surface (SMCMEX)	Mine countermeasure ship crews detect, locate, identify, and avoid mines while navigating restricted areas or channels using active sonar.
Mine Neutralization – Remotely Operated Vehicle Sonar	Helicopter aircrews disable mines using remotely operated underwater vehicles.
Mine Countermeasure (MCM) – Towed Mine Neutralization	Ship crews and helicopter aircrews tow systems (e.g., Organic and Surface Influence Sweep, MK 104/105) through the water that are designed to disable and/or trigger mines.

Table 2.4-1: Typical Training Activities in the Mariana Islands Training and Testing Study Area (continued)

Activity Name	Activity Description
Naval Special Warfare (NSW)	
Personnel Insertion/Extraction	Military personnel train for covert insertion and extraction into target areas using helicopters, fixed-wing aircraft (insertion only), small boats, and submersibles.
Parachute Insertion	Military personnel train for covert insertion into target areas using parachutes.
Embassy Reinforcement	Special Warfare units train to provide reinforcement of an Embassy under hostile conditions.
Direct Action (Combat Close Quarters)	Military personnel train for use of force, breaching doors and obstacles, and in close quarters combat.
Direct Action (Breaching)	Military personnel train for use of force, breaching doors and obstacles, and in close quarters combat.
Direct Action (Tactical Air Control Party [TACP]/Joint Tactical Air Control)	Military personnel train for controlling of combat support aircraft; providing target designation, airspace de-confliction, and terminal control for Close Air Support. Teams also train in use of small arms and mortars.
Underwater Demolition Qualification/Certification	Navy divers conduct training and certification in placing underwater demolition charges.
Intelligence, Surveillance, Reconnaissance (ISR)	Special Warfare units train to collect and report battlefield intelligence.
Urban Warfare Training	Special Warfare units train in mock urban environments.
Underwater Survey	Navy divers train in survey of underwater conditions and features in preparation for insertion, extraction, or intelligence, surveillance and reconnaissance activities.
Other Training Activities	
Surface Ship Sonar Maintenance	In-port and at-sea maintenance of sonar systems.
Submarine Sonar Maintenance	In-port and at-sea maintenance of sonar systems.
Small Boat Attack	Small boats or personal watercraft conduct attack activities on units afloat.
Submarine Navigation	Submarine crews locate underwater objects and ships while transiting out of port.
Search and Rescue at Sea	United States Coast Guard and military personnel train with ships, fixed wing and rotary aircraft to locate and rescue missing personnel and vessels at sea.
Precision Anchoring	Releasing of anchors in designated locations.
Maneuver (Convoy, Land Navigation)	Units conduct field maneuver training or convoy training.

Table 2.4-1: Typical Training Activities in the Mariana Islands Training and Testing Study Area (continued)

Activity Name	Activity Description
Water Purification	Units conduct water purification training using water purification equipment in field conditions.
Field Training Exercise	Units train in securing an area, establishing a camp or post, and guarding and patrolling. Event typically lasts a week or a few days.
Force Protection	Units train in providing defensive force protection against a terror threat.
Anti-terrorism	Units train in conducting direct action against a terror threat.
Seize Airfield	Train Naval Special Warfare, Navy Expeditionary Combat Command or Marine Corps personnel to seize control of an airfield or port for use by friendly forces.
Airfield Expeditionary	Units conduct training establishing, securing, maintaining, or operating an expeditionary airfield.
Unmanned Aerial Vehicle Operation	Units conduct training with unmanned aerial vehicles from airfields or in the battlefield.
Land Demolitions (Improvised Explosive Device Discovery/Disposal)	Explosive Ordnance units conduct training detecting, isolating, or securing Improvised Explosive Devices or unexploded ordnance.
Land Demolitions (Unexploded Ordnance) Discovery/Disposal	Explosive Ordnance units conduct disposal of unexploded ordnance. Training is incidental to the emergency disposal of unexploded ordnance.

2.4.2 PROPOSED TESTING ACTIVITIES

The Navy's research and acquisition community engages in a broad spectrum of testing activities in support of the fleet. These activities include, but are not limited to, basic and applied scientific research and technology development; testing, evaluation, and maintenance of systems (e.g., missiles, radar, and sonar), and platforms (e.g., surface ships, submarines, and aircraft); and acquisition of systems and platforms to support Navy missions and give a technological edge over adversaries.

The individual commands within the research and acquisition community included in this EIS/OEIS are Naval Air Systems Command, Naval Sea Systems Command, the Office of Naval Research, and the Naval Research Laboratory.

The Navy operates in an ever-changing strategic, tactical, and funding and time-constrained environment. Testing activities occur in response to emerging science or fleet operational needs. For example, future Navy experiments to develop a better understanding of ocean currents may be designed based on advancements made by non-government researchers not yet published in the scientific literature. Similarly, future but yet unknown Navy operations within a specific geographic area may require development of modified Navy assets to address local conditions. Such modifications must be tested in the field to ensure they meet fleet needs and requirements. Accordingly, generic descriptions of some of these activities are the best that can be articulated in a long-term, comprehensive document, like this EIS/OEIS.

Some testing activities are similar to training activities conducted by the fleet. For example, both the fleet and the research and acquisition community fire torpedoes. While the firing of a torpedo might look identical to an observer, the difference is in the purpose of the firing. The fleet might fire the torpedo to practice the procedures for such a firing, whereas the research and acquisition community might be assessing a new torpedo guidance technology or to ensure that the torpedo meets performance specifications and operational requirements. These differences may result in different analysis and potential mitigations for the activity.

2.4.2.1 Naval Air Systems Command Testing Activities

Naval Air Systems Command testing activities generally fall in the primary mission areas used by the fleets. Naval Air Systems Command activities include, but are not limited to, the testing of new aircraft platforms, weapons, and systems before those platforms, weapons and systems are delivered to the fleet. In addition to the testing of new platforms, weapons, and systems, Naval Air Systems Command also conducts lot acceptance testing of weapons and systems, such as sonobuoys.

The majority of testing and development activities conducted by Naval Air Systems Command are similar to fleet training activities, and many platforms (e.g., Maritime Patrol Aircraft) and systems (e.g., sonobuoys) currently being tested are already being used by the fleet or will ultimately be integrated into fleet training activities. However, some testing and development may be conducted in different locations and in a different manner than the fleet and therefore, though the potential environmental effects may be the same, the analysis for those activities may differ. Training with systems and platforms delivered to the fleet within the timeframe of this document are analyzed in the training sections of this EIS/OEIS. This section addresses Naval Air Systems Command's testing activities, which will occur in conjunction with fleet training, and are further described in Table 2.4-2.

Table 2.4-2: Typical Naval Air Systems Command Testing Activities in the Study Area

Activity Name	Activity Description
Anti-Surface Warfare (ASUW)	
Air-to-Surface Missile Test	This event is similar to the training event missile exercise (air-to-surface). Test may involve fixed wing aircraft launching missiles at surface maritime targets to evaluate the weapon system or as part of another systems integration test.
Anti-Submarine Warfare (ASW)	
Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (Sonobuoy)	This event is similar to the training event ASW TRACKEX – Maritime Patrol Aircraft. The test evaluates the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements.
Anti-Submarine Warfare Torpedo Test	This event is similar to the training event torpedo exercise. The Test evaluates anti-submarine warfare systems onboard rotary wing and fixed wing aircraft and the ability to search for, detect, classify, localize, track, and attack a submarine or similar target. Some tests from fixed-wing aircraft will involve releasing torpedoes and sonobuoys from high altitudes (approximately 25,000 feet [7,620 meters]).
Broad Area Maritime Surveillance (BAMS) – MQ-4C Triton Testing	The Broad Area Maritime Surveillance system will fill a complementary role to the P-8A aircraft, providing maritime reconnaissance support to the Navy. The current BAMS system in testing and development is called “Triton.” It will be equipped with electro-optical/infrared sensors, can remain on station for 30 hours, and fly at approximately 60,000 feet (18,288 meters).
Electronic Warfare (EW)	
Flare Test	Flare tests evaluate newly developed or enhanced flares, flare dispensing equipment, or modified aircraft systems against flare deployment. Tests may also train pilots and aircrew in the use of newly developed or modified flare deployment systems. Flare tests are often conducted with other test events, and are not typically conducted as standalone tests. Chaff and flares are expended for this test event.

2.4.2.2 Naval Sea Systems Command Testing Activities

Naval Sea Systems Command testing activities (Table 2.4-3) are aligned with its mission of new ship construction, life cycle support, and other weapon system development and testing. Each major category of Naval Sea Systems Command activities applicable to the MITT Study Area is described below.

2.4.2.3 New Ship Construction Activities

Ship construction activities include testing of ship systems, and developmental and operational test and evaluation programs for new technologies and systems. At-sea testing of systems aboard a ship may include sonar, acoustic countermeasures, radars, and radio equipment. At-sea test firing of shipboard weapon systems, including guns, torpedoes, and missiles, are also conducted.

2.4.2.4 Life Cycle Activities

Testing activities are conducted throughout the life of a Navy ship to verify performance and mission capabilities. Sonar systems testing occurs pierside during maintenance, repair, and overhaul availabilities, and at sea immediately following most major overhaul periods. Radar cross signature testing of surface ships is conducted on new vessels and periodically throughout a ship’s life to measure how detectable the ship is to radar. Additionally, electromagnetic measurements of off-board electromagnetic signature are conducted for submarines, ships, and surface crafts periodically.

2.4.2.5 Other Naval Sea Systems Command Testing Activities

Numerous test activities and technical evaluations, in support of Naval Sea Systems Command's systems development mission, often occur in conjunction with fleet activities within the MITT Study Area. Tests within this category include, but are not limited to anti-submarine warfare and mine warfare tests using torpedoes, sonobuoys, and mine detection and neutralization systems. Pierside, swimmer detection systems will also be tested.

Unique Naval Sea Systems Command planned testing includes a kinetic energy weapon for Navy ships, which uses electromagnetic energy to propel a projectile at a surface, air, or ground target.

Table 2.4-3: Typical Naval Sea Systems Command Testing Activities in the Study Area

Activity Name	Activity Description
Life Cycle Activities	
Ship Signature Testing	Tests ship and submarine radars, electromagnetic, or acoustic signatures.
Anti-Surface Warfare (ASUW)/Anti-Submarine Warfare (ASW) Testing	
Kinetic Energy Weapon Testing	A kinetic energy weapon uses stored electromagnetic energy released in a burst to accelerate a projectile. Projectiles used for testing are either non-explosive or in-air explosive munitions.
Torpedo Testing	Air, surface, or submarine crews employ live/exercise torpedoes against submarines or surface vessels.
Countermeasure Testing	Various systems (e.g., towed arrays and defense systems) are employed to detect, localize, and track incoming weapons.
At-sea Sonar Testing	At-sea testing to ensure systems are fully functional in an open ocean environment.
Shipboard Protection Systems and Swimmer Defense Testing	
Pierside Integrated Swimmer Defense	Swimmer defense testing ensures that systems can effectively detect, characterize, verify, and engage swimmer/diver threats in harbor environments.
New Ship Construction	
Anti-Submarine Warfare (ASW) Mission Package Testing	Ships and their supporting platforms (e.g., helicopters, unmanned aerial vehicles) detect, localize, and prosecute submarines.
Mine Countermeasures (MCM) Mission Package Testing	Ships conduct mine countermeasure operations.
Anti-Surface Warfare (ASUW) Mission Package Testing	Ships and their supporting platforms (e.g., helicopters, unmanned aerial vehicles) detect, localize, and prosecute surface vessels.

2.4.2.6 Office of Naval Research and Naval Research Laboratory Testing Activities

As the Navy's Science and Technology provider, Office of Naval Research and the Naval Research Laboratory provide technology solutions for Navy and Marine Corps needs. The Office of Naval Research's missions, defined by law, are to plan, foster, and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power, and the preservation of national security. Further, the Office of Naval Research manages the Navy's basic, applied, and

advanced research to foster transition from science and technology to higher levels of research, development, test and evaluation. The Ocean Battlespace Sensing Department explores science and technology in the areas of oceanographic and meteorological observations, modeling, and prediction in the battlespace environment; submarine detection and classification (anti-submarine warfare); and mine warfare applications for detecting and neutralizing mines in both the ocean and littoral environment. The Office of Naval Research activities include: research, development, test, and evaluation activities; surface processes acoustic communications experiments; shallow water acoustic communications experiments; sediment acoustics experiments; shallow water acoustic propagation experiments; and long range acoustic propagation experiments. Office of Naval Research testing is shown in Table 2.4-4.

Table 2.4-4: Typical Office of Naval Research Testing Activity in the Study Area

Activity Name	Activity Description
Office of Naval Research	
North Pacific Acoustic Lab Philippine Sea 2018–19 Experiment (Deep Water)	The experiment area encompasses international waters. The initial experiment was completed in May of 2011; an acoustic tomography array, a distributed vertical line array (DVLA), and moorings were deployed in the deep-water environment of the northwestern Philippine Sea. The acoustic tomography array and DVLA have remained in situ at the experiment site since that time, collecting oceanographic and acoustic data used to study deep-water propagation and to characterize the temperature and velocity structure in this oceanographically complex and highly dynamic region. In addition, data will be collected during two periods of intensive experimental at-sea operations in May and July of 2018. During fall 2018, data will be collected passively by remotely sensing seagliders. Research vessels, acoustic test sources, side scan sonar, ocean gliders, the existing moored acoustic tomographic array and distributed vertical line array, and other oceanographic data collection equipment will be used to collect information on the ocean environment. The final phases of the experiment will be completed during March through May 2019. The resulting analyses will aid in developing a more complete understanding of deep water sound propagation and the temperature-velocity profile of the water column in this part of the world.

2.5 ALTERNATIVES DEVELOPMENT

The identification, consideration, and analysis of alternatives are important aspects of the NEPA process and contribute to the goal of objective decision-making. The Council on Environmental Quality requires and provides guidance on the development of alternatives. The regulations require the decision maker to consider the environmental effects of the Proposed Action and a range of alternatives (including the No Action Alternative) to the Proposed Action (40 C.F.R. §1502.14). The range of alternatives include reasonable alternatives, which must be rigorously and objectively explored, as well as other alternatives that were considered but eliminated from detailed study. To be reasonable, an alternative must meet the stated purpose of and need for the Proposed Action. An EIS must explore all reasonable mitigation measures for a Proposed Action. Mitigation measures are discussed throughout this EIS/OEIS in connection with affected resources, and are also addressed in Chapter 5 (Standard Operating Procedures, Mitigation, and Monitoring). The purpose of including a No Action Alternative in environmental impact analyses is to ensure that agencies compare the potential impacts of the Proposed Action to the potential impacts of maintaining the status quo.

The Navy developed the alternatives considered in this EIS/OEIS after careful assessment by subject matter experts, including military units and commands that utilize the ranges, military range management professionals, and Navy environmental managers and scientists.

2.5.1 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

Alternatives eliminated from further consideration are described in Sections 2.5.1.1 (Alternative Training and Testing Locations) through 2.5.1.3 (Simulated Training and Testing). The Navy determined that these alternatives did not meet the purpose of and need for the Proposed Action after a thorough consideration of each.

2.5.1.1 Alternative Training and Testing Locations

The Navy's use of training ranges has evolved over the decades because these geographic areas allow the entire spectrum of training and testing to occur. While some unit level training and some testing activities may require only one training element (air space, sea space, or undersea space), more advanced training and testing activities may require a combination of air, surface, and undersea space as well as access to land ranges. The ability to utilize the diverse and multi-dimensional capabilities of each range complex allows the Navy to develop and maintain high levels of readiness. No other locations match the attributes found in the MITT Study Area, which are as follows:

- The MITT Study Area is the only capable and efficient training and testing location within the territory of the United States in the Western Pacific for military services homeported, deployed to, or returning from regions in the Western Pacific and the Indian Ocean.
- The MITT Study Area has the capability to support a large number of forces (multi-national air, land, and sea components), has extensive existing range assets, and accommodates training and testing activity responsibilities both geographically and strategically.
- The Mariana Islands strategic location within the MITT Study Area provides the Pacific Joint Commander an area from which he can launch strategic engagement plans that may include multinational training with allied nations from North America, Australia, and Asia or training U.S. forces for contingency response[3] to a humanitarian or geo-political crisis. Multi-national training not only provides a well-trained force, but also furthers international cooperation.
- The MITT Study Area presents a realistic environment for strike warfare training, contingency operations training including amphibious training activities, and anti-submarine warfare. Training may be conducted in the open ocean, close to land masses, and in unobstructed airspace so that battle situations may be realistically simulated. There is room and space to operate within proximity of land but at safe distances from other simultaneous training. This allows both training of locally based units and the necessary build-up of capability through training that culminates in multi-force training in waters offshore of Guam and CNMI. The premier capability of the MITT Study Area is the combination of large ocean and airspace to support subsurface, surface, and airspace warfare training combined with land-based ranges.

[3] A contingency response is a rapid response to an event that is a possibility that must be prepared for (i.e., a future emergency). The response ensures a smooth transition to subsequent operations.

One of the DoD's highest priorities is maintaining the readiness and sustainability of U.S. forces. Readiness is the overall ability of forces to arrive on time where needed, and be sufficiently trained, equipped, and supported to effectively carry out assigned missions. Forces must be placed and maintained such that they can be utilized in a timely fashion. A timely response is directly related to the amount of time required to reach the destination, and dependent on distance traveled. The distance from the potential threat can vary based on unit type and need, as well as mode of transport. Traditionally, forces were deployed in a slow steady buildup over time. Now, however, crises manifest quickly in a variety of locations. Forces must be placed and maintained such that they can provide a rapid and timely response. Therefore, it is imperative to locate forces so that the amount of time required to reach a crisis location is kept to a minimum. Deployed forces that use the MITT Study Area have reduced response times compared to forces positioned in Alaska, Hawaii, or California.

The greatest flexibility for the U.S. military to train is on ranges located in the United States and its territories. Guam and the CNMI are composed of territory belonging to the United States, and thus afford the greatest flexibility and the fewest restrictions from a government-to-government standpoint.

For the above reasons, it is not reasonable, practicable, nor appropriate to seek alternative locations for training conducted in the MITT Study Area. This alternative, therefore, has been eliminated from further consideration in the EIS/OEIS.

2.5.1.2 Reduced Training and Testing

Title 10 Section 5062 of the U.S. Code provides: "The Navy shall be organized, trained, and equipped primarily for prompt and sustained combat incident to operations at sea." Reduction or cessation of training and testing would prevent the Navy from meeting its Title 10 requirements and adequately preparing naval forces for operations at sea ranging from disaster relief to armed conflict; thus, this alternative does not meet the purpose and need of the proposal.

2.5.1.3 Mitigations Including Temporal or Geographic Constraints within the Study Area

Alternatives considered under the NEPA process may include mitigation measures. While alternatives including mitigation measures may be considered under the NEPA process, to do so is predicated on the ability to develop appropriate mitigation measures before conducting a detailed analysis and engaging in necessary consultations with regulators. Analysis of military training and testing activities involves compliance with several federal laws including the MMPA and the ESA. These laws require that the Navy complete complex and lengthy permitting processes, which include applying the best available science to analyze the effects of the actions and develop mitigations as required. The best available science is reviewed and identified during the course of the permitting and NEPA/EO 12114 processes. Consequently, in order to allow for potential mitigation measures to be more fully developed as part of the detailed NEPA/EO 12114 analysis and further refined and informed by applicable permitting processes, the Navy did not identify and carry forward for analysis any separate alternatives with pre-determined geographic or temporal restrictions. Rather, Chapter 5 (Standard Operating Procedures, Mitigation, and Monitoring) of this EIS/OEIS contains a detailed discussion of potential mitigation measures that were evaluated. Based on the analysis in Chapter 5, the MMPA and the ESA permitting processes, and other required regulatory consultations, practical science-based mitigation measures, including temporal or geographic constraints within the Study Area, may be implemented under either action alternative as well as the No Action Alternative.

2.5.1.4 Simulated Training and Testing

The Navy currently uses computer simulation for training and testing whenever possible (e.g., command and control exercises are conducted without operational forces); however, there are significant limitations and its use cannot completely substitute for live training or testing. Therefore, simulation as an alternative that replaces training and testing in the field does not meet the purpose of and need for the Proposed Action and has been eliminated from detailed study.

2.5.1.4.1 Simulated Training

The Navy continues to research new ways to provide realistic training through simulation, but there are limits to the realism that technology can presently provide. Unlike live training, computer-based training does not provide the requisite level of realism necessary to attain combat readiness. Simulation cannot replicate the inherent high-stress environment and complexity of the coordination needed to combine multiple military assets and personnel into a single fighting unit. Most notably, simulation cannot mimic dynamic environments involving numerous forces or accurately model the behavior of sound in complex training media such as the marine environment.

Today's simulation technology does not permit anti-submarine warfare training with the degree of fidelity required to maintain proficiency. While simulators are used for the basic training of sonar technicians, they are of limited utility beyond basic training. A simulator cannot match the dynamic nature of the environment, such as bathymetry and sound propagation properties, or the training activities involving several units with multiple crews interacting in a variety of acoustic environments. Moreover, it is imperative that crews achieve competence and gain confidence in their ability to use their equipment.

Sonar operators must train regularly and frequently to develop and maintain the skills necessary to master the process of identifying underwater threats in the complex subsurface environment. Sole reliance on simulation would deny service members the ability to develop battle-ready proficiency in the employment of active sonar in the following specific areas:

- Bottom bounce and other environmental conditions. Sound hitting the ocean floor (bottom bounce) reacts differently depending on the bottom type and depth. Likewise, sound passing through changing currents, eddies, or across changes in ocean temperature, pressure, or salinity is also affected. Both of these are extremely complex to simulate, and both are common in actual sonar operations.
- Mutual sonar interference. When multiple sonar sources are operating in the vicinity of each other, interference due to similarities in frequency can occur. Again, this is a complex variable that must be recognized by sonar operators, but is difficult to simulate with any degree of fidelity.
- Interplay between ship and submarine target. Ship crews, from the sonar operator to the ship's Captain, must react to the changing tactical situation with a real, thinking adversary (a Navy submarine for training purposes). Training in actual conditions with actual submarine targets provides a challenge that cannot be duplicated through simulation.
- Interplay between anti-submarine warfare teams in the strike group. Similar to the interplay required between ships and submarine targets, a ship's crew must react to all changes in the tactical situation, including changes from cooperating ships, submarines, and aircraft.

Computer simulation can provide familiarity and complement live training; however, it cannot provide the fidelity and level of training necessary to prepare naval forces for deployment. Therefore, the

alternative of substituting simulation for live training fails to meet the purpose of and need for the Proposed Action and was eliminated from detailed study.

2.5.1.4.2 Simulated Testing

As described in Section 1.4.3 (Why the Navy Tests), the Navy conducts testing activities to collect scientific data; investigate, develop, and evaluate new technologies; and to support the acquisition and life cycle management of platforms and systems used by the warfighters. Throughout the life cycle of platforms and systems, from performing basic research to procurement of the platform or system, the Navy uses a number of different testing methods, including computer simulation, when appropriate. The Navy cannot use or rely exclusively on simulation when performing a number of specific testing activities, including collection of scientific data; verifying contractual requirements; and assessing performance criteria, specifications, and operational capabilities.

The Navy collects scientific data that can only be obtained from direct measurements of the marine environment to support scientific research associated with the development of new platforms and systems. A full understanding of how waves in the ocean move, for example, can only be fully understood by collecting information on waves. This type of direct scientific observation and measurement of the environment is vital to developing simulation capabilities by faithfully replicating environmental conditions.

As the acquisition authority for the Navy, the Systems Commands are responsible for administering large contracts for the Navy's procurement of platforms and systems. These contracts include performance criteria and specifications that must be verified to assure that the Navy accepts platforms and systems that support the warfighter's needs. Although simulation is a key component in platform and systems development, it does not adequately provide information on how a system will perform or whether it will be able to meet performance and other specification requirements because of the complexity of the technologies in development and the marine environments in which they will operate. For this reason, at some point in the development process, platforms and systems must undergo at-sea or in-flight testing. For example, a new jet airplane design can be tested in a wind tunnel that simulates flight to assess elements like maneuverability, but eventually a prototype must be constructed and flown to confirm the wind tunnel data.

Furthermore, the Navy is required by law to operationally test major platforms, systems, and components of these platforms and systems in realistic combat conditions before full-scale production can occur. Under Title 10 of the U.S. Code, this operational testing cannot be based exclusively on computer modeling or simulation. At-sea testing provides the critical information on operability and support liability needed by the Navy to make decisions on the procurement of platforms and systems, ensuring that what is purchased performs as expected and that tax dollars are not wasted. This testing requirement is also critical to protecting the warfighters who depend on these technologies to execute their mission with minimal risk to themselves.

This alternative—substitution of simulation for live testing—fails to meet the purpose of and need for the Proposed Action and was therefore eliminated from detailed study.

2.5.2 ALTERNATIVES CARRIED FORWARD

Three alternatives are analyzed in this EIS/OEIS.

- **No Action Alternative:** Baseline training and testing activities, as well as airspace and seaspace reconfigurations, as defined by existing environmental planning documents including the 2010 MIRC EIS/OEIS, the 2011 Office of Naval Research *Acoustic Impact Analysis for the North Pacific Acoustic Laboratory Philippine Sea 2010 through 2011 Experiment* (U.S. Department of the Navy 2011), and the 2013 MIRC Airspace EA/OEA. The baseline training and testing activities include those testing events that have historically occurred in the Study Area and have been subject to previous analyses pursuant to NEPA/EO 12114.
- **Alternative 1 (Preferred Alternative):** Overall expansion of the Study Area, adjustment of range capabilities, location, type, and level of activities from the baseline as necessary to support current and planned training and testing requirements. This Alternative considers:
    - Analysis of areas where training and testing would continue as in the past, but were not considered in previous environmental analyses. This Alternative would not expand the area where the Navy trains and tests, but would simply expand the area that is to be analyzed.
    - Mission requirements associated with force structure changes, including those resulting from the development, testing, and ultimate introduction of new platforms (vessels and aircraft) and weapon systems into the fleet.
- **Alternative 2:** Consists of Alternative 1 plus adjustments to the type and levels of training and testing.

Each of the alternatives are discussed in further detail in Sections 2.6 (No Action Alternative), 2.7 (Alternative 1 [Preferred Alternative]), and 2.8 (Alternative 2).

2.6 NO ACTION ALTERNATIVE: CURRENT MILITARY READINESS WITHIN THE MARIANA ISLANDS TRAINING AND TESTING STUDY AREA

The Council on Environmental Quality regulations requires that a range of alternatives to the Proposed Action, including a No Action Alternative, be developed for analysis. The No Action Alternative serves as a baseline description from which to compare the potential impacts of the Proposed Action. The Council on Environmental Quality provides two interpretations of the No Action Alternative, depending on the Proposed Action. One interpretation would mean the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of taking the Proposed Action. For example, this interpretation would be used if the Proposed Action was the construction of a facility in a location where no facility has or currently exists. The second interpretation, which applies to this EIS/OEIS, allows the No Action Alternative to be thought of in terms of continuing with the present course of action until that action is changed. The No Action Alternative for this EIS/OEIS would continue currently conducted training and testing activities (baseline activities) and force structure requirements as defined by existing Navy environmental planning documents described in Section 2.5.2 (Alternatives Carried Forward).

The No Action Alternative represents the MITT Study Area training and testing activities and events as set forth in previously completed Navy environmental planning documents and Record of Decisions. However, the No Action Alternative would fail to meet the purpose of and need for the Proposed Action because it would not allow the Navy to meet current and future training and testing requirements necessary to achieve and maintain fleet readiness.

For example, the baseline activities do not account for changes in force structure (personnel, weapons, and assets) requirements, the introduction of new or upgraded weapons and platforms, and the training and testing required for proficiency with these systems.

Tables 2.8-1 to 2.8-4 provide a summary of the training and testing activities to be analyzed under the No Action Alternative, Alternative 1, and Alternative 2. Cells under the "Ordnance" column are shaded gray if that activity includes the use of explosive ordnance.

2.7 ALTERNATIVE 1 (PREFERRED ALTERNATIVE): EXPANSION OF STUDY AREA PLUS ADJUSTMENTS TO THE BASELINE AND ADDITIONAL WEAPONS, PLATFORMS, AND SYSTEMS

Alternative 1 would consist of the No Action Alternative, plus the expansion of Study Area boundaries, and adjustments to range capabilities and the location, type, and tempo of training and testing activities, which includes the addition of platforms and systems.

- **Expansion of the Overall Study Area Boundaries:** This EIS/OEIS contains analysis of areas where training and testing would continue as in the past, but were not considered in previous environmental analyses. This Alternative would simply expand the area that is to be analyzed, as depicted in Figure 2.1-1 and described in Section 2.1 (Description of the Mariana Islands Training and Testing Study Area), including:
    - **Expansion of the Northern and Western Boundary of the Study Area:** The area to the north of MIRC that is within the Exclusive Economic Zone of the Northern Mariana Islands and the areas to the west of the MIRC.
    - **Transit Corridor:** An area not previously analyzed in the open ocean between the MIRC and the HRC. During transit within this area, U.S. Navy ships conduct limited training and testing. These activities would be included in this EIS/OEIS.
    - **Navy Piers and Shipyards:** The Navy tests sonar systems at Navy piers and shipyards. These maintenance testing activities would be included in this EIS/OEIS.
    - **Apra Harbor Channel:** Vessels berthed at Naval Base Guam transit Apra Harbor to and from the naval base. During these transits, some sonar maintenance testing would occur.
- **Adjustments to Range Capabilities, Locations, and Tempo of Training and Testing Activities.** This alternative also includes changes to training and testing requirements necessary to accommodate (a) the relocation of ships, aircraft, and personnel; (b) planned aircraft, vessels, and weapons systems; and (c) ongoing activities not addressed in previous documentation in the MITT Study Area.
    - **Force Structure Changes:** Force structure changes involve the relocation of ships, aircraft, and personnel. As forces are moved within the existing Navy structure, training needs will necessarily change as the location of forces change.
    - **Planned Aircraft, Vessels, and Weapons Systems:** This EIS/OEIS will examine the training and testing requirements of planned vessels, aircraft, and weapon systems.
    - **Ongoing Activities:** Current training and testing activities not addressed in previous documentation will be analyzed in this EIS/OEIS.
    - **Danger Zones:** This EIS/OEIS will examine establishment of Title 33 C.F.R. Part 334 Danger Zones for existing shore-based small arms and explosive ordnance disposal ranges and a nearshore small arms training area. Figure 2.7-1 shows the current, proposed, and pending nearshore danger zones around Guam and FDM. Table 2.7-1,

Nearshore Training and Testing Danger Zones, describes the current, proposed, and pending nearshore danger zones status.

- **Underwater Detonations:** An increase in NEW for underwater detonations from 10 lb. to 20 lb. at the Agat Bay Mine Neutralization Site.

Alternative 1 reflects adjustments to the baseline activities which are necessary to support all current and proposed training and testing activities in the MITT Study Area. Locations identified within Table 2.8-1 through 2.8-4 represent the areas where events are typically conducted. Generally, the range complex is identified but, for some activities, smaller areas within the range are identified. Events could occur outside of the specifically identified areas if environmental conditions are not favorable on a range, the range is unavailable due to other units training or testing or it poses a risk to civilian or commercial users, or to meet fleet readiness requirements.

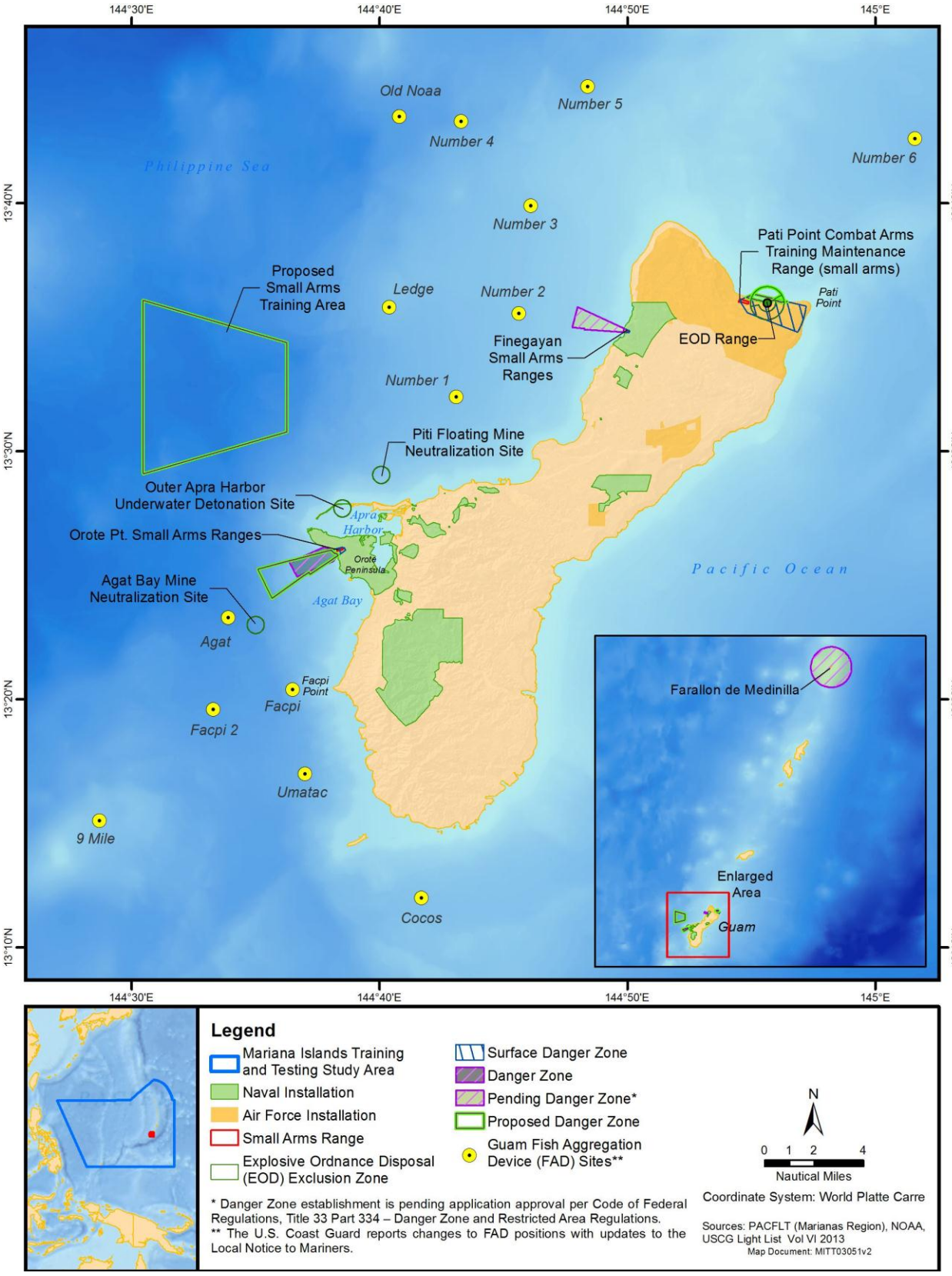

Figure 2.7-1: Nearshore Training and Testing Danger Zones, Surface Danger Zones, and Exclusion Zones

Table 2.7-1: Nearshore Training and Testing Danger Zones

Nearshore Training and Testing Zones (Current, Proposed, and Pending)	Description	Danger Zone Establishment Status (Current, Proposed, or Pending)
Danger Zone – Pacific Ocean around Farallon de Medinilla (FDM) Live Fire and Inert Gunnery, Missile, and Bombing Range	Extends around FDM with a 12-nautical-mile (nm) radius, congruent with the outer edge of Restricted Area 7201A.	Analyzed as part of the 2010 Mariana Islands Range Complex (MIRC) Environmental Impact Statement (EIS)/Overseas EIS (OEIS) and the 2013 MIRC Airspace Environmental Assessment (EA)/Overseas EA. Formal establishment is pending U.S. Army Corps of Engineers (USACOE) rule making.
Danger Zone – Pacific Ocean off Orote Point, Apra Harbor, Island of Guam, Marianas Islands; small arms firing range.	Used for Small Arms Training. Down range Surface Danger Zone extends out over the nearshore waters of Guam off Orote Point. (1) The Danger Zone shall be closed to the public and shipping on specific dates to be designated for actual firing, and no person, vessel, or other craft shall enter or remain in the Danger Zone designated for firing except as may be authorized by the enforcing agency. Notification to maritime interests of specific dates of firing will be disseminated by the enforcing agency. On dates not specified for firing, the Danger Zone shall be open to normal maritime traffic. (2) The regulations in this section shall be enforced by the Commanding Officer, U.S. Naval Station, Guam, Marianas Islands, and such agencies as he may designate.	Rule established in 33 C.F.R Part 334.1420. First established in year 1963, and amended in years 1985 and 1997. Shown on National Oceanic and Atmospheric Administration (NOAA) Chart 81048, Guam. Proposed Danger Zone modification under Mariana Islands Training and Testing (MITT) EIS/OEIS Alternative 1 (Preferred Action) to support the modification of existing Title 33 C.F.R. Part 334 Danger Zone.
Danger Zone – Finegayan Small Arms Range	Used for small arms training. Down range Surface Danger Zone extends out over the nearshore waters of Guam off Haputo Point and overlays part of the “Small Arms Safety Drop Zone” shown on NOAA Chart 81048, Guam.	2010 MIRC EIS/OEIS used to support the establishment of this Title 33 C.F.R. Part 334 Danger Zone. Formal establishment is pending USACOE rule making.
Danger Zone – Pati Point Combat Arms Training Maintenance Small Arms Range	Used for small arms training. Down range Surface Danger Zone extends out over the nearshore waters of Guam off Pati Point.	Proposed under Mariana Islands Training and Testing (MITT) EIS/OEIS Alternative 1 (Preferred Action) to support the establishment of a Title 33 C.F.R. Part 334 Danger Zone.
Danger Zone – Small Arms Training Area	An area used by surface vessel crews to conduct small arms training. This firing area is over water west of Guam.	Proposed under MITT EIS/OEIS Alternative 1 (Preferred Action). MITT analysis will be used to support the establishment of a Title 33 C.F.R. Part 334 Danger Zone.

Table 2.7-1: Nearshore Training and Testing Danger Zones (continued)

Nearshore Training and Testing Zones (Current, Proposed, and Pending)	Description	Danger Zone Establishment Status (Current, Proposed, or Pending)
Exclusion Zone – Agat Bay Mine Neutralization Site	Used by divers training to conduct underwater detonations. The Exclusion Zone has a minimum 640-meter (m) radius and is located beyond 3 nm of Guam and within territorial waters.	No C.F.R. Danger Zone or Safety Zone rule established, pending, or proposed under the MITT EIS/OEIS. Temporary Safety Zones are established by the Coast Guard as required, and announced in Local Notice to Mariners and Broadcast Notice to Mariners.
Exclusion Zone – Piti Point Mine Neutralization Site	Used by divers training to conduct underwater detonations. The Exclusion Zone has a minimum 640 m radius and is located within 3 nm of Guam.	No C.F.R. Danger Zone or Safety Zone rule established, pending, or proposed under the MITT EIS/OEIS. Temporary Safety Zones are established by the Coast Guard as required, and announced in Local Notice to Mariners and Broadcast Notice to Mariners.
Exclusion Zone – Apra Harbor UNDET Site	Used by divers training to conduct underwater detonations. The Exclusion Zone has a minimum 640 m radius over water, and is located within Apra Harbor. The Glass Breakwater forms the northern edge of Exclusion Zone.	No C.F.R. Danger Zone or Safety Zone rule established, pending, or proposed under the MITT EIS/OEIS. Temporary Safety Zones are established by the Coast Guard as required, and announced in Local Notice to Mariners and Broadcast Notice to Mariners.
Exclusion Zone – Pati Point Explosive Ordnance Disposal Range	Land site used by the Air Force to dispose of ordnance. The Exclusion Zone extends partially out over the nearshore waters of Guam off Pati Point.	No C.F.R. Danger Zone or Safety Zone rule currently established. Proposed under MITT EIS/OEIS Alternative 1 (Preferred Action). MITT analysis will be used to support the establishment of a Title 33 C.F.R. Part 334 Danger Zone.

2.7.1 PROPOSED ADJUSTMENTS TO BASELINE TRAINING ACTIVITIES

The proposed adjustments to baseline levels and types of training, as well the introduction of new activities, are categorized below by primary mission areas. Table 2.8-1 (Baseline and Proposed Training Activities) lists the proposed adjustments.

2.7.1.1 Anti-Air Warfare

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.

- Utilize new weapons in the conduct of anti-air warfare, such as the 57 mm (2.24 in.) (large-caliber) gun system and rolling airframe missile system installed on the Littoral Combat Ship.
- Proposed new anti-air warfare training activities: Air Defense Exercise, Gunnery Exercise Surface-to-Air – Large-caliber, and Gunnery Exercise Surface-to-Air – Medium-caliber.

2.7.1.2 Strike Warfare

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.
- Utilize new weapons during strike warfare events, such as the use of precision-guided rockets.

2.7.1.3 Amphibious Warfare

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.
- Proposed new amphibious warfare training activities: Amphibious Rehearsal (No Landing), and Unmanned Aerial Vehicle (Intelligence, Surveillance, and Reconnaissance).

2.7.1.4 Anti-Surface Warfare

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.
- Utilize new weapons during anti-surface warfare events, such as the 57 mm (2.24 in.) turret mounted gun on the Littoral Combat Ship, the upgraded 20 mm (0.79 in.) close-in weapon system which allows for its use in defending against surface craft, the 30 mm (1.18 in.) gun, and new precision-guided missiles/rockets currently under development.
- Proposed new anti-surface warfare training activities: Missile Exercise (Air-to-Surface) – Rocket, Torpedo Exercise (Submarine-to-Surface), Missile Exercise (Surface-to-Surface), and Gunnery Exercise – Boat (Medium-Caliber).

2.7.1.5 Anti-Submarine Warfare

- Support anti-submarine warfare requirement by adjusting number of events conducted and the amount of acoustic sensors used during those activities.
- Account for the introduction of planned anti-submarine warfare sensors being made available.

2.7.1.6 Electronic Warfare

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.
- Account for the introduction and operation of planned threat emitters such as the Joint Threat Emitter.

2.7.1.7 Mine Warfare

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.
- An increase in net explosive weight for underwater mine neutralization detonations from 10 lb. to 20 lb. at Agat Mine Neutralization Site.
- Employ new mine countermeasure systems in the Marianas in support of all other mine warfare training, such as the AQS-20 and AQS-24 towed sonar systems, the Airborne Laser Mine

Detection System, hull-mounted sonar such as the SQQ-32 and SLQ-48 system, and the ASQ-235 Airborne Mine Neutralization System.
- Propose new training activities: Civilian Port Defense, Limpet Mine Neutralization System/Shock Wave Generator, Submarine Mine Exercise, Airborne Mine Countermeasure – Mine Detection, Mine Countermeasure Exercise – Surface Sonar, Mine Neutralization – Remotely Operated Vehicle Sonar, and Mine Countermeasure – Towed Mine Detection.

2.7.1.8 Naval Special Warfare

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.
- An increase in net explosive weight for underwater detonations from 10 lb. to 20 lb. at Agat Mine Neutralization Site.

2.7.1.9 Other Training

- Support requirements by increasing number of events, and the amount of ordnance used for training requirements.
- Proposed new training activities: Surface Ship Sonar Maintenance, Submarine Sonar Maintenance, Small Boat Attack, Submarine Navigation, Search and Rescue at Sea, Precision Anchoring, Water Purification, and Unmanned Aerial Vehicle Operation.

2.7.2 PROPOSED ADJUSTMENTS TO BASELINE TESTING ACTIVITIES

The proposed adjustments to baseline levels and types of testing are listed in Table 2.8-2 (Baseline and Proposed Naval Air Systems Command Testing Activities), Table 2.8-3 (Baseline and Proposed Naval Sea Systems Command Testing Activities), Table 2.8-4 (Baseline and Proposed Office of Naval Research Testing Activities), and include the following:

2.7.2.1 Anti-Surface/Anti-Submarine Warfare Testing

Proposed new test events:

- Air-to-Surface Missile Testing.
- Kinetic Energy Weapon Testing, conducted on vessels at-sea (e.g., on Destroyer [DDG] 1000 vessels).
- At-Sea Sonar Testing (ship and submarine sonar testing).
- Tracking Testing (sonobuoys), Maritime Patrol Aircraft.
- Torpedo Testing (ship, air, and submarine launched torpedoes).
- Countermeasure Testing.
- MQ-4C Triton, Broad Area Maritime Surveillance System Testing.

2.7.2.2 Electronic Warfare

Proposed new test event, Flare Test using fixed-wing aircraft.

2.7.2.3 Life Cycle Activities

Proposed new test event, Ship Signature Testing.

2.7.2.4 Shipboard Protection Systems and Swimmer Defense Testing

Proposed new test event, Pierside Integrated Swimmer Defense Testing.

2.7.2.5 New Ship Construction

Proposed new test events:

- Anti-surface warfare mission package testing.
- Anti-submarine warfare mission package testing.
- Mine countermeasure mission package testing.

2.7.2.6 Office of Naval Research

There is no change to the type and level of baseline activity; however, the overall expansion of the Study Area includes ocean area that supports Office of Naval Research acoustic experiments.

2.7.3 PROPOSED PLATFORMS AND SYSTEMS

The following is a representative list of additional platforms, weapons and systems analyzed. The ships and aircraft will not be an addition to the fleet but rather replace older ships and aircraft that are decommissioned and removed from the inventory. Information regarding Navy platforms and systems can be found on the Navy Fact File website: http://www.navy.mil/navydata/fact.asp.

2.7.3.1 Aircraft

F-35 Joint Strike Fighter

The F-35 Joint Strike Fighter Lightning II aircraft will complement the Navy's F/A-18E/F. The F-35 is projected to make up about one-third of the Navy's strike fighter inventory by 2020. The Marine Corps will have a variant of the F-35 with a short takeoff, vertical landing capability that is planned to replace the AV-8B and F/A-18C/D aircraft. The Air Force F-35A is a conventional take-off and landing variant that could be introduced between 2015 and 2020. The Navy variant for aircraft carrier use is scheduled for delivery in 2015; the Marine Corps variant reached initial operating capability in 2012. The F-35 will operate similarly to the aircraft it replaces or complements. It will operate in the same areas and will be used in the same training exercises such as air-to-surface and air-to-air missile exercises, bombing exercises, and any other exercises where fixed-wing aircraft are used in training. No new activities will result from the introduction of the F-35.

EA-18G Airborne Electronic Attack Aircraft

The EA-18G is replacing the aging fleet of EA-6Bs providing a capability to detect, identify, locate, and suppress hostile emitters. It will operate similarly to the EA-6B, and in the same training areas, but will provide greater speed and altitude capabilities. No new activities will result from the introduction of the EA-18G.

E-2D Airborne Early Warning

The E-2D Advanced Hawkeye is the carrier-based Airborne Early Warning aircraft follow on variant of the E-2C Hawkeye. The E-2D will operate similarly to the E-2C, in the same training areas, with an increased on-station time as the new aircraft will include an in-flight refueling capability. Fleet integration is expected in 2015. No new activities will result from the introduction of the E-2D.

2.7.3.2 Ships

CVN-21 Aircraft Carrier (Gerald R. Ford Class)

The CVN-21 Program is designing the replacement for the Nimitz class carriers. The new aircraft carriers' capabilities will be similar to those of the carriers they will replace, and it will train in the same training and testing areas as the predecessor aircraft carriers. The first aircraft carrier (CVN 78) is expected to be delivered in 2015. No new activities will result from the introduction of the CVN 21 class of aircraft carriers.

DDG 1000 Multi-Mission Destroyer (Zumwalt Class)

Developed under the DD(X) destroyer program, Zumwalt (DDG 1000) is the lead ship of a class of next-generation multi-mission destroyers tailored for land attack and littoral dominance. DDG 1000 will operate similarly to the existing Arleigh Burke class of destroyers; however, it will provide greater capability in the nearshore sea space and will train more in that environment. Its onboard weapons and systems will include a 155 mm advanced gun system to replace the 5 in. gun system on current destroyers. This gun system will fire a new projectile at greater distances. See Section 2.7.3.6 (Munitions) for a description of the Long Range Land Attack Projectile.

The DDG 1000 will also be equipped with two new sonar systems; the AN/SQS-60 hull-mounted mid-frequency sonar, and the AN/SQS-61 hull-mounted high-frequency sonar.

The first ship of this class is expected to be delivered in 2016. This class will join the fleets and conduct training alongside existing DDG classes of ships.

Littoral Combat Ship

The Littoral Combat Ship is a fast, agile, mission-focused platform designed for operation in nearshore environments yet capable of open-ocean operation. These ships are capable of speeds in excess of 40 knots. As a focused-mission ship, the Littoral Combat Ship is equipped to perform one primary mission at any given time; however, the mission orientation can be changed by changing out its mission packages. Mission packages are supported by special detachments that will deploy manned and unmanned vehicles and sensors in support of mine, undersea and surface warfare missions. The first Littoral Combat Ships were delivered to the fleet in 2008 and 2010.

Joint High Speed Vessel

The Joint High Speed Vessel is capable of transporting personnel, equipment, and supplies 1,200 nm at an average speed of 35 knots. It is able to transport company-sized units with their vehicles, or reconfigure to become a troop transport for an infantry battalion. The Joint High Speed Vessel, while performing a variety of lift and support missions, is a non-combatant vessel that operates in permissive environments or in higher threat environments under the protection of combatant vessels and other joint forces. The first new vessel of the Spearhead class (JHSV-1) was delivered in 2012.

Amphibious Combat Vehicle

The Marine Corps is developing a vehicle to replace the Amphibious Assault Vehicle. The Amphibious Combat Vehicle will be the expected replacement, which the Marine Corps hopes to introduce to the

Fleet Marine Force by 2020. The Amphibious Combat Vehicle will have the capability of transporting Marines from naval ships located beyond the horizon to shore and further inland.

MK VI Patrol Craft

The MK VI Patrol Craft is 85 ft. (25.9 m) long, propulsion is provided by twin diesels and waterjets, capable of speeds up 30 knots, and a 600 nm range. Its mission is coastal and riverine patrol, and maritime security. It can be mounted with a 25 mm cannon on the bow. Initial craft delivery is expected in 2014 to the Naval Expeditionary Combat Command, followed by an initial four or five craft. Up to 48 craft may eventually be built, and replace the current 68 ft. (20.7 m) MK IV and 34 ft. (10.4 m) Sea Ark patrol craft.

2.7.3.3 Unmanned Vehicles and Systems

2.7.3.3.1 Unmanned Undersea Vehicle

In addition to unmanned undersea vehicles that are currently in service, new ones will be developed and enter fleet service that will support several high-priority missions including: (1) intelligence, surveillance, and reconnaissance; (2) mine countermeasures; (3) anti-submarine warfare; (4) oceanography; (5) communication/navigation network nodes; (6) payload delivery; (7) information operations; and (8) time critical strike.

Sea Maverick Unmanned Undersea Vehicle

Sea Maverick is a fully autonomous underwater vehicle specifically designed to minimize impacts to the environment. It uses no active sonar, and has an advanced propeller system that is encased to prevent damage to sea beds and other marine life.

2.7.3.3.2 Unmanned Surface Vehicle

Unmanned surface vehicles are primarily autonomous systems designed to augment current and future platforms to help deter maritime threats. They will employ a variety of sensors designed to extend the reach of manned ships.

Spartan Unmanned Surface Vehicle

The Spartan is an unmanned surface vehicle with a dipping sonar system. It will train in areas where current sonar training is conducted on Navy ranges.

Sea Horse Unmanned Surface Vehicle

The Sea Horse is an unmanned surface vehicle designed to provide force protection capabilities in harbors and bays.

2.7.3.3.3 Unmanned Aerial Systems

Unmanned aerial systems include aerial vehicles that operate as intelligence, search, and reconnaissance sensors or as armed combat air systems.

MQ-8B Fire Scout

The Fire Scout Vertical Take-Off and Landing Tactical Aerial Vehicle system is designed to operate from air-capable ships with initial deployment on a Guided Missile Frigate, followed by final integration and

test on board the Littoral Combat Ship. This unmanned aerial vehicle system is capable of providing radio voice communications relay and has a baseline payload that includes electro-optical/infrared sensors and a laser designator that enables the system to find tactical targets, track and designate targets, accurately provide targeting data to strike platforms, and perform battle damage assessment. There is current testing to place a weapons system on the Fire Scout.

MQ-4C Triton

The MQ-4C Triton is a Broad Area Maritime Surveillance unmanned aerial system in testing and development as a complementary system to the P-8A aircraft, providing maritime reconnaissance support to the Navy. It will be equipped with electro-optical/infrared sensors, can remain on station for 30 hours, and fly at approximately 60,000 ft. (18,288 m).

2.7.3.4 Missiles/Rockets/Bombs

Joint Air-to-Ground Missile

The joint air-to-ground missile is a possible replacement or upgrade to existing air-to-ground weapons currently in use. In addition to having a longer operating range than existing weapons, the joint air-to-ground missile could include a multi-mode seeker, with a combination of semi-active laser, passive infrared, and radar. The MH-60 helicopter and F/A-18 jet are Navy aircraft platforms from which this new missile would be fired.

AGM-154 Joint Standoff Weapon

The Joint Standoff Weapon is a missile able to be launched at increased standoff distances, using global positioning system and inertial navigation for guidance. All Joint Standoff Weapon variants share a common body but can be configured for use against area targets or bunker penetration. This would be integrated into strike warfare exercises as well as exercises where the use of this type of missile is required.

MK-54 Vertical Launch Anti-Submarine Rocket Missile

The Navy has designated the MK-54 torpedo to replace the MK-46 torpedo for rapid employment by surface ships. The missile is a rocket-propelled, three-stage weapon that is deployed on ships equipped with the MK-41 Vertical Launching System. Once entering the water, the MK-54 torpedo will operate similarly to the MK-46 that it replaces.

MK-54 Torpedo, High Altitude Anti-Submarine Warfare Capability

The high-altitude anti-submarine warfare capability is a low-cost, self-contained air launch accessory kit that enables the MK-54 torpedo to be launched from a fixed-wing aircraft operating at high altitude. The torpedo then glides to its normal launch altitude close to the surface, and jettisons the air launch accessory kit prior to water entry at a pre-determined location. Once in the water, the MK-54 torpedo will operate similarly to the MK-46 that it replaces.

Guided Rocket Systems

Guided rocket systems include the low cost guided imaging rocket (a guided infrared 2.75 in. [7 cm] rocket system) and the advanced precision kill weapon system (a laser-guided 2.75 in. [7 cm] rocket). The MH-60 helicopter is one platform expected to be equipped with these rockets.

2.7.3.5 Guns

Kinetic Energy Weapon

An electromagnetic kinetic energy weapon (e.g., rail gun) uses electrical energy to accelerate projectiles to supersonic velocities. This weapon will be operated from ships, firing at floating or in-air targets at sea. Kinetic energy weapons do not require powders or explosives to fire the round and could have ranges as great as 300 mi. (483 km).

2.7.3.6 Munitions

Long Range Land Attack Projectile

The Long Range Land Attack Projectile is part of a family of 155 mm (6.1 in.) projectiles designed to be fired from the Advanced Gun System for the Navy's next-generation DDG 1000 destroyer. The Long Range Land Attack Projectile allows the DDG 1000 class to provide precision fire support to Marine Corps and Army forces from a safe distance offshore. This capability would be integrated into amphibious warfare firing exercises and strike warfare exercises.

2.7.3.7 Other Systems

High Altitude Anti-Submarine Warfare

High altitude anti-submarine warfare integrates new and modifies existing sensors to enhance the sonobuoy capability to conduct anti-submarine warfare at high altitude. Sonobuoy modifications include integrating global positioning system for precise sonobuoy positional information and a digital uplink/downlink for radio frequency interference management. New sensors include a meteorological sensing device (dropsonde) for sensing atmospheric conditions from the aircraft altitude to the surface.

New Sonobuoys

New sonobuoys will operate similarly to existing systems, but will provide greater capabilities through improved processing. The key aspects of these new sonobuoys involve the active sound source.

Littoral Combat Ship Anti-Submarine Warfare Module

The anti-submarine warfare module provides a littoral anti-submarine warfare capability that includes active sonar. An increase to unit level and joint surface ship anti-submarine warfare exercises would be expected upon introduction to the fleets, and training would continue on existing Navy ranges. Note: low-frequency anti-submarine warfare sensors will be analyzed under Alternative 1 and Alternative 2.

Littoral Combat Ship Mine Countermeasure Module

The mine countermeasure module brings together several systems to support bottom mapping, mine detection, mine neutralization, and mine clearance. An increase to surface ship mine warfare training is

expected upon introduction to the fleets. This module would include mine detecting sonar and lasers, and neutralization techniques that involve underwater detonations.

Littoral Combat Ship Surface Warfare Module

The surface warfare module is designed to enable the Littoral Combat Ship to combat small, fast boat threats to the fleet. This module would include guns and missiles. Testing of this module would occur in the study area with an increase in training expected upon introduction to the fleets.

High Duty Cycle Sonar

High Duty Cycle Sonar technology provides improved detection performance and improved detection and classification decision time. This technology will be implemented as an alteration to the existing AN/SQQ-89A (V) 15 surface ship combat system.

SQS-60 and SQS-61 Sonar

The AN/SQS-60 and 61 are integrated hull-mounted sonar components of the DDG 1000 Zumwalt class destroyer. The SQS-60 is mid-frequency active sonar and the SQS-61 is high-frequency active sonar, and both would be operated similarly to the current AN/SQS 53 and 56 sonars.

Klein 5000 Sonar

This is a high-frequency side scan sonar system for detecting and classifying bottom objects and moored mine shapes.

Littoral Battlespace Sensing, Fusion and Integration Program

The Littoral Battlespace Sensing, Fusion and Integration program is the Navy's principal Intelligence Preparation of the Environment enabler. This capability is composed of ocean gliders and autonomous undersea vehicles. Gliders are two-man-portable, long-endurance (weeks to months), buoyancy-driven vehicles that provide a low-cost, semi-autonomous, and highly persistent means to sample and characterize the ocean water column properties at spatial and temporal resolutions not otherwise possible using survey vessels or tactical units alone. Autonomous undersea vehicles s are larger, shorter endurance (hours to days), conventionally powered (typically electric motor) vehicles that will increase the spatial extent and resolution of the bathymetry, imagery data, conductivity, temperature and depth data, and optical data collected by existing ships.

2.8 ALTERNATIVE 2: INCLUDES ALTERNATIVE 1 PLUS ADJUSTMENTS TO THE TYPE AND TEMPO OF TRAINING AND TESTING ACTIVITIES

Alternative 2 consists of all activities that would occur under Alternative 1 and proposed adjustments to type and tempo of training and testing, and new activities.

This alternative allows for potential budget increases, strategic necessity, and future training and testing requirements.

2.8.1 PROPOSED ADJUSTMENTS TO ALTERNATIVE 1 TRAINING ACTIVITIES

The proposed adjustments to Alternative 1 (Preferred Alternative) levels and types of training are as follows:

- The addition of three major at-sea training activities (Fleet Strike Group Exercise, Integrated Anti-Submarine Warfare Exercise, and Ship Squadron Anti-Submarine Warfare Exercise as described in Table 2.4-1) conducted in the Study Area.
- Increases to events/ordnance for the following training activities: Air Combat Maneuver, Area Defense Exercise, Air Intercept Control, Gunnery Exercise (Air-to-Air, medium caliber), Missile Exercise (Air-to-Air), Bombing Exercise (Air-to-Ground), Missile Exercise (Air-to-Surface) – Rocket, Counter Targeting Flare Exercise – Aircraft, and Counter Targeting Chaff Exercise – Aircraft.

2.8.2 PROPOSED ADJUSTMENTS TO ALTERNATIVE 1 TESTING ACTIVITIES

Under Alternative 2, the proposed adjustments to Alternative 1 (Preferred Alternative) levels and types of testing includes increases in activities and ordnance required for testing requirements for Naval Air Systems Command and Naval Sea Systems Command and presented in Table 2.8-2 and Table 2.8-3, respectively. No adjustments are proposed for Office of Naval Research testing activities.

Tables 2.8-1 to 2.8-4 provide a summary of the training and testing activities to be analyzed under the No Action Alternative, Alternative 1, and Alternative 2. Cells under the “Ordnance” column are shaded gray if that activity includes the use of explosive ordnance.

Table 2.8-1: Baseline and Proposed Training Activities

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Anti-Air Warfare									
Air Combat Maneuver (ACM)	2,880	None	Study Area > 12 nm from land: SUA/ATCAA	4,800	None	Study Area > 12 nm from land: SUA/ATCAA	5,300	None	Study Area > 12 nm from land: SUA/ATCAA
Air Defense Exercise (ADEX)	n/a	n/a	Study Area > 12 nm from land: SUA/ATCAA	100	None	Study Area > 12 nm from land: SUA/ATCAA	120	None	Study Area > 12 nm from land: SUA/ATCAA
Air Intercept Control (AIC)	320	None	Study Area > 12 nm from land: SUA/ATCAA	4,800	None	Study Area > 12 nm from land: SUA/ATCAA	5,300	None	Study Area > 12 nm from land: SUA/ATCAA
Gunnery Exercise (Air-to-Air) – Medium-caliber (GUNEX [A-A]) Medium-caliber	12	3,000 rounds	Study Area SUA > 12 nm from land	36	9,000 rounds	Study Area SUA > 12 nm from land	45	11,250 rounds	Study Area SUA > 12 nm from land
Missile Exercise (Air-to-Air) (MISSILEX [A-A])	12	12 explosive missiles	Study Area SUA > 12 nm from land	18	36 explosive missiles	Study Area SUA > 12 nm from land	24	48 explosive missiles	Study Area SUA > 12 nm from land
Gunnery Exercise (Surface-to-Air) – Large-caliber (GUNEX [S-A]) – Large-caliber	n/a	n/a	n/a	5	40 rounds	Study Area SUA > 12 nm from land	5	40 rounds	Study Area SUA > 12 nm from land

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Gunnery Exercise (Surface-to-Air) – Medium-caliber (GUNEX [S-A]) – Medium-caliber	n/a	n/a	n/a	12	24,000 rounds	Study Area SUA/ATCAAs > 12 nm from land	12	24,000 rounds	Study Area SUA/ATCAAs > 12 nm from land
Missile Exercise (Surface-to-Air) (MISSILEX [S-A])	2	2 explosive missiles	Study Area SUA > 12 nm from land	15	15 explosive missiles	Study Area SUA > 12 nm from land	15	15 explosive missiles	Study Area SUA > 12 nm from land
Strike Warfare (STW)									
Bombing Exercise (Air-to-Ground) (BOMBEX [A-G])	1,300	2,800 NEPM 2,150 explosive rounds	FDM	2,300	2,670 NEPM 6,242 explosive rounds	FDM	2,520	2,922 NEPM 6,821 explosive rounds	FDM

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Gunnery Exercise (Air-to-Ground) (GUNEX [A-G])	22	n/a	FDM	96	24,000 small-caliber rounds	FDM	96	24,000 small-caliber rounds	FDM
		n/a			94,150 medium-caliber rounds			94,150 medium-caliber rounds	
		21,500 explosive med.-caliber rounds			17,350 explosive med.-caliber rounds			17,350 explosive med.-caliber rounds	
		200 explosive large-caliber rounds			200 explosive large-caliber rounds			200 explosive large-caliber rounds	
Missile Exercise (MISSILEX)	60	60 explosive missiles	FDM	85	2,000 explosive rockets	FDM	85	2,000 explosive rockets	FDM
					85 explosive missiles			85 explosive missiles	

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Combat Search and Rescue	60	None	MIRC; Rota Airport	80	None	MIRC; Rota Airport	80	None	MIRC; Rota Airport
Amphibious Warfare (AMW)									
Naval Surface Fire Support Exercise – Land-based target (FIREX [Land])	8	800 explosive rounds	FDM	10	1,800 NEPM rounds 1,000 explosive rounds	FDM	10	1,800 NEPM rounds 1,000 explosive rounds	FDM
Amphibious Rehearsal, No Landing – Marine Air Ground Task Force	n/a	n/a	n/a	12	None	Study Area and Nearshore	12	None	Study Area and Nearshore
Amphibious Assault	4	Blanks; Simunitions	MIRC; Tinian; Guam	6	Blanks; Simunitions	MIRC; Tinian; Guam	6	Blanks; Simunitions	MIRC: Tinian; Guam
Amphibious Raid	2	Blanks; Simunitions	MIRC; Tinian; Guam	6	Blanks; Simunitions	MIRC; Tinian; Guam; Rota	6	Blanks; Simunitions	MIRC; Tinian; Guam; Rota
Urban Warfare Training	17	Blanks; Simunitions	MIRC; Tinian; Guam	36	Blanks; Simunitions	MIRC; Tinian; Guam	36	Blanks; Simunitions	MIRC: Tinian; Guam
Noncombatant Evacuation Operation	2	Blanks; Simunitions	MIRC; Guam; Tinian; Rota	5	Blanks; Simunitions	MIRC; Guam; Tinian; Rota	5	Blanks; Simunitions	MIRC; Guam; Tinian; Rota

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Humanitarian Assistance/Disaster Relief Operations	2	Blanks; Simunitions	MIRC; Guam; Tinian; Rota	5	Blanks; Simunitions	MIRC; Guam; Tinian; Rota	5	Blanks; Simunitions	MIRC; Guam; Tinian; Rota
Unmanned Aerial Vehicle – Intelligence, Surveillance, and Reconnaissance	n/a	n/a	MIRC; SUA	100	None	MIRC; SUA	100	None	MIRC; SUA
Anti-Surface Warfare (ASUW)									
Gunnery Exercise (Air-to-Surface) – Small-caliber (GUNEX [A-S]) – Small-caliber	220	44,000 non-explosive rounds	Study Area SUA > 12 nm from land	242	48,040 rounds	Study Area SUA > 12 nm from land	242	48,040 rounds	Study Area SUA > 12 nm from land
Gunnery Exercise (Air-to-Surface) – Medium-caliber (GUNEX [A-S]) – Medium-caliber	155	15,500 non-explosive rounds	Study Area SUA > 12 nm from land	295	29,500 non-explosive rounds 7,150 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor	295	29,500 non-explosive rounds 7,150 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor
Missile Exercise (Air-to-Surface) – Rocket (MISSILEX [A-S] – Rocket)	n/a	n/a	n/a	3	114 rockets (114 explosive)	Study Area SUA > 12 nm from land	10	380 rockets (380 explosive)	Study Area SUA > 12 nm from land
Missile Exercise (Air-to-Surface) (MISSILEX [A-S])	2	2 explosive missiles	Study Area > 25 nm from land	20	20 explosive missiles	Study Area SUA > 12 nm from land	20	20 explosive missiles	Study Area SUA > 12 nm from land

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Laser Targeting (at sea)	60	None	Study Area > 25 nm from land	600	None	Study Area SUA > 12 nm from land	600	None	Study Area SUA > 12 nm from land
Bombing Exercise (Air-to-Surface) (BOMBEX [A-S])	28	72 NEPM 4 explosive rounds	Study Area > 50 nm from land	37	368 NEPM 184 explosive rounds	Study Area > 50 nm from land	37	368 NEPM 184 explosive rounds	Study Area > 50 nm from land
Torpedo Exercise (Submarine-to-Surface)	n/a	n/a	n/a	5	10 EXTORP	Study Area > 3 nm from land	5	10 EXTORP	Study Area > 3 nm from land
Missile Exercise (Surface-to-Surface) (MISSILEX [S-S])	n/a	n/a	n/a	12	12 explosive missiles	Study Area > 50 nm from land	12	12 explosive missiles	Study Area > 50 nm from land
Gunnery Exercise (Surface-to-Surface) Ship – Large-caliber (GUNEX [S-S] – Ship) Large-caliber	12	440 explosive rounds	Study Area SUA > 12 nm from land	140	5,198 non-explosive rounds 500 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor	140	5,198 non-explosive rounds 500 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor
Gunnery Exercise (Surface-to-Surface) Ship – Small- and Medium-caliber (GUNEX [S-S] – Ship) Small- and Medium-caliber	5	8,000 non-explosive rounds	Study Area SUA > 12 nm from land	100	21,000 non-explosive rounds 900 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor	100	21,000 non-explosive rounds 900 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity		No Action Alternative			Alternative 1			Alternative 2		
		No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Sinking Exercise (SINKEX) Representative ordnance. Actual ordnance used will vary (typically less than shown).		2	28 explosive Bombs 42 explosive Missiles 800 explosive Large-caliber rounds 2 MK-48 explosive 4 explosive Demolitions	Study Area > 50 nm from land and > 1,000 fathoms depth	2	28 explosive Bombs 42 explosive Missiles 800 explosive Large-caliber rounds 2 MK-48 explosive 4 explosive Demolitions	Study Area > 50 nm from land and > 1,000 fathoms depth	2	28 explosive Bombs 42 explosive Missiles 800 explosive Large-caliber rounds 2 MK-48 explosive 4 explosive Demolitions	Study Area > 50 nm from land and > 1,000 fathoms depth
Gunnery Exercise (Surface-to-Surface) Boat – Small and Medium-caliber (GUNEX [S-S] – Boat	Medium-caliber	n/a	n/a	n/a	10	2,000 non-explosive rounds 100 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor	10	2,000 non-explosive rounds 100 explosive rounds	Study Area SUA > 12 nm from land; Transit Corridor
	Small-caliber	32	16,000 rounds	Study Area > 3 nm from land	40	36,000 rounds	Study Area > 3 nm from land; Transit Corridor	40	36,000 rounds	Study Area > 3 nm from land; Transit Corridor
Maritime Security Operations (MSO)		6	None	Study Area; MIRC	40	200 G911 anti-swimmer grenade	Study Area; MIRC	40	200 G911 anti-swimmer grenade	Study Area; MIRC

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Anti-Submarine Warfare (ASW)									
Tracking Exercise – Helicopter (TRACKEX – Helo)	18	None/ REXTORP	Study Area > 3 nm from land	62	None/ REXTORP	Study Area > 3 nm from land; Transit Corridor	62	None/ REXTORP	Study Area > 3 nm from land; Transit Corridor
Torpedo Exercise – Helicopter (TORPEX – Helo)	4	4 EXTORP	Study Area > 3 nm from land	4	4 EXTORP	Study Area > 3 nm from land	4	4 EXTORP	Study Area > 3 nm from land
Tracking Exercise – Maritime Patrol Advanced Extended Echo Ranging Sonobuoys	8	None	Study Area > 3 nm from land	11	None	Study Area > 3 nm from land	11	None	Study Area > 3 nm from land
Tracking Exercise – Maritime Patrol Aircraft (TRACKEX – Maritime Patrol Aircraft)	8	None/ REXTORP	Study Area > 3 nm from land	34	None/ REXTORP	Study Area > 3 nm from land	34	None/ REXTORP	Study Area > 3 nm from land

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Torpedo Exercise – Maritime Patrol Aircraft (TORPEX – Maritime Patrol Aircraft)	4	4 EXTORP	Study Area > 3 nm from land	4	4 EXTORP	Study Area > 3 nm from land	4	4 EXTORP	Study Area > 3 nm from land
Tracking Exercise – Surface (TRACKEX – Surface)	CG/DDG/ FFG 30	None/ REXTORP	Study Area > 3 nm from land	CG/DDG-92 FFG-30 LCS-10	None/ REXTORP	Study Area > 3 nm from land	CG/DDG-92 FFG-30 LCS-10	None/ REXTORP	Study Area > 3 nm from land
Torpedo Exercise – Surface (TORPEX – Surface)	3	3 EXTORP	Study Area > 3 nm from land	3	3 EXTORP	Study Area > 3 nm from land	3	3 EXTORP	Study Area > 3 nm from land
Tracking Exercise – Submarine (TRACKEX – Sub)	10	None	Study Area > 3 nm from land	12	None	Study Area > 3 nm from land; Transit Corridor	12	None	Study Area > 3 nm from land; Transit Corridor
Torpedo Exercise – Submarine (TORPEX – Sub)	10	40 MK-48 EXTORP	Study Area > 3 nm from land	10	40 MK-48 EXTORP	Study Area > 3 nm from land	10	40 MK-48 EXTORP	Study Area > 3 nm from land

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Major Training Events									
Joint Expeditionary Exercise	1	Note 1	Study Area; MIRC	1	Note 1	Study Area; MIRC	1	Note 1	Study Area; MIRC
Joint Multi-Strike Group Exercise	1	Note 1	Study Area > 12 nm from land; FDM	1	Note 1	Study Area; MIRC	1	Note 1	Study Area; MIRC
Fleet Strike Group Exercise	n/a	n/a	n/a	0	Note 1	Study Area > 12 nm from land; FDM	1	Note 1	Study Area > 12 nm from land; FDM
Integrated Anti-Submarine Warfare Exercise	n/a	n/a	n/a	0	Note 1	Study Area > 3 nm from land; FDM	1	Note 1	Study Area > 3 nm from land; FDM
Ship Squadron Anti-Submarine Warfare Exercise	n/a	n/a	n/a	0	Note 1	Study Area > 3 nm from land	1	Note 1	Study Area > 3 nm from land
Marine Air Ground Task Force Exercise (Amphibious) – Battalion	4	Note 1	Study Area to nearshore; MIRC; Tinian; Guam; Rota; Saipan; FDM	4	Note 1	Study Area to nearshore; MIRC; Tinian; Guam; Rota; Saipan; FDM	4	Note 1	Study Area to nearshore; MIRC; Tinian; Guam; Rota; Saipan; FDM
Special Purpose Marine Air Ground Task Force Exercise	2	Note 1	Study Area to nearshore; MIRC; Tinian; Guam; Rota; Saipan	2	Note 1	Study Area to nearshore; MIRC; Tinian; Guam; Rota; Saipan	2	Note 1	Study Area to nearshore; MIRC; Tinian; Guam; Rota; Saipan
Urban Warfare Exercise	5	Blanks/ Simunitions	MIRC; Tinian; Guam; Rota; Saipan	5	Blanks/ Simunitions	MIRC; Tinian; Guam; Rota; Saipan	5	Blanks/ Simunitions	MIRC; Tinian; Guam; Rota; Saipan

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Electronic Warfare (EW)									
Electronic Warfare Operations (EW Ops)	72 (Note 2)	None	Study Area > 12 nm from land	480	None	Study Area	530	None	Study Area
Counter Targeting Flare Exercise (FLAREX) – Aircraft	546	5,740 cartridges	Study Area > 12 nm from land	3,200	25,600 cartridges	Study Area > 12 nm from land	3,534	28,272 cartridges	Study Area > 12 nm from land
Counter Targeting Chaff Exercise (CHAFFEX) – Ship	16	90 cartridges	Study Area > 12 nm from land	40	240 cartridges	Study Area > 12 nm from land	40	240 cartridges	Study Area > 12 nm from land
Counter Targeting Chaff Exercise (CHAFFEX) – Aircraft	546	5740 cartridges	Study Area > 12 nm from land	3,200	25,600 cartridges	Study Area > 12 nm from land	3,534	28,272 cartridges	Study Area > 12 nm from land
Mine Warfare (MIW)									
Civilian Port Defense	n/a	n/a	n/a	1	Note 1	Mariana littorals; MIRC; Inner and Outer Apra Harbor	1	Note 1	Mariana littorals; MIRC, Inner and Outer Apra Harbor
Mine Laying	3	480 mine shapes	W-517	4	480 mine shapes	MIRC Warning Areas	4	480 mine shapes	MIRC Warning Areas

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Mine Warfare (MIW)									
Mine Neutralization – Explosive Ordnance Disposal (EOD)	20	20 explosive charges	MIRC mine neutralization sites, 10 lb. NEW maximum	20	20 explosive charges	Agat Bay site, 20 lb. NEW maximum charge. Piti and Outer Apra Harbor sites, 10 lb. NEW maximum.	20	20 explosive charges	Agat Bay site, 20 lb. NEW maximum charge. Piti and Outer Apra Harbor sites, 10 lb. NEW maximum.
Limpet Mine Neutralization System/Shock Wave Generator	n/a	n/a	n/a	40	40 charges	Mariana littorals; Inner and Outer Apra Harbor	40	40 charges	Mariana littorals; Inner and Outer Apra Harbor
Submarine Mine Exercise	n/a	n/a	n/a	16	n/a	Study Area; nearshore.	16	n/a	Study Area; nearshore
Airborne Mine Countermeasure – Mine Detection	n/a	n/a	n/a	4	n/a	Study Area; nearshore	4	n/a	Study Area; nearshore
Mine Countermeasure Exercise – Towed Sonar (AQS-20, LCS)	n/a	n/a	n/a	4	n/a	Study Area	4	n/a	Study Area
Mine Countermeasure Exercise – Surface (SMCMEX) Sonar (SQQ-32, MCM)	n/a	n/a	n/a	4	n/a	Study Area	4	n/a	Study Area

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Mine Neutralization – Remotely Operated Vehicle Sonar (ASQ-235 [AQS-20], SLQ-48)	n/a	n/a	n/a	4	4 explosive neutralizers	Study Area	4	4 explosive neutralizers	Study Area
Mine Countermeasure – Towed Mine Detection	n/a	n/a	n/a	4	n/a	Study Area	4	n/a	Study Area

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Naval Special Warfare (NSW)									
Personnel Insertion/ Extraction	150	None	MIRC; Guam; Tinian; Rota	240	None	MIRC; Guam; Tinian; Rota	240	None	MIRC; Guam; Tinian; Rota
Parachute Insertion	12	None	MIRC parachute drop zones; Guam; Tinian; Rota	20	None	MIRC parachute drop zones; Guam; Tinian; Rota	20	None	MIRC parachute drop zones; Guam; Tinian; Rota
Embassy Reinforcement	50	Blanks; Simunitions	MIRC; Guam; Tinian; Rota	50	Blanks; Simunitions	MIRC; Guam; Tinian; Rota	50	Blanks; Simunitions	MIRC; Guam; Tinian; Rota
Direct Action (Combat Close Quarters)	40	15,000 rounds	MIRC Combat Close Quarters sites	72	26,250 rounds	MIRC Combat Close Quarters sites	72	26,250 rounds	MIRC Combat Close Quarters sites
Direct Action (Breaching)	40	Total – 15 lb. NEW	MIRC explosive breaching sites	72	Total – 27 lb. NEW	MIRC explosive breaching sites	72	Total – 27 lb. NEW	MIRC explosive breaching sites
Direct Action (Tactical Air Control Party)	3	2,900 small-caliber rounds 100 explosive (grenade/ mortar)	FDM	18	18,000 small-caliber rounds 600 explosive (grenade/ mortar)	FDM	18	18,000 small-caliber rounds 600 explosive (grenade/ mortar)	FDM
Underwater Demolition Qualification/ Certification	30	30 explosive charges	MIRC underwater demolition sites (10 lb. NEW maximum/ charge)	30	30 explosive charges	Agat Bay site, 20 lb. NEW maximum charge. Piti and Outer Apra Harbor sites, 10 lb. NEW maximum	30	30 explosive charges	Agat Bay site, 20 lb. NEW maximum charge. Piti and Outer Apra Harbor sites, 10 lb. NEW maximum.

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Intelligence, Surveillance, Reconnaissance (ISR)	16	None	MIRC; Guam; Tinian; Rota; Saipan	16	None	MIRC; Guam; Tinian; Rota; Saipan	16	None	MIRC; Guam; Tinian; Rota; Saipan
Urban Warfare Training	8	Blanks/ Simunitions	MIRC; Tinian; Guam; Rota; Saipan	18	Blanks/ Simunitions	MIRC: Tinian; Guam; Rota; Saipan	18	Blanks/ Simunitions	MIRC; Tinian; Guam; Rota; Saipan
Underwater Survey	6	None	Mariana littorals	16	0	Mariana littorals	16	0	Mariana littorals
Other									
Surface Ship Sonar Maintenance	n/a	None	n/a	42	None	Study Area > 3 nm from land; Inner Apra Harbor; Transit Corridor	42	None	Study Area > 3 nm from land; Inner Apra Harbor; Transit Corridor
Submarine Sonar Maintenance	n/a	None	n/a	48	None	Study Area > 3 nm from land; Inner Apra Harbor; Transit Corridor	48	None	Study Area > 3 nm from land; Inner Apra Harbor; Transit Corridor
Small Boat Attack	n/a	n/a	n/a	6	2,100 small-caliber rounds	Study Area > 3 nm from land	6	2,100 small-caliber rounds	Study Area > 3 nm from land
	n/a	n/a	n/a	12	4000 blank rounds	Study Area	12	4,000 blank rounds	Study Area
Submarine Navigation	n/a	n/a	n/a	8	None	Apra Harbor and Mariana littorals	8	None	Apra Harbor and Mariana littorals
Search and Rescue At Sea	n/a	n/a	n/a	40	None	Study Area	40	None	Study Area

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Precision Anchoring	n/a	n/a	n/a	18	None	Apra Harbor; Mariana Islands anchorages	18	None	Apra Harbor; Mariana Islands anchorages
Maneuver (Convoy, Land Navigation)	16	None	MIRC; Guam; Tinian	16	None	MIRC; Guam; Tinian	16	None	MIRC; Guam; Tinian
Water Purification	n/a	n/a	n/a	16	None	MIRC	16	None	MIRC
Field Training Exercise	100	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota; Saipan	100	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota; Saipan	100	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota; Saipan
Force Protection	75	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota	75	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota	75	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota
Anti-Terrorism	80	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota	80	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota	80	Blanks/ Simunitions	MIRC; Guam; Tinian; Rota
Seize Airfield	12	Blanks/ Simunitions	MIRC airfields[1]	12	Blanks/ Simunitions	MIRC airfields[1]	12	Blanks/ Simunitions	MIRC airfields[1]
Airfield Expeditionary	12	None	MIRC airfields[1]	12	Blanks/ Simunitions	MIRC airfields[1]	12	Blanks/ Simunitions	MIRC airfields[1]
Unmanned Aerial Vehicle Operation	n/a	n/a	n/a	1,000	None	Study Area; MIRC airfields[1]; MIRC SUA	1,000	None	Study Area; MIRC airfields;[1] MIRC SUA

Table 2.8-1: Baseline and Proposed Training Activities (continued)

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Land Demolitions (Improvised Explosive Device) Discovery/Disposal	120	None	MIRC; Guam	120	None	MIRC; Guam	120	None	MIRC; Guam
Land Demolitions (Unexploded Ordnance) Discovery/Disposal	200	200 unexploded ordnance and neutralization charge	Navy Emergency Disposal Site	236	236 unexploded ordnance and neutralization charge	200 events, Navy Emergency Disposal Site; 36 events, Air Force Disposal Sites. (Guam)	236	236 unexploded ordnance and neutralization charge	200 events, Navy Emergency Disposal Site; 36 events, Air Force Disposal Sites. (Guam)

[1] Orote Point Airfield, Guam; Northwest Airfield, Guam; North Airfield, Tinian

Notes: (1) Exercise is composed of various activities accounted for elsewhere within Table 2.8-1.

(2) Discussed as an embedded training activity to CHAFFEX/FLAREX in MIRC EIS/OEIS Appendix D (Air Quality Calculations and Record of Non-Applicability).

(3) CHAFF = Chaff Exercise, EIS = Environmental Impact Statement. EOD = Explosive Ordnance Disposal, EXTORP = Exercise Torpedo, FDM = Farallon de Medinilla, FLAREX = Flare Exercise, g = gram, lb. = pound, LCS = Littoral Combat Ship, MIRC = Mariana Islands Range Complex, mm = millimeters, n/a = Not Applicable, NEPM = Non-explosive Practice Munitions, NEW = Net Explosive Weight, nm = nautical miles, OEIS = Overseas Environmental Impact Statement, REXTORP = Recoverable Exercise Torpedo, SUA = Special Use Airspace

Table 2.8-2: Baseline and Proposed Naval Air Systems Command Testing Activities

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Anti-Surface Warfare (ASUW)									
Air-to-Surface Missile Test	n/a	n/a	n/a	8	8 Harpoon Missiles, (up to 4 explosive)	Study Area > 50 nm from land	10	10 Harpoon Missiles, (up to 5 explosive)	Study Area > 50 nm from land
Anti-Submarine Warfare (ASW)									
Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (Sonobuoys)	n/a	n/a	n/a	188	240 IEER[1] 553 SUS	Study Area > 3 nm from land	207	260 IEER[1] 624 SUS	Study Area > 3 nm from land
Anti-Submarine Warfare Torpedo Test	n/a	n/a	n/a	40	40 EXTORP	Study Area > 3 nm from land	50	50 EXTORP	Study Area > 3 nm from land
Broad Area Maritime Surveillance (BAMS) Testing – MQ-4C Triton	n/a	n/a	n/a	10	None	Study Area	11	None	Study Area
Electronic Warfare (EW)									
Flare Test	n/a	n/a	n/a	10	300 flares; 600 chaff rounds	Study Area > 3 nm from land	11	330 flares; 660 chaff rounds	Study Area > 3 nm from land

[1] Use of Improved Extended Echo Ranging (IEER) sonobuoys will decrease over time while being replaced by use of Multi-static Active Coherent (MAC) sonobuoys. MAC buoys employ an electronic acoustic source in place of the explosive source used on the IEER buoys.

Notes: EIS = Environmental Impact Statement, EXTORP = Exercise Torpedo, IEER = Improved Extended Echo Ranging, MAC = Multi-static Active Coherent, n/a = Not Applicable, nm = nautical miles, OEIS = Overseas Environmental Impact Statement, SUS = Signal Underwater Sound

Table 2.8-3: Baseline and Proposed Naval Sea Systems Command Testing Activities

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Life Cycle Activities									
Ship Signature Testing	n/a	n/a	n/a	17	None	Study Area	19	None	Study Area
Anti-Surface Warfare (ASUW)/Anti-Submarine Warfare (ASW) Testing									
Kinetic Energy Weapon Testing	n/a	n/a	n/a	50 1 event total	2,000 projectiles 5,000 projectiles	MIRC > 12 nm from land	55 1 event total	2,200 projectiles 5,000 projectiles	MIRC > 12 nm from land
Torpedo Testing	n/a	n/a	n/a	2	20 torpedoes, (up to 8 explosive)	MIRC > 3 nm from land	2	20 torpedoes, (up to 8 explosive)	MIRC > 3 nm from land
Countermeasure Testing	n/a	n/a	n/a	2	56 torpedoes	Study Area	3	84 torpedoes	Study Area
At-Sea Sonar Testing	n/a	n/a	n/a	20	None	Study Area	24	None	Study Area
Shipboard Protection Systems and Swimmer Defense Testing									
Pierside Integrated Swimmer Defense	n/a	n/a	n/a	11	None	Inner Apra Harbor	11	None	Inner Apra Harbor

Table 2.8-3: Baseline and Proposed Naval Sea Systems Command Testing Activities (continued)

Range Activity		No Action Alternative			Alternative 1			Alternative 2		
		No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
New Ship Construction										
ASW Mission Package Testing		n/a	n/a	n/a	33	None	Study Area	37	None	Study Area
MCM Mission Package Testing		n/a	n/a	n/a	32	48 neutralizers, (up to 24 explosive)	Study Area	36	56 neutralizers, (up to 28 explosive)	Study Area
ASUW Mission Package Testing	Gun Testing – Small-caliber	n/a	n/a	n/a	4	2,000 rounds	Study Area; Warning Area > 12 nm from land	5	2,500 rounds	Study Area; Warning Area > 12 nm from land
	Gun Testing – Medium-caliber (30 mm)				4	4,080 rounds, (up to 2,040 explosive)		5	4,980 rounds, (up to 2,490 explosive)	
	Gun Testing – Large-caliber (57 mm)				4	5,600 rounds (up to 3,920 in-air explosive)		5	7,000 rounds (up to 4,900 in-air explosive)	
	Missile/ Rocket Testing				4	32 missiles/ rockets, (up to 16 explosive)		5	40 missiles/ rockets, (up to 18 explosive)	

Notes: EE = Explosive, EOD = Explosive Ordnance Disposal, IEER = Improved Extended Echo Ranging, lb. = pound, MCM = Mine Countermeasure, MIRC = Mariana Islands Range Complex, mm = millimeters, n/a = Not Applicable, NEW = Net Explosive Weight, nm = nautical miles, SUS = Signal Underwater Sound

Table 2.8-4: Baseline and Proposed Office of Naval Research Testing Activities

Range Activity	No Action Alternative			Alternative 1			Alternative 2		
	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location	No. of activities (per year)	Ordnance (Number per year)	Location
Office of Naval Research									
North Pacific Acoustic Lab Philippine Sea 2018–19 Experiment (Deep Water)	1	n/a	Study Area	1	n/a	Study Area	1	n/a	Study Area

Note: n/a = Not Applicable

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