GUAM AND CNMI MILITARY RELOCATION 2012 ROADMAP ADJUSTMENTS

Live-Fire Training Range Complex Alternatives Analysis Report

FINAL

DEPARTMENT OF THE NAVY
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GUAM LIVE-FIRE TRAINING RANGE COMPLEX
ALTERNATIVES ANALYSIS REPORT

FINAL

PREPARED FOR:

Joint Guam Program Office, Washington, D.C.

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Naval Facilities Engineering Command, Pacific

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ACRONYMS AND ABBREVIATIONS

AAFB	Andersen Air Force Base
ac	acre
ADNL	A-weighted Day-Night Level
ADR	Airfield Damage Repair
AGL	Above Ground Level
ATC	Air Traffic Control
BTS	Brown Tree Snake
CCN	Category Code Number
CDNL	C-weighted Day/Night Average Sound Level
CDP	Conceptual Development Plan
CFR	Code of Federal Regulations
cm	centimeters
CNMI	Commonwealth of the Northern Mariana Islands
Comm	Communication
dB	decibels
DoD	Department of Defense
ECP	Entry Control Point
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
ESQD	Explosives Safety Quantity Distance
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FOUO	For Official Use Only
ft	feet
ft^2	square feet
FTX	Field Training Exercise
FY	Fiscal Year
gal	gallons
GIS	Geographic Information System
GNWR	Guam National Wildlife Refuge
GovGuam	Government of Guam
GPA	Guam Power Authority
GWA	Guam Waterworks Authority
ha	hectares
IOC	Initial Operational Capability
IT	Information Technology
JGPO	Joint Guam Program Office
JTE	Joint Threat Emitter
KD	Known Distance
kg	kilograms
km	kilometers
kV	kilovolts
kVA	kilovolt amperes
kW	kilowatts
L	liters
lbs	pounds
LCC	Life Cycle Cost
LCCA	Life Cycle Cost Analysis
LFTRC	Live-Fire Training Range Complex
LZ/DZ	Landing Zone/Drop Zone

m	meters
m^2	square meters
m^3	cubic meters
MARFORPAC	U.S. Marine Forces Pacific
MCO	Marine Corps Order
MEC	Munitions and Explosives of Concern
mi	miles
mm	millimeters
MOUT	Military Operations in Urban Terrain
MPMG	Multi-Purpose Machine Gun
MRF	Modified Record of Fire
MSL	mean sea level
Mt.	Mount
NAVFACPAC	Naval Facilities Engineering Command Pacific
NAVFIG	Naval Flight Information Group
NAVMAG	Naval Magazine
Navy	Department of the Navy
NCTS	Naval Computer and Telecommunications Station
NEPA	National Environmental Policy Act
NEW	Net Explosive Weight
NHPA	National Historic Preservation Act
NMS	Naval Munitions Site
NRHP	National Register of Historic Places
NSSA	Non-Standard Small Arms
NWF	Northwest Field
PRTC	Pacific Air Forces Regional Training Center
PSDZ	Probabilistic Surface Danger Zone
RA	Restricted Area
RAICUZ	Range Air Installations Compatible Use Zones
RCF	Range Control Facility
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers
ROD	Record of Decision
RT 15A	Route 15A
SACON	Shock Absorbing Concrete
SDZ	Surface Danger Zone
SEIS	Supplemental Environmental Impact Statement
SNCO	Staff Non-Commissioned Officer
SOGCN	Species of Greatest Conservation Need
TECOM	Marine Corps Training and Education Command
THAAD	Theater High Altitude Air Defense
U.S.	United States
UFC	Unified Facilities Criteria
UFW	Unaccounted for Water
USAPHC	U.S. Army Public Health Command
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
V	volts
VFR	Visual Flight Rules
yd	yards

1 INTRODUCTION

1.1 PURPOSE

The objective of this report is to describe and analyze the five alternatives for the Live-Fire Training Range Complex (LFTRC) that have been developed to meet service-identified training requirements for Marines relocating to Guam from Okinawa. These five LFTRC alternatives will be fully analyzed under the *Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation (2012 Roadmap Adjustments) Supplemental Environmental Impact Statement* (SEIS). This technical report is intended to serve as a planning tool that supports the planning efforts for an LFTRC on Guam. Conclusions or recommendations are not provided in this report.

1.2 BACKGROUND

The development of an LFTRC would ensure the following: (1) live-fire training facilities are available for Marines based on Guam to meet their service-identified training requirements, as mandated by Section 5063 of Title 10 of the United States (U.S.) Code; (2) individual live-fire training requirements are satisfied as described in the *Final Environmental Impact Statement Guam and CNMI Military Relocation,* July 2010 (2010 FEIS) and associated Record of Decision (ROD); and (3) an operational Marine Corps presence is established on Guam in accordance with the April 2012 adjustments to the May 2006 United States-Japan Roadmap for Realignment Implementation (Roadmap). The LFTRC on Guam would allow simultaneous use of all firing ranges to support training and operations of the relocated Marines. The proposed action would also include a Main Cantonment area of sufficient size and layout to provide military support functions, including Family Housing, utilities, infrastructure, and bachelor housing. The Main Cantonment and associated infrastructure improvements are described in the *Guam and CNMI 2012 Roadmap Adjustments Planning Report* –Final, August 2013 (NAVFACPAC 2013a).

The LFTRC would consist of a Known Distance (KD) Rifle Range, a KD Pistol Range, a Modified Record of Fire (MRF) Range, a Non-Standard Small Arms (NSSA) Range, a Multi-Purpose Machine Gun (MPMG) Range, and a Hand Grenade Range. The complex would also include the construction of utilities and infrastructure required to support each of the ranges.

The Marine Corps identified five alternative locations for the LFTRC: one is located adjacent to Route 15 in northeastern Guam; three are located at or immediately adjacent to the Naval Magazine (NAVMAG); and one is located at Andersen Air Force Base (AAFB) Northwest Field (NWF) in northern Guam. The alternatives may continue to evolve as the Marine Corps considers public and regulatory agency input through the National Environmental Policy Act (NEPA) process. For example, the Marine Corps worked with the Federal Aviation Administration (FAA) to determine whether airspace impacts on commercial/general aviation would render a preliminary alternative untenable. Where the FAA concluded that an alternative's impacts on existing airspace could not be mitigated, that alternative was not carried forward for evaluation in the SEIS.

1.2.1 2010 Final Environmental Impact Statement

The 2010 FEIS contained two LFTRC alternatives, Range Alternatives A and B (Figure 1.2-1). These two alternatives were both located in the Route 15 area in northeastern Guam. Range Alternative A required the realignment of Route 15 to the interior of the existing Andersen South parcel and the acquisition of an estimated 1,090 acres (ac) (441 hectares [ha]). Range Alternative B did not require the realignment of Route 15 but required the acquisition of an estimated 1,800 ac (728 ha). Range Alternative A was identified as the Preferred Alternative because it involved the least amount of land acquisition and the least impact on the Pagat historical sites.

In September 2010, the United States Department of the Navy (Navy) signed a ROD regarding the 2010 FEIS for the "Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force" (JGPO 2010). The 2010 FEIS ROD deferred the selection of a specific LFTRC location on Guam, pending completion of the Section 106 consultation process under the National Historic Preservation Act (NHPA).

1.2.2 March 2012 Joint Guam Project Office Technical Report and Live-Fire Training Range Complex Supplemental Environmental Impact Statement Public Scoping

Following the September 2010 ROD, the Marine Corps investigated a methodology that offered the potential of reducing the overall size requirement for the LFTRC alternatives by reducing the dominant footprint of the MPMG Range's Surface Danger Zone (SDZ), which generally establishes the SDZ for the entire range complex. This methodology, the Probabilistic Surface Danger Zone (PSDZ), was first applied to Range Alternative A MPMG Range and resulted in a smaller overall LFTRC SDZ with fewer impacts on the Pagat Trail and Pagat Village historical sites. The PSDZ methodology is described in greater detail in Section 2.2.

Under the auspices of the Joint Guam Program Office (JGPO), the PSDZ methodology was then applied to previously considered and eliminated sites to determine if the application of a smaller SDZ changed previous conclusions as to the suitability and feasibility of those sites as reasonable alternatives. A total of 26 sites were reevaluated. As a result of this reevaluation, five alternatives were carried forward for analysis in the SEIS. The alternatives included the Route 15 Adjusted Option A, Route 15 Adjusted Option B, and three sites within and adjacent to the NAVMAG in southern Guam. These five alternatives were included in the LFTRC SEIS Public Scoping Meeting held on Guam in March 2012 (Figure 1.2-2).

1.2.3 Expanded Supplemental Environmental Impact Statement Scope

On April 27, 2012, shortly after the close of the LFTRC SEIS public scoping period, the U.S.-Japan Security Consultative Committee issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap. In accordance with the Security Consultative Committee's adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific that provided for a materially smaller force on Guam. Specifically, the adjustments included reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and 1,300 dependents on Guam. This decision prompted the Marine Corps to review the major actions previously planned for Guam and approved in the September 2010 ROD. The Marine Corps concluded that while some actions

were unaffected by the reduced force size, other actions could significantly change as a result of the modified force, such as the Main Cantonment and Family Housing areas. The Navy opted to issue a new Notice of Intent and expanded the scope of the LFTRC SEIS to include those actions that may materially change as a result of the new force posture.

The expanded SEIS would evaluate the potential environmental impacts from construction and operation of an LFTRC, a Main Cantonment area (including Family Housing), and associated infrastructure on Guam to support the relocation of a substantially reduced number of Marines than previously analyzed. The reduction in the number of Marines and dependents to be relocated to Guam led to a reduction in the required footprint for the Main Cantonment area, enabling the Navy to identify other preliminary alternatives in addition to Naval Computer and Telecommunications Station (NCTS) Finegayan for the Main Cantonment and Family Housing area. These additional alternatives include: AAFB; NCTS Finegayan (Main Cantonment)/South Finegayan (Family Housing); and Navy and Air Force Barrigada in central Guam. The possibility of not establishing the Main Cantonment area at NCTS Finegayan allowed that area to be considered as a new preliminary alternative for the LFTRC. Consideration of public input, refinement of range designs, and a reassessment of operational requirements, conflicts, and opportunities resulted in the addition of NWF at AAFB as a new preliminary range alternative. Therefore, the Marine Corps identified a total of seven preliminary site alternatives for the LFTRC: two Route 15 preliminary alternatives in northeastern Guam; three preliminary alternatives located at or immediately adjacent to the NAVMAG; one preliminary alternative at NWF in northern Guam; and one preliminary alternative at NCTS Finegayan on the northwestern coast of Guam. These seven preliminary alternatives were included in the SEIS Public Scoping Meeting held on Guam in November 2012 (Figure 1.2-3).

1.2.4 Preliminary Airspace Feasibility Assessment

In the Notice of Intent (October 2012), the Navy informed the public that preliminary LFTRC alternatives could evolve as the Navy considered public and regulatory agency input through the NEPA process. Specifically, the Navy noted that coordination with the FAA was ongoing in an effort to determine whether airspace impacts would render a preliminary LFTRC alternative infeasible and, therefore, would not be carried forward for evaluation in the SEIS. As a result of interagency coordination, in January 2013, the FAA provided the Navy with a feasibility assessment of each preliminary LFTRC alternative, intended to assist the Navy in identifying which alternatives would be carried forward for further analysis in the SEIS. The FAA emphasized that its feasibility assessment neither represented an endorsement of a particular preliminary LFTRC alternative nor considered any required safety risk mitigation. Noting that the island of Guam is surrounded by highly convective airspace, the FAA's feasibility assessment concluded that each preliminary LFTRC alternative would result in some impact on aviation. The Naval Flight Information Group (NAVFIG), which manages Navy Terminal Instrument Procedures (i.e., the requirements and standards for instrumented approaches at an airport), reviewed and concurred with the FAA's feasibility assessment. In response to the FAA's assessment and NAVFIG's concurrence, the Navy's airspace/air traffic control (ATC) experts undertook a subsequent analysis that focused on both quantifiable airspace/ATC impacts (e.g., frequency and severity) on commercial/general aviation associated with each preliminary LFTRC alternative and corresponding operational impacts on the proposed range operations and training.

The FAA's feasibility assessment determined that the preliminary LFTRC alternative at Route 15B would impact arrivals and departures at the Guam International Airport, regardless of runway use, due to the direct proximity of the alternative to established instrumented approaches, missed approach procedures, and known daily flight paths of civilian aircraft. Further, the FAA emphasized that the Route 15B preliminary alternative was located within Class D airspace, which requires aircraft to adhere to certain Visual Flight Rules (VFR) for cloud clearance and visibility requirements, and maintain two-way ATC communications. Class D airspace is generally cylindrical in form and normally extends from the surface to 2,500 feet (ft) (760 meters [m]) above the ground. The outer radius of the airspace is variable, but is generally 4 nautical miles (7.4 kilometers [km]).

The Navy's subsequent airspace/ATC analysis concluded that airspace/ATC impacts associated with the Route 15B preliminary LFTRC alternative could not be mitigated and, therefore, would not satisfy the primary screening criteria associated with sufficient airspace. The Route 15B preliminary LFTRC alternative will not be carried forward for further evaluation in the SEIS.

The FAA's feasibility assessment also determined that the preliminary LFTRC alternative at Finegayan would impact arrivals and departures at Guam International Airport and AAFB and, therefore, would not be feasible. The Navy's subsequent airspace/ATC analysis concluded that airspace/ATC impacts associated with the Finegayan preliminary LFTRC alternative could not be mitigated. As a result, the Navy determined that the Finegayan preliminary LFTRC alternative would not satisfy the primary screening criteria associated with sufficient airspace. The Finegayan preliminary LFTRC alternative will not be carried forward for further evaluation in the SEIS.

This preliminary screening resulted in the remaining five LFTRC alternatives being carried forward for further development and SEIS analysis (Figure 1.2-4), which include the following:

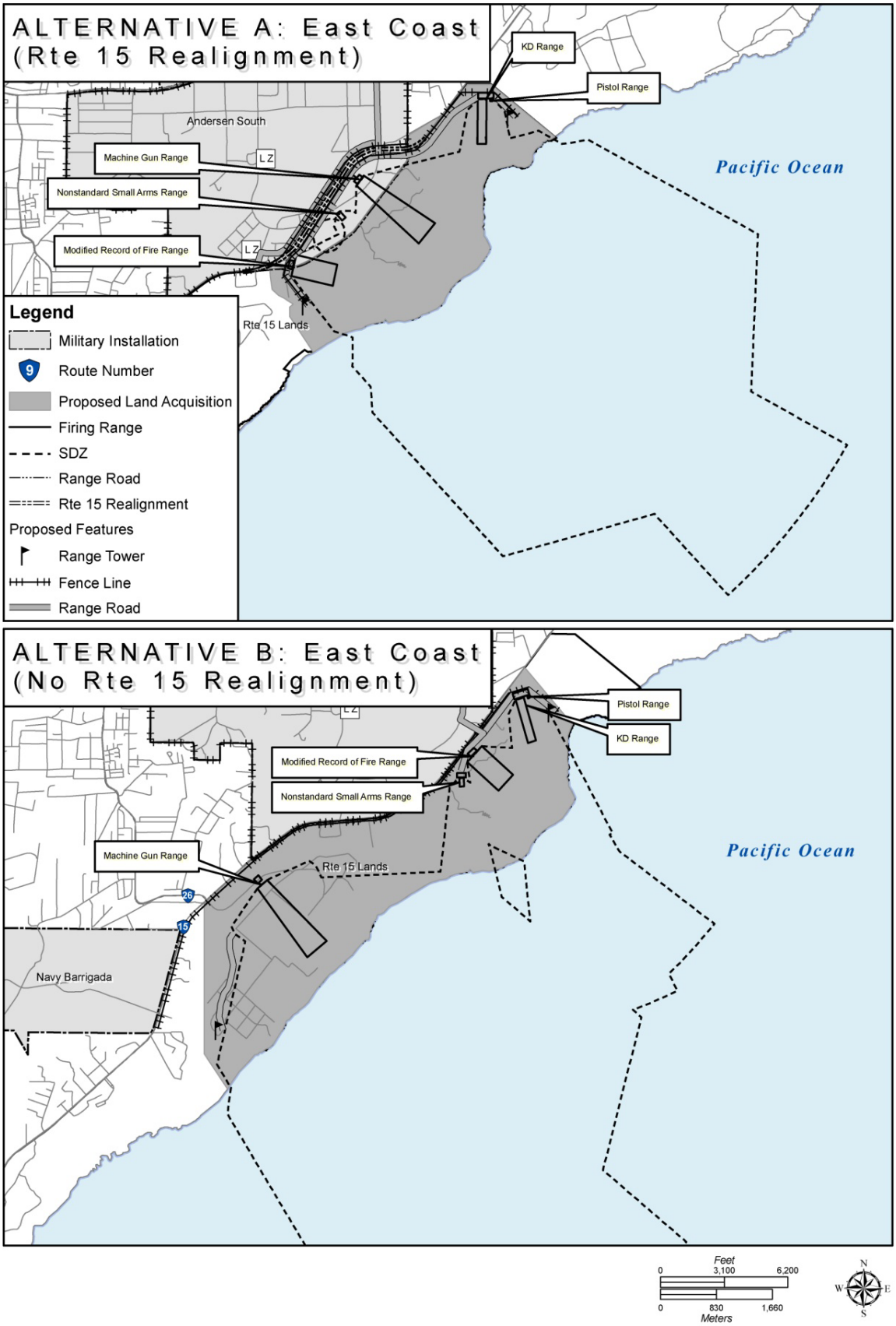
- NWF alternative;
- Route 15A (RT 15A) alternative;
- NAVMAG North/South alternative;
- NAVMAG L-Shaped alternative; and
- NAVMAG East/West alternative.

1.2.5 Live-Fire Training Range Complex Alternatives Refinement

Detailed analysis and planning has occurred on the five LFTRC alternatives. Refinements made to the alternatives included:

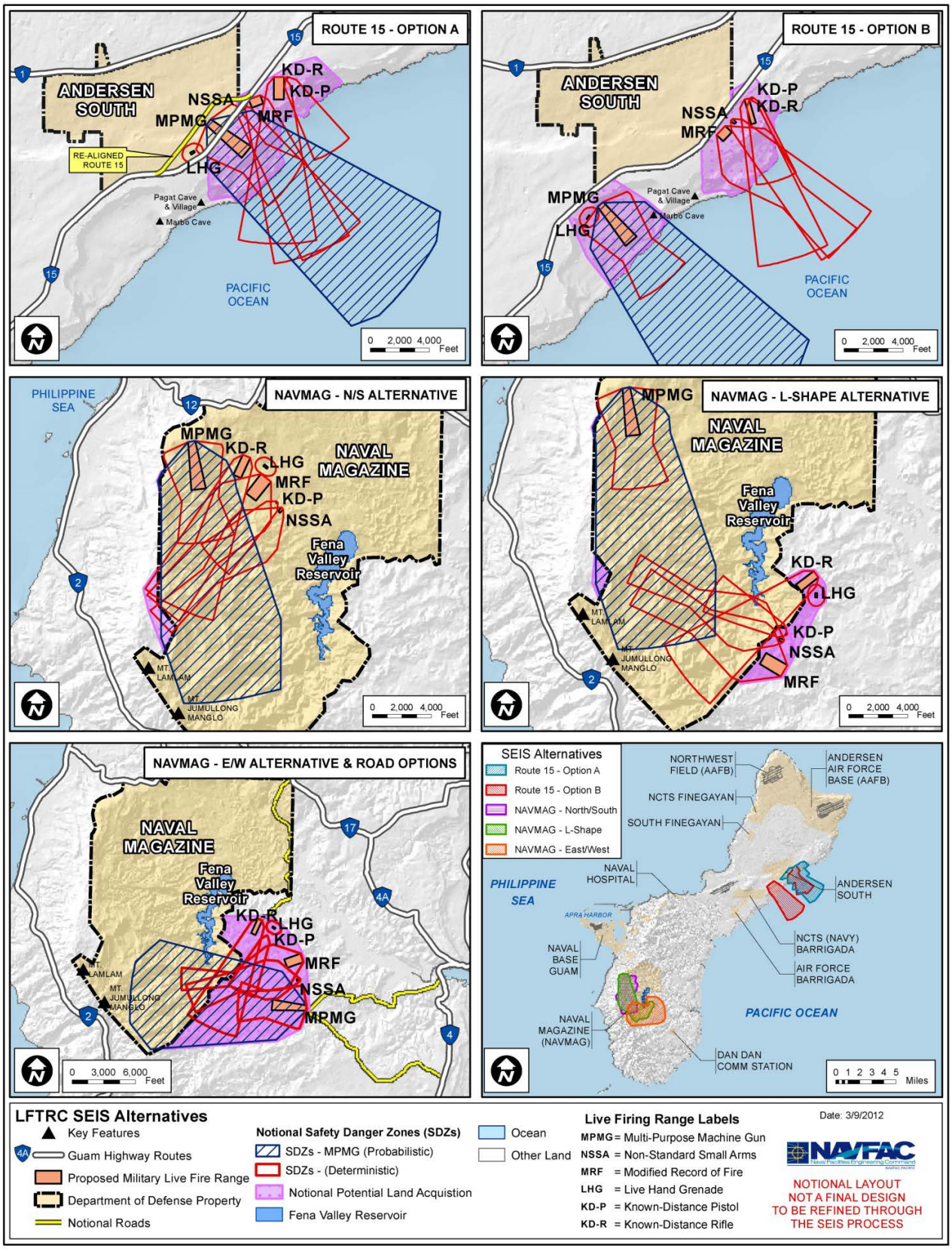
- Development of MPMG grading plans to facilitate MPMG PSDZ development by Marine Corps Training and Education Command (TECOM).
- Development of MPMG PSDZs by TECOM.
- Application of TECOM-developed PSDZs and adjustment of range laydowns, as necessary.
- Drafting of Conceptual Development Plans (CDPs) for each alternative to situate supporting facilities and infrastructure improvements.
- Development of grading plans to support all ranges and associated facilities and infrastructure.

The refined LFTRC alternatives are shown in Chapter 3.



Source: Provided by AECOM.

Figure 1.2-1: Range Alternatives from the 2010 Guam and CNMI Military Relocation FEIS



Source: Provided by AECOM.

Figure 1.2-2: LFTRC SEIS Public Scoping Alternatives, March 2012

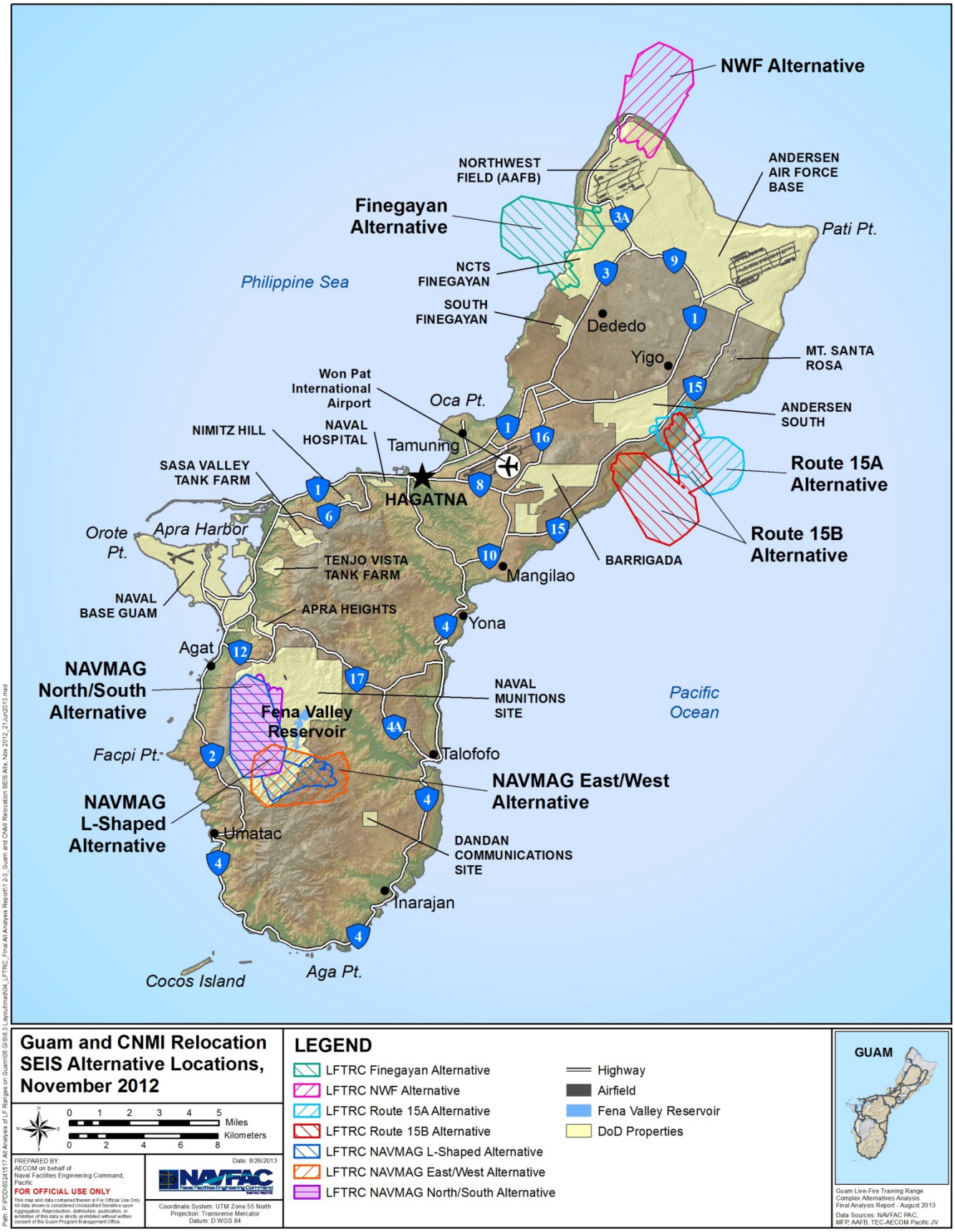


Figure 1.2-3: Guam and CNMI Relocation SEIS Alternative Locations, November 2012

Figure 1.2-4: Guam and CNMI Relocation SEIS Alternative Locations, August 2013

2 PLANNING CONSIDERATIONS

2.1 SURFACE DANGER ZONE

An SDZ is the ground and airspace designated within the training complex for the vertical and lateral containment of projectiles, fragments, debris, and components from the firing, launching, or detonation of weapons systems, including explosions and demolitions. SDZs serve as three-dimensional areas that delineate that portion of the earth and the air above which personnel and/or equipment may be endangered by ground weapons firing or detonation activities because of ricochet or fragmentation hazard. For safety purposes, outdoor ranges have SDZs.

The size and configuration of SDZs are determined through testing and computer simulation and are dependent on the performance characteristics of a given weapons system, training requirements, range configuration, geographical location, and environmental conditions. Criteria from Marine Corps Order (MCO) 3570.1C, *Range Safety* (Marine Corps 2012), define the SDZs for individual weapons systems based on weapon and ammunition characteristics. In addition, computer simulation models, based on and validated by actual weapons system firing, generate ballistic "footprints" that form the basis of SDZs.

The SDZs defined in MCO 3570.1C were developed using a deterministic approach that takes into account "worst-case" parameters for maximum distance, ricochet, impact medium, vertical hazard, and meteorological data effects as part of establishing the geographic limits of the SDZ. Deterministic SDZs represent containment of hazardous activity at a 1:1 million probability, and can be located to meet any given situation irrespective of terrain.

Firing ranges typically have fan-shaped SDZs that contain the following:

- **Firing positions:** the location from which weapons are fired.
- **Target areas:** the area that contains the targets/backstops and is demarcated by limits of fire delineators.
- **Dispersion areas:** the area that includes the ground and associated airspace within the training complex used to contain projectiles between points of fire and the farthest target, with allowance for overshot and horizontal aiming variation.
- **Buffer zones** (also known as secondary danger areas): the area that contains the ricochets and fragments that may extend beyond the dispersion area.

SDZs must be devoid of unrelated facilities. Access to the SDZ is restricted to those involved in the conducted training. SDZs located over water and affecting navigable airspace are published on charts with access restrictions, as appropriate. Depending on the type of restriction, these spaces are monitored by Range Control during firing for safety.

For planning purposes, notional SDZs have been developed to guide the placement of ranges (Figure 2.1-1 through Figure 2.1-5). These notional SDZs were reviewed and approved by TECOM. As the planning process progresses and range designs mature, the SDZs would be certified by TECOM in accordance with MCO 3550.9, Marine Corps Ground Range Certification and Recertification Program (Marine Corps 2004). Use limitations of water and airspace affected by SDZs are subject to regulation by the U.S. Coast Guard, U.S. Army Corps of Engineers, and the FAA, as appropriate.

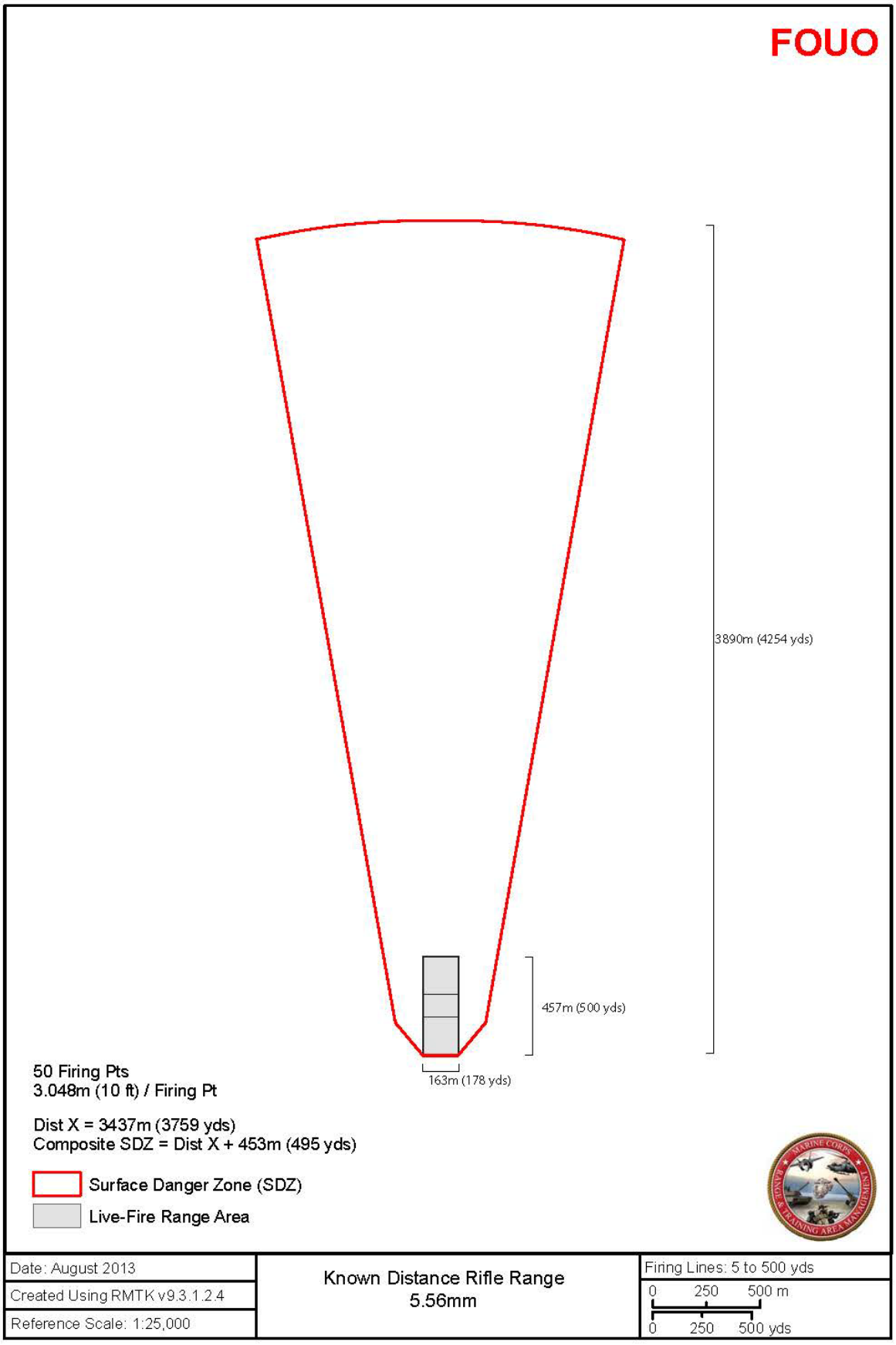


Figure 2.1-1: Known Distance Rifle Range, 5.56mm

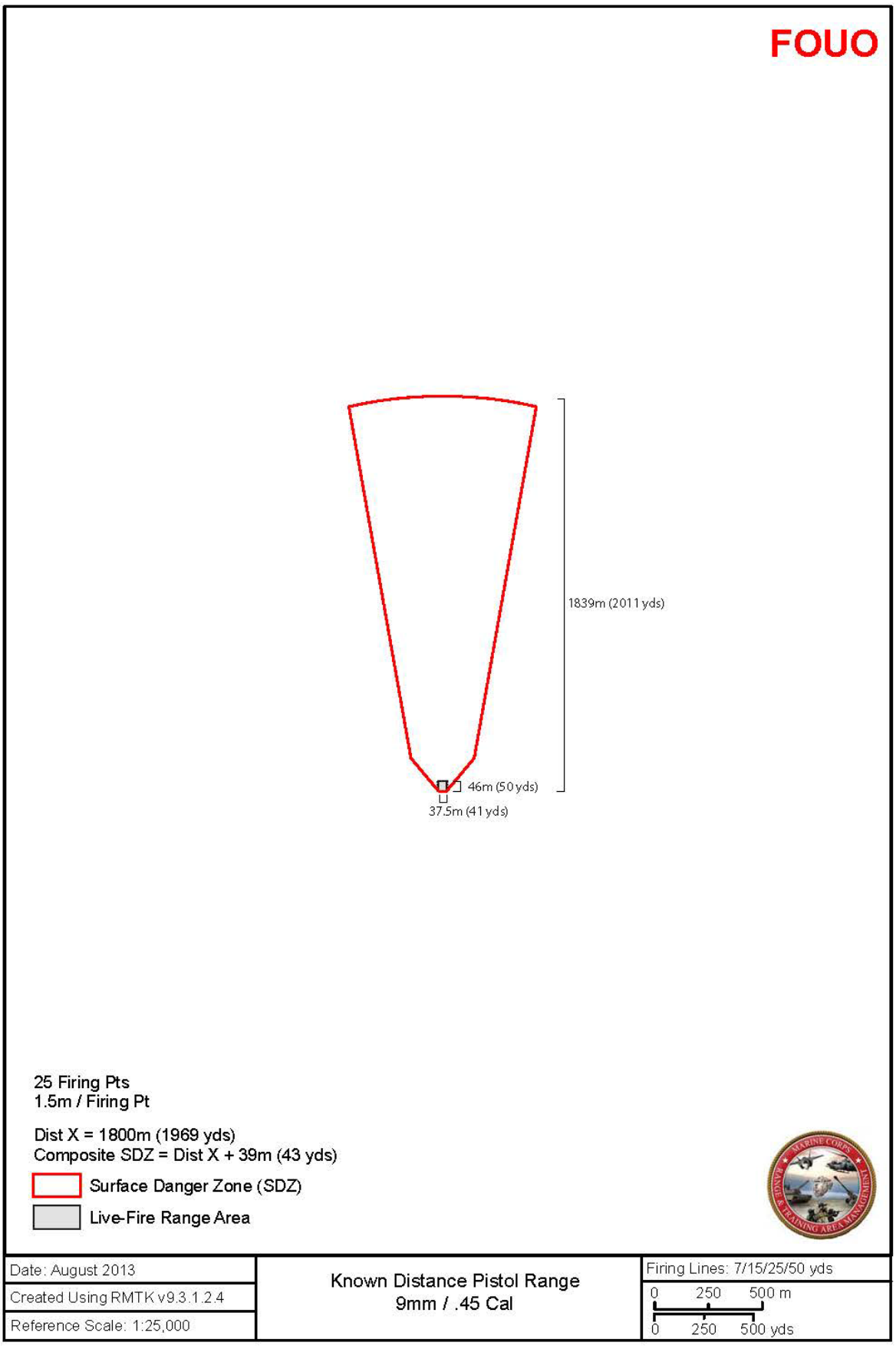


Figure 2.1-2: Known Distance Pistol Range, 9mm/.45 Cal

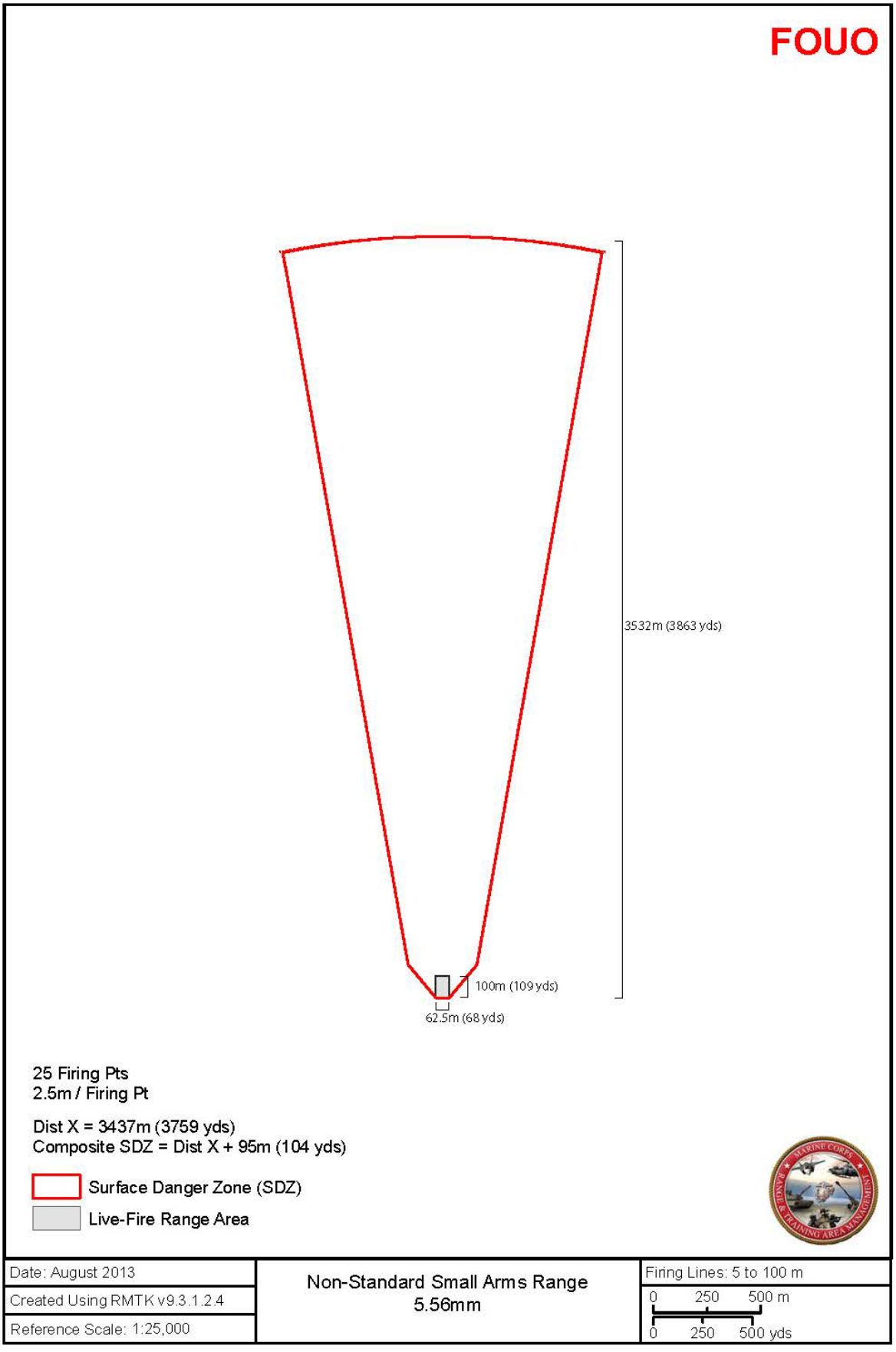


Figure 2.1-3: Non-Standard Small Arms Range, 5.56mm

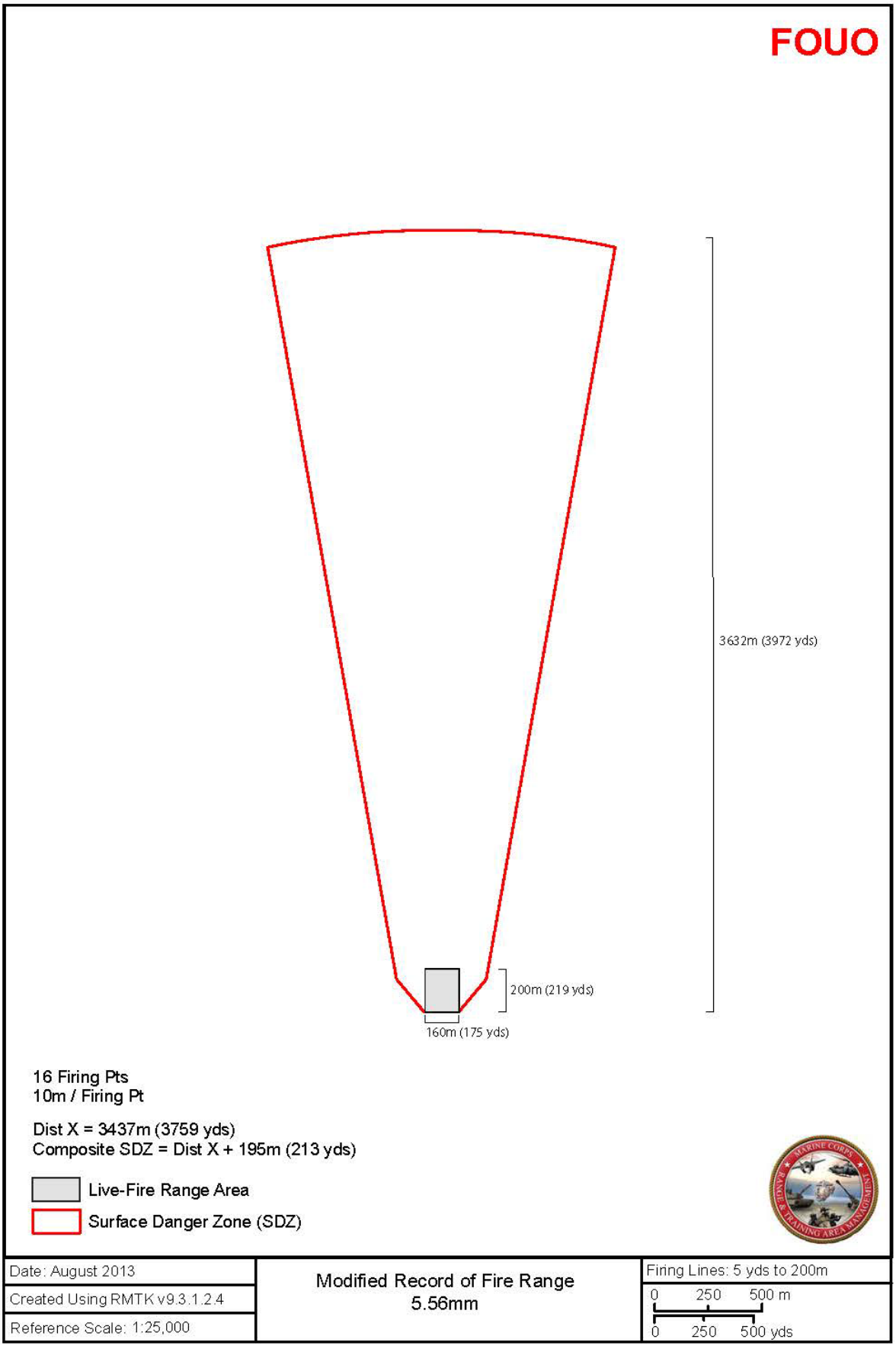


Figure 2.1-4: Modified Record of Fire Range, 5.56mm

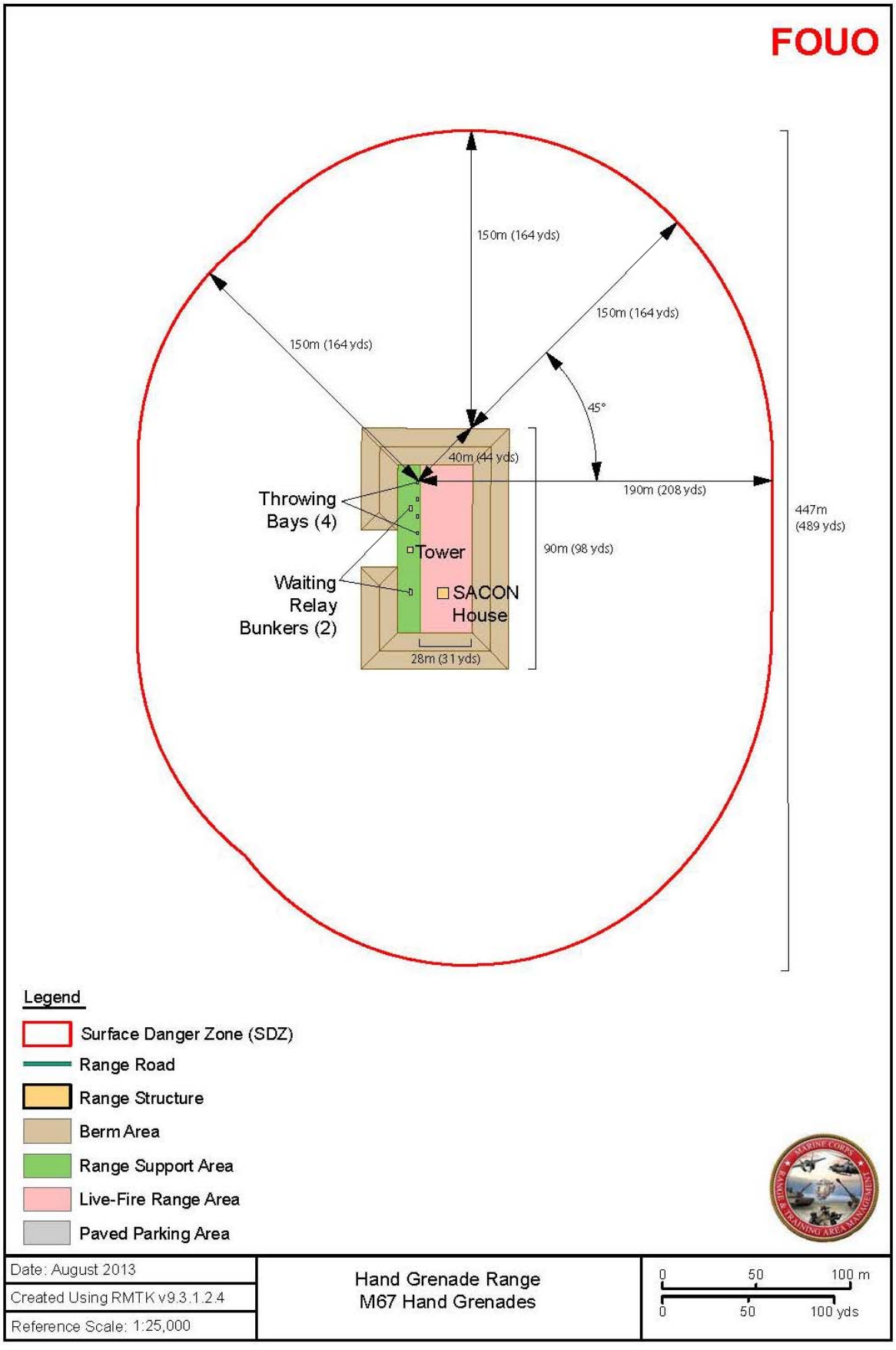


Figure 2.1-5: Hand Grenade Range

2.2 PROBABILISTIC SURFACE DANGER ZONE

The PSDZ methodology was first approved for use in 2009 as directed in TECOM Safety of Use Memorandum 8-09 (Marine Corps 2009). The PSDZ methodology represents an alternate means of defining an SDZ resulting in the same 1:1 million likelihood of escapement and containment of hazardous activity. Rather than "worst case," this methodology is site-specific and applied uniquely to each individual range situation. The PSDZ methodology uses very specific parameters, such as a given weapons and training event, specific terrain, weather conditions, elevation, firing positions, firing posture, and target location. The significant difference between the PSDZ methodology and the deterministic approach is that the PSDZ methodology relies on the precise conditions of the specified range, activity, and weapons system to establish the SDZ, while the deterministic approach relies on more generic parameters.

PSDZs have been used to recalculate the SDZs for two existing KD ranges at Cherry Point, North Carolina, and Marine Corps Base Hawaii. PSDZs have not been used for fire and movement/maneuver ranges or ranges that have the potential for increased ricochet potential (e.g., field firing ranges).

Because the ranges on Guam are currently in their planning stages, digital models of the proposed MPMG sites were developed to emulate the constructed ranges, and the PSDZ modeling was run on the digitally constructed range and altered terrain by TECOM. The resulting PSDZs are shown in Figure 2.2-1. Any changes or modification to this digital modeling or firing parameters and assumptions used for the analysis would invalidate the PSDZ and require additional analysis.

2.3 LIVE-FIRE TRAINING RANGE COMPLEX PLANNING CONSIDERATIONS

The following considerations were addressed in determining the feasibility, suitability, and acceptability of each LFTRC alternative.

2.3.1 Land/Sea/Airspace Availability

Sufficient land space should be available to support the target area of each proposed range and all range support facilities. All range areas and SDZs must be located on DoD-owned land, leased land, or controlled land/sea space. In instances where SDZs extend over off-shore waters, the affected waters must be charted and marked to prevent accidental entry during training. Sufficient airspace over each range and SDZ must be available to contain the vertical hazards associated with live-fire training. Appropriate Special Use Airspace must be established with the FAA to allow for uninterrupted training and to safeguard aircraft operations in the vicinity of the LFTRC (MCO 3570.1C; Marine Corps 2012).

2.3.2 Supporting Infrastructure

Adequate roads, power, water, and wastewater should be available to support range operations. Local extensions and/or tie-ins to existing infrastructure are preferred. In cases where existing supporting infrastructure is not available, infrastructure should be upgraded or extended to the LFTRC.

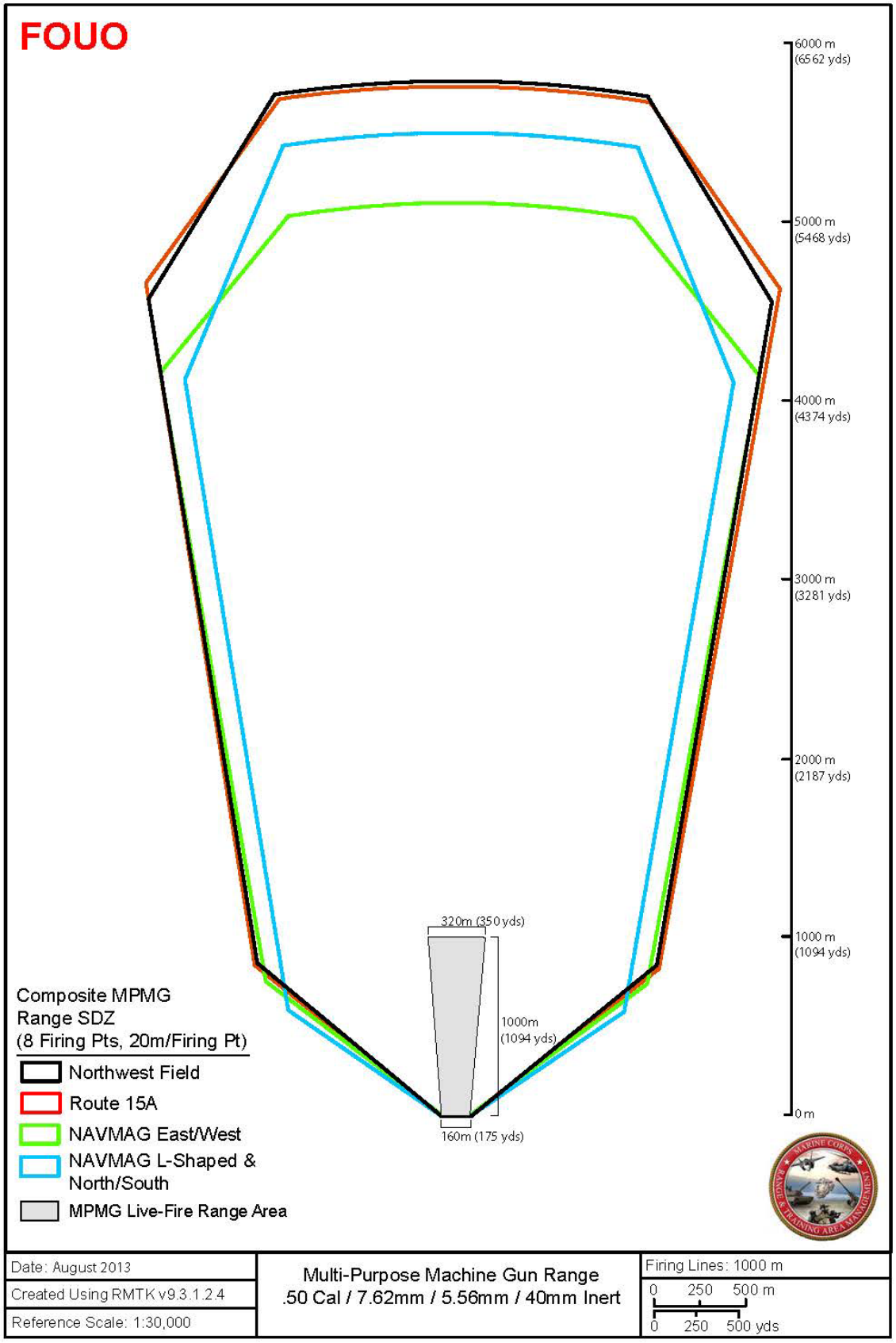


Figure 2.2-1: Multi-Purpose Machine Gun Range, .50 Cal/7.62mm/5.56mm/40mm Inert Training Rounds

2.3.3 Land Use Compatibility

The LFTRC site should be compatible with existing and future surrounding land uses. Noise from live-fire training can create conditions that make certain land uses incompatible with range operations. Suggested land use compatibility in military training noise zones is outlined in Appendix B of MCO 3550.11, *Range Air Installations Compatible Use Zones (RAICUZ) Program* (Marine Corps 2008). Planned growth in the vicinity of an LFTRC should not encroach upon range activities. Any incompatible facilities or infrastructure should be relocated.

2.3.4 Environmental Considerations

Environmental considerations have been taken into account in the planning and siting of each of the LFTRC alternatives, including avoidance and minimization of impacts on natural and cultural resources. Known wetlands, species of concern, and historic and archaeological resources were mapped and compared against the LFTRC laydowns and, where possible, the laydowns were shifted to minimize negative effects. Any remaining potential impacts associated with the various LFTRC alternatives will be assessed as part of the SEIS and through consultations with resource agencies as part of the Endangered Species Act (ESA) or Section 106 of the NHPA, as appropriate.

2.3.5 Public Access

Access to public areas such as cultural, historic, or recreational sites may be allowed during non-firing periods into land/sea space covered by SDZs.

2.3.6 Range Transients

Unauthorized persons are prohibited from entering training complexes (MCO 3570.1C, 2012). The unannounced or unauthorized presence of individuals, livestock, aircraft, or watercraft traversing ranges or their associated SDZs can constrain training activities. The target area, airspace, and SDZ must be sufficiently monitored and controlled to prevent range transients.

Warning signs must be posted around the installation training complex to warn and prohibit entry by unauthorized persons, and to alert authorized personnel of hazard areas. Warning signs would be placed at 656-ft (200-m) intervals or less, or in a way that ensures that persons entering the range would see at least one sign within a legible distance.

SDZs located over water must be published in Part 334, Title 33, Code of Federal Regulations (33 CFR 334, 1985). Firing cannot commence until the Coast Guard has marked the restricted danger area with buoys. The number and placement of permanent buoys delineating the overwater SDZ will be determined through consultation with the U.S. Coast Guard and U.S. Army Corps of Engineers.

2.3.7 Operational Efficiency

Operational efficiency is achieved through effective siting and proximity to cantonment/billeting areas. Locating all firing ranges in a single complex allows for training efficiency, reduces overall space requirements, and

lessens the potential for contamination by allowing SDZs to overlap. Proximity to cantonment areas produces training efficiencies by reducing the time spent transporting personnel and equipment to range areas.

2.3.8 Orientation

The geographical orientation of a firing range affects range operations and available hours of use. North/south facing ranges have the highest amount of available daytime use because personnel do not have to fire into the rising or setting sun.

2.4 LFTRC FACILITIES DESCRIPTIONS

2.4.1 Rifle Known Distance Range (Category Code Number [CCN] 17550)

The Rifle KD Range is designed for training rifle marksmanship and target engagement techniques (Figure 2.4-1). This range is used to train personnel on the skills necessary to identify, engage, and hit stationary targets in a static array from a known distance. The Rifle KD Range supports the Marine Corps' annual qualification and requalification required by the Marine Corps Combat Marksmanship Programs (MCO 3574.2K; Marine Corps 2007).

The proposed Rifle KD Range would provide 50 firing points to support training with 5.56 millimeter (mm) weapons. The range would be 178 yards (yd) (163 m) wide and 500 yd (457 m) from the farthest firing line to the target line. Other features would include:

- Target line flush with ground.
- Level ground from 200 yd (183 m) firing line to target line.
- 25-ft (8-m) tall impact berm behind the target line.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 250-person covered bleachers.
- Parking for range support personnel, Officers and Staff Non-Commissioned Officers (SNCOs), and range support vehicles.

The 18.5-ac (7.5-ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint in keeping with Best Management Practices.

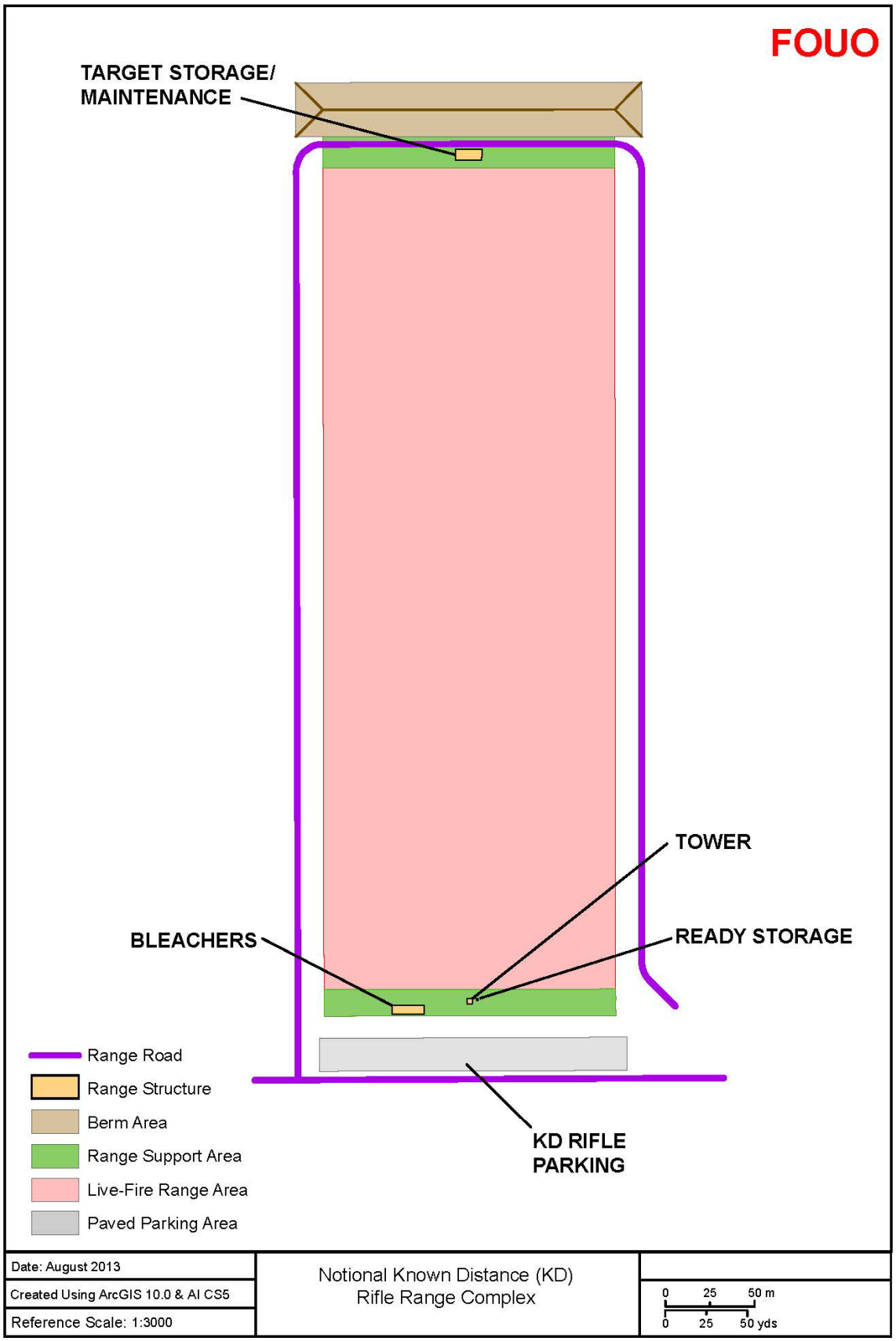


Figure 2.4-1: Notional Known Distance (KD) Rifle Range Complex

2.4.2 Pistol Known Distance Range (CCN 17570)

The Pistol KD Range is designed for training pistol and revolver marksmanship and target engagement techniques (Figure 2.4-2). This type of range is used to train personnel on the skills necessary to identify, engage, and hit stationary targets in a static array from a KD.

The proposed Pistol KD Range would provide 25 firing points to support training with 9mm and .45 caliber weapons. The range would be 41 yd (37.5 m) in width and 50 yd (46 m) from the farthest firing line to the target line. Other features would include:

- Level ground from 50 yd (46 m) firing line to target line.
- 12-ft (4-m) tall impact berm behind the target line and 12-ft (4-m) lateral berms.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 100-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The 0.4-ac (0.2-ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

2.4.3 Non-Standard Small Arms Range (CCN 17502)

The NSSA Range is designed for training requirements that are not associated with current published doctrine, but fall within a commander's training requirements (Figure 2.4-3).

The proposed NSSA Range would provide 25 firing points to support training with 5.56mm weapons. The range would be 68 yd (62.5 m) in width and 109.4 yd (100 m) from the farthest firing line to the target line. Other features would include:

- Level ground from 100 yd (91 m) firing line to target line.
- 16-ft (5-m) tall impact berm behind the target line and 16-ft (5-m) lateral berms.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 100-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The 1.5-ac (0.6-ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

2.4.4 Modified Record of Fire Range (CCN 17532)

The MRF Range is designed for training and day/night qualification with rifles (Figure 2.4-4).

The proposed MRF Range would provide 16 firing points to support training with 5.56mm weapons. The range would be 175 yd (160 m) in width and 219 yd (200 m) from the farthest firing line to the target line. All targets are fully automated and the event-specific target scenario is computer driven and scored from the range operations center. Other features would include:

- 25 ft (8 m) tall impact berm at the far end of the range.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 100-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The 7.9-ac (3.2-ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

2.4.5 Multi-Purpose Machine Gun Range (Automated) (CCN 17582)

The automated MPMG Range is designed for zeroing, training, and qualification requirements with Squad Automatic Weapons, sniper weapons, and machine guns (Figure 2.4-5). The range is used to train personnel on the skills necessary to identify, engage, and hit stationary and moving targets in tactical arrays. All targets on this range are fully automated, and the event-specific target scenario is computer driven and scored from the range operations center.

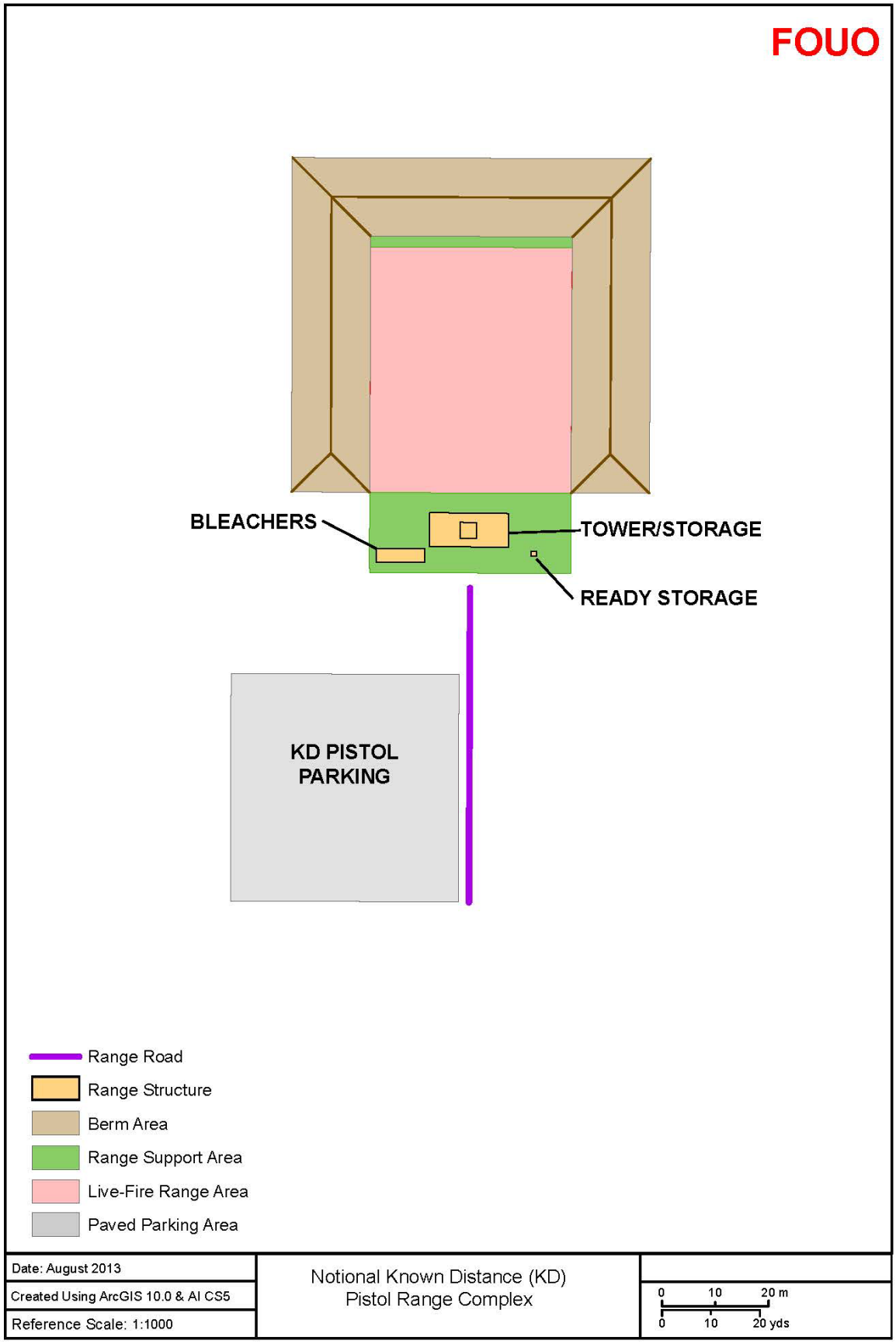


Figure 2.4-2: Notional Known Distance (KD) Pistol Range Complex

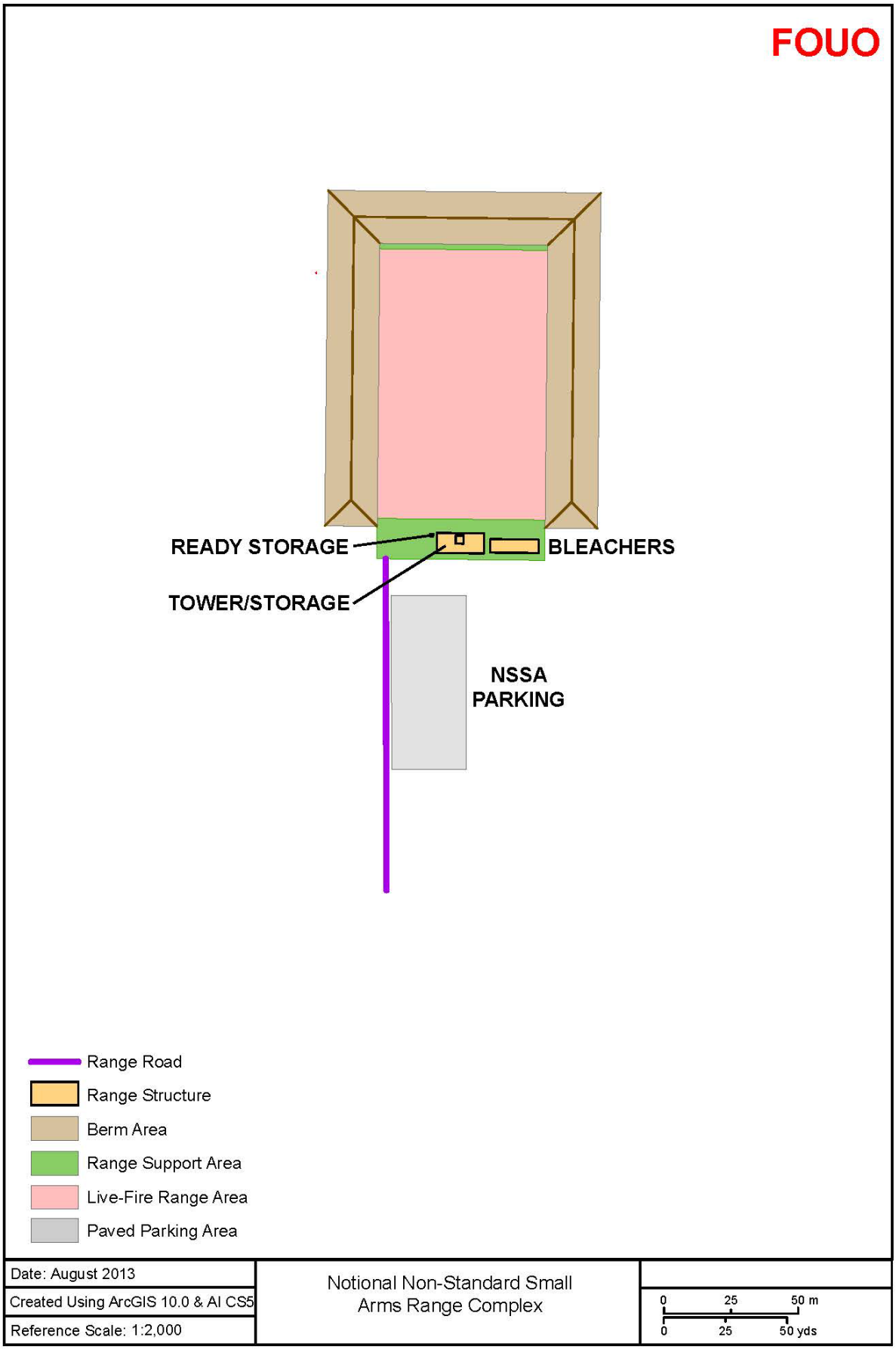


Figure 2.4-3: Notional Non-Standard Small Arms Range Complex

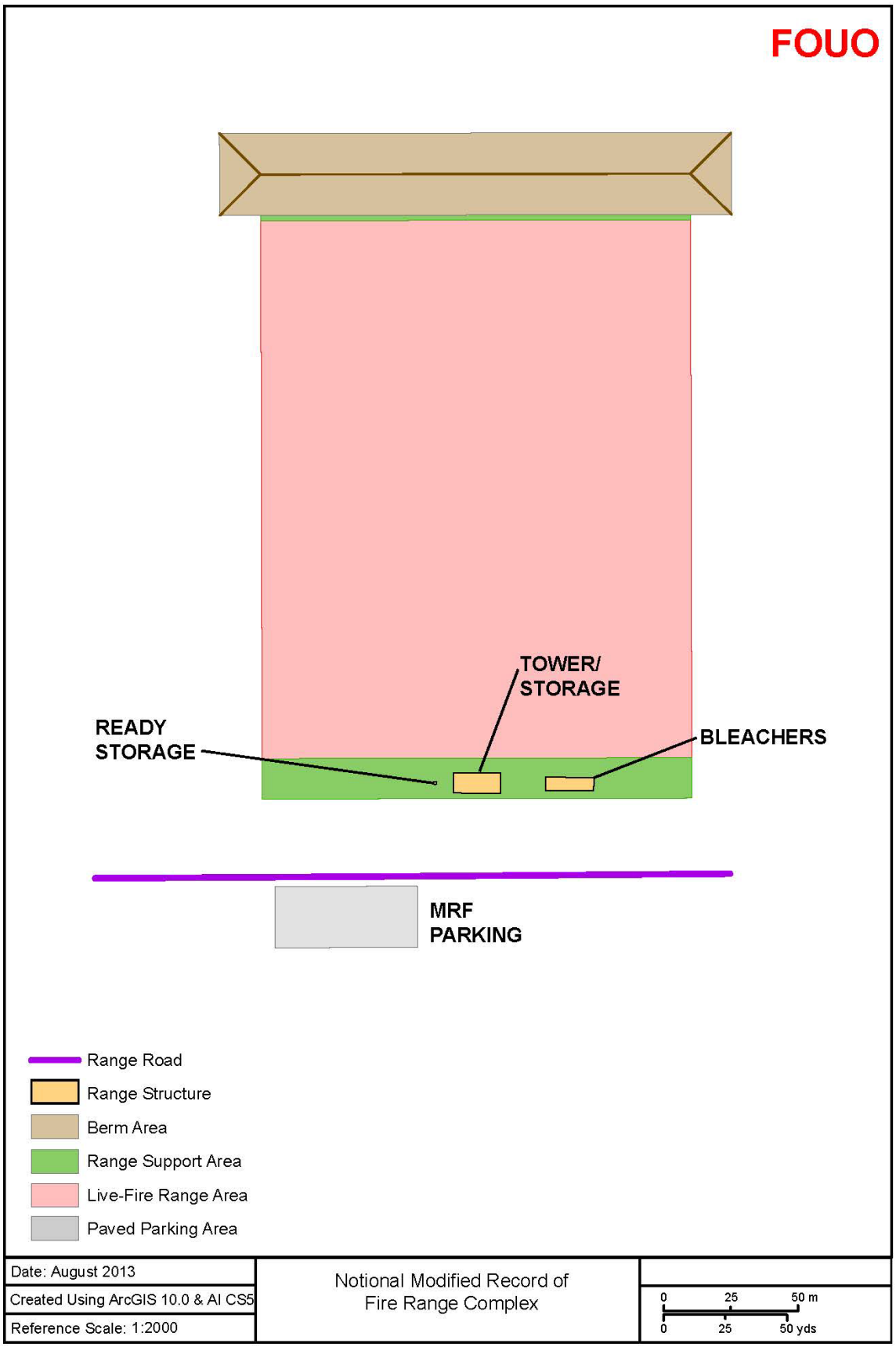


Figure 2.4-4: Notional Modified Record of Fire Range Complex

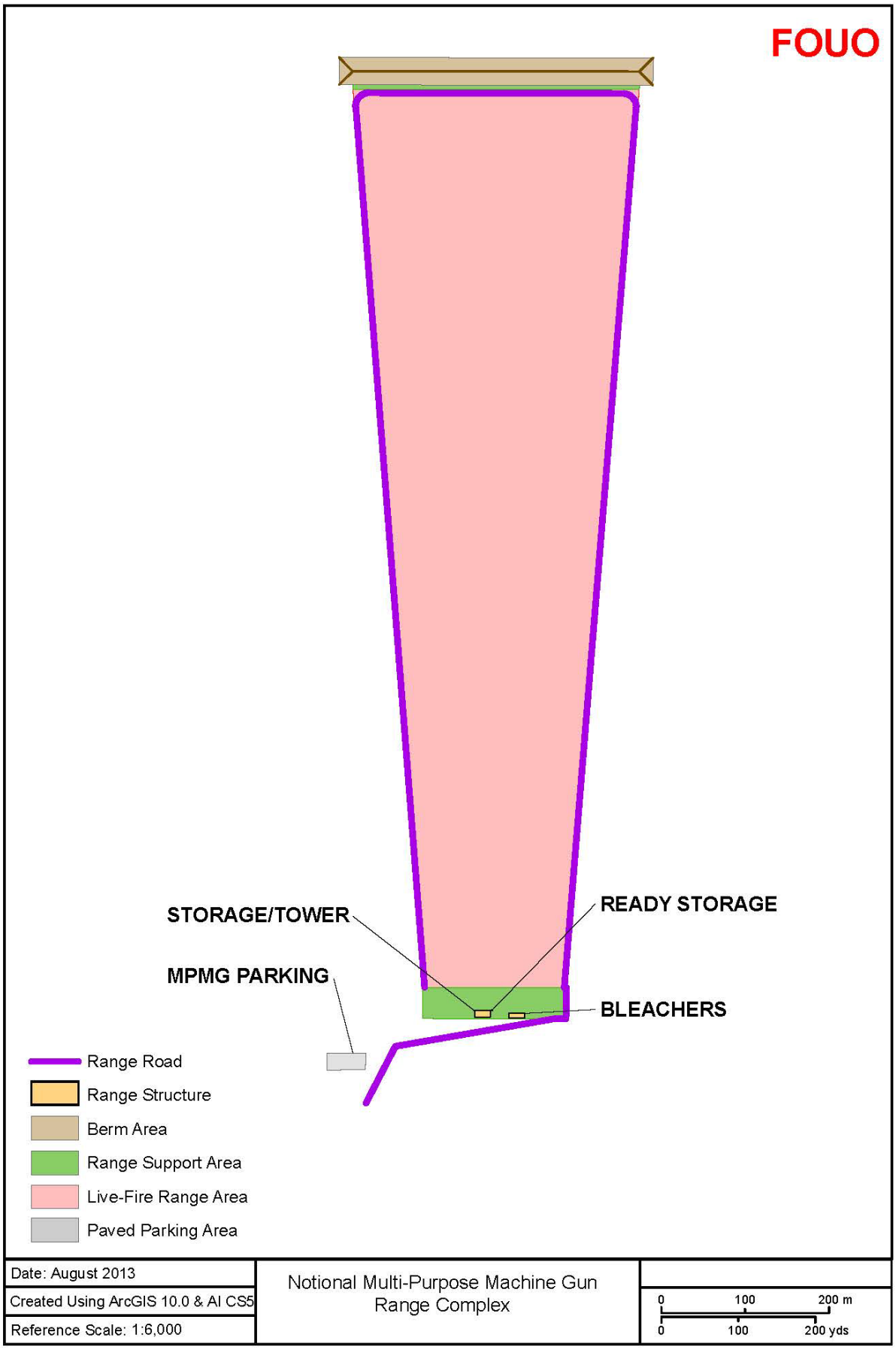


Figure 2.4-5: Notional Multi-Purpose Machine Gun Range Complex

The proposed MPMG Range would provide eight firing points to support training with 5.56mm, 7.62mm, .50 caliber, and 40mm weapons. The 40mm training would be restricted to Inert Training munitions. The range would be 175 yd (160 m) wide at the firing line, expanding to 350 yd (320 m) wide at the far end of the range, and 1,093.6 yd (1,000 m) long from the firing line to the farthest target line. Other features would include:

- 25-ft (8-m) tall impact berm at the far end of the range.
- Trench for future automated target scoring system.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 150-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The range footprint would encompass an estimated 59 ac (24 ha). Natural terrain and vegetation may be incorporated into the range as long as line-of-sight is maintained between the firing line and targets/target arrays. The overall acceptable slope for the range is of +/- 2 %.

2.4.6 Hand Grenade Range (CCN 17810) and Hand Grenade House

The Hand Grenade Range is designed to satisfy the training requirement of throwing live hand grenades. The range is used to familiarize personnel with the effects of live fragmentation grenades.

The proposed hand grenade training complex would consist of four grenade pits for basic familiarization training and a Grenade House for more advanced training. The Grenade House would provide four stations to accommodate training for up to four personnel at any given time. Fragmentation grenades would be authorized for use at the Grenade House. Operations at the proposed Grenade House would be suitable for fire team and squad training. An approximately 0.9-ac (0.4-ha) area would be cleared and developed as a hand grenade training range complex for the M67 fragmentation hand grenade (Figure 2.4-6). Other features would include:

- A 1.0-ac (0.4-ha) training and demonstration field.
- A holding shelter for the subsequent throwing relay of four persons.
- A Grenade House structure made of Shock Absorbing Concrete (SACON) or other bullet absorbing material.
- 16-ft (5-m) tall impact berm surrounding the range.
- Range Operations Tower with ballistic glass.
- Portable toilets.
- Ready issue magazine.
- 100-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

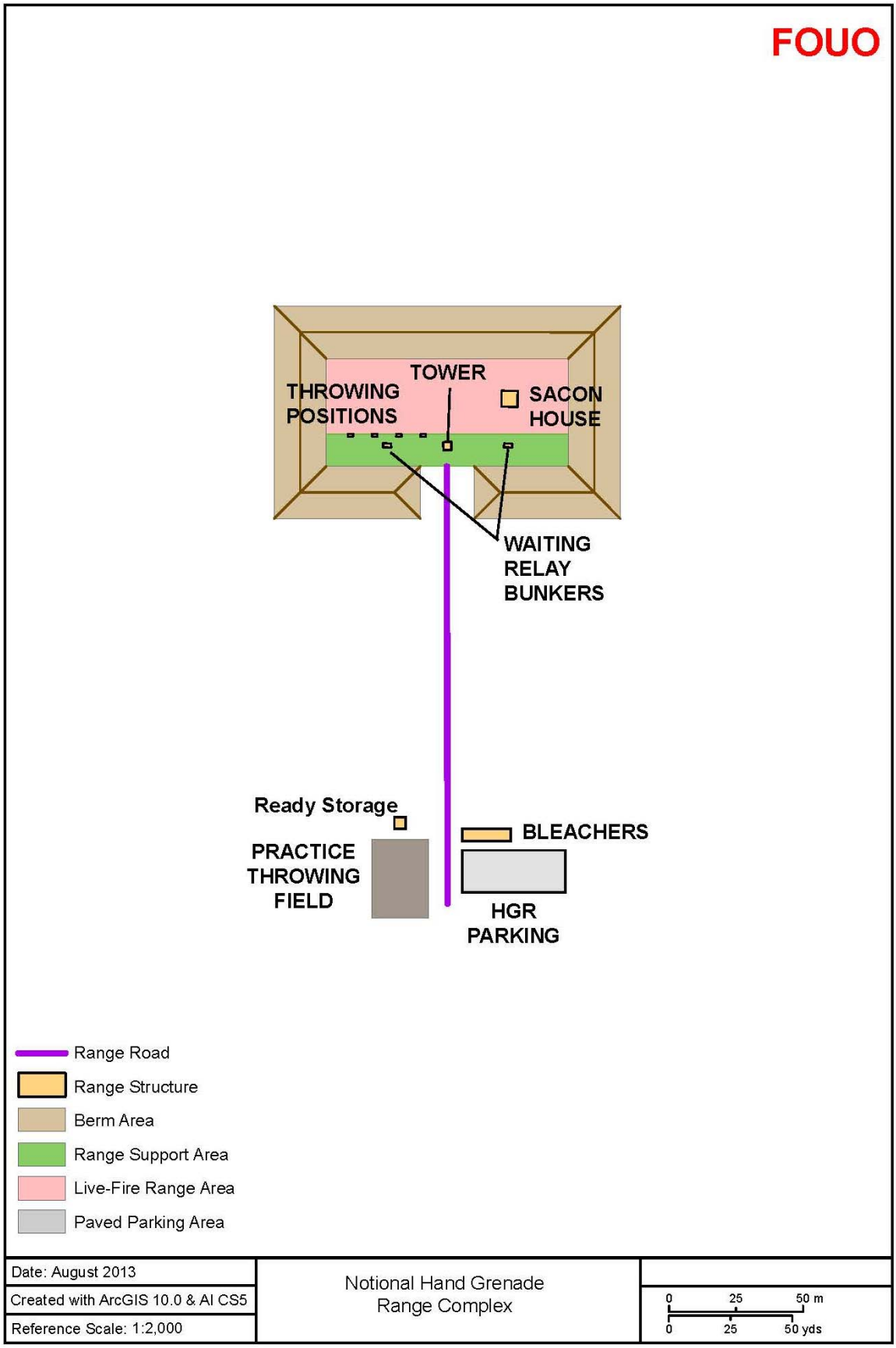


Figure 2.4-6: Notional Hand Grenade Range Complex

Training for this individual combat skill is conducted at individual stations and is enhanced when co-located with Military Operations in Urban Terrain (MOUT) and maneuver training areas.

2.4.7 Range Maintenance and Storage Building (CCN 17310)

The 27,500 square foot (ft^2) (2,555 square meter [m^2]) Range Maintenance and Storage Building would include offices for maintenance, supply, and environmental personnel; a maintenance bay for range vehicles; delivery point and storage for materials; carpenter shop for target construction/repair; storage for targets; and storage and repair for range maintenance equipment such as tractors and mowers. In addition, separate flammable storage is required for gasoline and other volatile consumables used in target repair.

2.4.8 Range Observation Towers (CCN 17935-1.2)

Range Observation Towers are proposed to support the observation of SDZs that extend over nearshore waters. These towers would have a 97 ft^2 (9 m^2) footprint and would be 33 ft (10 m) high. They are designed for manned and unmanned operation. Each tower would be equipped with day/night thermal cameras to provide enhanced observation of the over-water SDZs during periods of darkness or inclement weather. All cameras would be centrally monitored and remotely controlled by the Range Control Facility (RCF) at the Main Cantonment area. Range Observation Towers will be marked on top with flashing red lights for aviation safety and to demarcate SDZ boundaries at night.

2.4.9 Entry Control Point

The Entry Control Point (ECP) would control vehicular access to the LFTRC and serve as the primary means of entry. A 540 ft^2 (50.2 m^2) Sentry House (CCN 73025) provides all-weather protection to ECP security personnel and visitors' credential screening. An adjacent parking lot would provide parking for security vehicles and visitors during any required processing.

2.4.10 Range Control Facility

The RCF would be located on the Main Cantonment to facilitate coordination with operational units and headquarters and is included as part of each Main Cantonment alternative. The RCF has three functional areas:

- The Range Support Section is responsible for the day-to-day operations of the RCF, including budget development/execution, personnel administration, range sustainment and upgrades, range automation, training support, and geographic information system (GIS) support.
- The Range Maintenance Section is responsible for the upkeep of the ranges and training areas, including the submission of work requests, vegetation control, and target repair.
- The Range Operations Section consists of three distinct but integrated areas: Scheduling, Fire Desk Operations, and Range Safety, as described below.
    - Scheduling of the LFTRC would be accomplished by using the Range Facility Management Support System, which is a web-based, automated scheduling system that allows remote users to verify the availability of LFTRC facilities and associated airspace; submit requests for scheduling the LFTRC and associated airspace; and determine the status of previously submitted

LFTRC requests. The scheduling function also provides the ability for Range Control personnel to approve, process, and track LFTRC requests; schedule training area maintenance; resolve scheduling, safety, airspace, or environmental conflicts (deconfliction); and publish a range bulletin that reflects LFTRC assignments for a specific period.

- Fire Desk Operations would authorize scheduled units for access onto the appropriate range; provide real-time monitoring of the LFTRC and associated airspace's training status, which is accomplished by both ground and air Position Location Identification Systems; and collect range utilization data. If there is a real or perceived safety violation/concern (e.g., aircraft entering the SDZ of a "hot" range, units not maintaining radio communications, severe weather approaching, etc.), the Fire Desk Operator would immediately take the necessary actions to correct the situation.

- Range Safety personnel would ensure that training units are equipped with the authorized weapons and ammunition for that specific range; have established radio contact with the RCF prior to live fire; understand the range limitations; serve as the first responders to any Range Training Area accident; and conduct pre- and post-inspections of the range.

The Marine Corps would be responsible for the organizing, training, and equipping of the RCF. The Marine Corps would also coordinate with other services and Range Training Area users on Guam to integrate their respective RCFs into a larger, joint range management and control capability as additional Range Training Areas come online within the Mariana Islands Range Complex.

2.5 UTILITIES

2.5.1 Electrical Power

The electrical power demand for the LFTRC is based on the required power to support the various towers, ECPs, range support buildings, and outdoor lighting (to support limited night-time use). Using a diversity factor of 27% since not all connected loads are active at the same time, the estimated maximum total demand from the LFTRC facilities would be less than 100 kilowatts (kW).

In general, service to the site would be via single-phase, underground power lines, using either 13.8 kilovolts (kV) or 4,160 volts (V), depending on the existing available primary power source at each site. Where the electrical routing is in parallel with the Information Technology (IT)/Communication (Comm) lines, the primary power lines would be installed underground, in the same trench as the IT/Comm lines. Low voltage power to the buildings would be 120/240 V, single phase to be fed from a pad-mounted distribution transformer. Because of the distance between buildings, each building would be served with a separate transformer rather than using a common transformer to serve multiple buildings.

The power demand from the LFTRC would be insignificant and would not impact Guam Power Authority (GPA) transmission or local distribution systems. The power to the LFTRC would be supplied by connecting to the

closest available distribution system lines, whether owned by DoD or GPA. The LFTRC power distribution lines are shown in the electrical distribution figures provided in Chapter 3 for each LFTRC alternative.

2.5.2 Potable Water

For all of the LFTRC alternatives, the water demand would be minimal; the required water supply would come from the nearest water distribution pipe (DoD or Guam Waterworks Authority [GWA]) and would be adequate to meet fire water requirements of the Unified Facilities Criteria (UFC).

Potable water service is required for only the KD Rifle Range, KD Pistol Range, and the Range Maintenance and Storage Building. The Range Maintenance and Storage Building would need a sprinkler system and fire protection in accordance with UFC 3-600-01: *Fire Protection Engineering for Facilities* (DoD 2013). Water demand calculations are based on UFC 3-230-03: *Water Treatment* (DoD 2012). There are four different types of water demand: (1) domestic uses, (2) industrial uses, (3) fire protection demands, and (4) unaccounted for water (UFW).

Domestic uses include drinking water, household uses, and household lawn irrigation. The LFTRC has no residential housing, so the entire domestic demand is based solely on non-resident personnel and civilian employees, with a daily consumption rate of 30 gallons (gal) (113 liters [L]) per day. A total design population of 884 persons was used to calculate demand. The average day demand for the entire LFTRC is 26,520 gal (100,389 L) per day.

To properly size the pipes, the design population must be separated and properly applied to the different locations of the LFTRC. Of the assumed total of 884 personnel, 145 support personnel are required to support the five different ranges (i.e., KD Rifle, KD Pistol, NSSA, MRF, and MPMG Ranges), and the demand for these support personnel would be applied to the Range Maintenance and Storage Building. The remaining 739 personnel would consist of the training personnel on the five ranges. However, it was determined that potable water should only be provided to the KD Rifle Range and KD Pistol Range; therefore, the total demand for the 739 training personnel would be split equally between the two ranges. It is assumed that training personnel from the other ranges would visit either the KD Rifle or KD Pistol Range for water uses, such as filling up canteens or consuming the water at the site.

Industrial uses include water for cooling, irrigation, shops, laundry facilities, air conditioning, wash racks, and boiler makeup. The only industrial demand for the LFTRC would pertain to air conditioning for the Range Maintenance and Storage Building. Although the Range Observation Towers at the perimeter and the Gate House at the ECP would also have air conditioning, the air conditioning units would consist of the smaller, window-type units that only require electricity. The air conditioning requirement for the Range Maintenance and Storage Building is based on an estimated building area of 27,500 ft^2 (2,555 m^2) and an average requirement of 0.05 gal per minute per ton. This requirement was derived from the cancelled UFC 3-230-19N (DoD 2005), as the new UFC 3-230-03 (DoD 2012) does not include air conditioning demand guidance. A total industrial load of 0.96 gal (3.6 L) per minute, or 1,375 gal (5,199 L) per day, is required for the Range Maintenance and Storage Building.

Adequate fire protection that complies with UFC 3-600-01 (DoD 2013) is required for the Range Maintenance and Storage Building. Fire protection and suppression for the five ranges would be provided by fire fighting vehicles such as fire trucks and water tank trucks. Fire hydrants would not be needed for protection of the ranges, and a fire fill connection at an accessible location on the LFTRC would be provided. This can be in either the form of a stand pipe or fire hydrant.

UFW is water that is not metered and lost through leakages. The UFC provides no guidance on estimating UFW. Most water utilities, policymakers, and associations, such as the American Water Works Association, deem a 10% to 15% UFW loss as acceptable. Using this as guidance and to be consistent with the demand calculations for the *Guam and CNMI Military Relocation 2012 Roadmap Adjustments Planning Report* (NAVFACPAC 2013a), a value of 15% was used for these calculations for both the domestic and industrial uses. A summary of the calculations is provided in Table 2.5-1.

Table 2.5-1: Estimated Water Demand for the LFTRC

	Domestic	UFW – Domestic	Industrial	UFW – Industrial	Total
Range Maintenance and Storage Building	4,350	653	1,375	206	6,584
KD Pistol Range	11,085	1,663	—	—	12,748
KD Rifle Range	11,085	1,663	—	—	12,748
Total LFTRC	**26,520**	**3,979**	**1,375**	**206**	**32,080**

Source: Provided by AECOM.
Note: All measurements in gallons per day.
Legend: KD = known distance; LFTRC = Live-Fire Training Range Complex; UFW = unaccounted for water.

2.5.3 Wastewater

Wastewater requirements for the LFTRC would be minimal as the Range Maintenance and Storage Building would be the only LFTRC facility requiring sewer service. Any existing sewer in proximity to the LFTRC is assumed to have adequate capacity. Portable toilets would be provided at each of the ranges.

2.5.4 Information Technology/Communication

The LFTRC would be connected to the Main Cantonment with a duct bank consisting of six 4-inch (10-centimeter [cm]) diameter conduit. Where the routing is off base, the duct bank would be encased in concrete and provided with lockable manholes. Where routing is on base, the duct bank would be encased in concrete only when under roadways or parking lots and would not require locking manholes. The depth of the duct bank would be a minimum 2 ft (0.6 m) below ground surface. For redundancy, the LFTRC would also be provided with a wireless system of communications with the Main Cantonment.

2.6 LIFE CYCLE COST

A comprehensive Life Cycle Cost Analysis (LCCA) was submitted in August 2013 as a separate report, *Life Cycle Cost Analysis, Marine Corps Relocation* (NAVFACPAC 2013b). The LCCA covers the development of the Main Cantonment and the LFTRC. The LFTRC life cycle costs (LCC) are summarized in this report.

The purpose of the LCCA was to develop comparative costs of the alternatives to facilitate decision-making. For this reason, with the exception of initial construction costs, costs that are common across all alternatives were disregarded for the purpose of the comparative study. These costs are often referred to as "wash costs," and examples include costs associated with the non-live-fire training at Andersen South and operational costs associated with the ranges. Certain costs vary among the alternatives, such as the costs for fire/law enforcement and security, or service contract work related to road and grounds maintenance. Where material differences exist, the costs were evaluated in the LCCA. For the purpose of the LCCA, material or substantial refers to a cost that is sufficient to influence the relative ranking of the alternatives.

The findings of the LCCA provided only cost analyses; benefits or advantages of the alternatives were not considered, nor were non-cash impacts, such as overall operational efficiency or productivity differences among alternatives.

The LCCA for the LFTRC considered the following elements (Table 2.6-1):

- **Initial Investment:** Includes buildings, utilities and site improvements, off-site improvements, easement acquisition, and environmental/cultural mitigation.
- **Sustainment:** Covers all routine maintenance and repair of facilities, including periodic replacement of equipment or components. Sustainment preserves, but would not extend, the total useful service life of the asset.
- **Relinquished Land Value:** Includes the value of land given to the Government of Guam (GovGuam) in accordance with DoD's commitment to pursue a "Net Negative" strategy, which would mean that any land acquisition will be offset by returning underutilized federal-owned lands to GovGuam.
- **Major Replacement:** Includes replacement of assets at the end of their economic life, where the economic life is less than the term of the analysis.
- **Terminal Value:** The remaining value of facilities at the end of the 32-year project period.

Table 2.6-1: Life Cycle Costing for the LFTRC

Life Cycle Cost Elements (Discounted)	NWF ($,000)	RT 15A ($,000)	NAVMAG North/South ($,000)	NAVMAG L-Shaped ($,000)	NAVMAG East/West ($,000)
Initial Investment	$266,031	$356,257	$501,130	$394,992	$259,125
Sustainment	$67,776	$60,629	$58,535	$71,973	$56,451
Relinquished Land Value	$0	$111,553	$36,553	$73,406	$186,652
Major Replacement	$524	$507	$507	$496	$496
Terminal Value	-$20,177	-$70,789	-$20,626	-$59,175	-$70,481
TOTAL	**$314,154**	**$458,157**	**$576,099**	**$481,692**	**$432,243**

Source: Provided by AECOM.

2.7 CONSTRUCTION PHASING PLANS

A construction phasing plan has been developed and is described for each alternative in Chapter 3, with construction phasing timelines presented in Appendix A. The phasing plans assume a ROD for the ongoing SEIS will be signed in March 2015 and forecast when each LFTRC alternative would achieve its Initial Operational Capability (IOC) to support Marine live-fire training. The phasing plans consider the following: development of

design/build packages; land acquisition (where required); land surveys; grading; utilities and road development; vertical (buildings) construction; and construction of relocated or replacement facilities (where required).

The construction phasing plans were developed using the following assumptions:

- The following are the three contract packages:
  - Hand Grenade Range (funding in Fiscal Year [FY] 2016).
  - KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
  - MPMG Range (funding in FY 2017).
- The KD Rifle, KD Pistol, MRF, and NSSA Range package is assumed to include an access road, area roads, a Range Maintenance and Storage Building, any common facilities required to render these ranges functional (such as overwater Range Observation Towers), and associated utilities that extend to the direct access roads of other ranges.
- For the NAVMAG L-Shaped and North/South alternatives, munitions storage construction is assumed to occur in parallel with range construction.
- Abandoned munitions storage units would not be demolished.
- The transfer of munitions from old to new units would happen concurrently with storage unit construction and range construction. It is assumed that one unit per week can be transferred.
- As ranges are constructed, they would be functional upon completion and within the allotted funding.
- Vertical construction would delay excavation, utilities, and roads by 4 months for all alternatives and would not include new munitions storage facilities.
- The excavation productivity assumptions may need to be adjusted for difficult terrain and would not include Munitions and Explosives of Concern (MEC) or vegetation clearance.
- Property acquisition durations were provided by Naval Facilities Engineering Command Pacific (NAVFACPAC), and worst-case scenarios were used in the schedules.
- Excavation productivity summarized in Table 2.7-1, below.

Table 2.7-1: Estimated Excavation Productivity

Quantity Range (Total)	Daily Volume
Large Quantities (above 100,000 cubic meters [m^3])	3,500 m^3/day
Medium quantities (10,000 to 100,000 m^3)	1,000 m^3/day (with trenching) 2,000 m^3/day (without trenching)
Small quantities (below 10,000 m^3)	400 m^3/day (with trenching) 800 m^3/day (without trenching)

Source: Provided by AECOM.

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3 CONCEPTUAL DEVELOPMENT PLANS FOR THE LIVE-FIRE TRAINING RANGE COMPLEX

3.1 INTRODUCTION

The purpose of the LFTRC CDPs is to visually demonstrate land use, functional relationships, access, building footprints and massing, utility corridors, sustainability features, and the overall built environment experience associated with each of the LFTRC alternative sites. The CDP process allows the design of all of the interrelated elements and features associated with the creation of a new training complex. The CDP process also facilitates comparison by applying holistic and consistent criteria to each alternative. To ensure a comprehensive approach, utilities, infrastructure, and sustainability planning efforts were integrated with all aspects and at each stage of the planning process.

Each of the CDPs aimed for optimum consistency with the Marine Corps mission, Guiding Principles, Vision Statement, applicable UFC, and Marine Corps development policies, goals, and mandates, while minimizing impacts on existing operations, where applicable.

The CDP process involved continuous stakeholder engagement, decision-maker briefings, and collaborative concurrence throughout the stages of plan refinement. An overarching outcome of this planning process, in general, and the CDP staged development in particular, is to inform the decision-making process in the identification of a Preferred Alternative that will be used in the SEIS and to document that process of selection.

The following chapter outlines the baseline conditions of the five alternative sites (i.e., NWF, RT 15A, NAVMAG North/South, NAVMAG L-Shaped, and NAVMAG East/West), including natural and man-made constraints; proposed utilities and infrastructure improvements; and consistency with Marine Corps guidance and criteria. Based on the specifics of each CDP developed, this chapter then summarizes LCC and construction phasing plans for each of the five LFTRC alternatives. In addition, the Hand Grenade Range is considered a stand-alone alternative and would be implemented regardless of which LFTRC alternative is eventually selected. Analysis of the Hand Grenade Range is therefore presented as an independent section at the end of the chapter (Section 3.7).

3.2 NORTHWEST FIELD LIVE-FIRE TRAINING RANGE COMPLEX ALTERNATIVE

The NWF LFTRC alternative would be located on the northwest tip of Guam (Figure 3.2-1 and Figure 3.2-2). The ranges and supporting facilities would be located on NWF on AAFB. The composite SDZ (the total of combined individual range SDZs) would extend over the U.S. Fish and Wildlife Service (USFWS) Guam National Wildlife Refuge, Ritidian Point Unit and over the Philippine Sea.

3.2.1 Existing Conditions and Constraints

The Air Force's 36th Wing operates AAFB, the largest land parcel in the Pacific region comprising approximately 15,423 ac (6,242 ha) of federal government land on Guam. It occupies the northern portion of Guam and extends from the Finegayan boundary on the west to the village of Yigo on the east with the Pacific Ocean as its northern boundary. The NWF area is approximately 4,400 ac (1,776 ha) and consists of two former B-29

runways with adjacent taxiways and parking areas (Figure 3.2-2). These facilities are currently in various states of repair/usability. NWF serves as the primary maneuver training area at AAFB for field exercises, demolition training, and Landing Zone/Drop Zone (LZ/DZ) operations. NWF is home to the Pacific Air Forces Pacific Regional Training Center (PRTC), 554th Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers (RED HORSE) Squadron, 254th RED HORSE Squadron, and 644th Combat Communications Squadron. The PRTC conducts approximately ten Commando Warrior Training Courses per year, with each course consisting of an estimated 150 personnel. Silver Flag expeditionary service support training exercises would be hosted at NWF commencing in 2014. Eight Silver Flag exercises are planned per year, with each training exercise consisting of approximately 144 personnel. The 2010 Guam Relocation FEIS ROD identified NWF as the location for weapons emplacements for the Army Air and Missile Defense Task Force if a future decision is made to construct and operate the unit on Guam.

Source: AECOM 2010.

Figure 3.2-1: Aerial View of NWF

On the northern boundary of NWF, the USFWS Ritidian Point Unit of the Guam National Wildlife Refuge encompasses the shoreline area below the cliff line. Access to the Refuge is via Route 3A through federal real property under an agreement between GovGuam and the Air Force. Private lands are located to the south and east of the Refuge and are developed at very low density levels, with few permanent buildings. A summary of existing conditions and constraints is shown in Figure 3.2-3, Figure 3.2-4, and Figure 3.2-5.

MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
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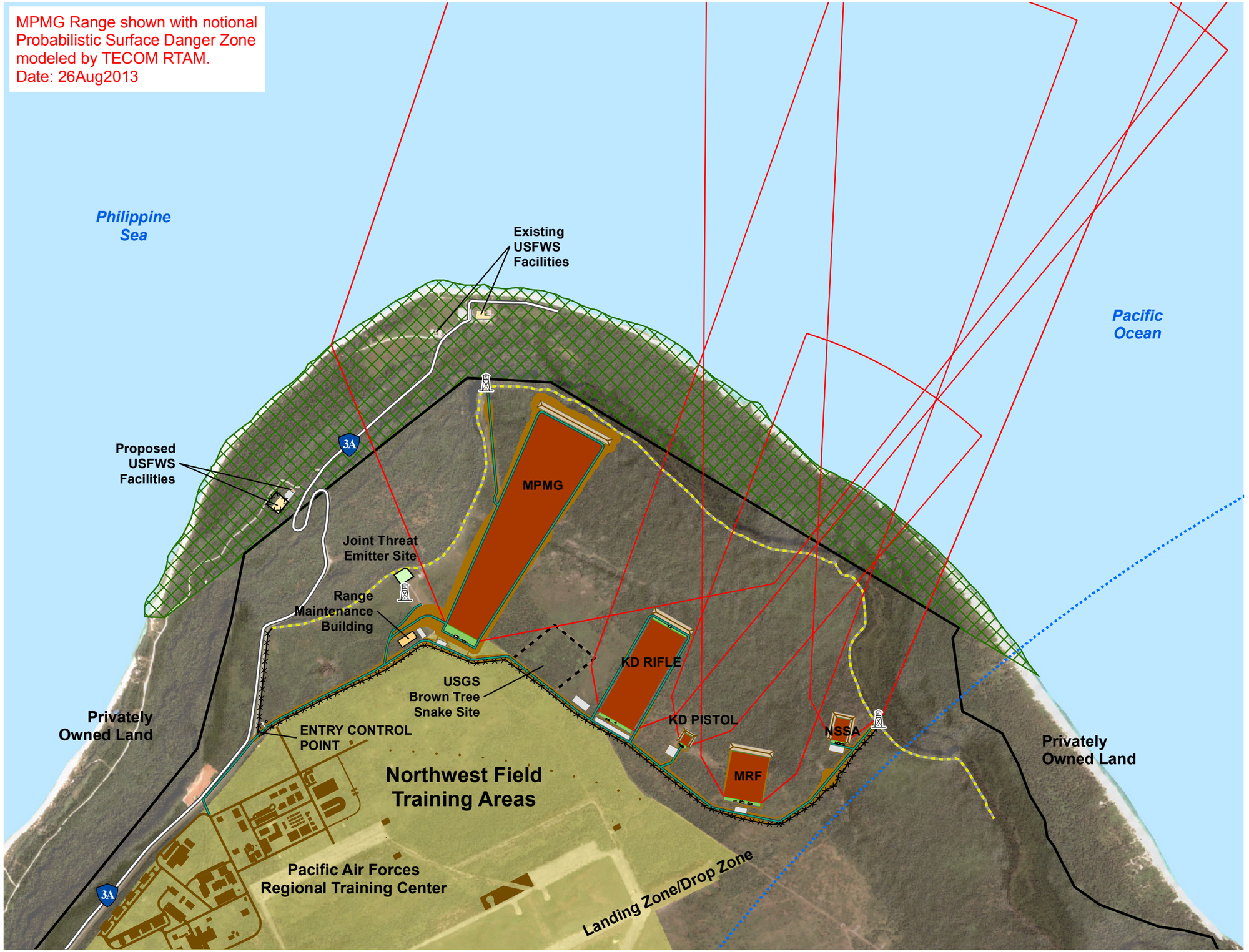

Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\04_LFTRC_Final Alt Analysis Report\3.2-2_NWF_Alt.mxd

Figure 3.2-2
NWF Alternative

- Range Observation Tower
- Proposed Ungulate Fence Line
- Range Parking
- Range Structures
- Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone
- Live-Fire Range Area
- Proposed Grading Disturbance Area
- Joint Threat Emitter Site
- Pacific Air Forces Regional Training Center
- Cliffline
- Highway
- Class D Airspace
- USGS Brown Tree Snake Site
- DoD Property
- Guam National Wildlife Refuge Ritidian Unit
- NWF Training Areas

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: 8/26/2013

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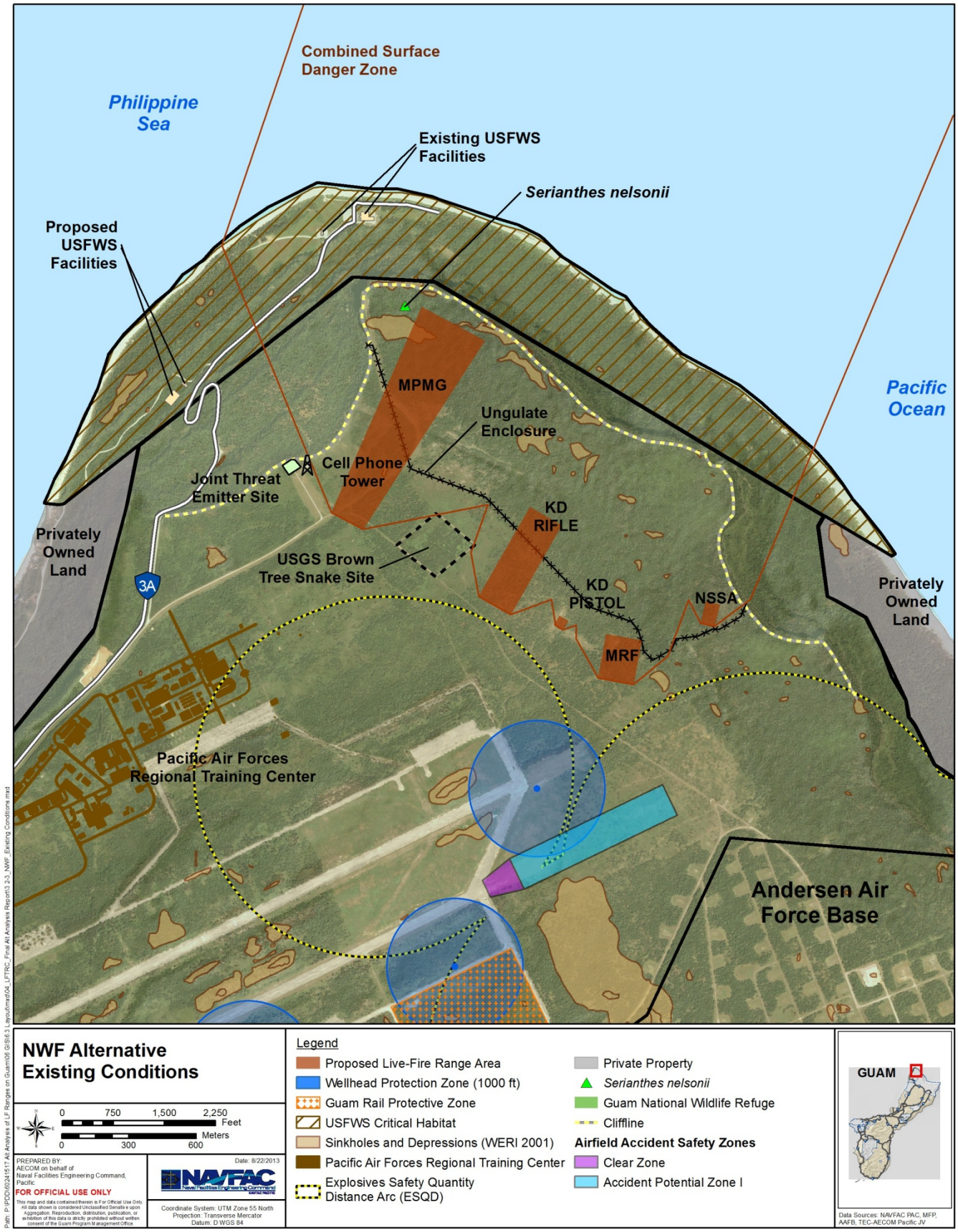

Figure 3.2-3: NWF Alternative Existing Conditions

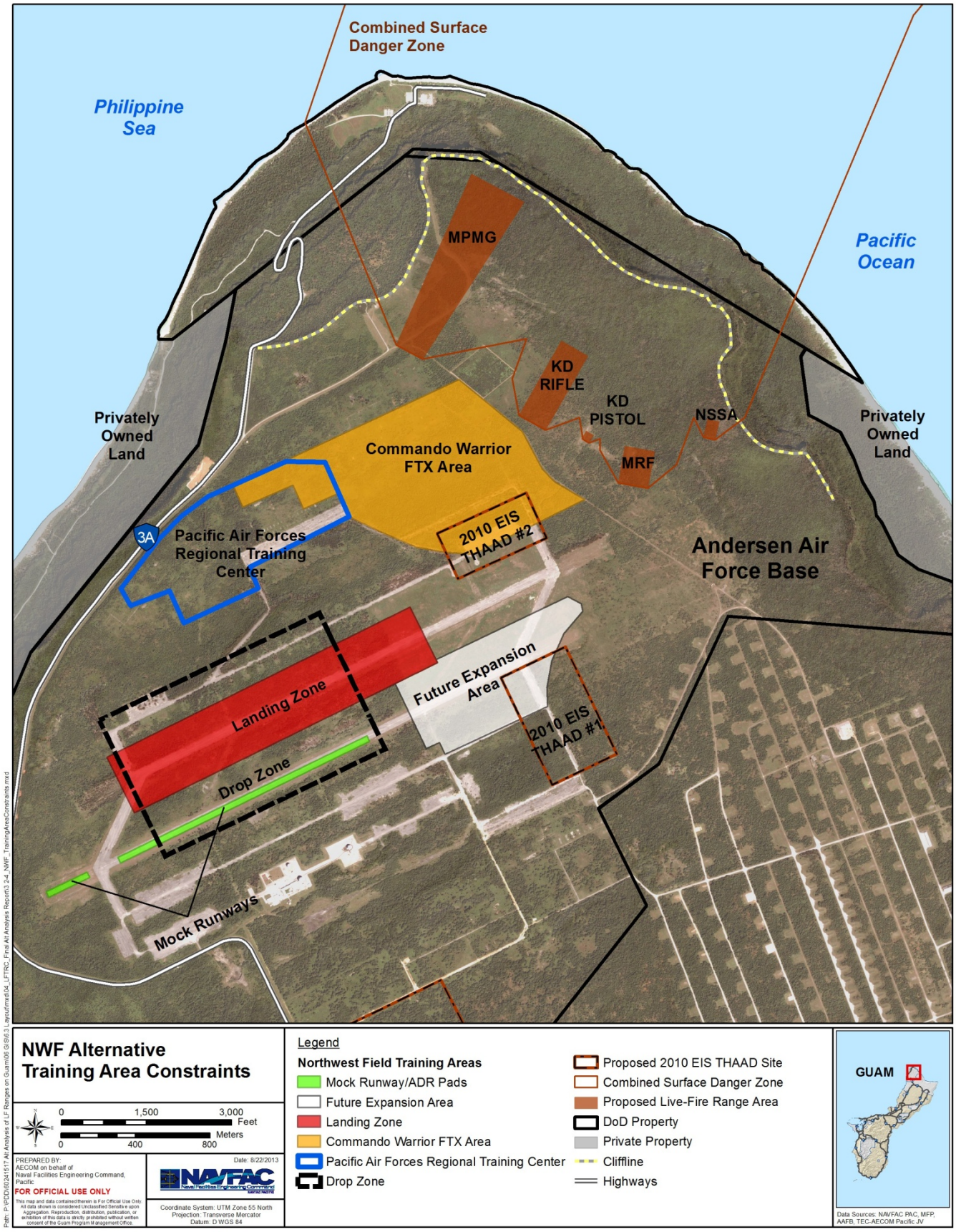

Figure 3.2-4: NWF Alternative Training Area Constraints

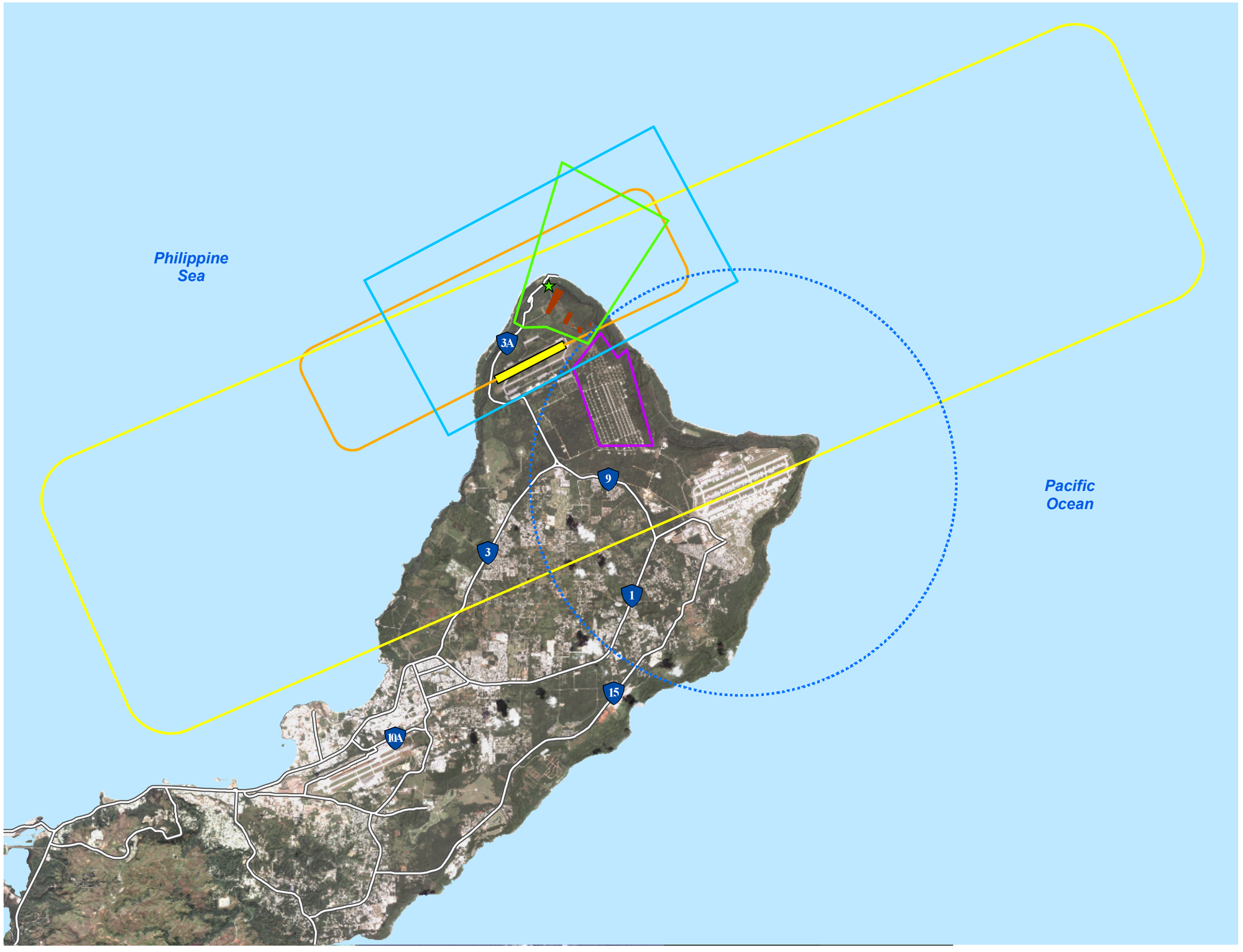

Figure 3.2-5
NWF Alternative Airspace Constraints

- Andersen Primary Arrival "North Point" Surface-2,600 ft MSL
- R-7205 (Proposed-Subject to Change) Surface-20,000 ft MSL (FL220)
- R-7202 (Proposed-Subject to Change) Surface-3,500 ft MSL
- Andersen Class "Delta" Airspace Surface-2,600 ft MSL
- Andersen Runway 06/24/13 Radar Traffic Pattern Surface-3,000 ft MSL
- NWF Assault Pattern Surface-2,000 ft MSL
- MSA-1 Surface-1,600 ft MSL
- Highway
- Northwest Field Landing Zone
- Live-Fire Range Area

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2 4 Miles

0 2 4 Kilometers

PREPARED BY:
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Date: 8/22/2013

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3.2.2 Land/Sea/Airspace Availability

All range areas and range support facilities are located on existing federally owned land at AAFB. SDZs would extend over approximately 264 ac (107 ha) of the USFWS Ritidian Point Reserve, and extend over approximately 3,053 ac (1,236 ha) of the Philippine Sea. No privately owned lands are encumbered by this alternative.

Grading for the NWF alternative is shown in Appendix B and summarized in Table 3.2-1.

Table 3.2-1: Grading Volumes for the NWF Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,452,000	1,410,000	42,000	Cut	78
KD Rifle Range	47,440	44,720	2,720	Cut	26
MRF Range	57,130	11,330	45,800	Cut	11
NSSA Range	6,800	8,650	1,850	Fill	2
KD Pistol Range	1,900	2,720	820	Fill	1
Totals	**1,565,270**	**1,477,420**	**87,850**	**Cut**	**118**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend up to 2,965 ft (904 m) above ground level (AGL). U.S. Marine Forces Pacific (MARFORPAC) has proposed the NWF R-7202 Restricted Area (RA) to deconflict range operations with air traffic. The proposed NWF R-7202 RA would overlay the departure and approach corridors to Guam International Airport Runway 24/06. The Guam International Airport and AAFB VFR reporting point at Ritidian Point would also be located within the proposed RA. The RA would affect the AAFB radar traffic pattern, select instrument approach procedures, circling procedures, minimum/emergency safe altitudes, helicopter rescue response routings, and helicopter Cliff Line Departure pattern; the proposed R-7205 for support of Theater High Altitude Air Defense (THAAD) operations; and would impact NWF LZ/DZ operations. Deconfliction and mitigation of these impacts were the subject of discussions between the Marine Corps (Pacific Division and MARFORPAC) and Air Force (Pacific Air Forces and 36th Wing) in June 2013. All issues were addressed, and the agreed mitigation measures will be codified in a jointly developed Memorandum of Agreement.

3.2.3 Supporting Infrastructure

Proposed entry to the LFTRC and PRTC would be through a new ECP located to the northwest of the current NWF Gate off of Route 3A. Specifics are the topic of ongoing discussions between the Marine Corps, Air Force, and Navy planners. Approximately 5.4 miles (mi) (8.7 km) of range roads would be improved/constructed to support internal LFTRC traffic.

Power to the site would extend from the existing three-phase 13.8 kV overhead line that serves Building 322 and Building 337. This overhead line (Circuit P-110) would be intercepted near or at Pole NG-146 to provide single-phase primary power to the various facilities.

At or near pole NG-139, a single-phase 13.8 kV line would tap onto the existing overhead line and transition to an underground line to serve the ranges and Range Maintenance and Storage Building. A 10 kilovolt ampere (kVA) pad-mounted transformer would be located near each Range Operations Tower to transform the 13.8 kV line to 120/240 V.

The utilities plans for the NWF LFTRC alternative are depicted in Figure 3.2-6 through Figure 3.2-9.

3.2.4 Land Use Compatibility

The NWF LFTRC alternative was developed in coordination with AAFB representatives during an August 2012 site visit and revised after meetings with AAFB representatives in April 2013. Ranges were sited to minimize impacts on the Air Force's existing PRTC and RED HORSE Squadron operations at NWF. The NSSA Range was re-sited to deconflict range operations with the Air Force's Joint Threat Emitter (JTE) site. The position of the SDZs would cause the relocation of the existing USFWS Ritidian Point Unit Administration Building and Visitors' Center and a reduction in the Wildlife Unit area that can be accessed by the public. An alternate location for the USFWS facilities has been identified by NAVFACPAC and is shown on Figure 3.2-2.

An Operational Noise Assessment of the NWF alternative, conducted by the U.S. Army Public Health Command (USAPHC), concluded that the Noise Zones (as shown and defined on Figure 3.2-10) would be generally contained within the AAFB boundary, the proposed LFTRC, or federal land. Based on available imagery, the remaining off-base areas within the Noise Zones are undeveloped and would not contain any noise-sensitive land uses. Within NWF, Zone 1 would extend to the PRTC and would be compatible with PRTC operations. Noise levels above 65 decibel (dB) A-weighted Day-Night Level (ADNL) (Zones 2 and 3) would not encompass any noise-sensitive land uses on AAFB. The JTE site is located within Zone 2 (70–74 dB), and consideration for noise reduction and mitigation at the site would be required.

3.2.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.2-11 and Figure 3.2-12). The significance of the impacts will be addressed in the SEIS. All construction and operation activities have the potential to increase the biological impacts associated with the spread of invasive species, with resulting threats to special-status species.

The NWF alternative may impact the following terrestrial biological resources:

- Clearing of primary limestone forest and large numbers of the Guam Species of Greatest Conservation Need (SOGCN) cycad fadang (*Cycas micronesica*). Primary limestone forest serves as potential habitat for special-status species. A large area of limestone forest at the MPMG Range that is relatively undisturbed and not substantially impacted by ungulates would be removed.
- Removal of large areas of the Guam National Wildlife Refuge, which would reduce natural resource conservation benefits.
- Restricted access to over half of the terrestrial land area of the Guam National Wildlife Refuge, which would affect refuge conservation efforts, including conservation and monitoring efforts and public outreach for ESA-listed and Guam-listed species.
- Clearing of suitable habitat used by the ESA-listed Mariana fruit bat and disturbance of suitable habitat that could be used by the fruit bat in additional areas around the LFTRC.
- Possible mortality of the candidate ESA Mariana eight-spot butterfly, which has been documented in the LFTRC developed area.

Biological impacts may include the following:

- Impacts on the Mariana fruit bat from activity and noise.
- Invasive species impacts on all special-status species.

Marine biological impacts may include impacts on marine flora and invertebrates, fish, essential fish habitat, special-status species, and marine protected areas.

For cultural resources, construction of the NWF alternative may result in direct impacts on 21 sites eligible for listing on the National Register of Historic Places (NRHP). One site and two structures have not been evaluated for listing on the NRHP. In addition, indirect impacts on as many as 38 NRHP-eligible archaeological sites could occur during operations.

3.2.6 Public Access

Public access would be prohibited to the portions of the Ritidian Point Unit and nearshore waters encumbered by the SDZ when the LFTRC ranges are active.

3.2.7 Range Transients

The existing controlled access to AAFB would greatly reduce the possibility of unauthorized personnel on the portions of the range complex. Proposed signage on Ritidian Point would warn individuals of the dangers of entering the SDZ encumbering the Ritidian Point Unit without coordination and permission from Range Control.

Watercraft may inadvertently enter portions of the SDZ that extend over nearshore waters. Buoys would mark the SDZ to warn mariners from entering the SDZ. The two proposed Range Observation Towers would provide surveillance of the nearshore SDZ, and live-fire training would cease if the SDZ is penetrated by watercraft. The visual coverage of the Range Observation Towers is shown in Figure 3.2-13. Live-fire training may resume once the watercraft clears the SDZ.

If approved by the FAA, the proposed NWF R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA, unless otherwise cleared by the applicable control authority. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, training would cease until the aircraft is clear of the SDZ.

3.2.8 Operational Efficiency

The proposed NWF alternative would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.

3.2.9 Orientation

The generally northern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.

3.2.10 Life Cycle Cost

The life cycle cost for the NWF alternative is $314,154,000. See Table 2.6-1 for cost breakdown.

3.2.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NWF alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges — October 2018
- MPMG Range — May 2019

NOTES:

1. PROVIDE 480Y/277V, 3Ø UNDERGROUND LINE TO BUILDING VIA 750 KVA PAD-MOUNTED TRANSFORMER.
2. 13.8 KV LINE TO PROVIDE 120/240V, 1Ø SERVICE TO BUILDING VIA PAD MOUNTED 10 KVA TRANSFORMER.
3. TAP ONTO EXISTING 3-PHASE, 13.8 KV OVERHEAD LINES AND EXTEND NEW 13.8 KV, THREE PHASE LINE AS SHOWN. TAP SHALL BE RUN UNDERGROUND.
4. PROVIDE "Y" CONNECTION FOR SINGLE PHASE, 13.8KV UNDERGROUND LINES AT MANHOLE.
5. TAP ONTO EXISTING 3-PHASE, 13.8 KV OVERHEAD LINE AND EXTEND NEW 13.8 KV SINGLE PHASE LINE AS SHOWN. TAPS SHALL RUN UNDERGROUND.

EXISTING U.S. FISH & WILD LIFE SERVICE BUILDING

Pacific Ocean

Proposed Range Observation Towers

NOTE 2

PROPOSED NEW LOCATION FOR U.S. FISH & WILD LIFE SERVICE BUILDING

NOTE 1

MPMG

Philippine Sea

Range Maintenance Building

NOTE 4

NOTE 2

KD RIFLE

Proposed Range Observation Tower

ENTRY CONTROL POINT

NOTE 2

EXIST. POLE NOTE 5

NOTE 4

NOTE 2

KD PISTOL

NSSA

NOTE 2

EXIST. POLE NOTE 3

NOTE 2

MRF

NOTE 2

NOTE 4

NOTE 4

NOTE 4

NOTE 2

PACIFIC AIR FORCES REGIONAL TRAINING CENTER

Figure 3.2-6
NWF Alternative Electrical Plan

- NEW 120/240V, 1Ø UNDERGROUND SERVICE TO BUILDING
- NEW 13.8 KV, 3Ø UNDERGROUND LINE
- NEW 13.8 KV, 1Ø UNDERGROUND LINE
- EXIST 13.8 KV, 3Ø OVERHEAD LINE TO REMAIN
- EXIST 13.8 KV, 3Ø OVERHEAD LINE TO BE REMOVED

- Range Observation Tower
- Highway
- Proposed Range Area
- Range Parking
- Range Structure
- Pacific Air Forces Regional Training Center
- DoD Property
- USFWS GNWR Ritidian Unit

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV, JGPO 2013

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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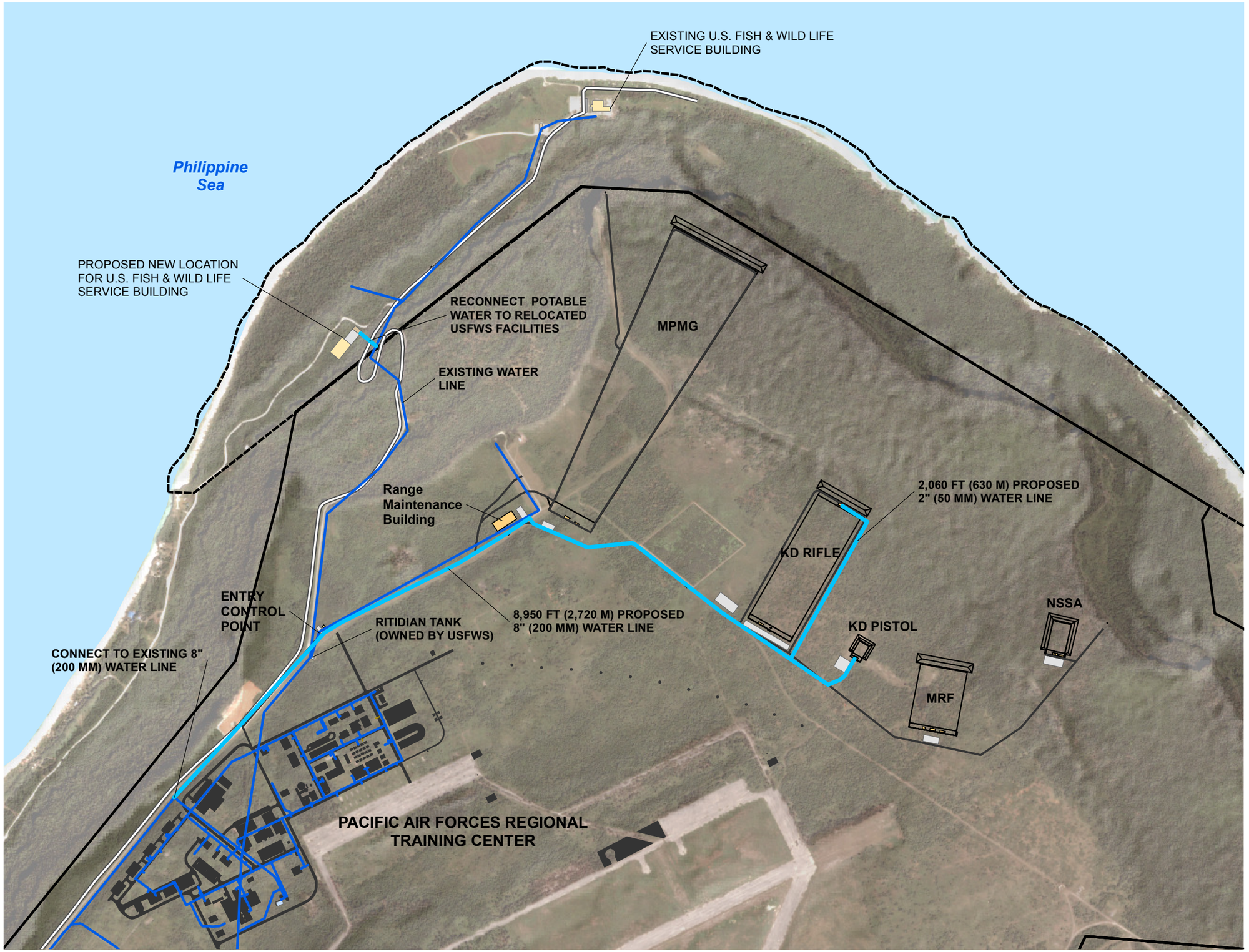

Figure 3.2-7
NWF Alternative Water Plan

PROPOSED 8" (200 MM) WATER LINE
EXISTING DOD WATER LINE

Highway
Proposed Range Area
Range Parking
Range Structure
Pacific Air Forces Regional Training Center
DoD Property
USFWS GNWR Ritidian Unit

All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet
0 250 500 Meters

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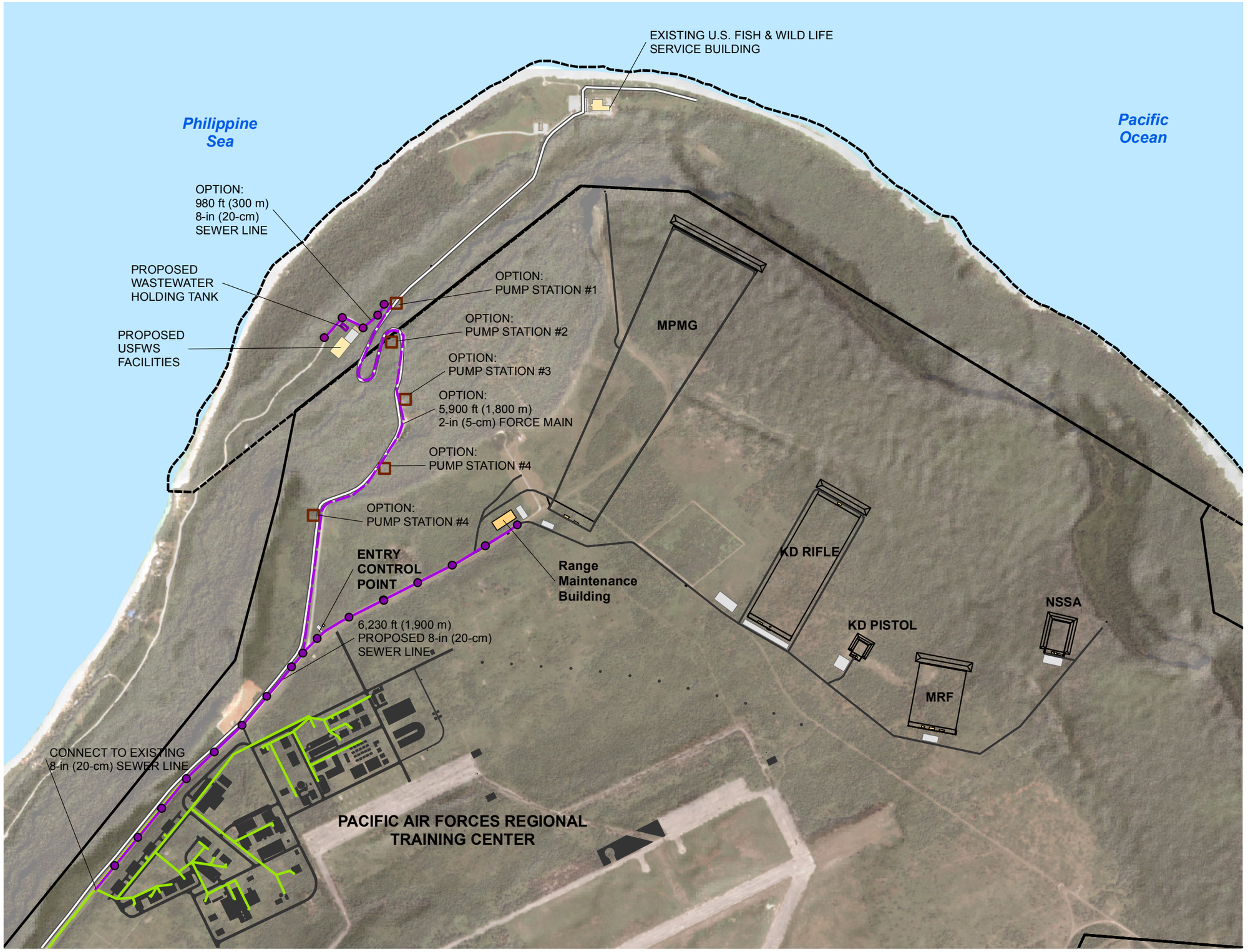

Figure 3.2-8
NWF Alternative Wastewater Plan

- PROPOSED SEWER MANHOLE
- PROPOSED 8" (200 MM) SEWER LINE
- PROPOSED 2" (50 MM) FORCE MAIN
- EXISTING DOD SEWER LINE
- PROPOSED PUMP STATION

- Highway
- Proposed Range Area
- Range Parking
- Range Structure
- Pacific Air Forces Regional Training Center
- DoD Property
- USFWS GNWR Ritidian Unit

Sewer collection is required for the Range Maintenance Building only.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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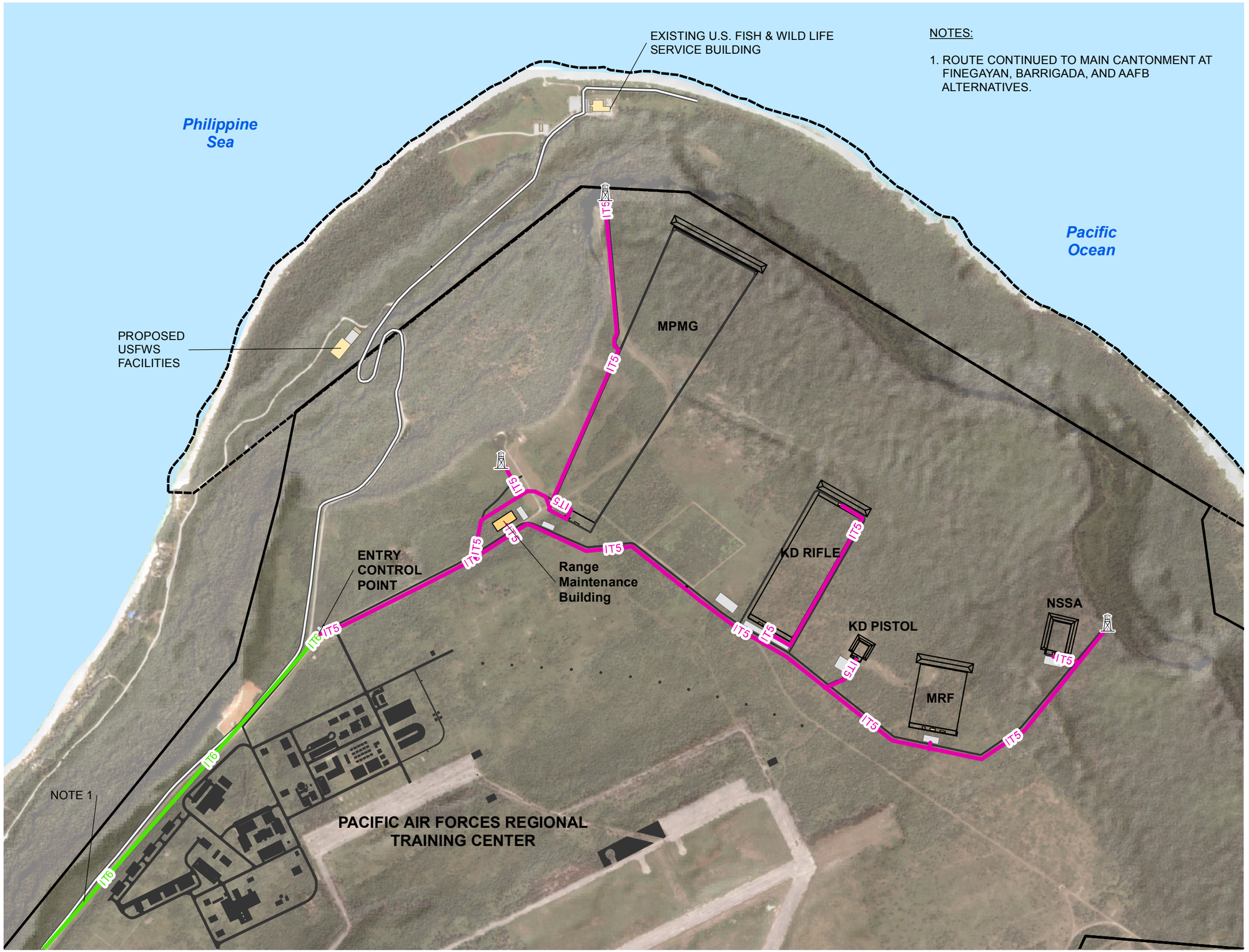

NOTES:

1. ROUTE CONTINUED TO MAIN CANTONMENT AT FINEGAYAN, BARRIGADA, AND AAFB ALTERNATIVES.

Figure 3.2-9
NWF Alternative IT/Comm Plan

IT5 DISTRIBUTION TO LFTRC - DB1

IT6 USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

- Range Observation Tower
- Highway
- Proposed Range Area
- Range Parking
- Range Structure
- Pacific Air Forces Regional Training Center
- DoD Property
- USFWS GNWR Ritidian Unit

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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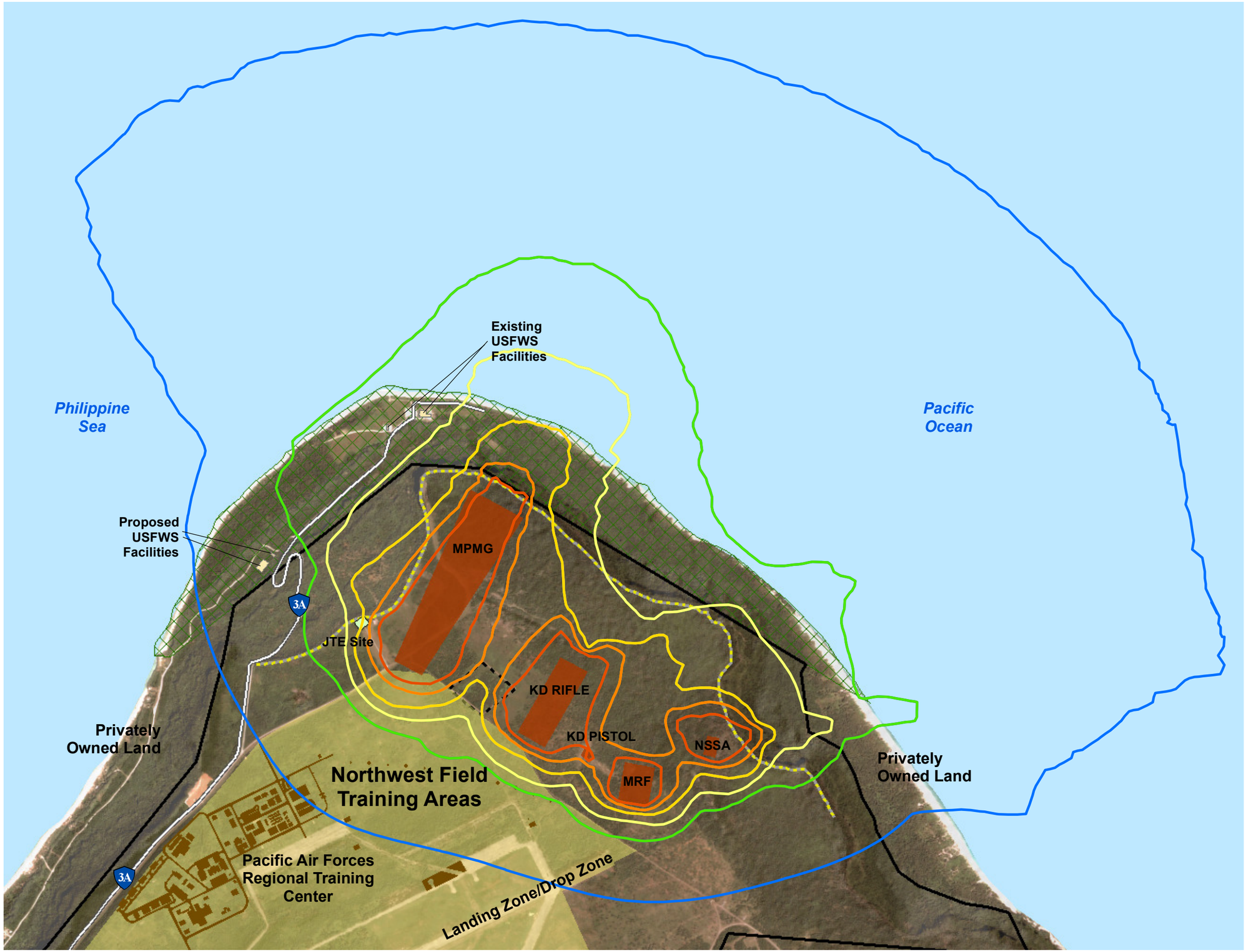
Figure 3.2-10
NWF Alternative Operational Noise Assessment



Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Live-Fire Range Area
- JTE Site
- Pacific Air Forces Regional Training Center
- NWF Training Areas
- Cliffline
- Highway
- USGS BTS Site
- DoD Property
- USFWS GNWR Ritidian Unit

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

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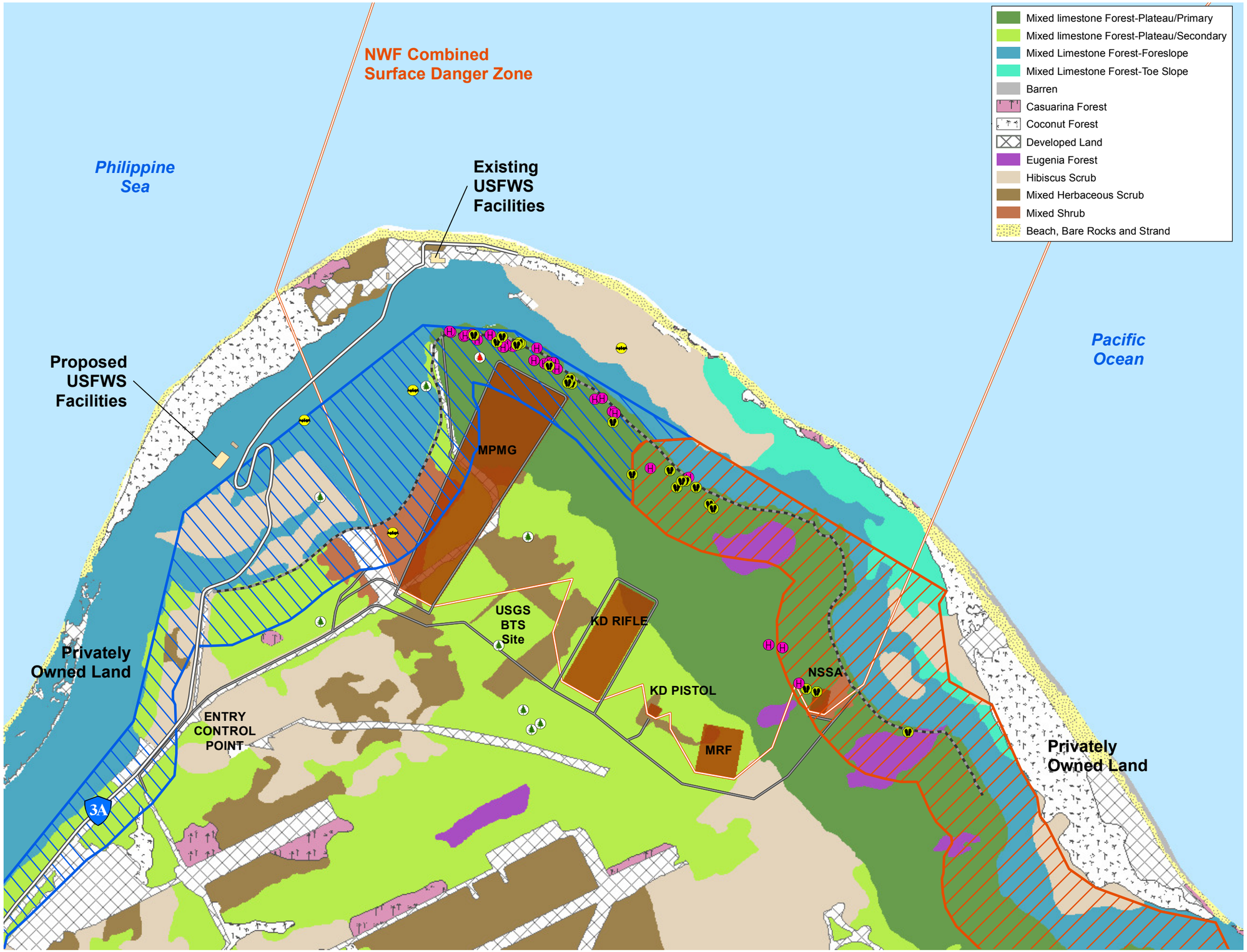

Figure 3.2-11
NWF Alternative Vegetation and Special-Status Species

Cliffline

Special-Status Species Occurrence

Fauna

- Fruit Bat
- Mariana Eight-Spot Butterfly

Flora

- Mariana Eight-Spot Butterfly Host Plant
- *Serianthes nelsonii*
- *Tabernaemontana rotensis*

Fruit Bat Roosting Habitat:

- High Priority
- Medium Priority

Proposed Development:

- Range Road
- Combined Surface Danger Zone
- Live-Fire Range Area

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

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MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 28Aug2013

Philippine Sea

Pacific Ocean

Existing USFWS Facilities

Proposed USFWS Facilities

MPMG

USGS Brown Tree Snake Site

Joint Threat Emitter Site

KD RIFLE

KD PISTOL

NSSA

MRF

Range Maintenance Building

ENTRY CONTROL POINT

Privately Owned Land

Privately Owned Land

Northwest Field Training Areas

Pacific Air Forces Regional Training Center

Landing Zone/Drop Zone

3A

3A

Figure 3.2-12
NWF Alternative Cultural Resources

- Cultural Resource Area
- Range Parking
- Range Structures
- Range Road
- Berm Area
- Range Support Area
- NWF Combined Surface Danger Zone
- Live-Fire Range Area
- Joint Threat Emitter Site
- Cliffline
- Highway
- Class D Airspace
- USGS Brown Tree Snake Site
- DoD Property
- USFWS Guam National Wildlife Refuge Ritidian Unit
- Pacific Air Forces Regional Training Center
- NWF Training Areas

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

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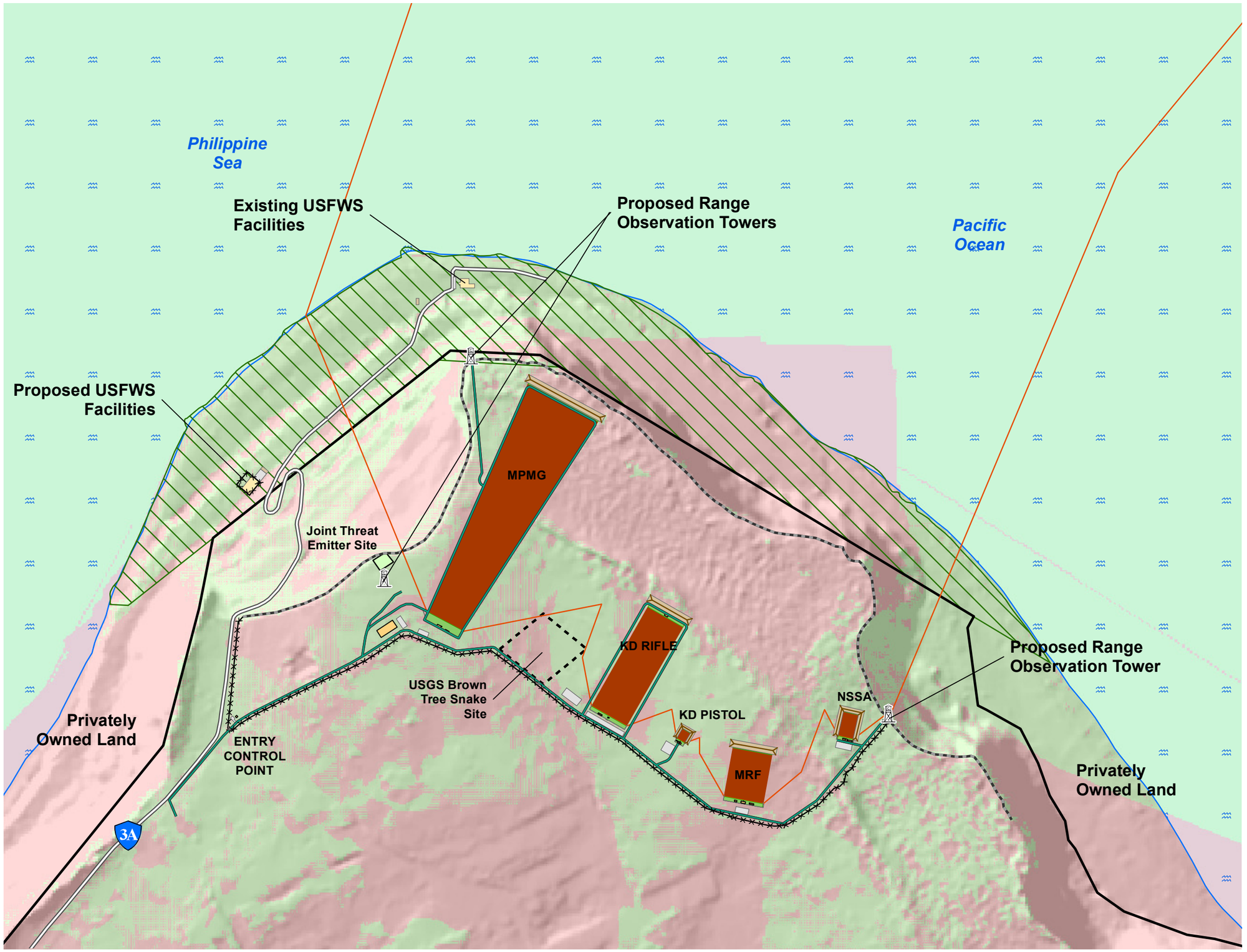
Figure 3.2-13
NWF Alternative Range Observation Tower Coverage



- Range Observation Towers
- Fence Line
- Range Road
- Range Structures
- Berm Area
- Range Support Area
- NWF Combined SDZ
- Live-Fire Range Area
- Cliffline
- USGS Brown Tree Snake Site
- Joint Threat Emitter Site
- Highway
- DoD Property
- Guam National Wildlife Refuge Ritidian Unit
- Open Water (Ocean)

Range Observation Tower Coverage

- Not Visible to 10m Range Tower
- Visible to 10m Range Tower

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

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3.3 ROUTE 15A ALTERNATIVE

The RT 15A alternative would be located on the northeast coast of Guam (Figure 3.3-1 and Figure 3.3-2). The ranges and supporting facilities would be located on the plateau adjacent to Andersen South. This alternative would require the relocation of portions of Route 15 to create the necessary space for siting the range complex. The composite SDZ would extend over the Pagat Point archaeological site and over the Pacific Ocean.

3.3.1 Existing Conditions and Constraints

The Route 15 area is located on the eastern coast of Guam and directly east of Andersen South and south of AAFB (Figure 3.3-2). Route 15 parallels the shoreline approximately 1 mi (1.6 km) inland and connects this area to the rest of the Guam road network. This area between Route 15 and the Pacific Ocean is topographically hilly with limited existing development. The dominant development in the area is the Guam International Raceway and the residential communities of Yigo to the north and Mangilao farther south along Route 15. Natural and cultural features in the area include the Pagat Trail, Pagat Cave, Pagat Village, and Pagat Point, all accessed from trailheads along Route 15. The Pagat Trail and Pagat Cave and Village complex are areas of cultural and historical importance and are listed on the NRHP. The DoD-owned Andersen South area contains some abandoned structures and other facilities that are used for non-live-fire training. Surrounding properties in this area are zoned for rural and agricultural uses. A summary of existing conditions is shown in Figure 3.3-3.

3.3.2 Land/Sea/Airspace Availability

The RT 15A alternative would require the acquisition of 872 ac (353 ha) of non-federal land. The composite SDZ would extend over approximately 83 ac (34 ha) of the Pagat Point Archaeological Reserve and extend over approximately 3,120 ac (1,262 ha) of the Pacific Ocean.

Grading for the RT 15A alternative is shown in Appendix B and summarized in Table 3.3-1.

Table 3.3-1: Grading Volumes for the RT 15A Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,800,000	680,750	1,119,250	Cut	80
KD Rifle Range	26,800	880,000	853,200	Fill	35
MRF Range	48,030	305,550	257,520	Fill	13
NSSA Range	23,900	1,440	22,460	Cut	3
KD Pistol Range	4,000	6,900	2,900	Fill	2
Totals	**1,902,730**	**1,874,640**	**28,090**	**Cut**	**133**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend up to 2,965 ft (904 m) AGL. MARFORPAC has proposed the Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic.

3.3.3 Supporting Infrastructure

To avoid an increase in traffic on Route 15 and local roads, proposed entry to the LFTRC would be from Route 1 through the existing Andersen South access road. An underpass under the relocated Route 15 would allow access to the internal range road network. Alternate access would be via a second underpass under the Route 15 bypass from the Andersen South MOUT facility.

Power to the site would be from the existing 13.8 kV line near Route 15. An alternative source of power could be the existing GPA-owned 13.8 kV overhead line on concrete poles, which originates from the north on Route 15 and serves the raceway. This existing 13.8 kV line would need to be modified to serve the ranges.

Source: AECOM 2010

Figure 3.3-1: Aerial View of Route 15 Area

Because of the Route 15 realignment, the existing single-phase, 13.8 kV line that feeds the existing buildings south of Route 15 would need to be modified to maintain the proper circuit to the existing buildings.

The utilities plans for the RT 15A alternative are depicted in Figure 3.3-4 through Figure 3.3-7.

3.3.4 Land Use Compatibility

Route 15 would need to be re-routed to create the necessary space to accommodate this alternative. In particular, the MPMG Range would not meet the mandated 3,281 ft (1,000 m) range length required for training without the relocation of the existing roadway.

MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 22Aug2013

ENTRY CONTROL POINT

Andersen South

Highway Underpass

Range Maintenance Building

KD RIFLE

KD PISTOL

MRF

MPMG

NSSA

Highway Underpass

Pagat Plateau

PAGAT TRAIL

PAGAT POINT CULTURAL SITE

PAGAT CAVE

PAGAT VILLAGE

PAGAT VILLAGE CULTURAL SITE

Sasayan Valley

Pacific Ocean

Figure 3.3-2
RT 15A Alternative

- Cultural Landmark
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Observation Tower
- Fence Line
- Parking Area
- Proposed Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone
- Live-Fire Range Area
- Proposed Grading Disturbance Area
- Cliffline
- Class D Airspace
- Existing Structure
- DoD Property Line
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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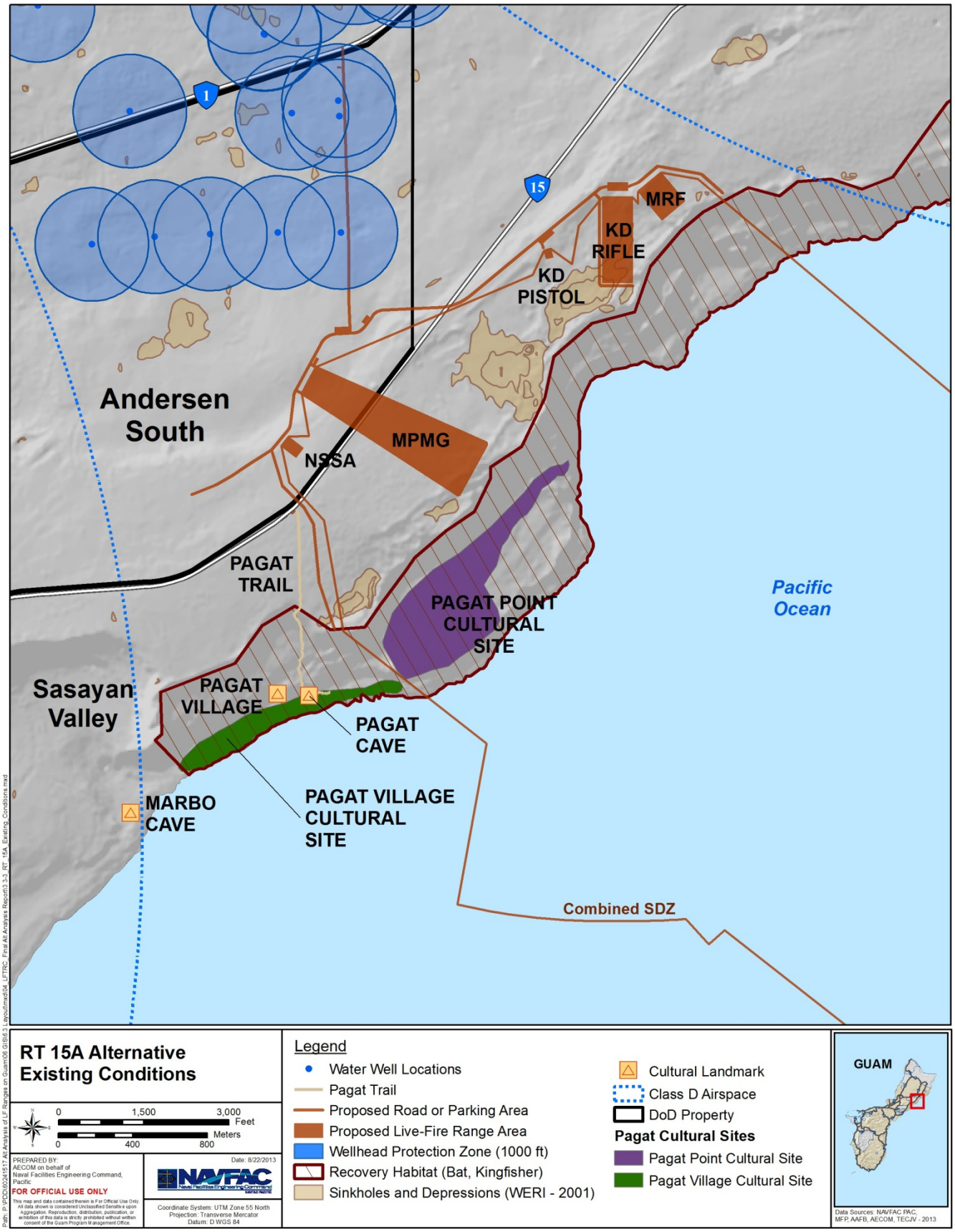

Figure 3.3-3: RT 15A Alternative Existing Conditions

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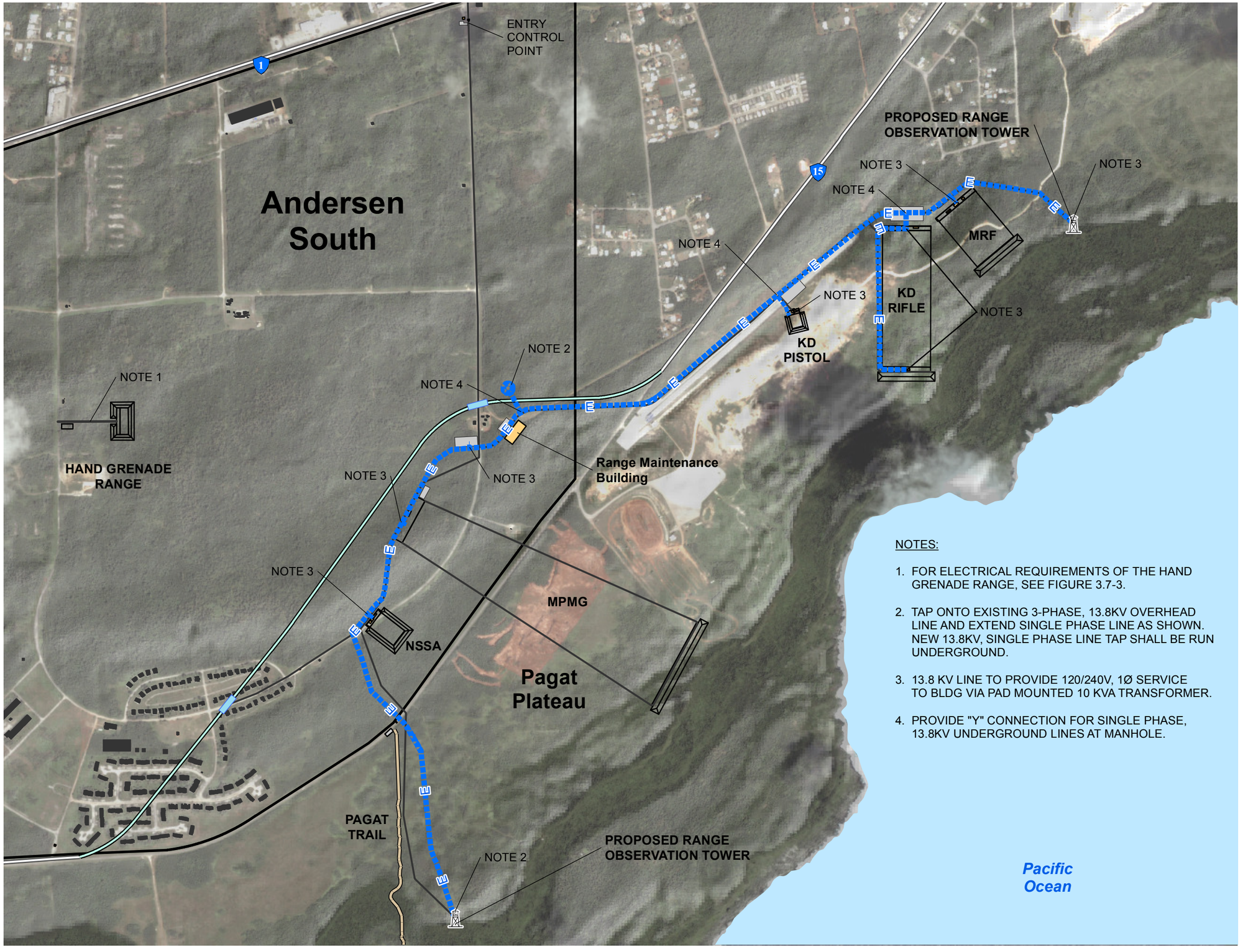

NOTES:

1. FOR ELECTRICAL REQUIREMENTS OF THE HAND GRENADE RANGE, SEE FIGURE 3.7-3.
2. TAP ONTO EXISTING 3-PHASE, 13.8KV OVERHEAD LINE AND EXTEND SINGLE PHASE LINE AS SHOWN. NEW 13.8KV, SINGLE PHASE LINE TAP SHALL BE RUN UNDERGROUND.
3. 13.8 KV LINE TO PROVIDE 120/240V, 1Ø SERVICE TO BLDG VIA PAD MOUNTED 10 KVA TRANSFORMER.
4. PROVIDE "Y" CONNECTION FOR SINGLE PHASE, 13.8KV UNDERGROUND LINES AT MANHOLE.

Figure 3.3-4
RT 15A Alternative Electrical Plan

NEW 120/240V 1Ø UNDERGROUND LINE FROM PAD MOUNTED 10 KVA TRANSFORMER

NEW 13.8 KV, 1Ø UNDERGROUND LINE

- Range Observation Tower
- Pagat Trail
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Structure
- Range Parking
- Range Road
- Proposed Range Area
- Existing Structure
- DoD Property Line

Data Sources: JGPO 2013

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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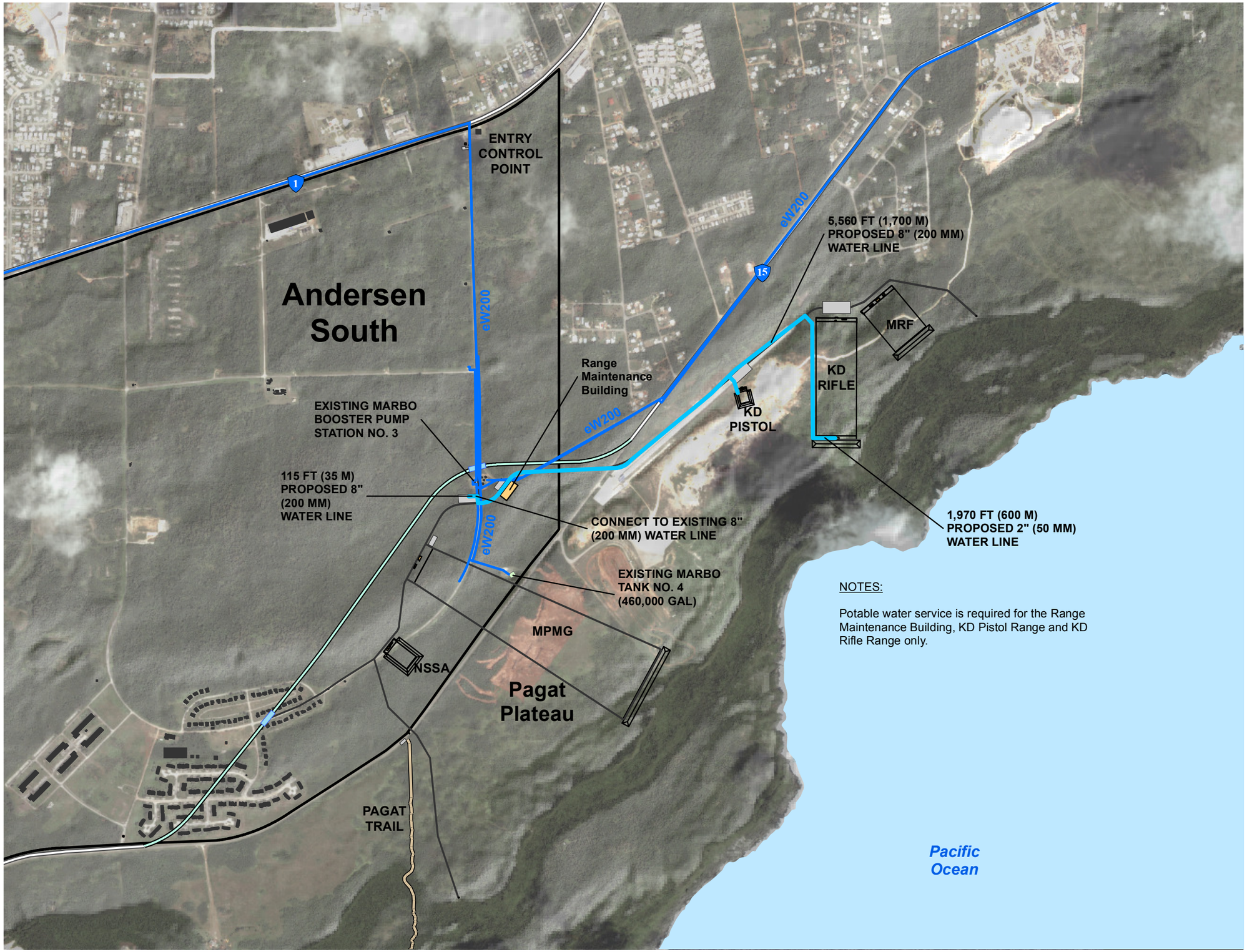

Figure 3.3-5
RT 15A Alternative Water Plan

- PROPOSED 8" (200 MM) WATER LINE
- EXISTING DOD WATER LINE
- Pagat Trail
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Structure
- Range Parking
- Range Road
- Proposed Range Area
- Existing Structure
- DoD Property Line

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Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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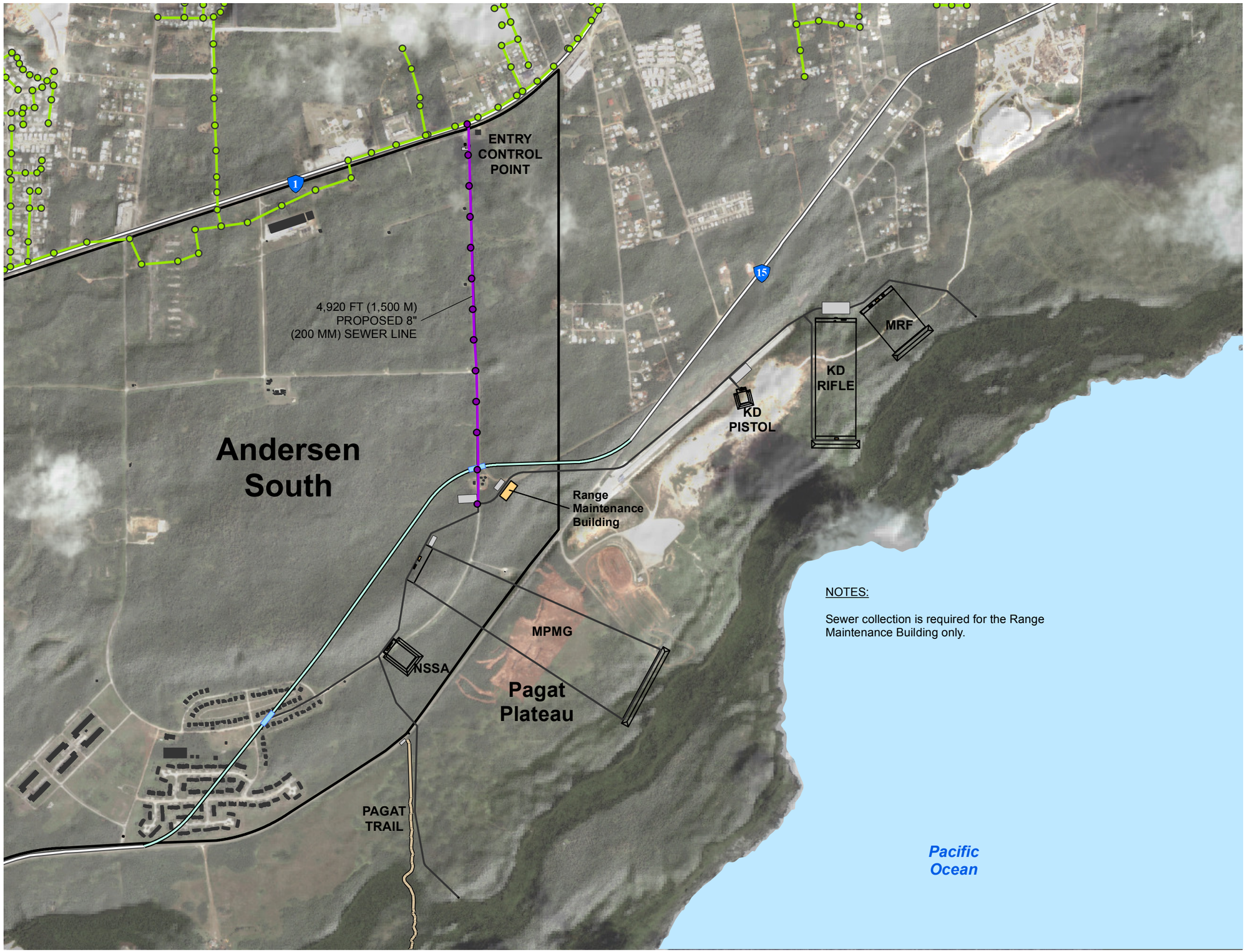

NOTES:

Sewer collection is required for the Range Maintenance Building only.

Figure 3.3-6
RT 15A Alternative Wastewater Plan

- PROPOSED SEWER MANHOLE
- PROPOSED 8" (200 MM) SEWER LINE
- EXISTING GWA MANHOLE
- EXISTING GWA SEWER

- Pagat Trail
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Structure
- Range Parking
- Range Road
- Proposed Range Area
- Existing Structure
- DoD Property Line

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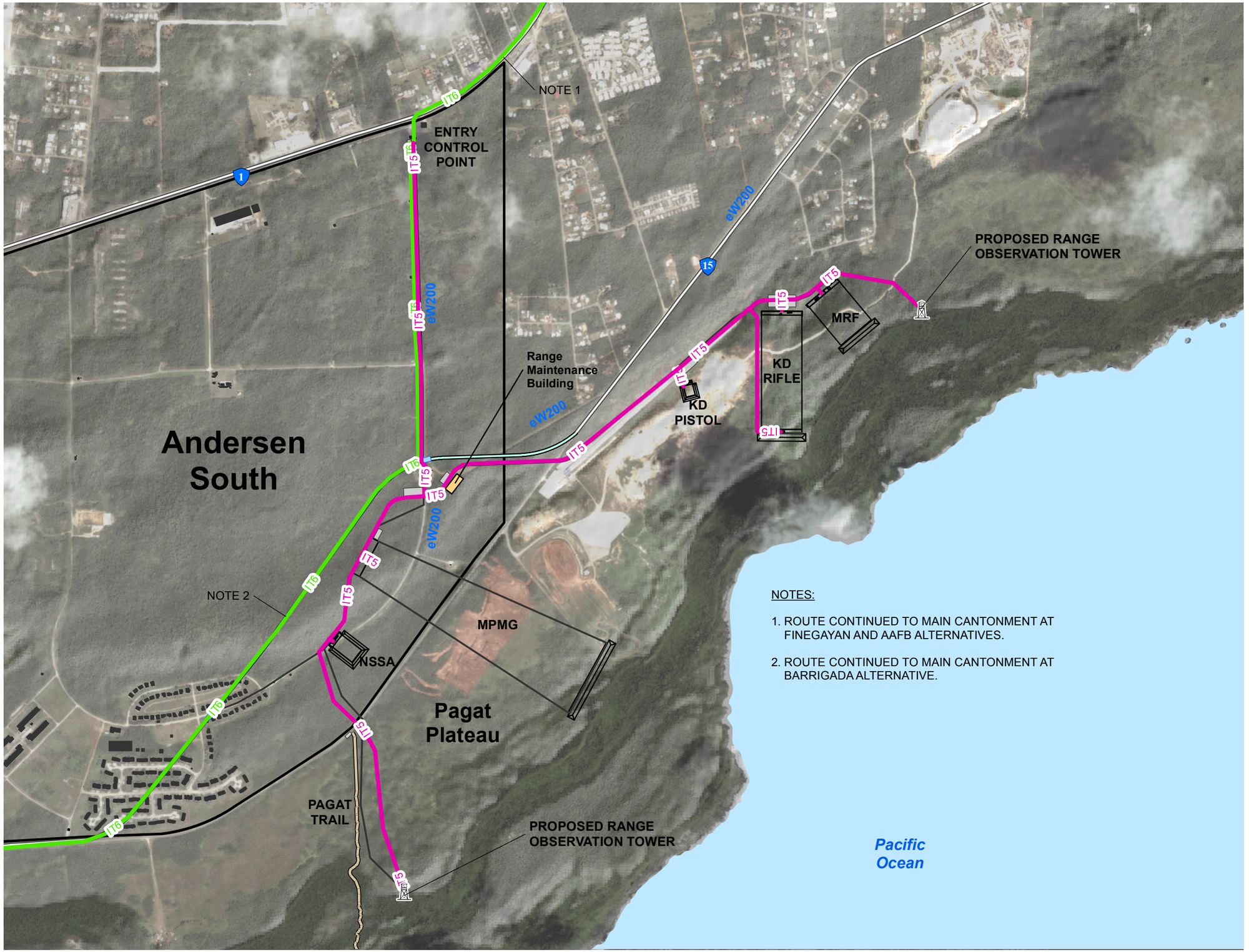
Figure 3.3-7
RT 15A Alternative
IT/Comm Plan



NOTES:

1. ROUTE CONTINUED TO MAIN CANTONMENT AT FINEGAYAN AND AAFB ALTERNATIVES.
2. ROUTE CONTINUED TO MAIN CANTONMENT AT BARRIGADA ALTERNATIVE.

- IT5 DISTRIBUTION TO LFTRC - DB1
- IT6 USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

- Range Observation Tower
- Pagat Trail
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Structure
- Range Parking
- Range Road
- Proposed Range Area
- Existing Structure
- DoD Property Line

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Data Sources: JGPO 2013

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Projection: Transverse Mercator
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0 1,000 2,000 Feet
0 250 500 Meters

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The RT 15A alternative would displace the Guam International Raceway and a quarry operation adjacent to the raceway. Both of these activities are operating under a lease between the Chamorro Land Trust Commission and the Guam Raceway Federation that ends on June 1, 2018.

Approximately 80 ac (32 ha) of the Pagat Point archaeological site would be encumbered by the LFTRC composite SDZ.

An Operational Noise Assessment of the RT 15A alternative, conducted by the USAPHC, concluded the following:

- The ranges in the northern area of the RT 15A land expansion area generate Noise Zones (Figure 3.3-8), which would extend beyond the boundary encompassing residential areas and undeveloped land. Noise-sensitive land uses are discouraged within areas that would experience 65–69 dB ADNL, and residential uses are strongly discouraged between 70–74 dB ADNL. Based on available imagery, there would be no noise-sensitive land uses within the off-base Zone 3. Zone 2 (65–69 dB ADNL) would encompass approximately eight residential properties. Zone 2 (70-74 dB ADNL) would encompass two residential properties. Although Zone 1 would encompass multiple residential properties, noise-sensitive land uses would be considered compatible within Zone 1.
- The ranges in the southern portion of the Route 15A land expansion area would generate Zones 1 and 2, which extend beyond the southern boundary of Andersen South. The Route 15A land expansion area would encompass undeveloped land. Levels above 75 dB ADNL (Zone 3) would not extend beyond the boundary.
- The Noise Zones would not encompass any noise-sensitive land uses within Andersen South.

3.3.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.3-9 and Figure 3.3-10). The significance of the impacts will be addressed in the SEIS. The construction and operation of the facility may increase the impacts of invasive species throughout the area, as well as affect the surrounding vegetation communities.

The RT 15A alternative may affect the following terrestrial biological resources:

- Clearing of primary and secondary limestone forest, which is considered suitable habitat for the ESA-listed Mariana fruit bat.
- Removal of a large number of the Guam-listed tree *Heritiera longipetiolata*.
- Possible mortality of the candidate ESA Mariana eight-spot butterfly, which has been documented in the LFTRC developed area.
- Clearing of suitable habitat potentially used by the ESA-listed Mariana fruit bat, and disturbance of suitable habitat that could be used by the fruit bat in additional areas around the LFTRC.
- Invasive species impacts on all special-status species.

Marine biological impacts may include impacts on marine flora and invertebrates, fish, essential fish habitat, special-status species, and marine protected areas.

For cultural resources, construction of the RT 15A alternative may result in impacts on three historic properties (archaeological sites). In addition, 23 buildings that have not been evaluated for NRHP-eligibility would require demolition. As many as four historic properties could be impacted during operations.

3.3.6 Public Access

The siting of the RT 15A alternative would allow unimpeded (24 hours per day/7 days a week) access to the Pagat Trail and the Pagat Village archaeological site. Public access to the Pagat Point archaeological site and nearshore waters encumbered by the SDZ would be prohibited when the LFTRC ranges are active.

3.3.7 Range Transients

Proposed fencing and the ECP would prevent unauthorized persons from entering the LFTRC and the SDZ encumbering the plateau above Pagat Point. Signage at Pagat Village would warn individuals of the dangers of entering Pagat Point without coordination and permission from Range Control.

Watercraft may inadvertently enter portions of the nearshore SDZ. Buoys would mark the SDZ to warn mariners from entering the SDZ. The two proposed Range Observation Towers would allow surveillance of the nearshore SDZ, and live-fire training would cease if the SDZ were penetrated by watercraft. The visual coverage of the Range Observation Towers is shown in Figure 3.3-11. Live-fire training may resume once the watercraft clears the SDZ.

If approved by the FAA, the proposed Andersen South R-7202 (Plateau) RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.

3.3.8 Operational Efficiency

The proposed RT 15A alternative locates all facilities in a single complex. The location adjacent to the Andersen South Training Complex would facilitate transitions from live-fire to non-live-fire training and provide maximum efficiency for range maintenance and management.

3.3.9 Orientation

The generally southeastern orientation of the ranges would cause a loss of daylight training in the early morning hours. The low sun rising in the east would affect the training audience's ability to engage targets on the southeast-facing ranges and would limit early morning use of magnifying optics to avoid damage to eyesight.

3.3.10 Life Cycle Cost

The life cycle cost for the RT 15A alternative is $458,157,000. See Table 2.6-1 for cost breakdown.

3.3.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the RT 15A alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges January 2020
- MPMG Range March 2020

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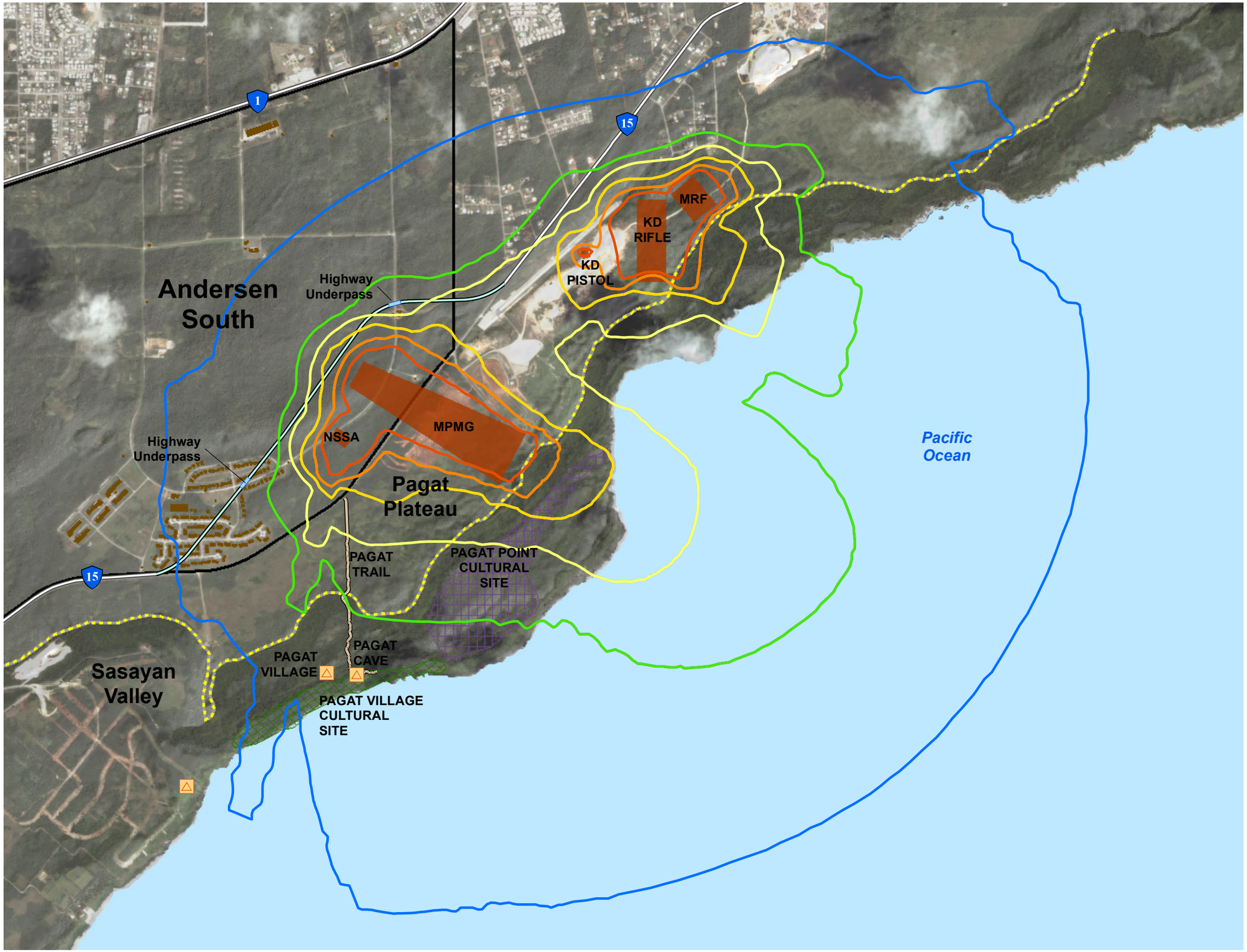

Figure 3.3-8
RT 15A Alternative Operational Noise Assessment

Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Cultural Landmark
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Live-Fire Range Area
- Cliffline
- Existing Structure
- DoD Property Line
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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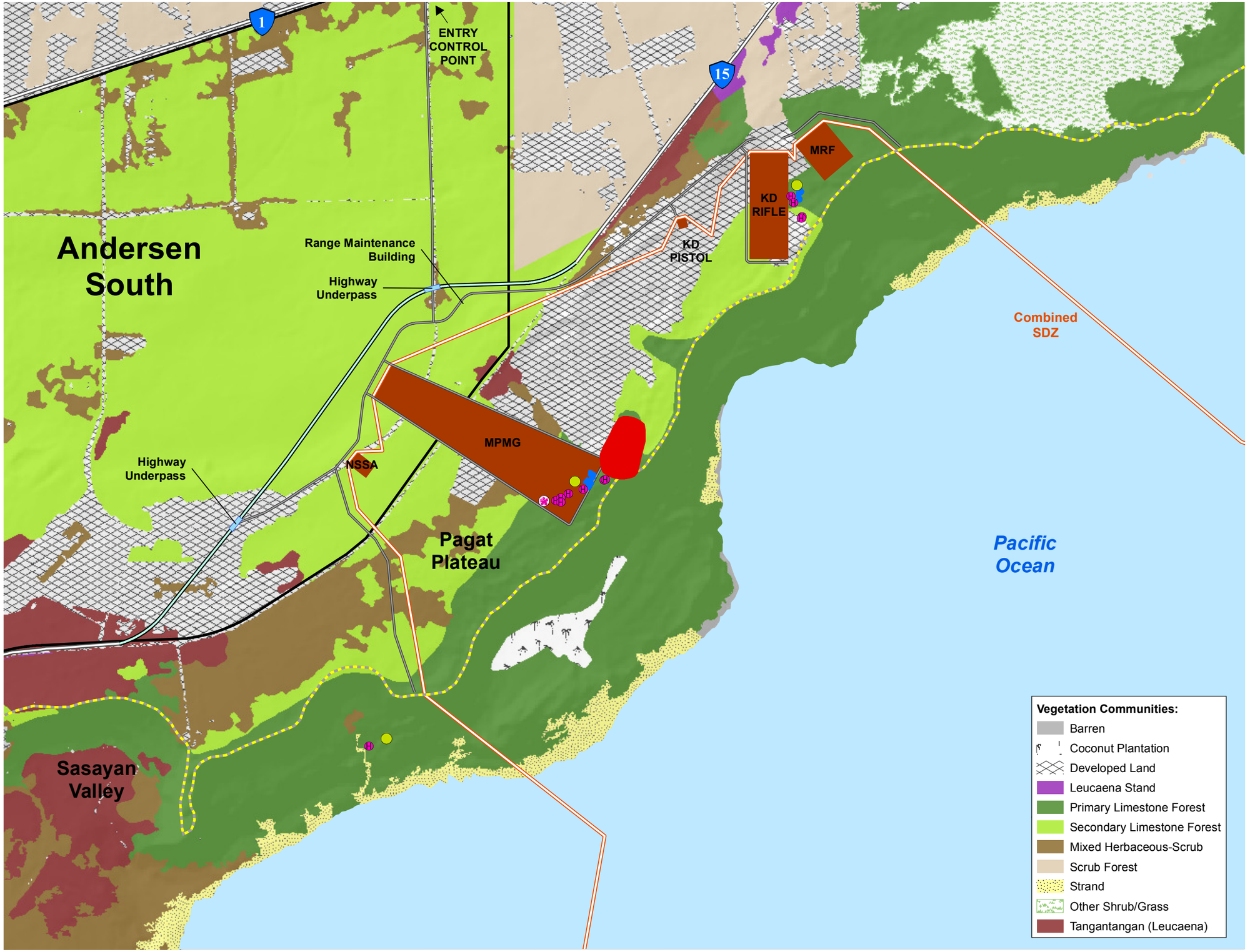

Figure 3.3-9
RT 15A Alternative Vegetation and Special-Status Species

Special-Status Species Occurrence

Fauna
- Mariana Eight-Spot Butterfly

Flora
- Mariana Eight-Spot Butterfly Host Plant
- *Heritiera longipetiolata*
- Mariana Eight-Spot Butterfly Host Plant Area
- *Heritiera longipetiolata* Clusters
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Road
- Cliffline
- RT 15A Combined SDZ
- Live-Fire Range Area

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
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0 1,200 2,400 Feet

0 300 600 Meters

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MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 22Aug2013

ENTRY CONTROL POINT

Andersen South

Highway Underpass

KD PISTOL

KD RIFLE

MRF

Range Maintenance Building

MPMG

NSSA

Highway Underpass

Pagat Plateau

PAGAT TRAIL

PAGAT POINT CULTURAL SITE

Pacific Ocean

Sasayan Valley

PAGAT VILLAGE

PAGAT CAVE

PAGAT VILLAGE CULTURAL SITE

Figure 3.3-10
RT 15A Alternative
Cultural Resources

- Cultural Resource Area
- Cultural Landmark
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Parking Area
- Proposed Range Road
- Berm Area
- Range Support Area
- RT 15A Combined SDZ
- Live-Fire Range Area
- Cliffline
- Existing Structure
- DoD Property Line
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

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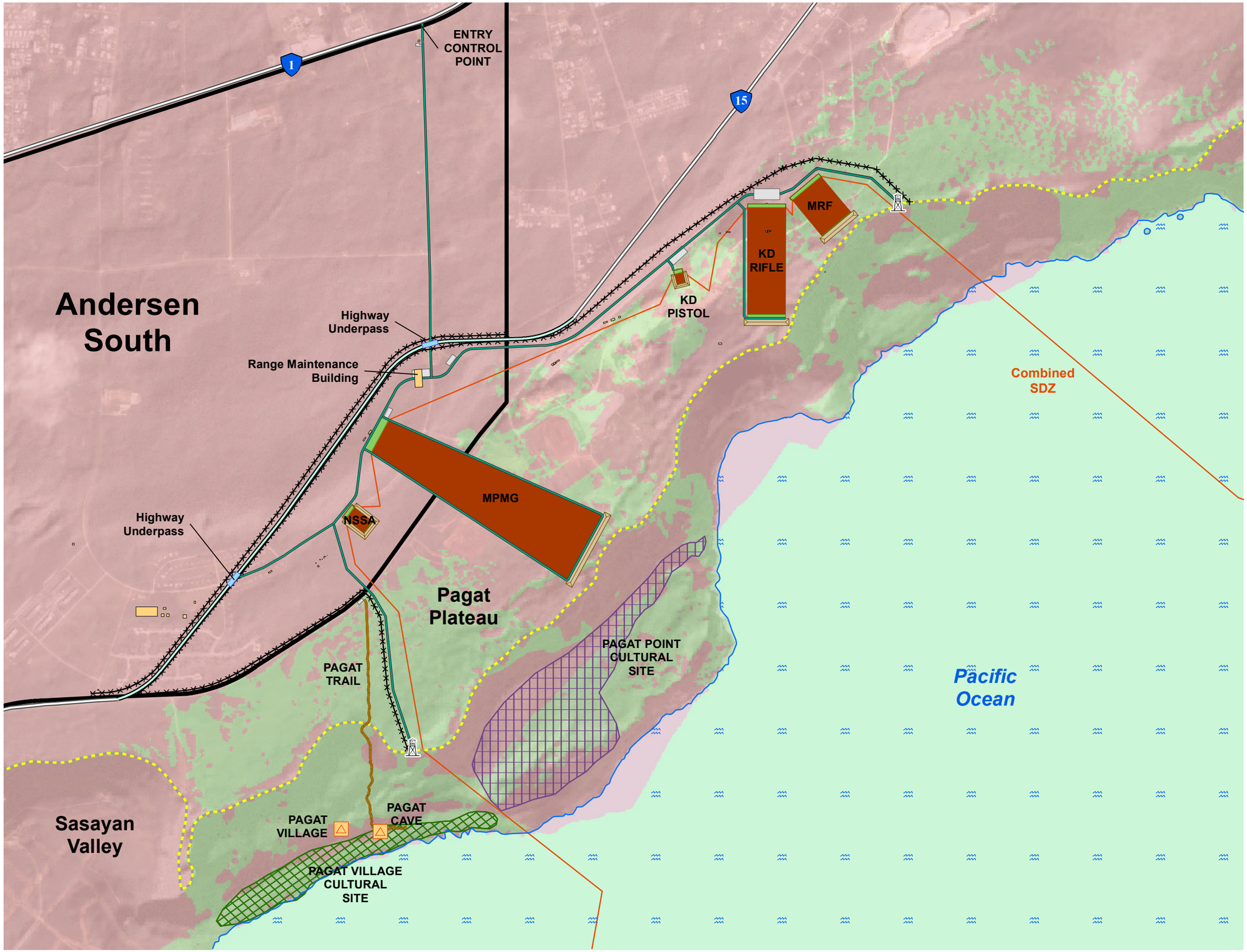

Figure 3.3-11
RT 15A Alternative Range Observation Tower Coverage

- Cultural Landmark
- Open Water (Ocean)
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Observation Tower
- Fence Line
- Range Structure
- Range Road
- Parking Area
- Cliffline
- RT 15A Combined SDZ
- Live-Fire Range Area
- Pagat Point Cultural Site
- Pagat Village Cultural Site

Range Observation Tower Coverage

- Not Visible to 10m Range Tower
- Visible to 10m Range Tower

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet
0 300 600 Meters

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3.4 NAVMAG NORTH/SOUTH ALTERNATIVE

The NAVMAG North/South alternative would be located on the NAVMAG in southern Guam (Figure 3.4-1 and Figure 3.4-2). The construction of ranges and supporting facilities would cause the relocation of some existing NAVMAG munitions storage magazines to newly constructed magazines on unaffected areas of the NAVMAG. The composite SDZ would extend over non-federal land to the east of the NAVMAG.

3.4.1 Existing Conditions and Constraints

The NAVMAG covers 8,645 ac (3,499 ha) and consists of the munitions storage area and the Fena Valley Reservoir and watershed area (Figure 3.4-2). The NAVMAG is approximately 6 mi (10 km) southeast of Naval Base Guam. The property contains the Naval Munitions Command Detachment Guam Headquarters. The explosives storage and associated administrative facilities are located in the northern portion of the site. Seventy-five percent of the NAVMAG parcel is within the designated explosives safety arcs due to the storage and transport of munitions. The NAVMAG and the surrounding area consist of hilly, heavily vegetated and sparsely developed areas. The highest point on Guam (Mount [Mt.] Lamlam) is just within the NAVMAG boundary along its southwest border.

The Fena Valley Reservoir is an important source of drinking water for Guam. The reservoir is entirely within DoD property and closed to the public. A summary of existing conditions is shown in Figure 3.4-3.

Source: AECOM 2010.

Figure 3.4-1: NAVMAG Aerial Photo

3.4.2 Land/Sea/Airspace Availability

The NAVMAG North/South alternative would require the acquisition of approximately 252 ac (102 ha) of non-federal land to the east of the NAVMAG for the SDZ. Construction of the LFTRC on the NAVMAG would require the relocation of 72 munitions storage magazines with a Net Explosive Weight (NEW) capacity of 17,607,519 pounds (lbs) (7,986,636 kilogram [kg]) and 116,000 ft² (10,777 m²) to create the necessary land area for the range complex and associated SDZ. Infill at the NAVMAG east of Fena Valley Reservoir would support a total NEW capacity of 32,384,600 lbs (14,689,407 kg) and 130, 000 ft² (12,077 m²).

Grading for the NAVMAG North/South alternative is shown in Appendix B and summarized in Table 3.4-1.

Table 3.4-1: Grading Volumes for the NAVMAG North/South Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,873,170	1,955,000	81,830	Fill	93
KD Rifle Range	1,446,800	14,000	1,432,800	Cut	36
MRF Range	402,820	396,000	6,820	Cut	24
NSSA Range	29,300	27,300	2,000	Cut	5
KD Pistol Range	19,440	800	18,640	Cut	2
Totals	**3,771,530**	**2,393,100**	**1,378,430**	**Cut**	**160**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend up to 2,965 ft (904 m) AGL. MARFORPAC has proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic. The proposed Naval Munitions R-7202 RA would overlay the Guam International Airport Runway 24/06 approach/departure corridors. Mitigation of these impacts is subject to ongoing actions between the Marine Corps and FAA.

3.4.3 Supporting Infrastructure

Access to the NAVMAG North/South alternative would be from the existing NAVMAG Main Gate on Route 5. Existing NAVMAG roadways would be used wherever possible, but a total of 3 mi (5 km) of new roadway would be required to support LFTRC operations.

Power to the MPMG Range would be from existing Navy-owned 13.8 kV overhead line along Blandy Road, near Building 835. This tap circuit would run underground and share a common trench with the new IT/Comm line to the MPMG Range. A 10 kVA, pad-mounted transformer near the range would transform the 13.8 kV line to 120/240 V.

Power to the remaining range sites could be from an existing three-phase, 13.8 kV overhead line, running along Parsons Road, near Building 465NM. This 13.8 kV, single-line tap would run underground and share a common trench with the IT/Comm line. A 10 kVA, pad-mounted transformer would be located near each tower building to transform the 13.8 kV line to 120/240 V.

The utilities plans for the NAVMAG North/South alternative are depicted in Figure 3.4-4 through Figure 3.4-7.

MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 22Aug2013

Philippine Sea

Santa Rita

Agat

Main Gate

Range Maintenance Buillding

NAVMAG

Operations and Storage

MRF

MPMG

KD PISTOL

KD RIFLE

NSSA

Fena Cave

MAGAZINE RELOCATION AREA

Fena Valley Reservoir

NMS1

Detonation Range (EOD Pit)

Mount Lamlam

NMS3

Mount Lamlam Trail

Mount Jumullong Manglo

NMS2

Philippine Sea

Figure 3.4-2
NAVMAG North/South Alternative

- Cultural Landmark
- Detonation Range Area
- Helicopter Landing Zone
- Range Structure
- Parking Area
- Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone
- Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- Proposed Grading Disturbance Area
- Hiking Trail (Mt. Lamlam)
- NAVMAG ESDQ Arc
- DoD Property
- Approved Non-Live-Fire Maneuver Training Area
- Wetlands (NAVMAG and Private Lands)

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet

0 500 1,000 Meters

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AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: 8/22/2013

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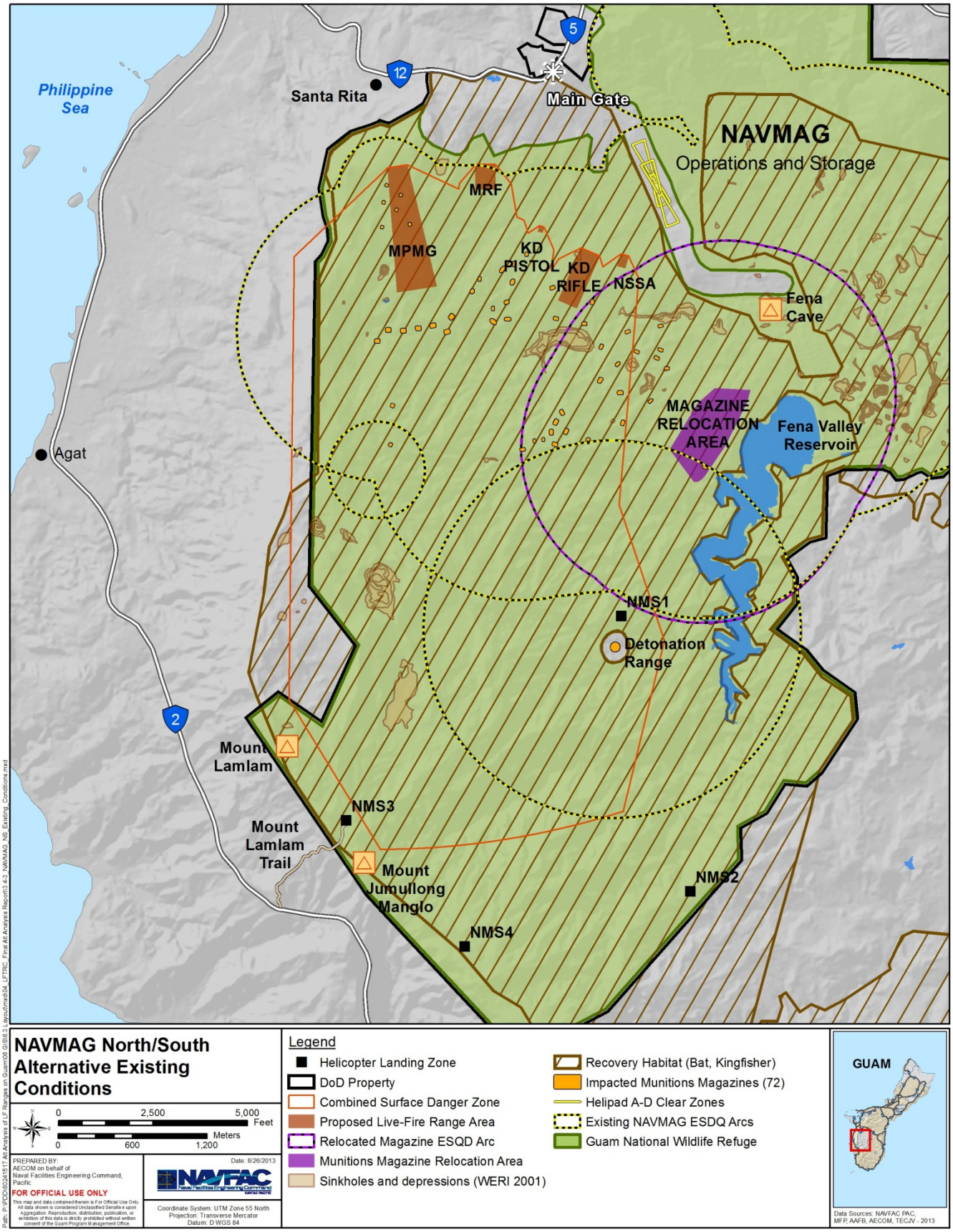

Figure 3.4-3: NAVMAG North/South Alternative Existing Conditions

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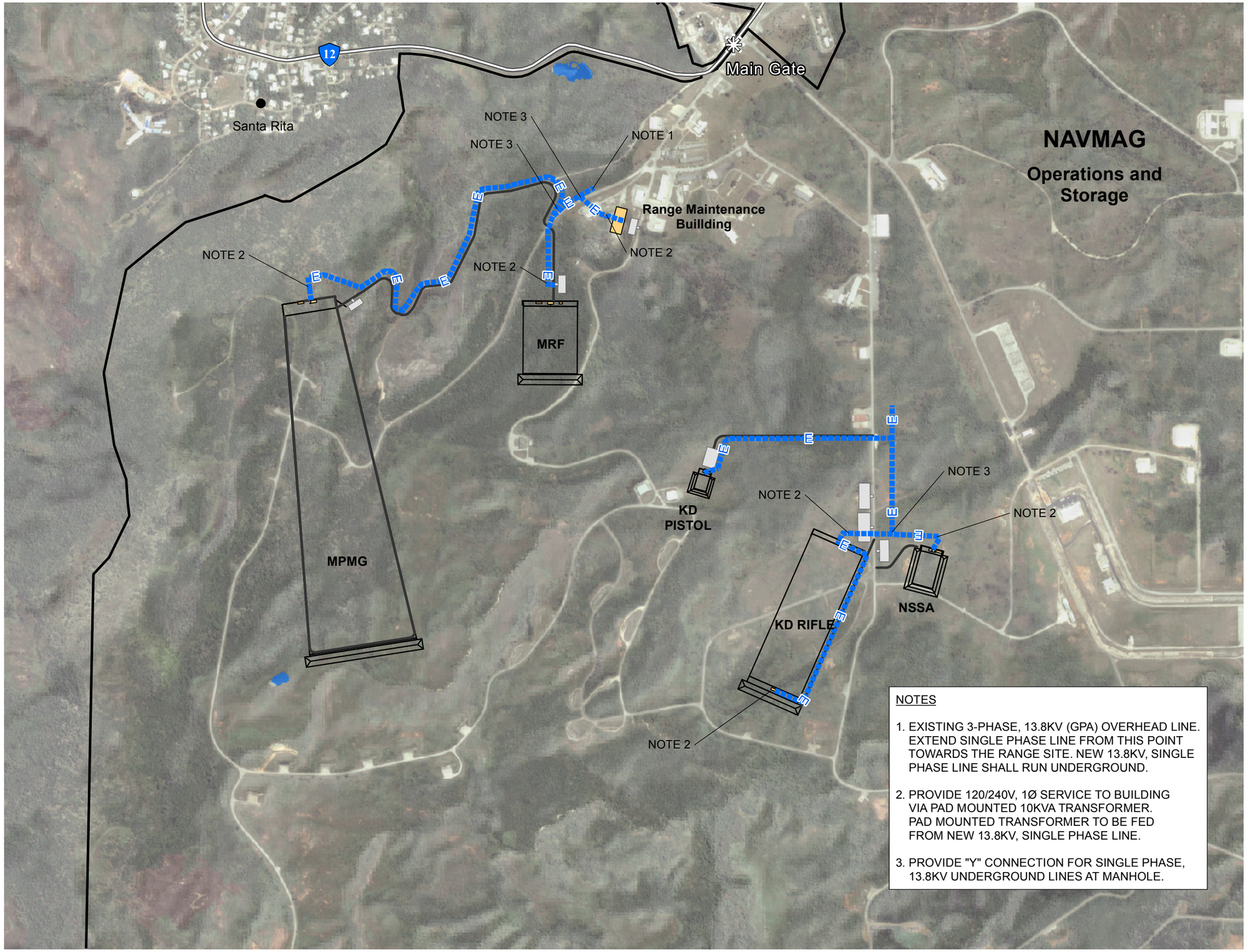

NOTES

1. EXISTING 3-PHASE, 13.8KV (GPA) OVERHEAD LINE. EXTEND SINGLE PHASE LINE FROM THIS POINT TOWARDS THE RANGE SITE. NEW 13.8KV, SINGLE PHASE LINE SHALL RUN UNDERGROUND.
2. PROVIDE 120/240V, 1Ø SERVICE TO BUILDING VIA PAD MOUNTED 10KVA TRANSFORMER. PAD MOUNTED TRANSFORMER TO BE FED FROM NEW 13.8KV, SINGLE PHASE LINE.
3. PROVIDE "Y" CONNECTION FOR SINGLE PHASE, 13.8KV UNDERGROUND LINES AT MANHOLE.

Figure 3.4-4
NAVMAG North/South Alternative Electrical Plan

NEW 120/240V, 1Ø

NEW 120/240V, 1Ø UNDERGROUND LINE FROM TRANSFORMER TO BUILDING

- Range Structure
- Parking Area
- Range Road
- Proposed Range Area
- DoD Property
- Surface Water Body

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Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

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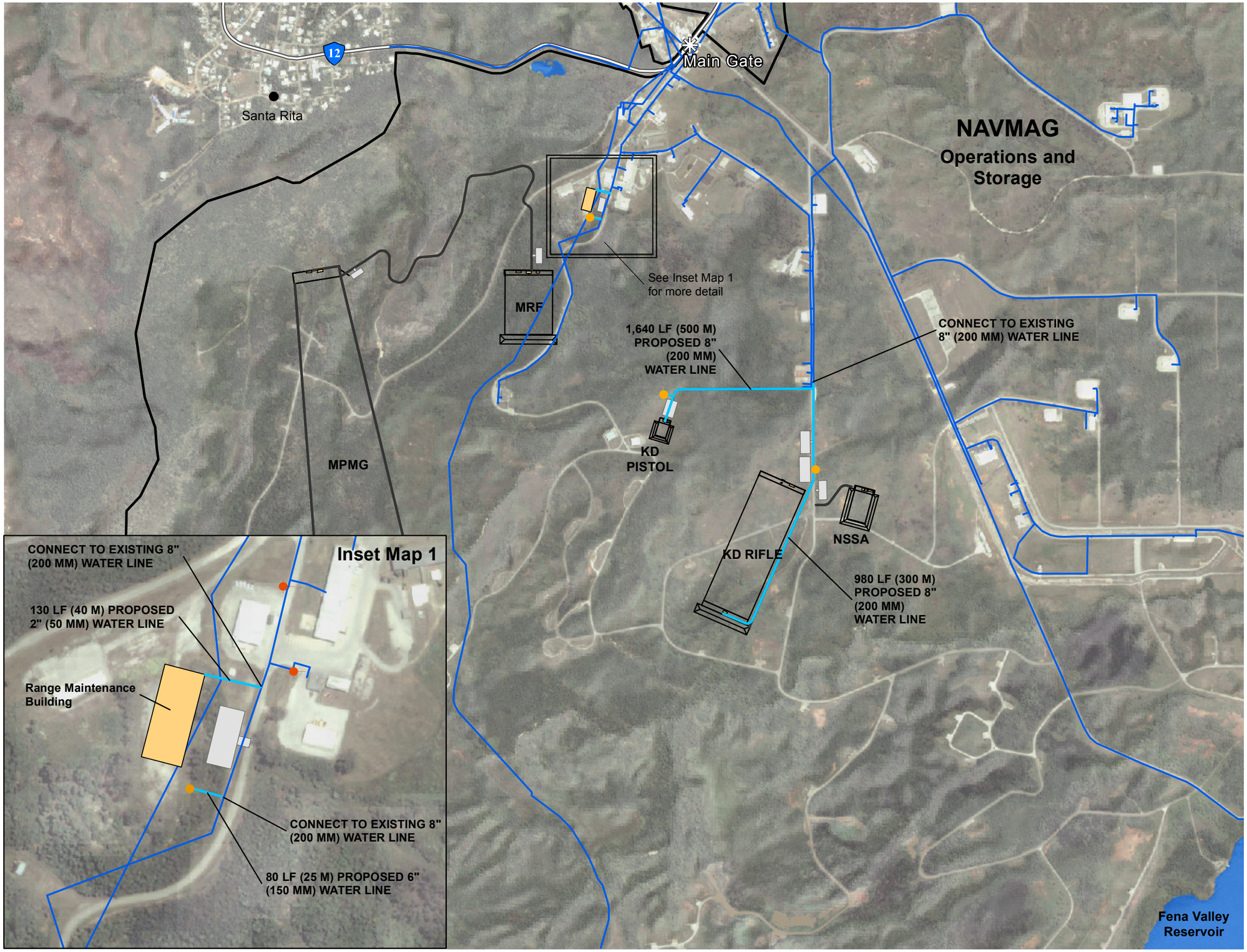

Figure 3.4-5
NAVMAG North/South Alternative Water Plan

PROPOSED FIRE HYDRANT

PROPOSED 8" (200 MM) WATER LINE

EXISTING DOD WATER LINE

Range Structure

Parking Area

Range Road

Proposed Range Area

DoD Property

Surface Water

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Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

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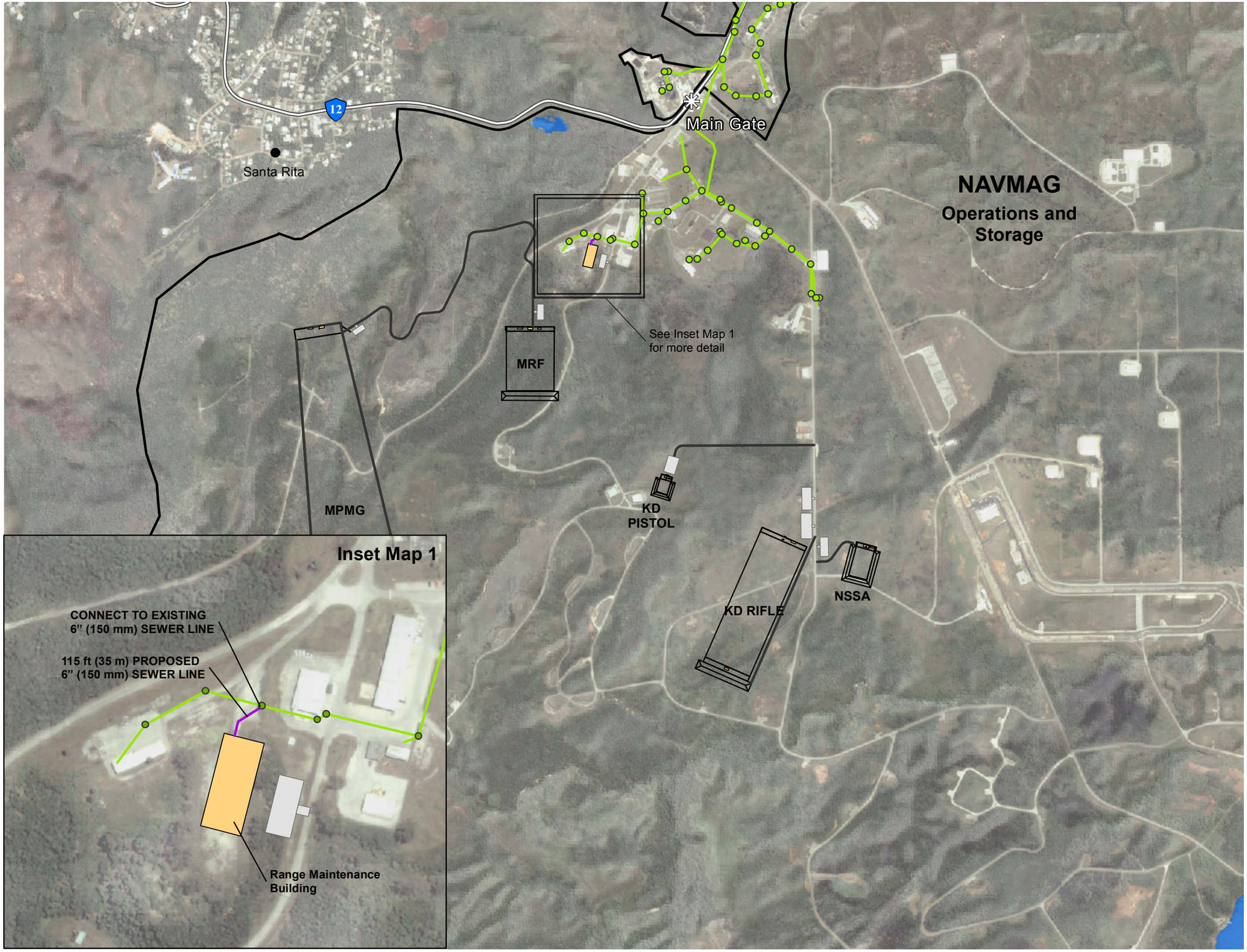
Figure 3.4-6
NAVMAG North/South Alternative Wastewater Plan



- EXISTING DOD MANHOLE
- EXISTING DOD SEWER LINE
- PROPOSED 8" (200 MM) SEWER LINE

- Range Structure
- Parking Area
- Range Road
- Proposed Range Area
- DoD Property
- Surface Water Body

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Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

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Figure 3.4-7
NAVMAG North/South Alternative IT/Comm Plan

Legend

- IT5 — DISTRIBUTION TO LFTRC - DB1
- IT6 — USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

- Range Structure
- Parking Area
- Range Road
- Proposed Range Area
- DoD Property
- Surface Water Body

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Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

PREPARED BY:
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Naval Facilities Engineering Command Pacific

Date: 8/22/2013

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3.4.4 Land Use Compatibility

The NAVMAG North/South alternative would displace 72 existing munitions storage magazines and would also encumber the planned location of 10 magazines with a NEW capacity of 5,000,000 lbs (2,267,962 kg) and 20,000 ft² (1,860 m^2) identified in the 2010 Guam Relocation FEIS (JGPO 2010). These planned magazines were planned to support 8,600 Marines. The requirement must be revalidated due to the reduction in force size and change in force structure. In addition to the lost munitions storage, the composite LFTRC SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. The Detonation Range is used approximately 82 days each year to neutralize mines or unexploded ordnance (UXO) (JGPO 2010). The Detonation Range also supports the round-the-clock emergency destruction of UXO. This emergency destruction mission would take precedence over MPMG training and would cause a cessation of training on the MPMG Range during emergency destructions. In addition to existing uses, the LFTRC SDZ would also encumber the Naval Munitions Site (NMS) 1 Landing Zone and 1,630 ac (660 ha) of the Non-Firing Maneuver area identified in the Guam Relocation FEIS (JGPO 2010). Use of these facilities/areas would be prohibited when the LFTRC is supporting live-fire training. While the LFTRC SDZ does not directly encumber the NMS 3 Landing Zone, its proximity would present operational flight limitations should the surface winds dictate a flight path into or near the SDZ for takeoff and landing maneuvers.

An Operational Noise Assessment of the NAVMAG North/South alternative (Figure 3.4-8), conducted by the USAPHC, concluded that Noise Zones 2 and 3 for the NAVMAG North/South alternative would be generally contained within the NAVMAG, with only approximately 30 ac (12 ha) extending beyond the boundary into undeveloped areas. Although residences would be exposed to Zone 1 levels from MPMG Range activity off-base, noise levels would be compatible with existing land uses. Within the NAVMAG, the Noise Zones would not encompass any noise-sensitive land uses.

3.4.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.4-9 and Figure 3.4-10). The significance of the impacts will be addressed in the SEIS. All construction and operation activities have the potential to increase the biological impacts associated with the spread of invasive species, with resulting threats to special-status species.

The NAVMAG North/South alternative may affect the following terrestrial biological resources:

- Clearing of primary limestone forest, ravine forest, and forested wetland, which serve as potential habitat for special-status species. A large area of limestone forest at the MPMG Range that is relatively undisturbed and not substantially impacted by ungulates would be removed. Some patches of the Guam SOGCN tree *Merrilliodendron megacarpum* would also be removed.
- Removal of large areas of the Guam National Wildlife Refuge, which would reduce natural resource conservation benefits.
- Mortality of the Guam-listed Pacific slender-toed gecko at the MPMG Range.
- Clearing of suitable habitat used by the ESA-listed Mariana fruit bat and ESA-listed Mariana swiftlet.
- Loss of one pond used by the Mariana common moorhen.

- Removal of host plants for the ESA-candidate species Mariana eight-spot butterfly would occur, although the butterfly itself has not been observed in the area.

Biological impacts may include the following:

- Impacts on the Mariana common moorhen at one pond that would be cleared and one pond just outside in an area that would be impacted by activity and noise from range operations.
- Impacts on the Mariana fruit bat from activity and noise.
- Invasive species impacts on all special-status species.

For cultural resources, construction of the NAVMAG North/South alternative may result in direct impacts on 15 NRHP-eligible archaeological sites. Indirect impacts on as many as 215 archaeological sites and two structures could occur during operations.

3.4.6 Public Access

Public access to the NAVMAG is currently restricted. The proposed LFTRC would not cause any additional loss of public access. There would be no impacts on the Mt. Lamlam Trail under this alternative.

3.4.7 Range Transients

The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NAVMAG. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NAVMAG would reduce the likelihood of unauthorized access by personnel. The perimeter of the composite SDZ would be marked with signage to warn individuals of the dangers of entering the SDZ without coordination and permission from Range Control.

If approved by the FAA, the proposed Naval Munitions R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.

3.4.8 Operational Efficiency

The NAVMAG North/South alternative would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.

3.4.9 Orientation

The generally southern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.

3.4.10 Life Cycle Costing

The life cycle cost for the NAVMAG North/South alternative is $576,099,000. See Table 2.6-1 for cost breakdown.

3.4.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NAVMAG North/South alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges July 2019
- MPMG Range July 2019

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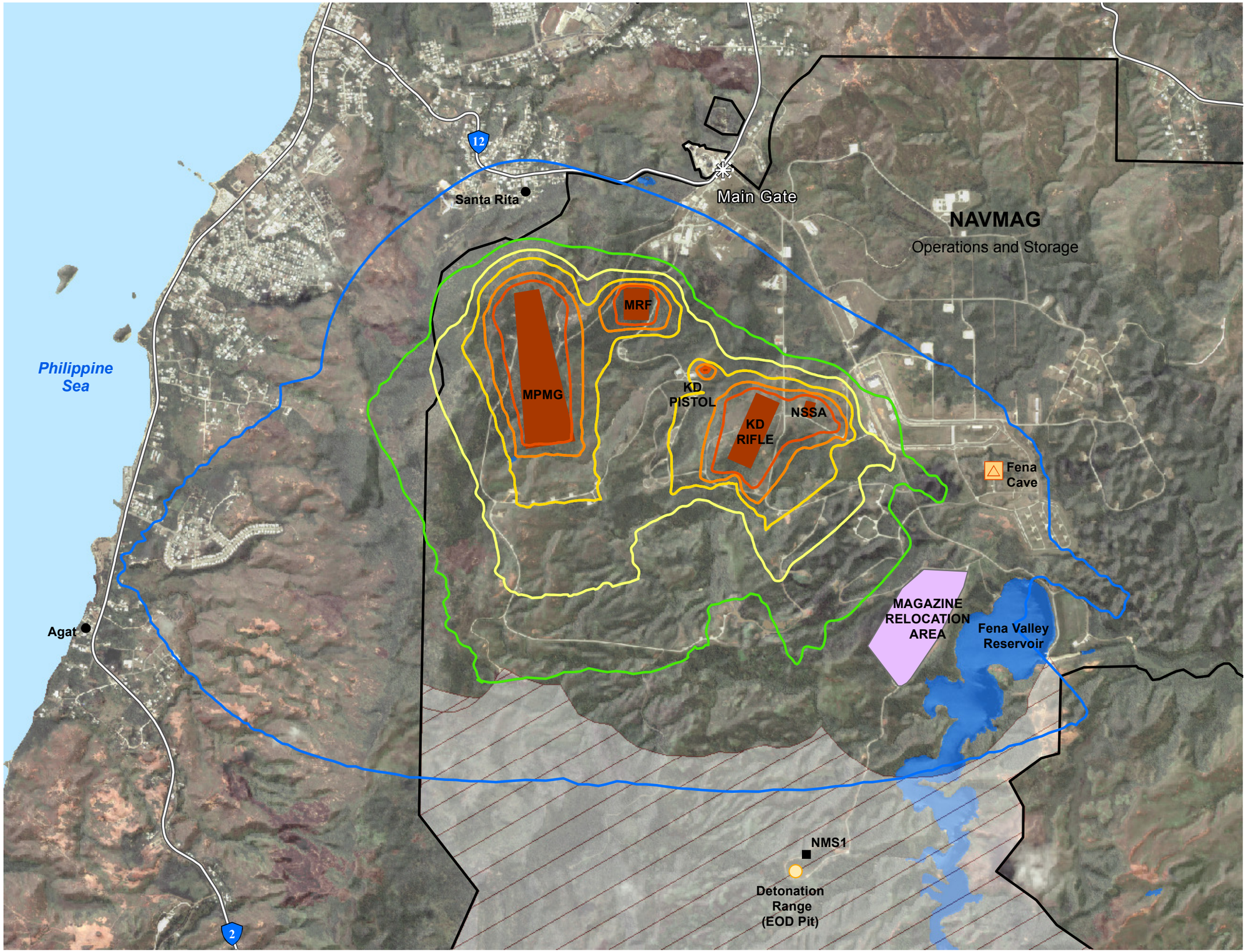

Figure 3.4-8
NAVMAG North/South Alternative Operational Noise Assessment

Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Live-Fire Range Area
- Munitions Magazine Relocation Area
- Detonation Range Area
- Cultural Landmark
- Helicopter Landing Zone
- Highway
- DoD Property

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet

0 500 1,000 Meters

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Naval Facilities Engineering Command Pacific

Date: 8/22/2013

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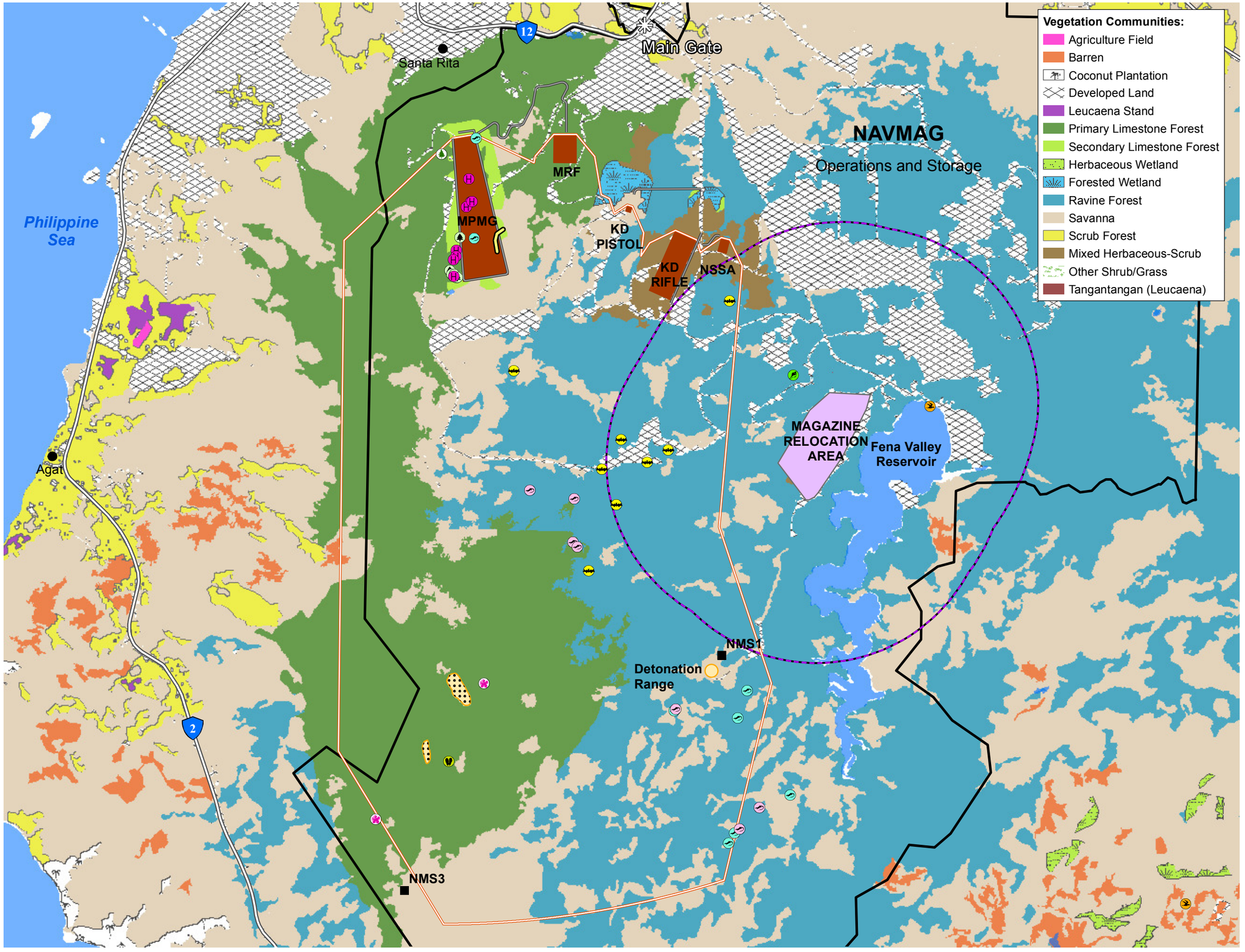
Figure 3.4-9
NAVMAG North/South Alternative Vegetation and Special-Status Species



Special-Status Species Occurrence

Fauna:
- Fruit Bat
- Guam Tree Snail
- Moth Skink
- Pacific Slender-Toed Gecko
- Mariana Common Moorhen
- Mariana Eight-Spot Butterfly

Flora:
- Mariana Eight-Spot Butterfly Host Plant
- *Heritiera longipetiolata*

Known Plant SOGCN Locations
- *Tabernaemontana rotensis*
- *Merrilliodendron megacarpum*
- Cycad Area
- *Merrilliodendron*
- Helicopter Landing Zone
- Range Road
- Combined Surface Danger Zone
- Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- DoD Property

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet

0 500 1,000 Meters

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MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 26Aug2013

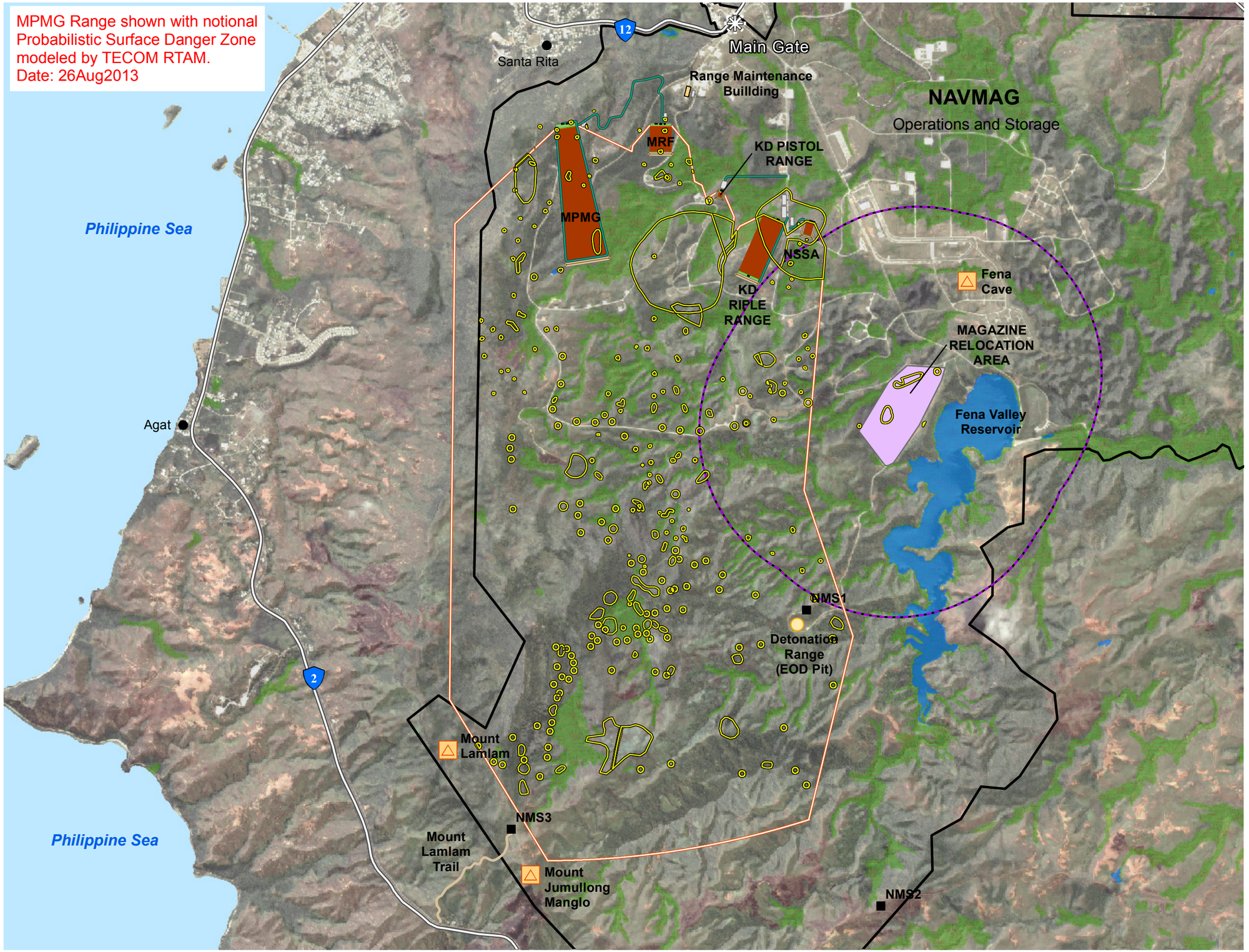

Figure 3.4-10
NAVMAG North/South Alternative Cultural Resources

- Cultural Landmark
- Detonation Range Area
- Helicopter Landing Zone
- Cultural Resource Area
- Range Structure
- Parking Area
- Range Road
- Berm Area
- Range Support Area
- Combined Surface Danger Zone
- Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- Hiking Trail (Mt. Lamlam)
- DoD Property

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

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3.5 NAVMAG L-SHAPED ALTERNATIVE

The NAVMAG L-Shaped alternative (Figure 3.5-1 and Figure 3.5-2) would be divided between two locations. The MPMG Range and Range Maintenance and Storage Building would be located on the NAVMAG and would be in the same respective locations identified for the NAVMAG North/South alternative. Construction of the MPMG Range would cause the relocation of some existing munitions storage magazines to new magazines constructed on unaffected areas of the NAVMAG. The MPMG SDZ would extend over non-federal land to the east of the NAVMAG.

All other ranges would be located on non-federal property to the east of the NAVMAG. The ranges located off the NAVMAG would require the construction of an access road to allow all-weather operation.

Source: AECOM 2010.

Figure 3.5-1: Aerial View of Undeveloped Non-federal Land Southeast of the NAVMAG

3.5.1 Existing Conditions and Constraints

In addition to the NAVMAG (described in Section 3.4.1), the L-Shaped alternative would use non-federal land to the southeast (Figure 3.5-2). This rural land is largely undeveloped. There are some small agricultural fields, but the area primarily consists of rolling hills interspersed with wetland areas. A summary of existing conditions is shown in Figure 3.5-3.

3.5.2 Land/Sea/Airspace Availability

The NAVMAG L-Shaped alternative would require the acquisition of approximately 914 ac (370 ha) of non-federal land. Construction of the MPMG Range on the NAVMAG would require the relocation of 66 munitions storage magazines with a NEW capacity of 13,723,254 lbs (6,224,763 kg) and 84,000 ft² (7,804 m²) to create the necessary land area for the MPMG Range and associated SDZ. Infill at the NAVMAG east of Fena Valley Reservoir would support a total NEW capacity of 32,384,600 lbs (14,689,407 kg) and 130, 000 ft² (12,077 m²).

Grading for the NAVMAG L-Shaped alternative is shown in Appendix B and summarized in Table 3.5-1.

Table 3.5-1: Grading Volumes for the NAVMAG L-Shaped Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,873,170	1,955,000	81,830	Fill	93
KD Rifle Range	115,964	111,461	4,503	Cut	22
MRF Range	43,643	21,401	22,242	Cut	11
NSSA Range	24,914	19,943	4,971	Cut	4
KD Pistol Range	18,936	8,073	10,864	Cut	2
Totals	**2,076,627**	**2,115,878**	**39,250**	**Fill**	**133**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend up to 2,965 ft (904 m) AGL. MARFORPAC has proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic. The proposed Naval Munitions R-7202 RA would overlay the approach/departure corridors of Guam International Airport Runway 24/06. Mitigation of these impacts would be subject to ongoing actions between the Marine Corps and FAA.

3.5.3 Supporting Infrastructure

Access to the NAVMAG L-Shaped MPMG Range and Range Maintenance and Storage Building would be from the existing NAVMAG Main Gate on Route 5. Existing NAVMAG roadways would be used wherever possible, but a total of 1 mi (1.6 km) of new/improved roadway is required to support range operations on the NAVMAG.

Access to the ranges to the east of the NAVMAG would be via an access road that would connect to the existing Dandan Road (Figure 3.5-4). Within the eastern portion of the range complex, 3 mi (5 km) of roadway would be constructed to support training.

Planned utilities for the MPMG Range and Range Maintenance and Storage Building are the same as described in Section 3.4.3. Utilities and communications for the remaining ranges east of the NAVMAG would follow the constructed access road. In all cases, extension of single-phase, 13.8 kV lines from the points of connections would be accomplished via underground duct banks. The underground electrical lines would share the same trench with the IT/Comm lines when routed in the same access roads. Power to the site would be from the existing underground power line that runs along Dandan Road.

MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 22Aug2013

Philippine Sea

Santa Rita

Main Gate

Range Maintenance Buillding

NAVMAG
Operations and Storage

MPMG

Fena Cave

MAGAZINE RELOCATION AREA

Fena Valley Reservoir

Agat

NMS1

Detonation Range (EOD Pit)

Mount Lamlam

NMS3

Mount Lamlam Trail

Mount Jumullong Manglo

NMS2

NMS4

NMS5

NSSA

MRF

KD RIFLE

KD PISTOL

ENTRY CONTROL POINT

Talofofo Falls

Proposed Access Road

Philippine Sea

5 12 2 17

Figure 3.5-2
NAVMAG L-Shaped Alternative

- Proposed Fence Line
- Proposed Range Structures
- Proposed Range Road
- Proposed Access Road
- Proposed Berm Area
- Proposed Range Support Area
- Live-Fire Surface Danger Zone
- Proposed Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- Proposed Grading Disturbance Area
- Cultural Landmark
- Helicopter Landing Zone
- Hiking Trail (Mt. Lamlam)
- Highway
- Existing ESDQ Arc
- DoD Property
- Non-Live-Fire Maneuver Training Area
- Wetlands (NAVMAG and Private Lands)

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet

0 600 1,200 Meters

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Naval Facilities Engineering Command Pacific

Date: 8/22/2013

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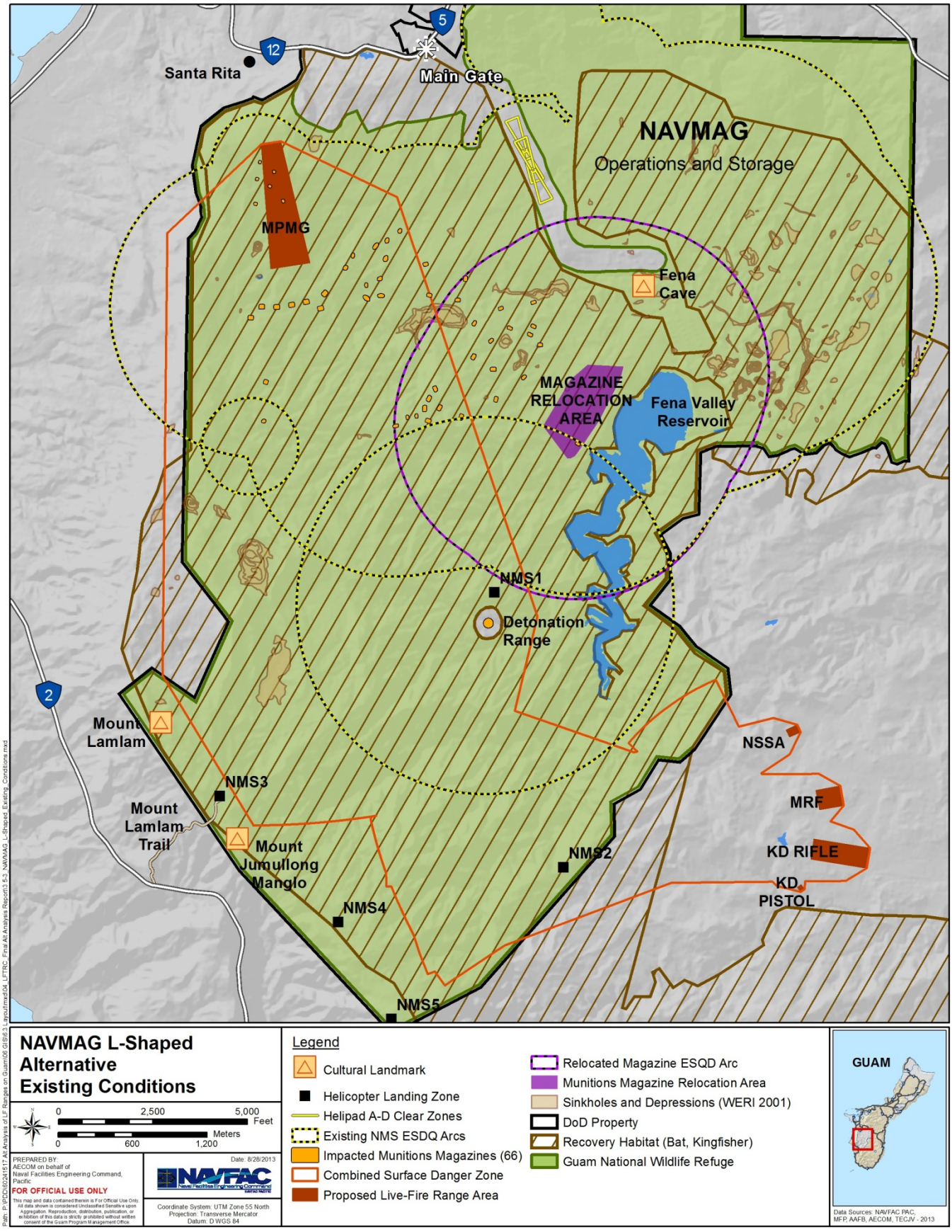


Figure 3.5-3: NAVMAG L-Shaped Alternative Existing Conditions

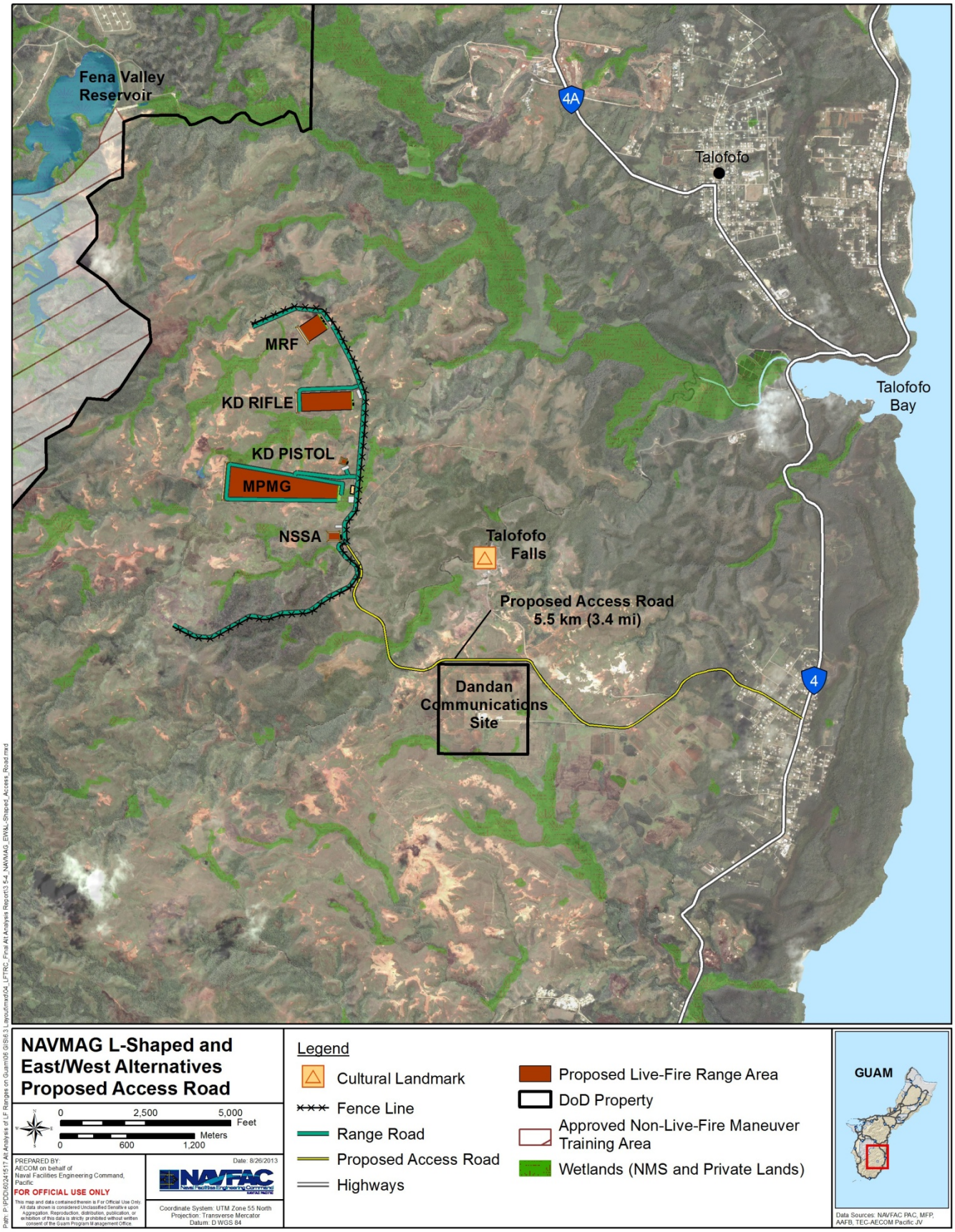


Figure 3.5-4: NAVMAG L-Shaped and NAVMAG East/West Alternatives Proposed Access Road

The utilities plans for the NAVMAG L-Shaped alternative are depicted in Figure 3.5-5 through Figure 3.5-8.

3.5.4 Land Use Compatibility

The NAVMAG L-Shaped MPMG Range would displace 66 existing munitions storage magazines and would also encumber the planned location of 10 magazines with a NEW capacity of 5,000,000 lbs (2,267,962 kg) and 20,000 ft² (1,858 m²), as identified in the Guam and CNMI Military Relocation FEIS (JGPO 2010). These magazines were planned to support 8,600 Marines. This requirement will need to be revalidated due to the reduction in force size and change in force structure. In addition to the lost munitions storage, the MPMG SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. The Detonation Range is used approximately 82 days per year to neutralize mines or UXO (JGPO 2010). The Detonation Range also supports the round-the-clock emergency destruction of UXO. This emergency destruction mission would take precedence over MPMG training and would cause a cessation of training on the MPMG Range during emergency destructions. In addition to existing uses, the LFTRC SDZ would also encumber the NMS 1 and 2 Landing Zones, and 2,303 ac (932 ha) of the Non-Live-Fire Maneuver area identified in the Guam and CNMI Military Relocation FEIS (JGPO 2010). Use of these facilities/areas would be prohibited when the LFTRC is supporting live-fire training. While the LFTRC SDZ would not directly encumber the NMS 3, 4, and 5 Landing Zones, its proximity would present operational flight limitations should the surface winds dictate a flight path into or near the SDZ for takeoff and landing maneuvers.

An Operational Noise Assessment of the NAVMAG L-Shaped alternative, conducted by the USAPHC, concluded that the Noise Zones (Figure 3.5-9) would extend beyond the boundary, but the activity would be compatible with the surrounding land uses. Zone 1 would extend beyond the northern boundary from the MPMG Range activity. Residential properties are located within Zone 1; however, noise-sensitive land uses within Zone 1 would be considered compatible. Within the off-base Zone 2, the land is undeveloped and does not contain any noise-sensitive land uses. Although the Noise Zones for the eastern portion of the NAVMAG-L Shaped alternative would extend beyond the boundary, the area surrounding the site is undeveloped and would not contain any noise-sensitive land uses. Within the NAVMAG, the Noise Zones would not encompass any noise-sensitive land uses.

3.5.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.5-10 and Figure 3.5-11). The significance of the impacts will be addressed in the SEIS.

The NAVMAG L-Shaped alternative may affect the following terrestrial biological resources:

- Clearing of primary limestone forest, ravine forest, and forested wetland, which serve as potential habitat for special-status species. A large area of limestone forest at the MPMG Range that is relatively undisturbed and not substantially impacted by ungulates would be removed. Some patches of the Guam SOGCN tree *Merrilliodendron megacarpum* would be removed.
- Removal of large areas of the USFWS National Wildlife Refuge, which would reduce natural resource conservation benefits.

- Clearing of areas currently used by the Mariana swiftlet for foraging.
- Mortality of the Guam-listed Pacific slender-toed gecko at the MPMG Range.
- Clearing of suitable habitat used by the ESA-listed Mariana fruit bat, and disturbance of suitable habitat that could be used by the fruit bat in additional areas around the LFTRC.
- Removal of host plants for the ESA-candidate species Mariana eight-spot butterfly would occur, although the butterfly itself has not been observed in the area.

Biological impacts may include the following:

- Impacts on the Mariana common moorhen at one pond just outside the MPMG Range that would be impacted by activity and noise from range operations.
- Impacts on the Mariana fruit bat from activity and noise.
- Invasive species impacts on all special-status species.

For cultural resources, construction of the NAVMAG L-Shaped alternative may result in direct impacts on 11 NRHP-eligible archaeological sites. Ten sites that have not been evaluated for listing on the NRHP would also be affected. One building covered under a program comment would be demolished. In addition, up to 264 archaeological sites and five structures may be impacted during operations.

3.5.6 Public Access

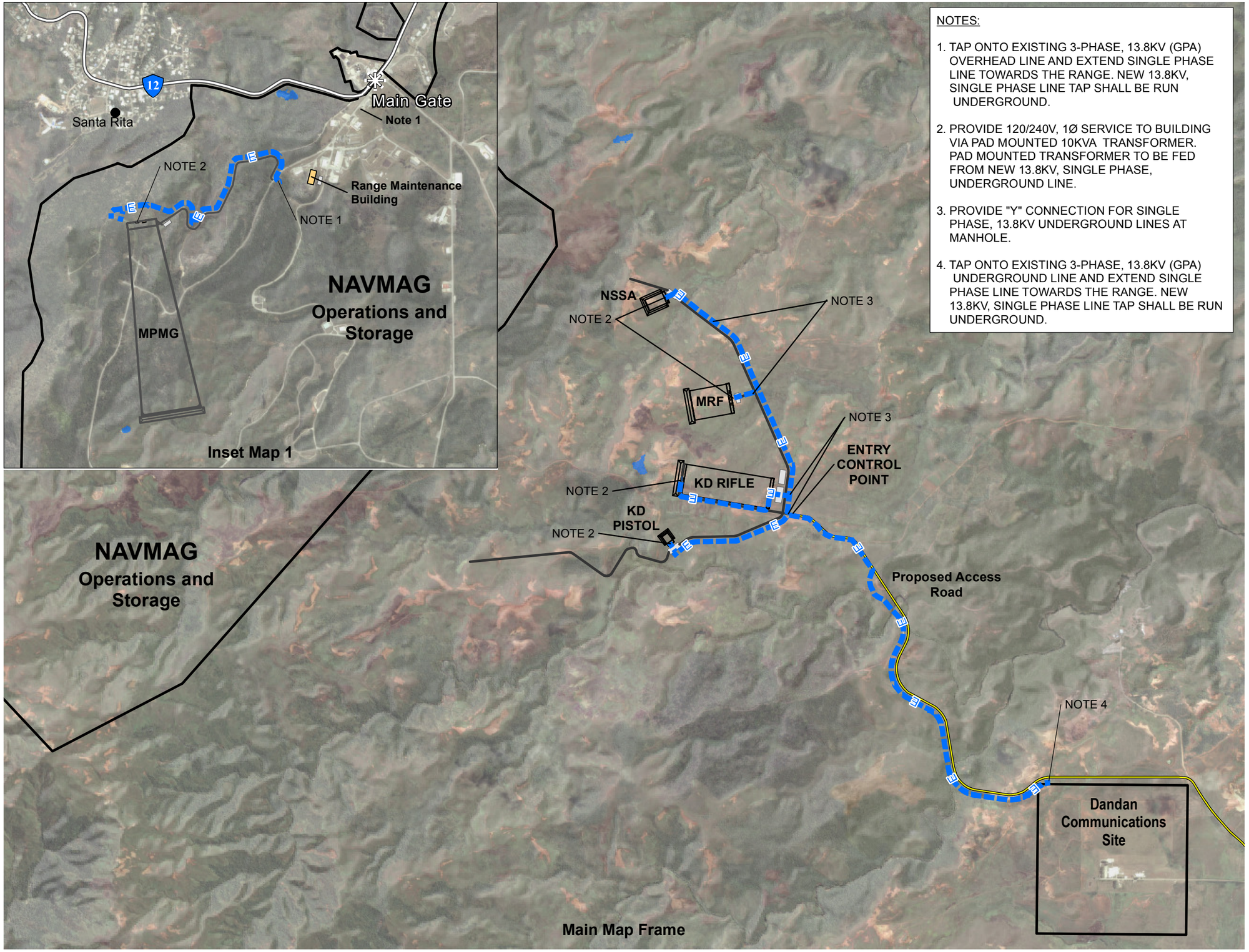
Public access to the NAVMAG is currently restricted. Public access would also be restricted from 914 ac (370 ha) of the eastern ranges and their associated SDZs. There would be no impacts on the Mt. Lamlam Trail under this alternative.

3.5.7 Range Transients

The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NAVMAG. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NAVMAG reduces the likelihood of unauthorized personnel access.

Proposed fencing on the southern, eastern, and northern sides of the eastern ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ. The remaining unfenced perimeter of the composite SDZ would be marked with signage to warn individuals of the dangers of entering the SDZ without coordination and permission from Range Control.

If approved by the FAA, the proposed Naval Munitions R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.



NOTES:

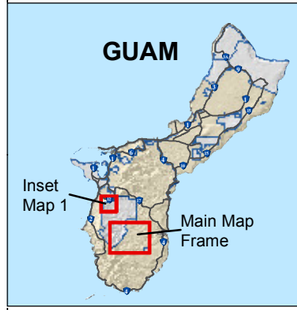
1. TAP ONTO EXISTING 3-PHASE, 13.8KV (GPA) OVERHEAD LINE AND EXTEND SINGLE PHASE LINE TOWARDS THE RANGE. NEW 13.8KV, SINGLE PHASE LINE TAP SHALL BE RUN UNDERGROUND.
2. PROVIDE 120/240V, 1Ø SERVICE TO BUILDING VIA PAD MOUNTED 10KVA TRANSFORMER. PAD MOUNTED TRANSFORMER TO BE FED FROM NEW 13.8KV, SINGLE PHASE, UNDERGROUND LINE.
3. PROVIDE "Y" CONNECTION FOR SINGLE PHASE, 13.8KV UNDERGROUND LINES AT MANHOLE.
4. TAP ONTO EXISTING 3-PHASE, 13.8KV (GPA) UNDERGROUND LINE AND EXTEND SINGLE PHASE LINE TOWARDS THE RANGE. NEW 13.8KV, SINGLE PHASE LINE TAP SHALL BE RUN UNDERGROUND.

Figure 3.5-5
NAVMAG L-Shaped Alternative Electrical Plan

- NEW 120/240V 1Ø UNDERGROUND LINE FROM TRANSFORMER TO BUILDING
- NEW 120/240V 1Ø UNDERGROUND LINE
- Proposed Range Road
- Proposed Access Road
- Parking Area
- Range Structures
- Range Area
- DoD Controlled Waters
- DoD Property
- Surface Water Body

All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

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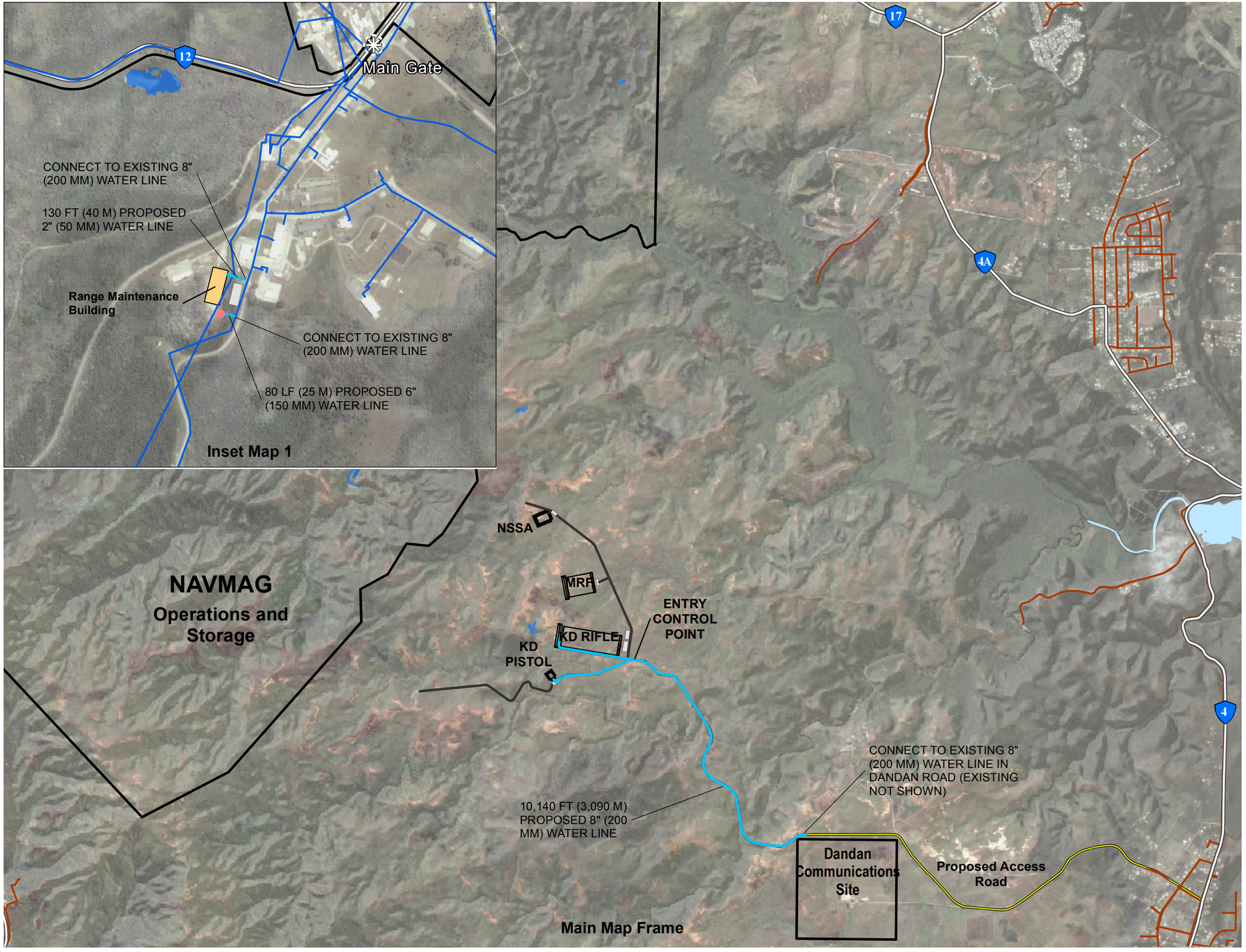
Figure 3.5-6
NAVMAG L-Shaped Alternative Water Plan



PROPOSED FIRE HYDRANT
PROPOSED 8" (200 MM) WATER LINE
EXISTING DOD WATER LINE
EXISTING GWA WATER LINE

Proposed Range Road
Proposed Access Road
Parking Area
Range Structures
Range Area
DoD Controlled Waters
DoD Property
Surface Water Body

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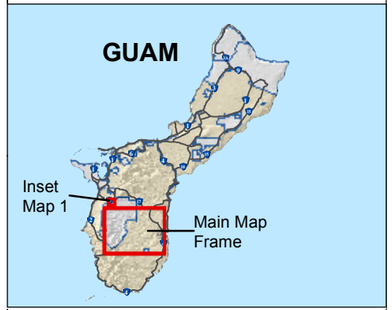
Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

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Figure 3.5-7
NAVMAG L-Shaped Alternative Wastewater Plan

- PROPOSED 8" (200 MM) SEWER LINE
- EXISTING DOD MANHOLE
- EXISTING DOD SEWER LINE

- Proposed Range Road
- Proposed Access Road
- Parking Area
- Range Structures
- Range Area
- DoD Controlled Waters
- DoD Property
- Surface Water Body

Sewer collection is required for the Range Maintenance Building only.

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Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 400 800 Feet

0 100 200 Meters

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Figure 3.5-8
NAVMAG L-Shaped Alternative IT/Comm Plan

NOTES:

1. ROUTE CONTINUED TO MAIN CANTONMENT AT FINEGAYAN, BARRIGADA, AND AAFB ALTERNATIVES.

Philippine Sea

NOTE 1

Santa Rita

Main Gate

MPMG

See Inset Map 1

NAVMAG
Operations and Storage

Fena Valley Reservoir

USMC IT/Comm Route to Cable Head (TATA)

Agat

Range Maintenance Building

NSSA

MRF

KD RIFLE

KD PISTOL

ENTRY CONTROL POINT

Dandan Communications Site

Inset Map 1

Main Map Frame

IT5 DISTRIBUTION TO LFTRC - DB1

IT6 USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

DISA COMM ROUTE TO TATA CLF - DB1

- Proposed Range Road
- Parking Area
- Range Structures
- Range Area
- DoD Controlled Waters
- DoD Property
- Surface Water Body

All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Inset Map 1

Main Map Frame

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 3,600 7,200 Feet

0 1,000 2,000 Meters

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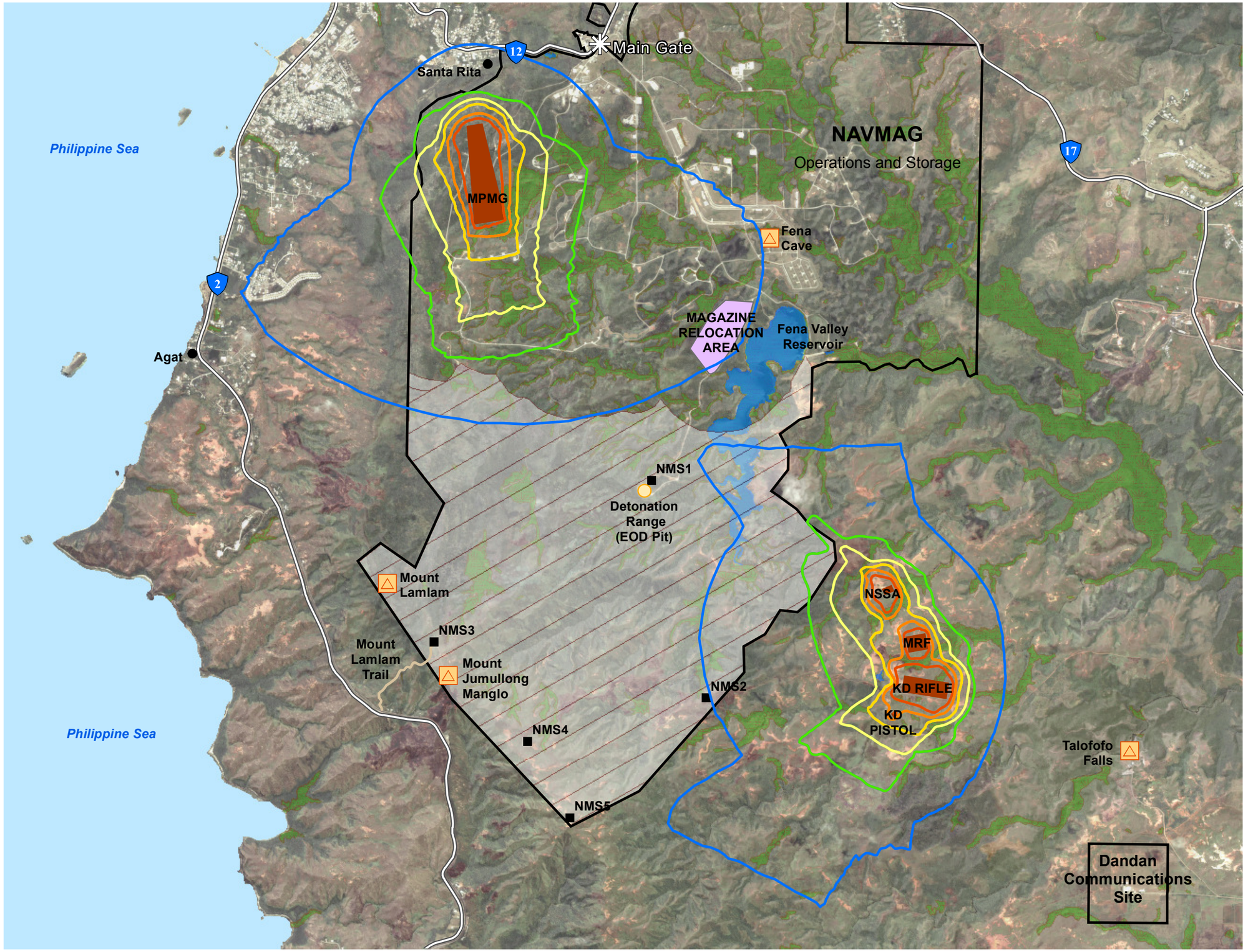
Figure 3.5-9
NAVMAG L-Shaped Alternative Operational Noise Assessment



Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Proposed Live-Fire Range Area
- Munitions Magazine Relocation Area
- Cultural Landmark
- Helicopter Landing Zone
- Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Approved Non-Live-Fire Maneuver Training Area
- Wetlands (NAVMAG and Private Lands)

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet

0 600 1,200 Meters

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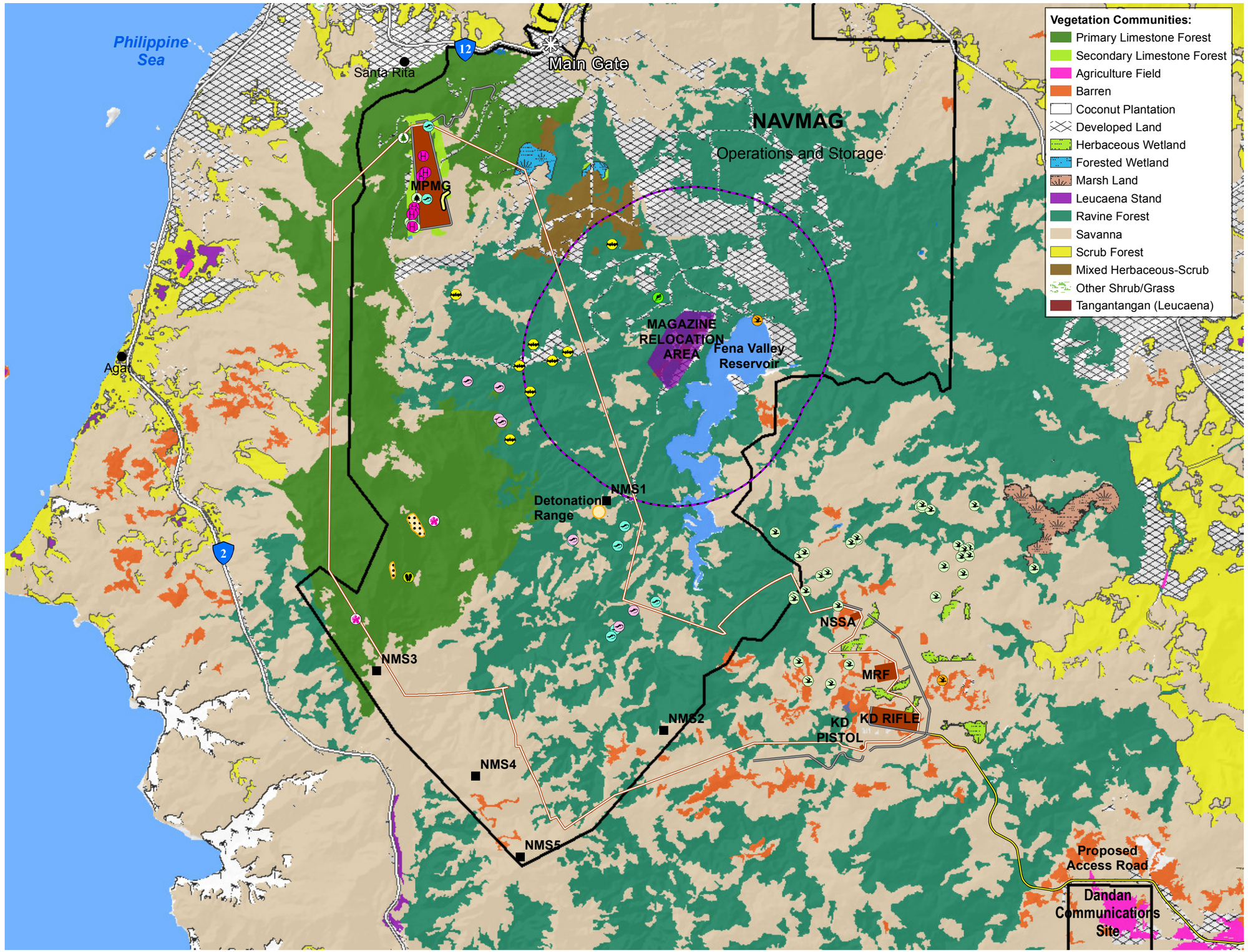

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Figure 3.5-10
NAVMAG L-Shaped Vegetation and Special-Status Species

Special-Status Species Occurrence

Fauna:
- Fruit Bat
- Guam Tree Snail
- Moth Skink
- Pacific Slender-Toed Gecko
- Mariana Common Moorhen
- Mariana Swiftlet
- Mariana Eight-Spot Butterfly

Flora:
- Mariana Eight-Spot Butterfly Host Plant
- *Heritiera longipetiolata*

Known Plant SOGCN Locations
- *Tabernaemontana rotensis*
- *Merrilliodendron megacarpum*

- Cycad Area
- *Merrilliodendron*
- Helicopter Landing Zone
- Proposed Range Road
- Proposed Access Road
- Combined Surface Danger Zone
- Proposed Live-Fire Range Area
- Relocated Magazine ESQD Arc
- DoD Property

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet

0 600 1,200 Meters

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MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 22Aug2013

Main Gate
Santa Rita
Range Maintenance Buillding
NAVMAG
Operations and Storage
Philippine Sea
MPMG
Fena Cave
MAGAZINE RELOCATION AREA
Fena Valley Reservoir
Agat
NMS1
Detonation Range (EOD Pit)
Mount Lamlam
NSSA
NMS3
Mount Lamlam Trail
Mount Jumullong Manglo
MRP
ENTRY CONTROL POINT
NMS2
KD RIFLE
KD PISTOL
NMS4
Talofofo Falls
Proposed Access Road
NMS5
Philippine Sea

12
2
17

Date: 8/22/2013 Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\04_LFTRC_Final Alt Analysis Report\3.5-11_NAVMAG_L-Shaped_Cultural_Resources.mxd

Figure 3.5-11
NAVMAG L-Shaped Alternative Cultural Resources

- Cultural Resource Area
- Proposed Range Structures
- Proposed Range Road
- Proposed Access Road
- Proposed Berm Area
- Proposed Range Support Area
- Combined Surface Danger Zone
- Proposed Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- Cultural Landmark
- Helicopter Landing Zone
- Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Wetlands (NAVMAG and Private Lands)

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet
0 600 1,200 Meters

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3.5.8 Operational Efficiency

The proposed NAVMAG L-Shaped alternative would locate ranges and facilities in two locations. This would reduce the efficiency in range maintenance and management.

3.5.9 Orientation

The generally southern orientation of the MPMG Range would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun. The western orientation of the remaining ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets, and limit the late afternoon use of magnifying optics to avoid damage to eyesight.

3.5.10 Life Cycle Cost

The life cycle cost for the NAVMAG L-Shaped alternative is $481,692,000. See Table 2.6-1 for cost breakdown.

3.5.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NAVMAG L-Shaped alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges April 2024
- MPMG Range July 2019

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3.6 NAVMAG EAST/WEST ALTERNATIVE

The NAVMAG East/West alternative (Figure 3.6-1) would be located in a single location on non-federal land to the southeast of the NAVMAG. The ranges would be oriented to the west, and the composite SDZ would extend over portions of the NAVMAG. The range complex would require the construction of an access road to allow all-weather operation. The same access road developed for the L-Shaped alternative would also support this alternative.

3.6.1 Existing Conditions and Constraints

The existing conditions and constraints described in Section 3.5.1 apply to this alternative as well. A summary of existing conditions is shown in Figure 3.6-2.

3.6.2 Land/Sea/Airspace Availability

The NAVMAG East/West alternative would require the acquisition of approximately 1,894 ac (766 ha) of non-federal land.

Grading for the NAVMAG East/West alternative is shown in Appendix B and summarized in Table 3.6-1.

Table 3.6-1: Grading Volumes for the NAVMAG East/West Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	724,940	682,116	42,824	Cut	93
KD Rifle Range	145,807	143,251	2,557	Cut	25
MRF Range	79,378	79,158	220	Cut	12
NSSA Range	334	51,953	51,619	Fill	4
KD Pistol Range	2,727	2,810	83	Fill	2
Totals	**953,186**	**959,288**	**6,102**	**Fill**	**136**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend up to 2,965 ft (904 m) AGL. MARFORPAC has proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic. The proposed Naval Munitions R-7202 RA would overlay the Guam International Airport Runway 24/06 approach and departure operations. Mitigation of these impacts is subject to ongoing actions between the Marine Corps and FAA.

3.6.3 Supporting Infrastructure

Access to the LFTRC would be from the route described in Section 3.5.3. Within the range complex, 5 mi (9 km) of roadway would be constructed to support training.

Utilities and communications for this alternative would follow the constructed access road and are the same as those described in Section 3.5.3. The utilities plans for the NAVMAG East/West alternative are depicted in Figure 3.6-3 through Figure 3.6-6.

3.6.4 Land Use Compatibility

The LFTRC SDZ would encumber the NMS 2 and 4 Landing Zones, and 1,700 ac (688 ha) of the Non-Live-Fire Maneuver area identified in the 2010 Guam Relocation FEIS (JGPO 2010). Use of these facilities/areas would be prohibited when the LFTRC is supporting live-fire training. While the LFTRC SDZ would not directly encumber

the NMS 1 and 5 Landing Zones, its proximity would present operational flight limitations should the surface winds dictate a flight path into or near the SDZ for takeoff and landing maneuvers.

An Operational Noise Assessment of the NAVMAG East/West alternative, conducted by the USAPHC, concluded that the Noise Zones (Figure 3.6-7) would extend beyond the NAVMAG and proposed land expansion area boundaries, but the area surrounding the site is undeveloped and would not contain any noise-sensitive land uses. Within the NAVMAG, the Noise Zones would not encompass any noise-sensitive land uses.

3.6.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.6-8 and Figure 3.6-9). The significance of the impacts will be addressed in the SEIS. All construction and operation activities would have the potential to increase the biological impacts associated with the spread of invasive species, with resulting threats to special-status species, as well as the increased potential of wildfire.

The NAVMAG East/West alternative may affect the following terrestrial biological resources:

- Clearing of important vegetation communities such as ravine forest, herbaceous wetland, and small areas of primary limestone forest.
- Clearing of areas currently used by the Mariana swiftlet for foraging.

Biological impacts may include the following:

- Loss of seasonal ponds in the area that may be used by the Mariana common moorhen. Surveys during the wet season would be required to determine if the species occurs in the area.
- Invasive species impacts on all special-status species.
- Wildfire impacts on special-status species habitat.

For cultural resources, construction of the NAVMAG East/West alternative may result in direct impacts on nine historic properties (archaeological sites). In addition, indirect impacts on as many as 98 historic properties could occur during operations.

3.6.6 Public Access

Public access to the NAVMAG is currently restricted. Public access would also be restricted from 1,894 ac (766 ha) of the ranges and their associated SDZs to the east of the NAVMAG.

There would be no impacts on the Mt. Lamlam Trail under this alternative.

MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 22Aug2013

NAVMAG
Operations and Storage

Fena Valley Reservoir

NM61

Detonation Range (EOD Pit)

Mount Lamlam

Mount Lamlam Trail

NMS3

Mount Jumullong Manglo

NMS2

NMS4

NMS5

MRF

KD RIFLE

KD PISTOL

MPMG

Range Maintenance Building

NSSA

ENTRY CONTROL POINT

Talofofo Falls

Proposed Access Road

Dandan Communications Station

4A

2

Date: 8/22/2013 Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\04_LFTRC_Final Alt Analysis Report\3.6-1 NAVMAG_EW_Alternative.mxd

Figure 3.6-1
NAVMAG East/West Alternative

- Fence Line
- Proposed Access Road
- Parking Area
- Range Structures
- Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone
- Live-Fire Range Area
- Proposed Grading Disturbance Area
- Cultural Landmark
- Helicopter Landing Zone
- Detonation Range Area
- Existing Hiking Trail (Mt. Lamlam)
- Highway
- Existing ESDQ Arc
- DoD Property
- Approved Non-Firing Maneuver Training Area
- Wetlands (NAVMAG and Private Lands)

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,500 3,000 Feet

0 400 800 Meters

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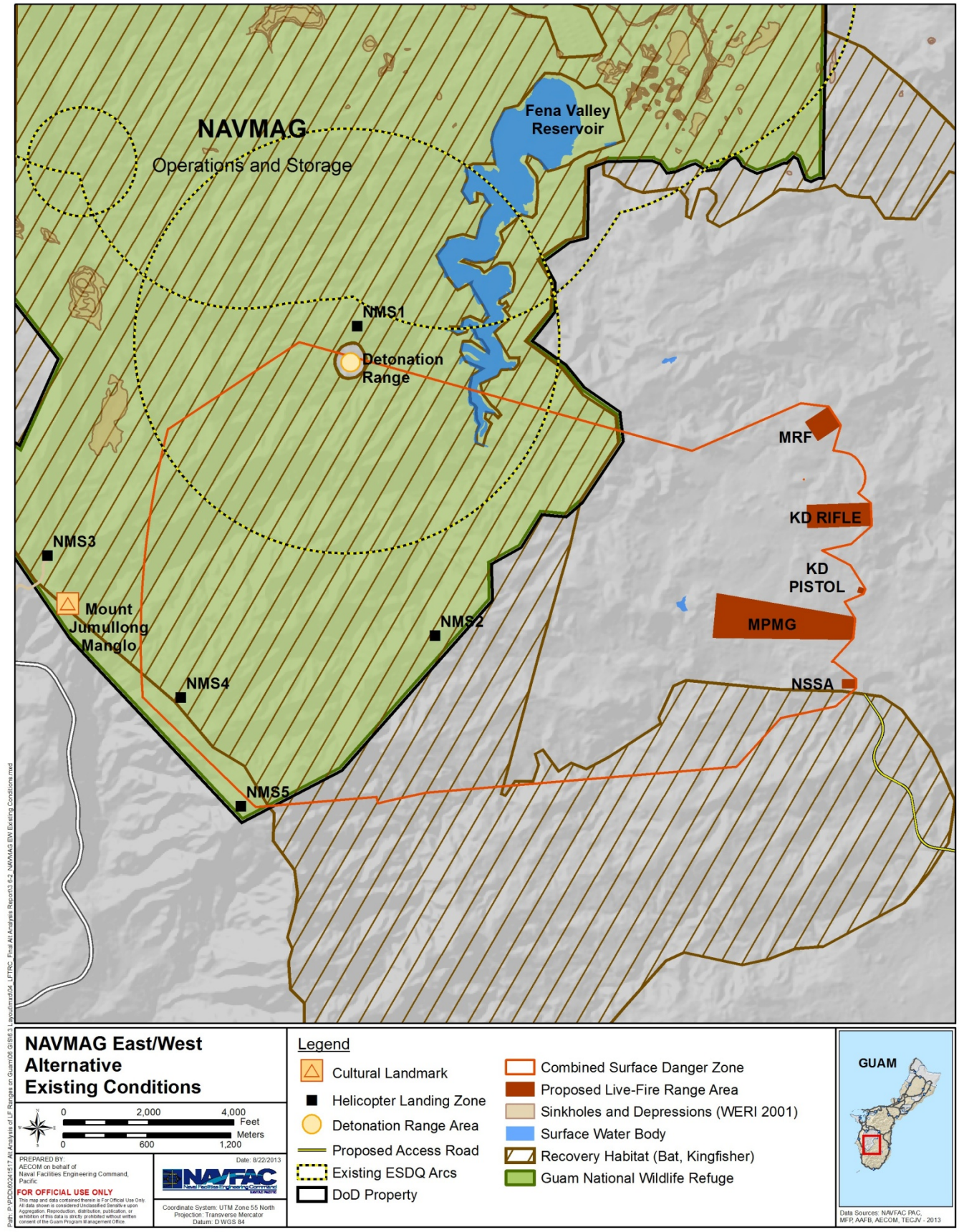

Figure 3.6-2: NAVMAG East/West Alternative Existing Conditions

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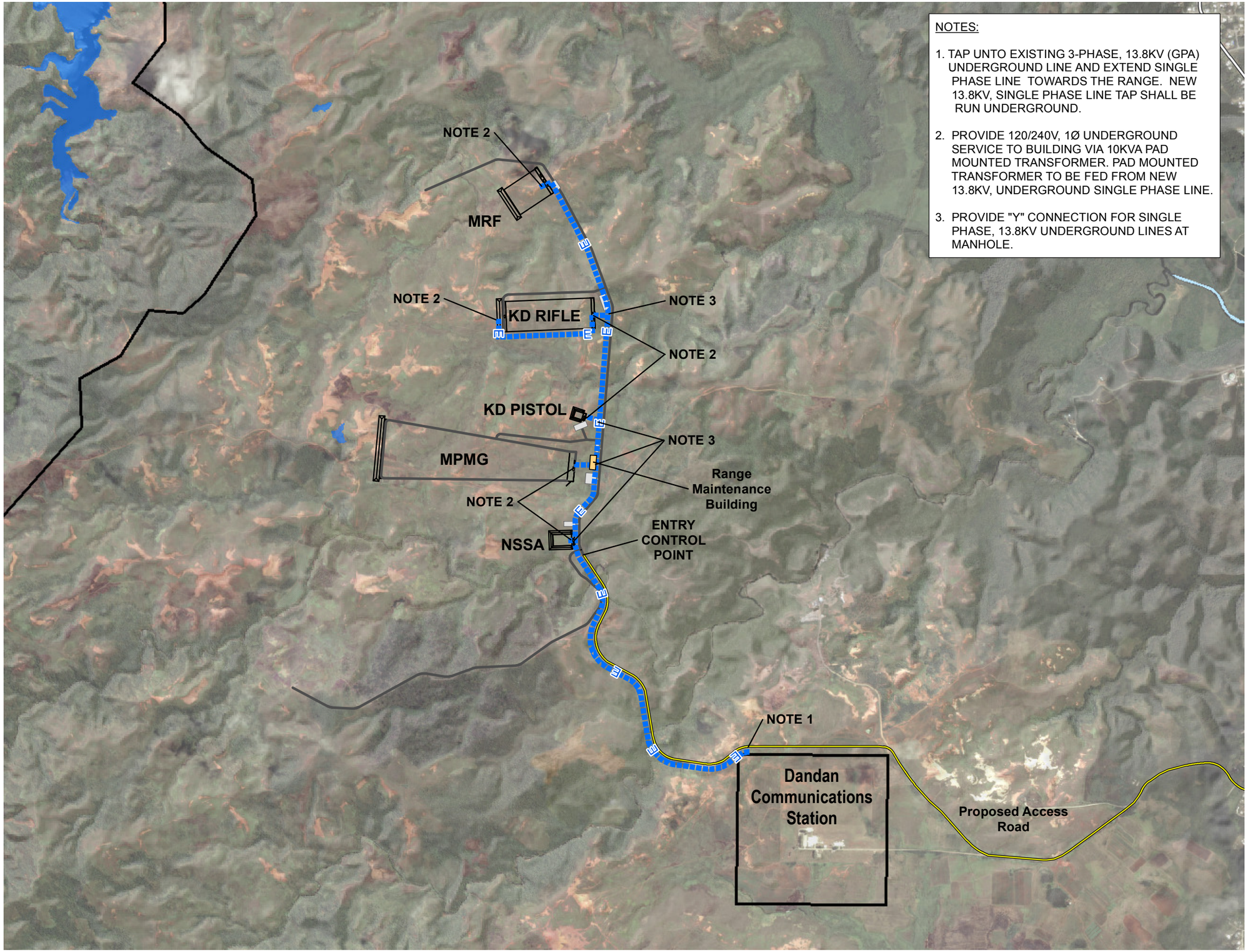

NOTES:

1. TAP UNTO EXISTING 3-PHASE, 13.8KV (GPA) UNDERGROUND LINE AND EXTEND SINGLE PHASE LINE TOWARDS THE RANGE. NEW 13.8KV, SINGLE PHASE LINE TAP SHALL BE RUN UNDERGROUND.
2. PROVIDE 120/240V, 1Ø UNDERGROUND SERVICE TO BUILDING VIA 10KVA PAD MOUNTED TRANSFORMER. PAD MOUNTED TRANSFORMER TO BE FED FROM NEW 13.8KV, UNDERGROUND SINGLE PHASE LINE.
3. PROVIDE "Y" CONNECTION FOR SINGLE PHASE, 13.8KV UNDERGROUND LINES AT MANHOLE.

Figure 3.6-3
NAVMAG East/West Alternative Electrical Plan

- NEW 13.8 KV, 1Ø UNDERGROUND LINE
- NEW 120/240V, 1Ø UNDERGROUND LINE FROM TRANSFORMER TO BUILDING
- Range Structures
- Parking Area
- Proposed Range Area
- Range Road
- Proposed Access Road
- Highway
- Surface Water Body
- DoD Property

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Projection: Transverse Mercator
Datum: D WGS 84

0 1,500 3,000 Feet

0 400 800 Meters

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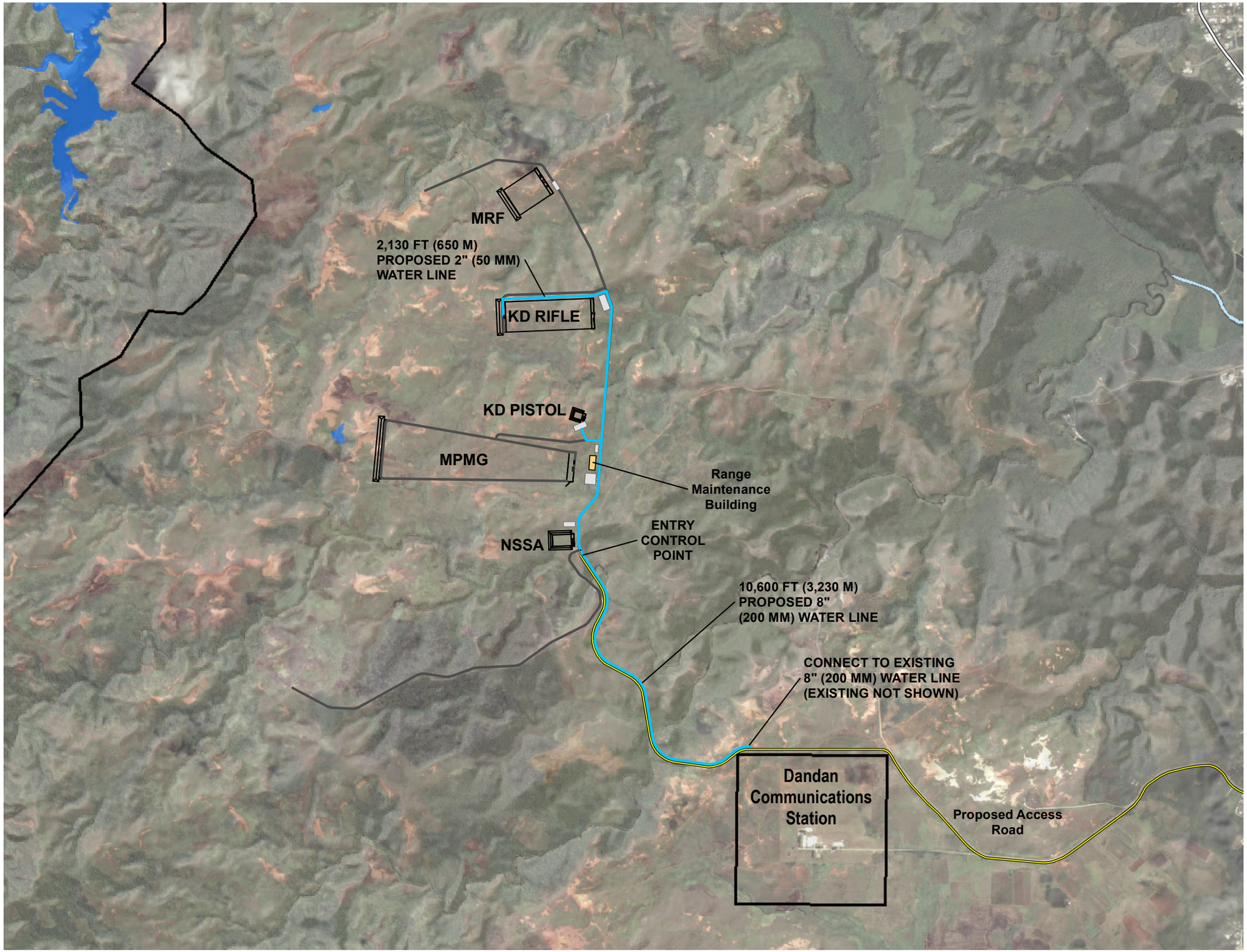

Figure 3.6-4
NAVMAG East/West Alternative Water Plan

PRPOSED 8" (200 mm) WATER LINE

- Range Structures
- Parking Area
- Range Road
- Proposed Access Road
- Proposed Range Area
- Highway
- Surface Water Body
- DoD Property

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0 1,500 3,000 Feet

0 400 800 Meters

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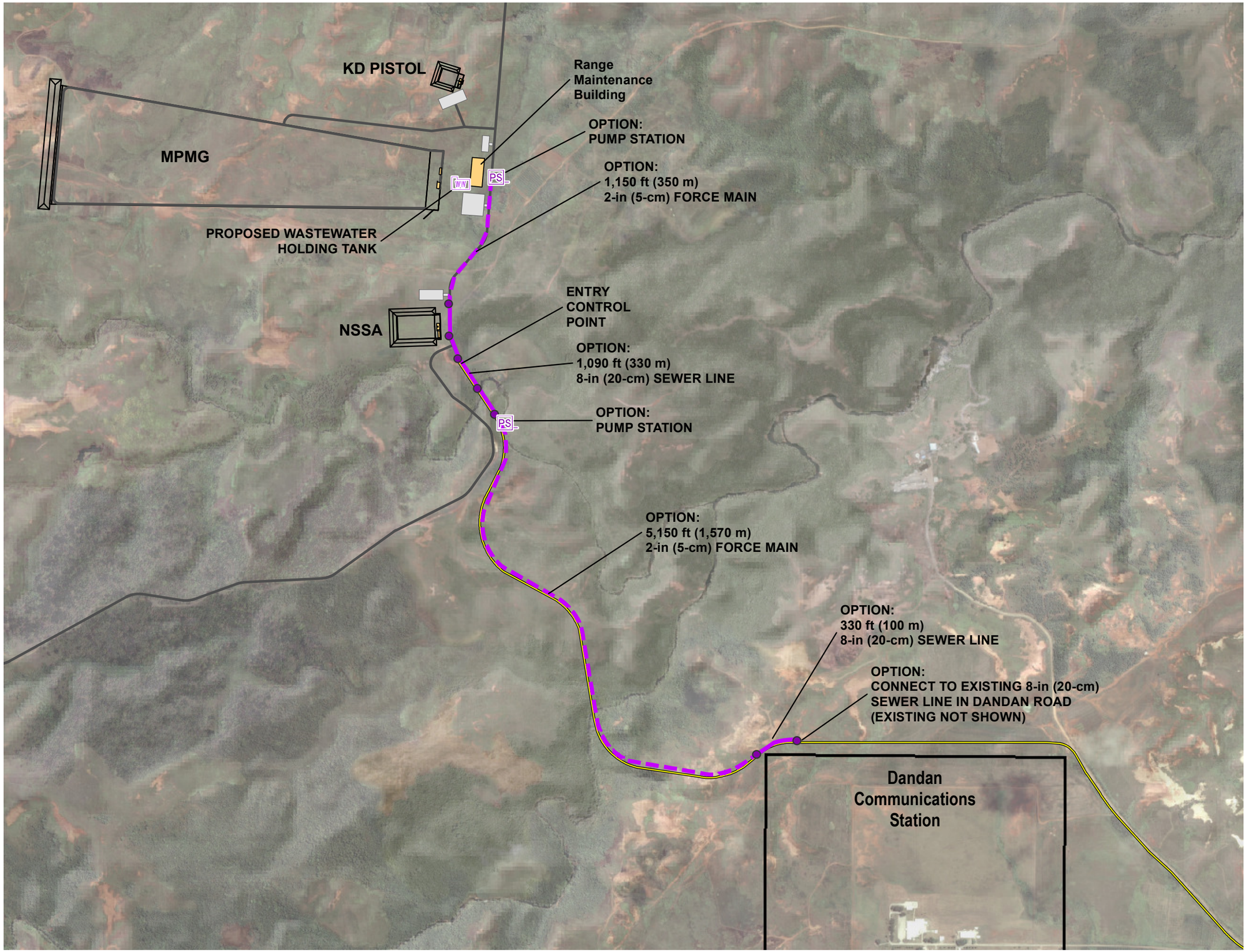

Figure 3.6-5
NAVMAG East/West Alternative Conceptual Wastewater Plan

- PROPOSED PUMP STATION
- PROPOSED WASTEWATER HOLDING TANK
- PROPOSED SEWER MANHOLE
- PROPOSED 8" (200 mm) SEWER LINE
- PROPOSED 8" (200 mm) FORCE MAIN

- Range Structures
- Parking Area
- Range Road
- Proposed Access Road
- Proposed Range Area
- Highway
- Surface Water Body
- DoD Property

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Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

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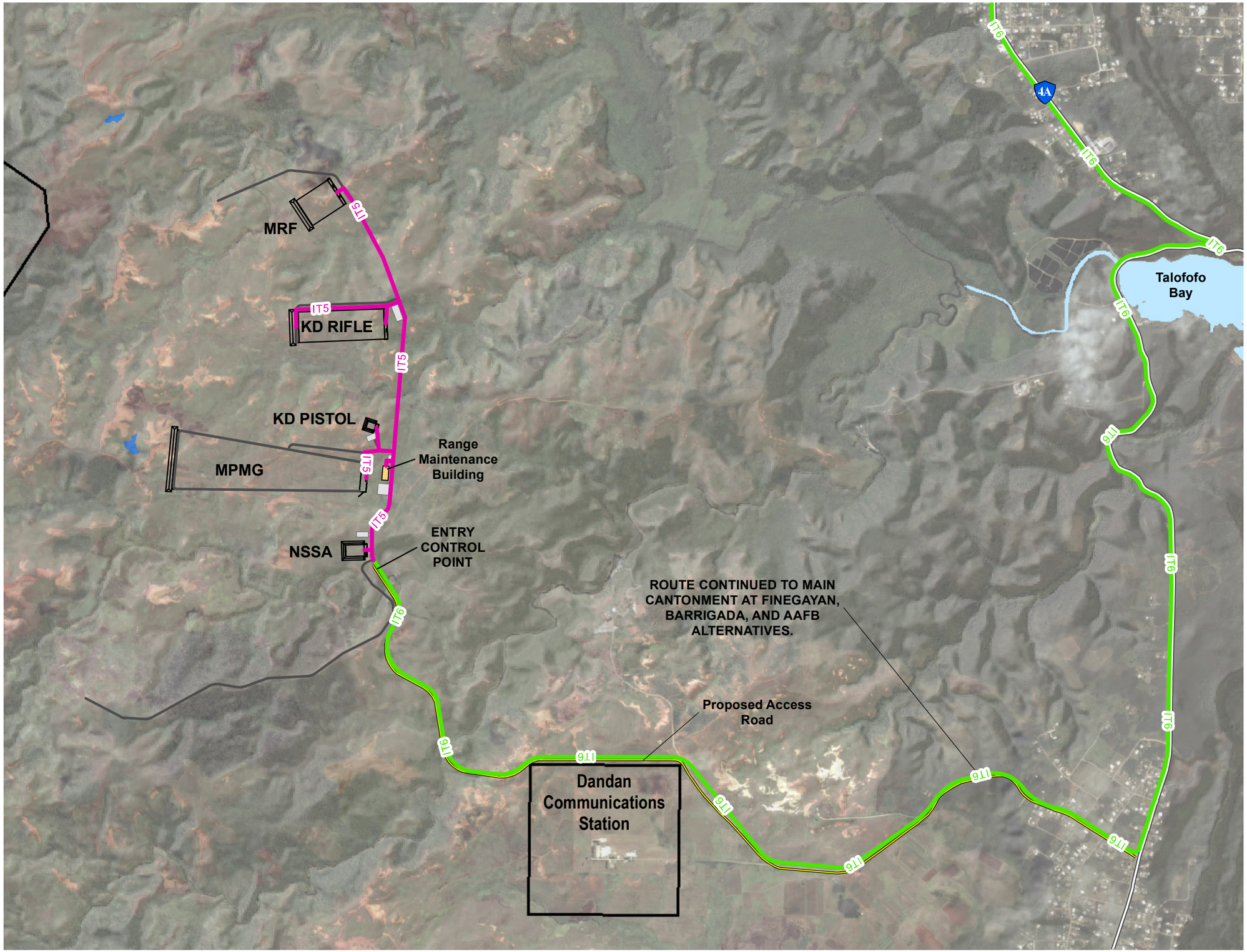

Figure 3.6-6
NAVMAG East/West Alternative IT/Comm Plan

IT5 DISTRIBUTION TO LFTRC - DB1

IT6 USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC-DB1

- Range Structures
- Parking Area
- Range Road
- Proposed Access Road
- Proposed Range Area
- Highway
- Surface Water Body
- DoD Property

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Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

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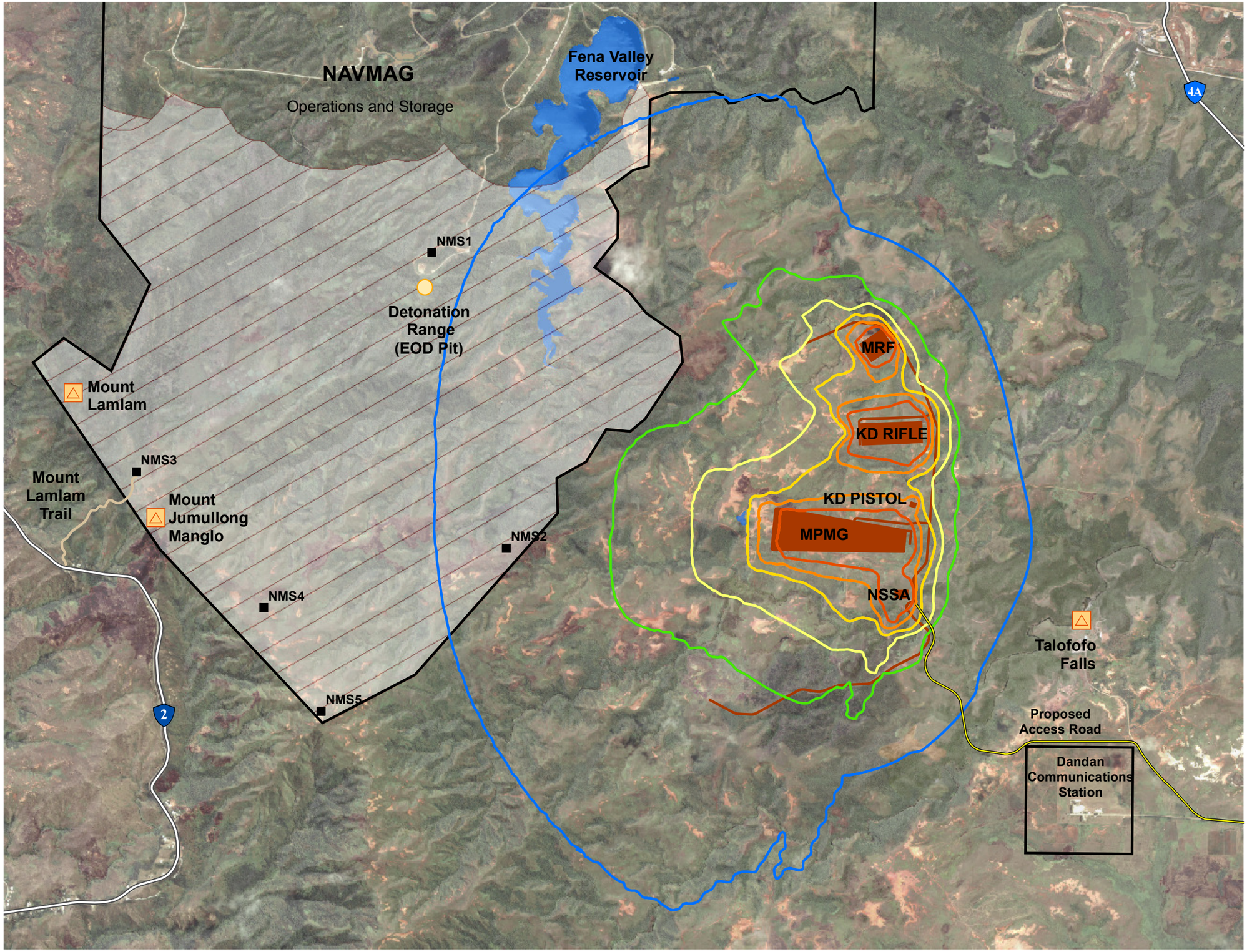
Figure 3.6-7
NAVMAG East/West Alternative Operational Noise Assessment



Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Proposed Access Road
- Range Road
- Live-Fire Range Area
- Cultural Landmark
- Helicopter Landing Zone
- Detonation Range Area
- Existing Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Approved Non-Live-Fire Maneuver Training Area

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,500 3,000 Feet

0 400 800 Meters

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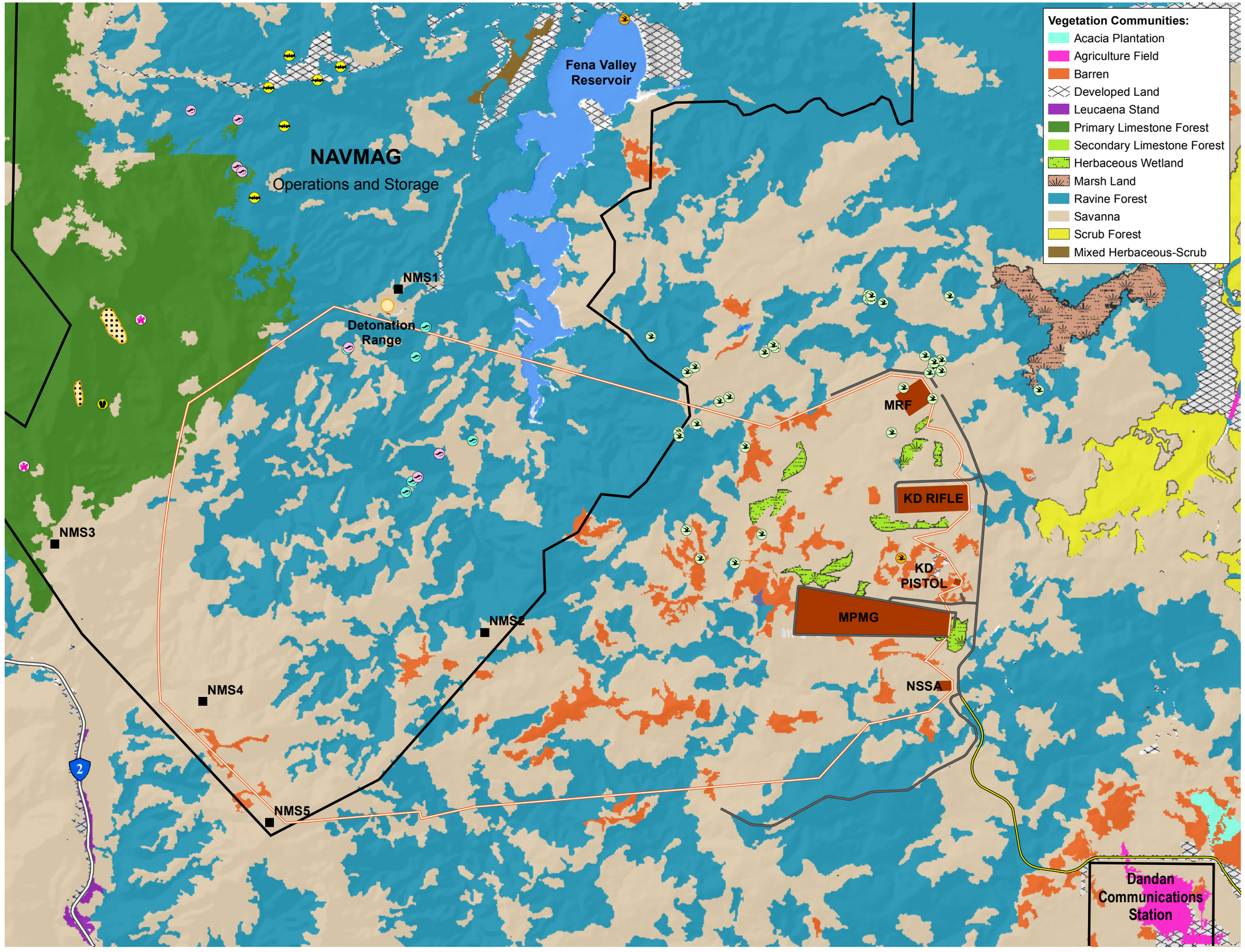

Figure 3.6-8
NAVMAG East/West Alternative Vegetation and Special-Status Species

Special-Status Species Occurrence

Fauna:
- Fruit Bat
- Moth Skink
- Pacific Slender-Toed Gecko
- Mariana Common Moorhen
- Mariana Swiftlet
- Mariana Eight-Spot Butterfly

Flora:
- *Heritiera longipetiolata*

Known Plant SOGCN Locations
- *Tabernaemontana rotensis*
- *Merrilliodendron megacarpum*
- Cycad Area
- *Merrilliodendron*
- Helicopter Landing Zone
- Proposed Access Road
- Range Road
- Combined Surface Danger Zone
- Proposed Live-Fire Range Area
- Proposed Access Road
- DoD Property

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
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Datum: D WGS 84

0 2,000 4,000 Feet

0 500 1,000 Meters

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MPMG Range shown with notional Probabilistic Surface Danger Zone modeled by TECOM RTAM.
Date: 22Aug2013

NAVMAG
Operations and Storage

Fena Valley Reservoir

NMS1

Detonation Range (EOD Pit)

Mount Lamlam

NMS3

Mount Jumullong Manglo

Mount Lamlam Trail

NMS2

NMS4

NMS5

2

MRF

KD RIFLE

KD PISTOL

MPMG

Range Maintenance Building

ENTRY CONTROL POINT

NSSA

Talofofo Falls

Proposed Access Road

Dandan Communications Site

Figure 3.6-9
NAVMAG East/West Alternative Cultural Resources

- Cultural Resource Area
- Proposed Access Road
- Range Road
- Parking Area
- Range Structures
- Berm Area
- Range Support Area
- Combined Surface Danger Zone
- Live-Fire Range Area
- Cultural Landmark
- Helicopter Landing Zone
- Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Non-Live-Fire Maneuver Training Area
- Wetlands (NAVMAG and Private Lands)

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

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3.6.7 Range Transients

Proposed fencing on the southern, eastern, and northern sides of the ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ. The remaining unfenced perimeter of the composite SDZ would be marked with signage to warn individuals of the dangers of entering the SDZ without coordination and permission from Range Control. If approved by the FAA, the proposed Naval Munitions R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.

3.6.8 Operational Efficiency

The proposed NAVMAG East/West alternative would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.

3.6.9 Orientation

The western orientation of the ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets and limit the late afternoon use of magnifying optics to avoid damage to eyesight.

3.6.10 Life Cycle Cost

The life cycle cost for the NAVMAG East/West alternative is $432,243,000. See Table 2.6-1 for cost breakdown.

3.6.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NAVMAG East/West alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges — November 2022
- MPMG Range — December 2022

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3.7 HAND GRENADE RANGE

For all of the LFTRC alternatives, the Hand Grenade Range would be located at Andersen South (Figure 3.7-1). This location would complement Marine non-live-fire training approved under the 2010 ROD. Similar to the alternatives analysis presented earlier in this chapter, this section outlines the baseline conditions of the Hand Grenade Range, including natural and man-made constraints; proposed utilities and infrastructure improvements; consistency with Marine Corps guidance criteria; LCC; and construction phasing.

3.7.1 Existing Conditions and Constraints

Andersen South encompasses approximately 2,060 ac (834 ha). The property is inland of the Pacific Ocean coast (Figure 3.7-2), south of Route 1, and west of Route 15. The Andersen South area consists of open fields, wooded areas, and vacant houses that have been used for humanitarian operations, staging, bivouac, equipment inspection, and small unit tactics. MOUT training is conducted in abandoned housing areas. There are installation restoration (clean-up) sites and water production wells with wellhead clearance buffers in the area (Figure 3.7-2).

3.7.2 Land/Sea/Airspace Availability

The Hand Grenade Range would not require the acquisition of non-federal land. The Hand Grenade Range would occupy approximately 0.9 ac (0.4 ha), and the SDZ would encompass approximately 30.7 ac (12.4 ha). In addition to the live-fire area, there would be a 1.0-ac (0.4-ha) non-live-fire training area developed adjacent to the range and outside of the SDZ. The training area would consist of a demonstration area with bleachers, an open practice throwing field with various targets and throwing positions, and a parking area. Inert practice hand grenades would be used at this training area to provide familiarization training prior to proceeding onto the live-fire Hand Grenade Range.

The vertical hazard associated with the Hand Grenade Range would extend 492 ft (150 m) AGL. MARFORPAC has proposed the Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic. Grading for the Hand Grenade Range is shown in Appendix B and summarized in Table 3.7-1.

Table 3.7-1: Grading Volumes for the Hand Grenade Range

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
Hand Grenade Range	6,800	9,665	2,865	Fill	2

Source: Provided by AECOM.

3.7.3 Supporting Infrastructure

Access to the Hand Grenade Range would be from Route 1 through the existing Andersen South access road and along the existing internal road network in the Andersen South complex. A 0.12-mi (0.2-km) access road would be constructed to connect the Hand Grenade Range to the existing road network. The Hand Grenade Range would only require electrical utilities and IT/Comm services. These plans are shown in Figure 3.7-3 and Figure 3.7-4.

3.7.4 Land Use Compatibility

There would be no land use compatibility conflicts associated with the Hand Grenade Range.

An Operational Noise Assessment of the Hand Grenade Range, conducted by the USAPHC, concluded that the annual average noise levels from the proposed hand grenade activity would be compatible with the surrounding environment (Figure 3.7-5).

3.7.5 Environmental Considerations

No terrestrial biological or cultural resources would be impacted by the construction or operation of the Hand Grenade Range.

3.7.6 Public Access

Public access to Andersen South would be restricted by perimeter fencing and ECPs approved in the 2010 ROD. There would be no additional loss of public access caused by the Hand Grenade Range.

3.7.7 Range Transients

Perimeter fencing approved in the 2010 ROD would prevent unauthorized personnel from entering the Hand Grenade Range and SDZ.

If approved by the FAA, the proposed Andersen South R-7202 (Plateau) RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live hand grenade training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live hand grenade training would cease until the aircraft is clear of the SDZ.

3.7.8 Operational Efficiency

The proposed Hand Grenade Range location would facilitate like-training with the breacher house, shooter house, and MOUT Facility approved by the 2010 ROD.

3.7.9 Orientation

The Hand Grenade Range is not affected by range orientation.

3.7.10 Life Cycle Costs

The life cycle costs associated with the Hand Grenade Range are factored into the costs shown for each of the five LFTRC range alternatives, as shown in Table 2.6-1.

3.7.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7. The Hand Grenade Range would achieve IOC by June 2017.

Figure 3.7-1
Hand Grenade Range

- Pagat Trail
- Highway
- Proposed Range Structure
- Range Road
- Parking Area
- Berm Area
- Range Support Area
- Surface Danger Zone
- Live-Fire Range Area
- Existing Road
- Proposed Grading Disturbance Area
- Existing Structure
- Class D Airspace
- Pagat Point Cultural Site
- DoD Property

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

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Projection: Transverse Mercator
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0 800 1,600 Feet

0 200 400 Meters

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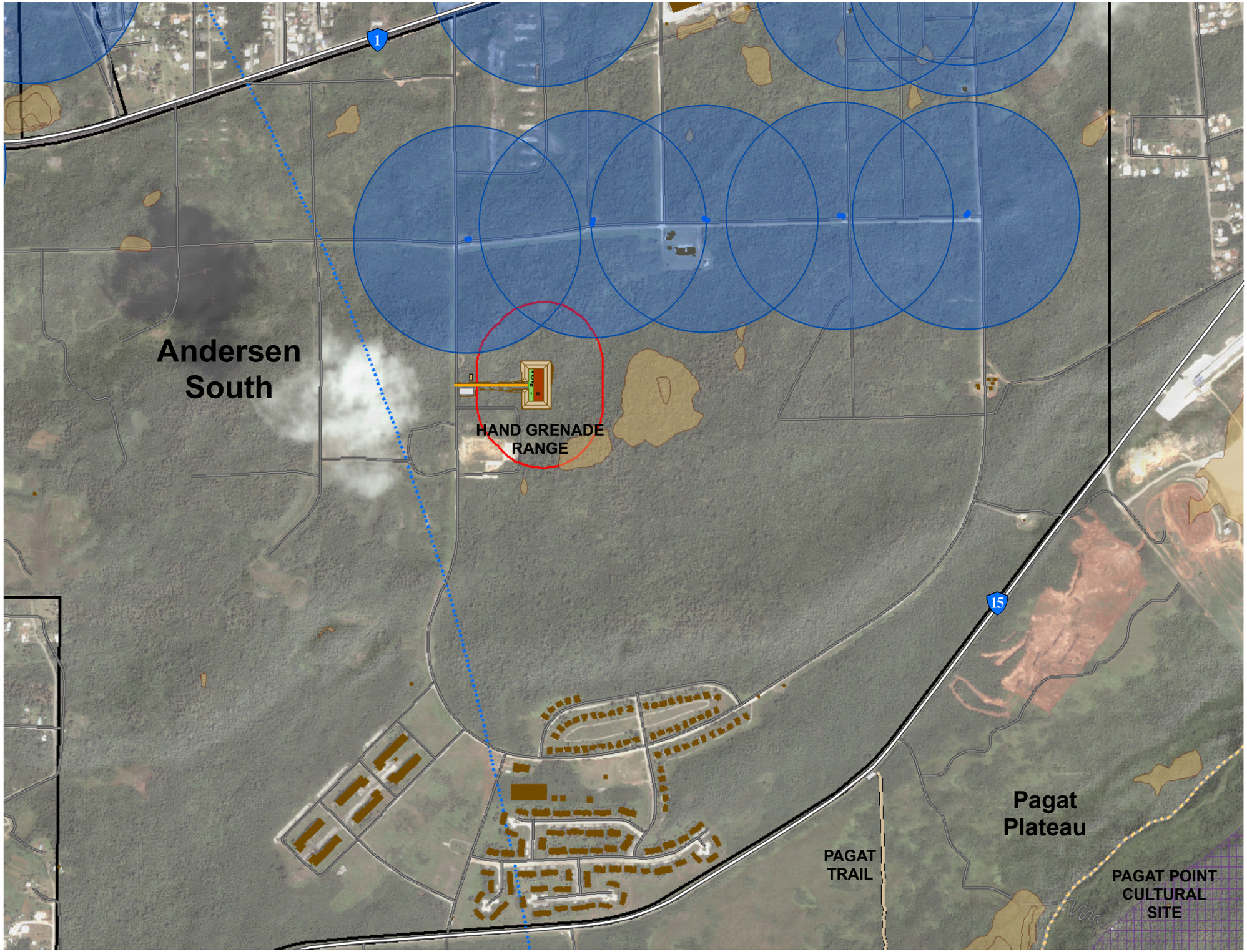

Figure 3.7-2
Hand Grenade Range
Existing Conditions

- Water Well Locations
- Wellhead Protection Zone (1000 ft.)
- Sinkholes and Depressions
- Proposed Range Structure
- Range Road
- Parking Area
- Berm Area
- Range Support Area
- Surface Danger Zone
- Proposed Live-Fire Range Area
- Pagat Trail
- Existing Road
- Proposed Grading Contour (5 ft int)
- Existing Structure
- Class D Airspace
- DoD Property
- Pagat Point Cultural Site

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

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0 800 1,600 Feet

0 200 400 Meters

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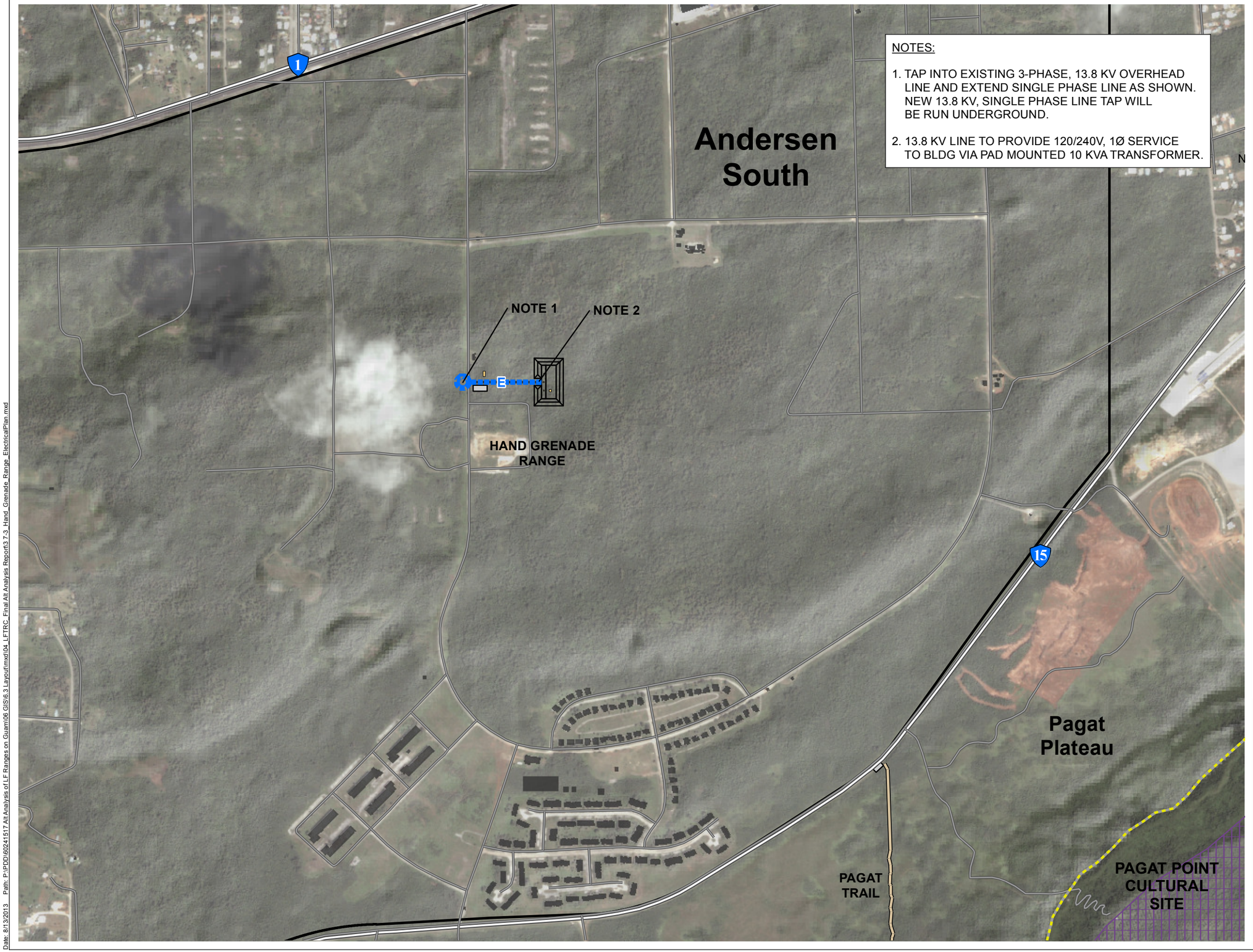

Figure 3.7-3
Hand Grenade Range Electrical Plan

- NEW 120/240V 1Ø UNDERGROUND LINE FROM PAD MOUNTED 10 KVA TRANSFORMER
- NEW 13.8 KV, 1Ø UNDERGROUND LINE

- Cliffline
- Existing Road
- Highway
- Pagat Trail
- Proposed Range Structure
- DoD Property Line
- Pagat Point Cultural Site
- Existing Structure

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0 800 1,600 Feet
0 200 400 Meters

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Figure 3.7-4
Hand Grenade Range
IT/Comm Plan

Andersen South

IT6 USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC

- Cliffline
- Existing Road
- Highway
- Pagat Trail
- Proposed Range Structure
- DoD Property Line
- Pagat Point Cultural Site
- Existing Structure

IT6

SEE CONTINUATION ON FIGURE 3.3-7

HAND GRENADE RANGE

PAGAT TRAIL

Pagat Plateau

PAGAT POINT CULTURAL SITE

1

15

All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government.

Data Sources: JGPO 2013

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: 8/14/2013

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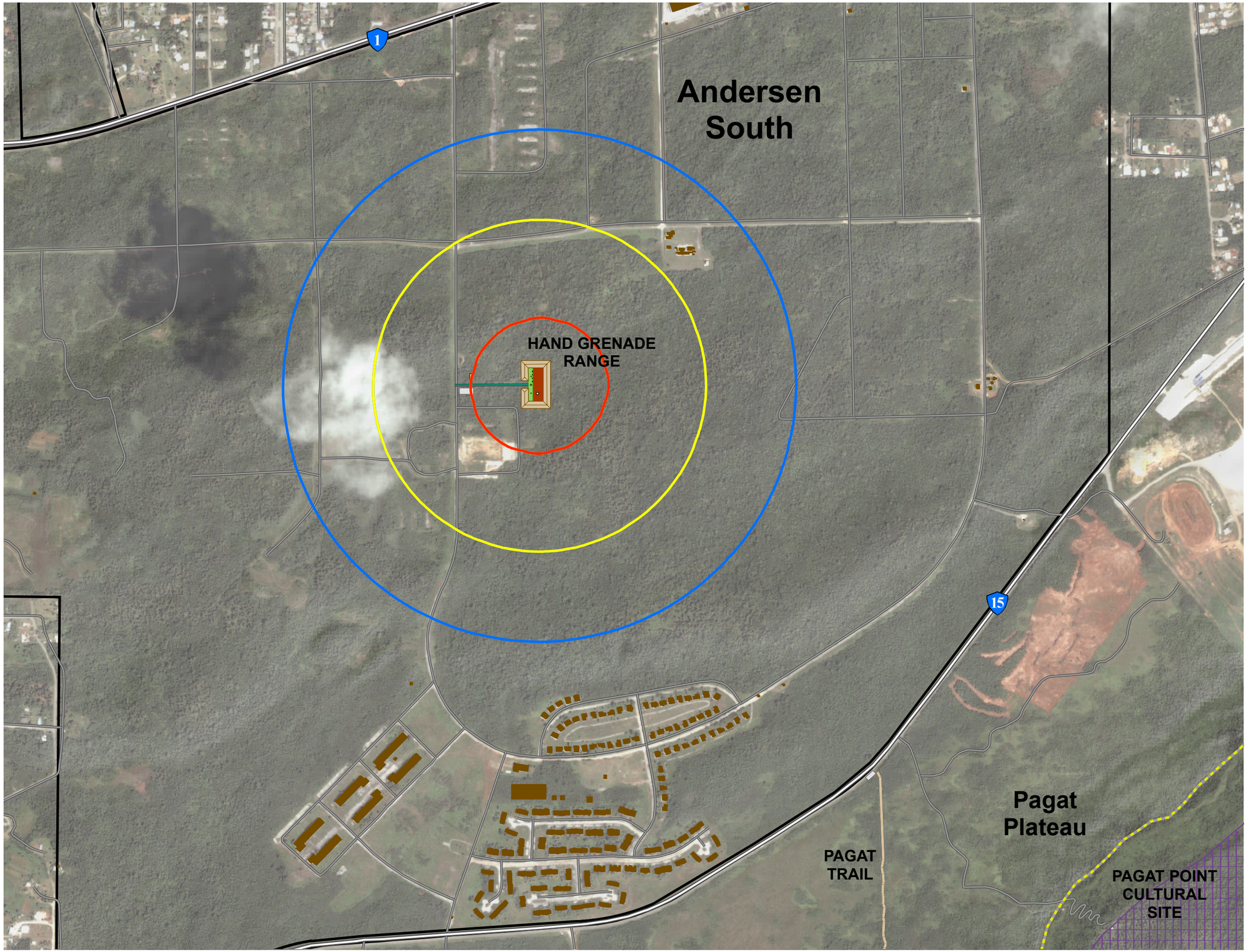

Figure 3.7-5
Hand Grenade Range Operational Noise Assessment

CDNL Noise Zone

- Zone 3 (>70 dB CDNL)
- Zone 2 (62-70 dB CDNL)
- Land Use Planning Zone (57-62 dB CDNL)
- Pagat Trail
- Cliffline
- Existing Road
- Range Road
- Proposed Range Structure
- Parking Area
- Berm Area
- Range Support Area
- Live-Fire Range Area
- Existing Structure
- Pagat Point Cultural Site
- DoD Property

* This map shows only on-site impacted areas. Off-site required projects such as utilties and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

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NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 8/22/2013 Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\04_LFTRC_Final Alt Analysis Report\3.7-5_HGR_CDNL_Noise_Zones.mxd

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3.8 SUMMARY

Table 3.8-1 provides a summary of information about the various planning considerations addressed for each of the LFTRC alternatives. The intent of the summary table is to compare the various alternatives according to planning considerations. The table does not apply weighting, hierarchy, or classification to the information presented (i.e., it is not an analysis or screening tool). The planning considerations align with the information presented in Sections 3.2 through 3.7.

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Table 3.8-1: Summary of Planning Considerations for the LFTRC Alternatives

Planning Considerations	NWF Alternative	Route 15A Alternative	NAVMAG North/South Alternative	NAVMAG L-Shaped Alternative	NAVMAG East/West Alternative	Hand Grenade Range
Land/Sea/ Airspace Availability	Located on existing DoD-owned land at AAFB. SDZs would extend over the USFWS Ritidian Point Reserve, and extend over the Philippine Sea. No privately owned lands are encumbered by this alternative. Proposed NWF R-7202 RA to deconflict range operations with air traffic.	Requires the acquisition of 872 ac (324 ha) of non-federal land. SDZ would extend over approximately the Pagat Point Archaeological Reserve and extend over the Pacific Ocean. Would require the relocation of portions of Route 15. Proposed Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic.	Requires the acquisition of approximately 252 ac (102 ha) of non-federal land to the east of the NAVMAG for the SDZ. Would require the relocation of 72 munitions storage magazines. Proposed Naval Munitions R-7202 RA to deconflict range operations with air traffic.	Requires the acquisition of approximately 914 ac (370 ha) of non-federal land. Would require the relocation of 66 munitions storage magazines. Proposed Naval Munitions R-7202 RA to deconflict range operations with air traffic.	Requires the acquisition of approximately 1,894 ac (766 ha) of non-federal land. Proposed Naval Munitions R-7202 RA to deconflict range operations with air traffic.	Requires no non-federal land. Proposed Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic.
Supporting Infrastructure	Entry through the existing NWF Gate and via existing road network. Approximately 5.4 mi (8.7 km) of range roads would be improved /constructed to support internal LFTRC traffic. Utilities would be extended from existing lines.	Entry from Route 1 through the existing Andersen South access road. Underpass under the relocated Route 15 would allow access to the internal range road network. Alternate access would be via a second underpass under the Route 15 bypass from the Andersen South MOUT facility. Utilities would be extended from existing lines.	Entry through the existing NAVMAG Main Gate on Route 5. Existing NAVMAG roadways would be used wherever possible, but a total of 3 mi (5 km) of new roadway would be required to support LFTRC operations. Utilities would be extended from existing lines.	Access to the MPMG Range and Range Maintenance and Storage Building would be from the existing NAVMAG Main Gate on Route 5. 4 mi (7 km) of new/improved roadway is required to support range operations on the NAVMAG. Access to the ranges to the east of the NAVMAG would be via an access road connecting to Dandan Road. Utilities would be extended along the access road from existing lines along Dandan Road.	Access from new road connecting to Dandan Road. 5 mi (9 km) of roadway would be constructed to support training. Utilities would be extended along the access road from existing lines along Dandan Road.	Access to the Hand Grenade Range would be from Route 1 through the existing Andersen South access road and along the existing internal road network in the Andersen South complex. Would only require electrical utilities and IT/Comm services that would be extended from existing lines.
Land Use Compatibility	Requires relocation of the existing USFWS Ritidian Point Unit Administration Building and Visitors' Center and reduces the Wildlife Unit area that can be accessed by the public. Impacts on existing Air Force air/ground operations at NWF and AAFB airspace. No noise-sensitive land uses affected by range noise.	Route 15 would need to be re-routed. Would displace the Guam International Raceway and a quarry operation adjacent to the raceway. Approximately 83 ac (34 ha) of the Pagat Point archaeological site would be encumbered by the LFTRC composite SDZ. Noise impacts on approximately 10 residential properties.	Would displace 72 existing munitions storage magazines. SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. SDZ would also encumber the NMS 1 Landing Zone and 1,630 ac (660 ha) of the Non-Live-Fire Maneuver area identified in the Guam Relocation FEIS. No noise-sensitive land uses affected by range noise.	Would displace 66 existing munitions storage magazines. MPMG SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. SDZ would also encumber the NMS 1 and 2 Landing Zones, and 2,303 ac (932 ha) of the Non-Live-Fire Maneuver area identified in the Guam Relocation FEIS. No noise-sensitive land uses affected by range noise.	SDZ would encumber the NMS 2 and 4 Landing Zones; and 1,700 ac (688 ha) of the Non-Live-Fire Maneuver area identified in the 2010 Guam Relocation FEIS. No noise-sensitive land uses affected by range noise.	No land use compatibility issues. No noise-sensitive land uses affected by range noise.
Environmental Considerations	Requires clearing of primary limestone forest and removal of areas of the Guam National Wildlife Refuge. Impacts conservation efforts in the National Wildlife Refuge. Clears suitable Mariana fruit bat habitat. Noise/activity impacts on Mariana fruit bat. Potential impact on 21 NRHP eligible sites. Potential indirect impacts on as many as 38 NRHP eligible sites.	Requires clearing of primary and secondary limestone forest. Possible mortality to Mariana eight-spot butterfly. Clears suitable Mariana fruit bat habitat. Potential direct impacts on three historic properties during construction. Potential impacts on four historic properties during operations.	Requires clearing of primary limestone forest, ravine forest, and forested wetland. Removes large areas of the Guam National Wildlife Refuge. Mortality of Pacific slender-toed gecko at MPMG. Clears suitable Mariana fruit bat and Mariana swiftlet habitat. Loss of one pond used by Mariana common moorhen. Would potentially result in direct impacts on 15 NRHP-eligible archaeological sites. Indirect impacts on as many as 215 archaeological sites and two structures could occur during operations.	Requires clearing of primary limestone forest, ravine forest, and forested wetland. Removes large areas of the Guam National Wildlife Refuge. Mortality of Pacific slender-toed gecko at MPMG. Clears suitable Mariana fruit bat and Mariana swiftlet habitat. Loss of one pond used by Mariana common moorhen. Would potentially result in direct impacts on 11 NRHP-eligible archaeological sites. Indirect impacts on up to 264 archaeological sites and five structures could occur during operations.	Requires clearing of ravine forest, herbaceous wetlands, and areas of primary limestone forest. Clears suitable Mariana swiftlet habitat. Would potentially result in direct impacts on nine historic properties (archaeological sites). Indirect impacts on as many as 98 historic properties could occur during operations.	No terrestrial biological or cultural resources would be impacted by the construction or operation of the Hand Grenade Range.
Public Access	Public access would be prohibited to the portions of the Ritidian Point Unit and nearshore waters encumbered by the SDZ when the LFTRC ranges are active.	Would allow unimpeded (24 hours per day/7 days a week) access to the Pagat Trail and the Pagat Village archaeological site. Public access to the Pagat Point archaeological site and nearshore waters encumbered by the SDZ would be prohibited when the LFTRC ranges are active.	Public access to the NAVMAG is currently restricted. The proposed LFTRC would not cause any additional loss of public access. There would be no impacts on the Mt. Lamlam Trail under this alternative.	Public access to the NAVMAG is currently restricted. Public access would also be restricted from 914 ac (370 ha) of the eastern ranges and their associated SDZs. There would be no impacts on the Mt. Lamlam Trail under this alternative.	Public access to the NAVMAG is currently restricted. Public access would also be restricted from the 1,894 ac (766 ha) of the ranges and their associated SDZs to the east of the NAVMAG. There would be no impacts on the Mt. Lamlam Trail under this alternative.	Public access to Andersen South would be restricted by perimeter fencing and ECPs approved in the 2010 ROD. There would be no additional loss of public access caused by the Hand Grenade Range.

Table 3.8-1: Summary of Planning Considerations for the LFTRC Alternatives (cont'd)

Planning Considerations	NWF Alternative	Route 15A Alternative	NAVMAG North/South Alternative	NAVMAG L-Shaped Alternative	NAVMAG East/West Alternative	Hand Grenade Range
Range Transients	The existing controlled access to AAFB and proposed signage on Ritidian Point would warn unauthorized persons from entering the SDZ. Two proposed Range Observation Towers would provide surveillance of the nearshore SDZ. Proposed NWF R-7202 RA would allow uninterrupted live-fire training.	Proposed fencing and the ECP would prevent unauthorized persons from entering the LFTRC and the SDZ. Two proposed Range Observation Towers would provide surveillance of the nearshore SDZ. Proposed Andersen South R-7202 (Plateau) RA would allow uninterrupted live-fire training.	The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NAVMAG. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NAVMAG would reduce the likelihood of unauthorized access by personnel. Proposed Naval Munitions R-7202 RA would allow uninterrupted live-fire training.	The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NAVMAG. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NAVMAG reduces the likelihood of unauthorized personnel access. Proposed fencing on the southern, eastern, and northern sides of the eastern ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ. Proposed Naval Munitions R-7202 RA would allow uninterrupted live-fire training.	Proposed fencing on the southern, eastern, and northern sides of the eastern ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ. Proposed Naval Munitions R-7202 RA would allow uninterrupted live-fire training.	Perimeter fencing approved in the 2010 ROD would prevent unauthorized personnel from entering the Hand Grenade Range and SDZ. Proposed Andersen South R-7202 (Plateau) RA would allow uninterrupted live-fire training.
Operational Efficiency	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC. Location adjacent to the Andersen South Training Complex would facilitate transitions from live-fire to non-live-fire training and provide maximum efficiency for range maintenance and management.	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.	Would locate ranges and facilities in two locations. This would reduce the efficiency in range maintenance and management.	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.	Would facilitate like-training with the breacher house, shooter house, and MOUT Facility approved by the 2010 ROD.
Orientation	Generally northern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.	Generally southeastern orientation of the ranges would cause a loss of daylight training in the early morning hours. The low sun rising in the east would affect the training audience's ability to engage targets on the southeast-facing ranges and would limit early morning use of magnifying optics to avoid damage to eyesight.	Generally southern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.	Generally southern orientation of the MPMG Range would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun. The western orientation of the remaining ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets and limit the late afternoon use of magnifying optics to avoid damage to eyesight.	The western orientation of the ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets and limit the late afternoon use of magnifying optics to avoid damage to eyesight.	Not affected by range orientation.
Life Cycle Cost	$314,154,000	$458,157,000	$576,099,000	$481,692,000	$432,243,000	Life cycle costs associated with the Hand Grenade Range are factored into the costs shown for each of the five LFTRC range alternatives
Construction Phasing	MPMG IOC – May 2019 Small Arms Ranges IOC – Oct 2018	MPMG IOC – Mar 2020 Small Arms Ranges IOC – Jan 2020	MPMG IOC – Jul 2019 Small Arms Ranges IOC – Jul 2019	MPMG IOC – Nov 2019 Small Arms Ranges IOC – Apr 2024	MPMG IOC – Dec 2022 Small Arms Ranges IOC – Nov 2022	IOC – June 2017

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Appendix A: Construction Phasing Timelines

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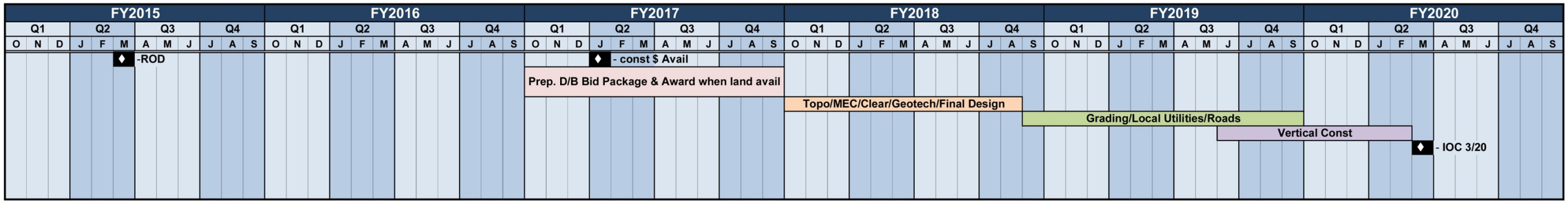

Figure A-1: Construction Phasing Timeline for the NWF Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

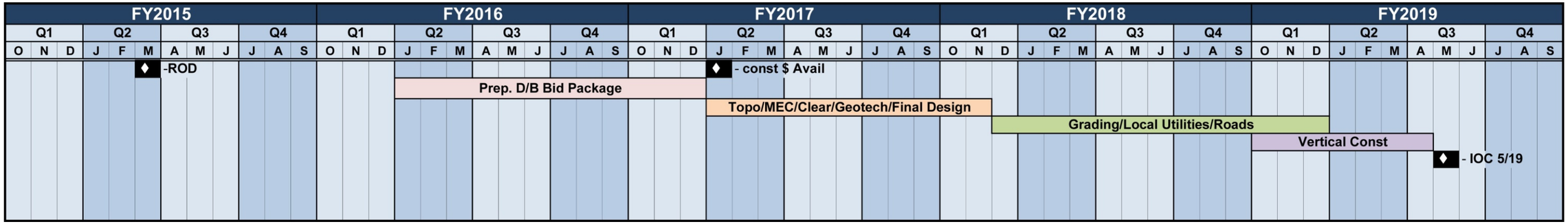

Figure A-2: Construction Phasing Timeline for the NWF Alternative: MPMP Range

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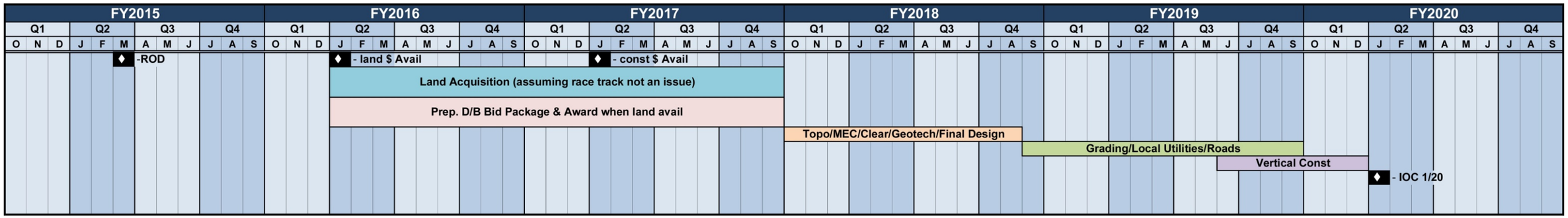

Figure A-3: Construction Phasing Timeline for the RT 15A Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

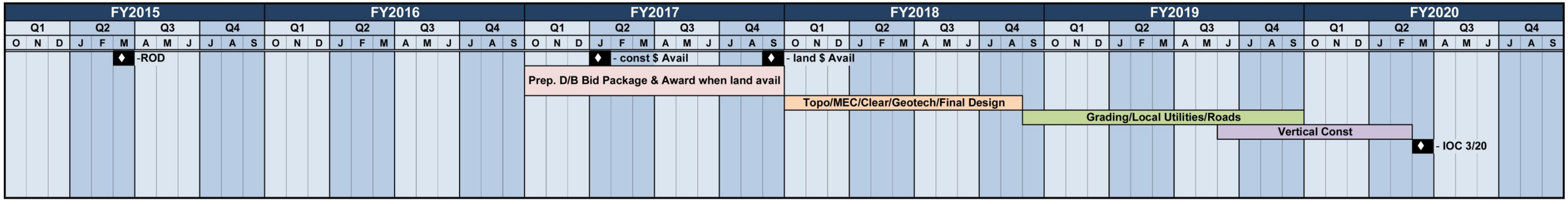

Figure A-4: Construction Phasing Timeline for the RT 15A Alternative: MPMP Range

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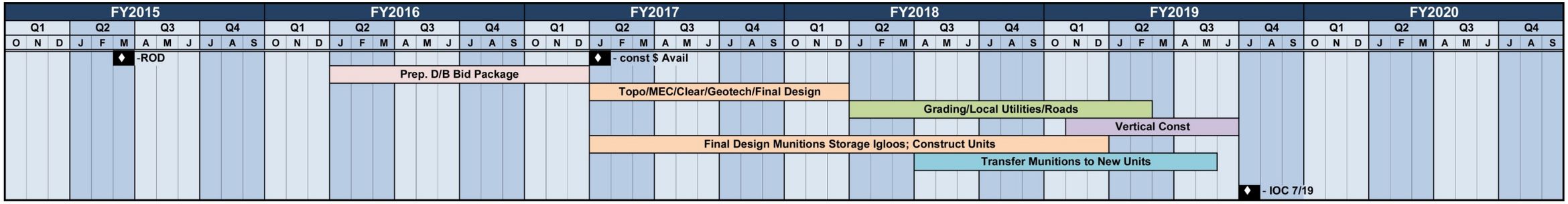

Figure A-5: Construction Phasing Timeline for the NAVMAG North/South Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

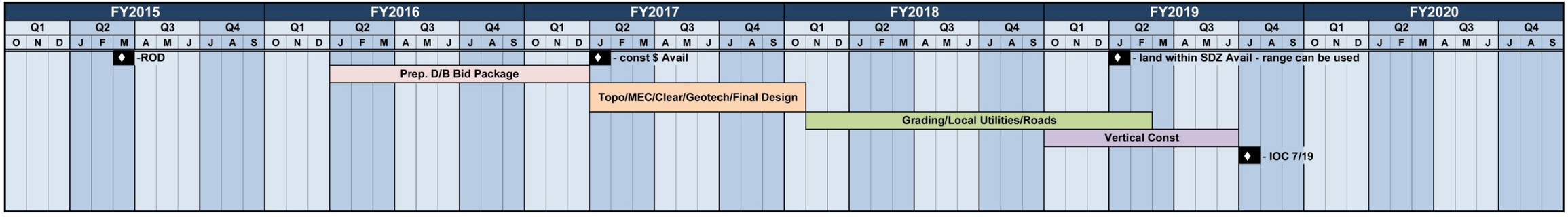

Figure A-6: Construction Phasing Timeline for the NAVMAG North/South Alternative: MPMP Range

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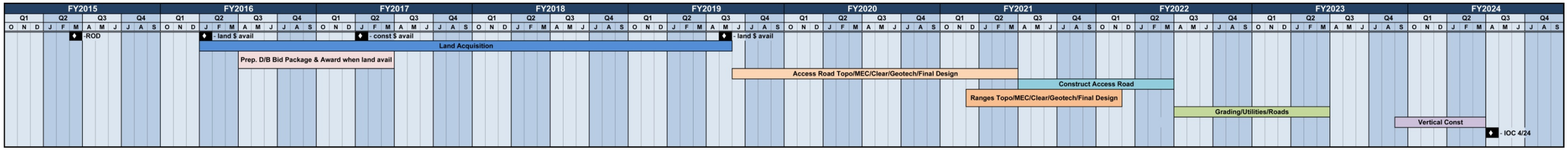

Figure A-7: Construction Phasing Timeline for the NAVMAG L-Shaped Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

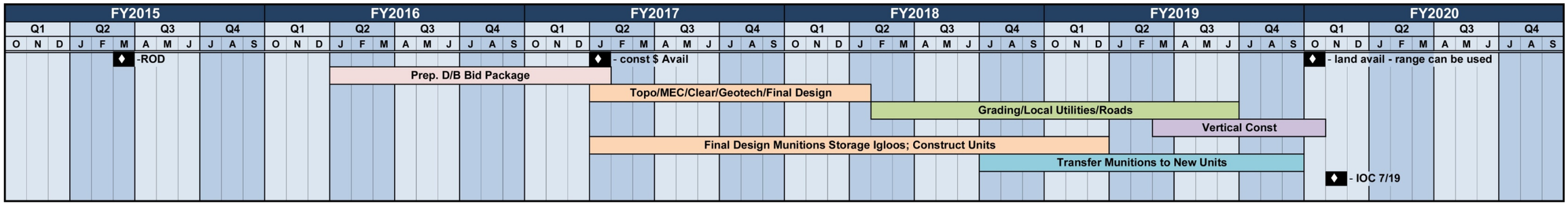

Figure A-8: Construction Phasing Timeline for the NAVMAG L-Shaped Alternative: MPMP Range

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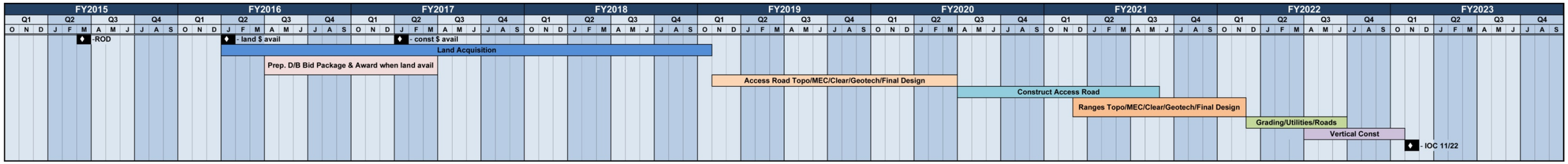

Figure A-9: Construction Phasing Timeline for the NAVMAG East/West Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

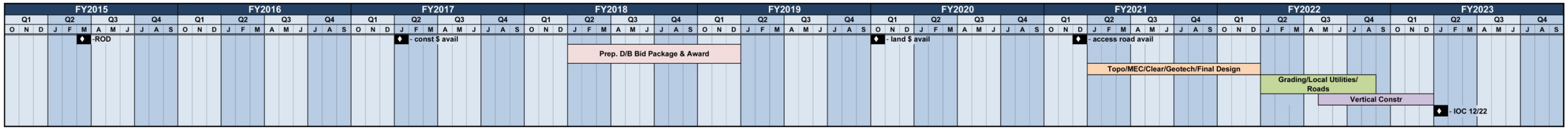

Figure A-10: Construction Phasing Timeline for the NAVMAG East/West Alternative: MPMP Range

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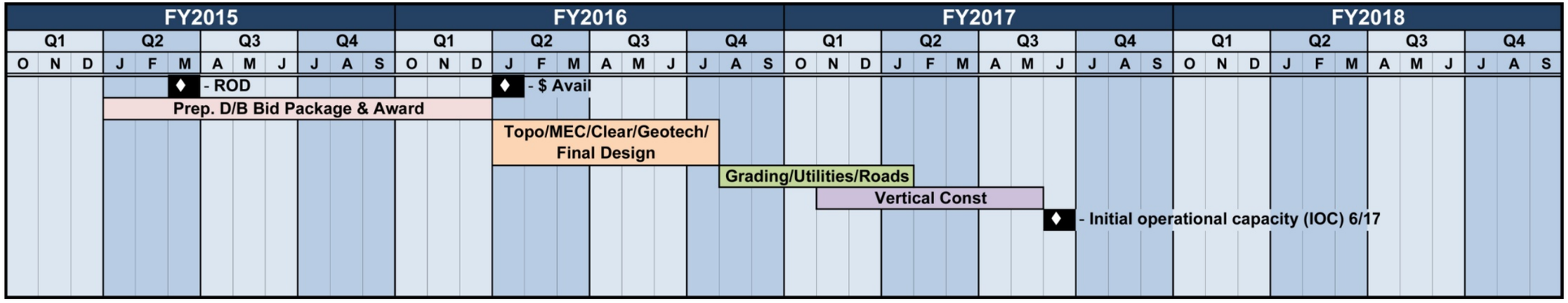

Figure A-11: Construction Phasing Timeline for the Hand Grenade Range

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Appendix B: Grading Plans

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Appendix C: Response to Comments, Pre-Final

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Table C-1: Response to Comments on the Pre-Final Version of the Live-Fire Training Range Complex Alternatives Analysis Report (Dated June 2013)

NO.	PAGE	SECTION	PARAGRAPH	LINE	ORGANIZATION	COMMENT	ACTION / RESPONSE
1	GENERAL				CNIC N44	Land Use Compatibility. While noise has been addressed, the impacts of blast vibration have not. The affect of continuing long-term blast vibration on structures and occupants should be addressed for full compatibility analysis.	Weapons proposed on LFTRC do not have a blast component that affects structures or occupants.
2	GENERAL				CNIC N44	Environmental considerations include potential impacts on terrestrial biological resources, but where range fans extend over open water no analysis has been provided for impacts on aquatic biological resources.	Will add verbiage on potential impacts to marine resources to NWF and RT15A alternatives.
3	vii	acronyms and abbreviations			JGPO	Acronyms should match those in the Draft SEIS for consistency. For example NMS in this report is NAVMAG in the SEIS and NTCS Finegayan is simply referred to Finegayan in the Draft SEIS. Recommend comparing the acronyms for consistency where the ones in the Draft SEIS shall take precedence.	Will review the SEIS acronyms list and compare to LFTRC Planning Report for Consistency.
4	viii				HAF/A7CI	Substantive - PRTC is the Pacific Air Forces Regional Training Center	Concur. Will update as noted.
5	1-1	1	1.2	30	HAF/A7CI	Substantive - rewrite "For example, the Marines are currently working with the Federal Aviation Administration (FAA) and Air Force to determine….. Rationale: Truthful statement.	Non-concur. Sentence refers to actions taken between the Marine Corps and FAA to determine if preliminary alternatives were untenable. These discussions resulted in Finegayan and RT 15B alternatives being paused for future planning. Air Force was not part of the process/discussions. Will change sentence from "currently working with" to "worked with" to indicate this was a past action.
6	1-1	1.2	NA	30-33	36 WG/XP	Substantive. Delete: "...process. For example, the Marines are currently working with the Federal Aviation Administration (FAA) to determine whether airspace impacts would render a preliminary alternative untenable. If the FAA concludes that an alternative's impacts on existing airspace cannot be mitigated, that alternative would not be carried forward for evaluation in the SEIS. Rationale: I don't believe this comment applies to the 5 remaining alternatives, does it? Believe it is talking about either the Finegayan or Rte 15B alternatives, discussed later in this section.	Non-concur. Recommendation has been noted, however, will keep write-up as is to account for past analysis. A total of seven alternatives were subject to FAA preliminary analysis. This preliminary analysis resulted in Finegayan and RT15B being paused for future planning.
7	1-2	1.2.1	1	9	MCICOM	Remain consistent with how other documents refer to the 2010 ROD. Suggest changing this language to: the United States Department of the Navy (DON) signed a Record of Decision (ROD) regarding the 2010 Final Environmental Impact Statement (EIS) for the "Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force."	As per JGPO guidance received on 25 July, agree to stay consistent with the NOI for the SEIS.
8	1-2	1.2.2	1	32	MCICOM	Insert "approximately" 9,000 dependents and "approximately" 1,300 dependents.	Non-concur. Grammatically correct as written.
9	1-3	1.2	1.2.4	34	36 WG/XP	Major. Add: "..both quantifiable airspace/ATC impacts (e.g., frequency and severity) to commercial/general aviation associated with…" Rationale: Neither FAA nor NAVFIG accounted for impacts to AAFB operations in these analyses.	Concur. Will update as noted.
10	2-1	2.1	6	29-34	MCICOM	Suggest making it clear that these are the originally designed SDZs and were developed without the use of the probabilistic methodology.	Section discusses the deterministic approach used for SDZ development. Based on conversations with TECOM during the analysis of the identified ranges, SDZs are considered notional until the range is certified by TECOM.
11	2-2	Figure 2.1-1			MCICOM	According to the dates on these, they were developed 4 months ago. If this is the case, how were they considered in the scoping meetings and other SEIS related documentation in relation to determining preliminary alternatives and/or the preferred alternative.	To clarify, the date shown is the date the graphic was created, not the date that the SDZ was developed.
12	2-6	2	2.3.1	28	HAF/A7CI	Substantive - Clarify "uninterrupted training" within document to include Range Mgmt. Rationale: Recent discussions between USMC and Air Force on Range Mgmt clarify that there could be times that training is interrupted due to LZ/DZ ops or need of VFR Recovery Point.	Non-concur. Sentence notes requirements defined by MCO 3570 Range Safety and is the objective sought (that is the purpose of this section). Air Force comment notes the reality of real-world mitigation, but mitigation is not part of this report.
13	2-8	2.3.5	1	16	MCICOM	Change "To access" to, "Access to"	Concur. Will update.
14	2-8	2.3.6	2	23	MCICOM	Suggest including that beaches impacted by SDZs would be demarcated with larger lighted signs visible on shore and from approaching water craft.	Non-concur. These details are part of the range management plan that will be developed in the future as part of a separate effort.
15	2-8	2.3.6		27-28	JGPO	Recommend expanding on range requirements over the water to keep public out of the SDZ. Given the daily use of the range these buoys may need to be permanent. What will be the cost and impact.	Concur with adding comments about requirements for buoys to this section. Non-concur with providing any discussion on impacts and mitigation since that will be covered in the SEIS.
16	2-8	2.3.6	3	28	MCICOM	Is USCG placing out buoys each time the ranges is active? Suggest rewording to indicated that lighted buoys will be placed to demarcate the extent of the SDZs and the danger area will be monitored by range control while the range is active.	Non-concur. Report identifies that buoys are required subject to consultation with the Coast Guard and Army Corps of Engineers. Details will be part of the range management plan that will be developed in the future as part of a separate effort.
17	2-17	2.4.6			NFP AM IB	Include a drawing showing the SDZ for the HG Range.	The drawing will be included.

NO.	PAGE	SECTION	PARAGRAPH	LINE	ORGANIZATION	COMMENT	ACTION / RESPONSE
						Missing drawing in report.	
18	2-17	2.4.6			NFP AM IB	Include proposed location of permanent concrete structure magazine.	Concur. Will update.
19	2-17	2.4.6			NFP AM IB	Include a synopsis at the end of the HG Range write up similar to the write ups for the other ranges.	Concur. Will update.
20	2-18	2.4.8	1	10	MCICOM	Include flashing red lights mounted on the range observation towers for aviation safety as well as to demarcate the boarders of the range when towers are located on the cliff line.	Concur. Will add statement noting hazard markings. Full details will be developed in the range management plan that will be prepared in the future as part of a separate effort.
21	2-19	FIG 2.4-6			NAVFACMAR DPRI AM	Notional HG Range Complex Map (FIG 2.4-6): Why is this Figure located on Page 2-19 in the middle of the discussion of the three functional areas of the Range Control Facility (RCF)? Recommend it be inserted between Paragraphs 2.4.6 and 2.4.7.	Graphic is inserted after discussion of Hand Grenade Range that occurs on pages 2-17 and 2-18. Will review placement after making format changes requested in comment 19.
22	2-20	2.4.10	2	22	MCICOM	Suggest changing Marines to, "US Marine Corps" for both instances on this line.	Concur: Will update as noted.
23	2-21	2.5.2	3	19	MCICOM	Does this 30 GPD estimate include irrigation? If so, 30 Gpd seems a bit low especially for 884 persons....	Note that in section 2.5.2, line 17, it states that domestic uses include "household lawn irrigation." The reference of 30 GPD is a consumption rate per person. The average day demand for the LFTRC is 26,520 GPD for the entire 884 persons, indicated in line 20, page 2-21.
24	2-21	2.5.2	5	31	MCICOM	Domestic uses also lists irrigation. Are we counting this twice? How is industrial irrigation different? Suggest differentiating or including in only one place.	See response to comment on Page 2-21, comment 23.
25	2-22	2.5	2.5.2	6-8	NAVFACMAR DPRI AM	Why is this report "assuming" that a system of fire hydrants are not required? This may be fine for the 30%, 60% submission. If a single hydrant or stand pipe is all that is required, then say so.	The sentence has been revised to state that there are no UFC fire water requirements for the ranges themselves, but a fire hydrant or stand pipe would be required to fill range fire fighting vehicles.
26	2-22	2.5	2.5.2	9-14	NAVFACMAR DPRI AM	Why is UFW accounted for in the water demand calcs since this is new construction and you know the demand based on personnel? If the connection is directly to GWA, I would also expect at least a main meter be installed.	UFW also pertains to new construction and comes from unmetered O&M activities (line flushing, hydrant testing, and others) as well as allowing for future leak development as the system ages. Also as the water supplied must move through the rest of the water system, UFW will occur. So it is appropriate to have a UFW demand component for a new extension of an existing system, or even an entirely new system. Meter requirements would be determined during more advanced design stages as this is a conceptual level only.
27	2-22	2.5	2.5.2	9-14	NAVFACMAR DPRI AM	I would not expect any water loss or unaccounted for water anywhere in the new system running to the LFTRCs. I do expect UFW in existing (GWA, NBG, AAFB) water supply distribution/transmission systems.	See response to comment 26 above.
28	2-22	2.5	2.5.3		NAVFACMAR DPRI AM	Again, why are we "assuming" that existing sewer in proximity to the LFTRCs have adequate capacity. You should have all the data/info on hand to make the required calculations and state that the existing capacity is either adequate or not.	Current data for sewer flows in the existing collection systems in the vicinity of the LFTRC proposed connections are not available by either GWA or DoD. Determination of the existing capacity of the collection system would require field measurements, which is not included in this scope of work. The estimated wastewater to be generated from the LFTRC Range Maintenance Building is a very small amount compared to the capacity the existing sewer lines being considered for use. Once a preferred alternative is chosen, a more detailed analysis and measurement of current wastewater flows and wastewater pump station capacities in existing wastewater collection systems should be considered.
29	2-22	2.5.3	1	21	MCICOM	This sections is a bit brief. Suggest expanding and possibly including UFC numbers for heads at range maintenance and storage bldgs.	Comment has been noted. As stated, the minimal sewer requirements from the range maintenance operations are assumed to be small enough as to not stress the load to the existing sewer system. Therefore the level of detail being suggested is not required at this time.
30	2-23	2.6	NA	22-26	36 WG/XP	Substantive. General comment: this seems to be saying that for those LFTRC alternatives requiring land acquisition (all except NWF), that the costs for land would be factored twice, first in the cost of land to be acquired and second in the value of land to be given up under net negative. This is problematic because it potentially biases the costs in favor of NWF to a disproportionate extent. It also presupposes the value of the land to be relinquished, which could vary widely in execution based on which areas are offered up. Recommend treating the land to be given up as a wash cost and not factor it into the calculations because it could not be sold as a method to generate revenue for DoD anyway.	As written, the comment may oversimplify the model for the LCCA. When doing a cost/benefit analysis it is important to include all costs and all benefits. If this is ignored, the integrity of the mathematical model may be compromised.
31	2-23	2.6	bullet 3	25	MCICOM	Suggest changing DoD land to, "federal land"	Concur. Will update as noted.
32	2-24	2.7	1	3	MCICOM	Change "assume a ROD" to, "assumes a ROD will be signed"	Concur. Will update as noted.
33	2-24	2.7	2.7	9-12	NAVFACMAR DPRI AM	FY 2017 funding assumptions for the ranges do not align with the Rainbow Chart. Same issue for the Construction Phasing para in each Alt.	The Rainbow Chart shows notional dates. Therefore, the information presented does not fall outside the lines of the purpose of this document. Review of the rainbow chart (last

NO.	PAGE	SECTION	PARAGRAPH	LINE	ORGANIZATION	COMMENT	ACTION / RESPONSE
							on record when the socioeconomic team was preparing population estimates), the dates should be funding in 2017 for the three bullets indicated in the LFTRC Pre-final.
34	3-1	3.1	NA	13	36 WG/XP	Substantive. Delete: "…existing tenant operations…" Rationale: for the NWF alternative, the AF would not be a "tenant" on our own installation	Concur. Will update as noted.
35	3-1	3.1	3	17	MCICOM	Suggest deleting, "and document that process of selection." The CDP process does not document the process of selecting a preferred alternative, that is the intent of the DOPAA.	Non-concur. As written simply suggests that this report provides information to inform decision-makers.
36	3-1	3.2	3.2.1	31	36 WG/XP	Substantive. Delete" "…36th Wing operates on AAFB…" Rationale: I know it seems like a minor point, and I also know CNIC wanted this language, but per the JRM MOA the 36th Wing Commander is dual hatted as the AAFB base commanding officer. The units that execute installation support on AAFB, e.g., the 36th Mission Support Group, all fall within the 36th Wing organizational structure. Yes, it is Navy real property, but it remains Andersen Air Force Base.	Concur. Will remove the word "on" in the document. The sentence will read as "….36th Wing operates AAFB…".
37	3-1	3.2	3.2.1	34-35	36 WG/XP	Substantive. Change: "...consists of two former B-29 paved expeditionary 10,000 ft (3,048 m) runways with adjacent taxiways and parking areas (Figure 3.2-2. these facilities are currently in various states of repair/usability) ..." Rationale: accuracy. We had developed a landing zone (LZ) on the south runway and a drop zone (DZ) north of the south runway, but due to AMDTF restrictions, are planning to relocate the LZ and DZ to the north runway. The way this passage is written makes it sound like NWF is a modern expeditionary airfield, e.g., akin to Bagram or Kandahar, which is far from the truth. I don't believe those are 10,000' runways, either.	Concur. Will update as noted.
38	3-2	3.2	3.2.1	8	36 WG/XP	Admin. Change: "…the Army Air and Missile Defense…" Rationale: accuracy.	Concur. Will update as noted.
39	3-2	3.2	3.21	14	HAF/A7CI	Change "DoD real property" to "federal real property" Rationale: Stays consistent with what was stated in the SEIS Tiger Team with regards to all DoD operated land being federal property. Change throughout document.	Concur. Will update as noted.
40	3-3	3.2-2	Figure 3.2-2		MCICOM	For all LFTRCs match figure with changes made at the Draft V1 SEIS Tiger Team meeting in HI. (e.x., buoys, signage, fence line changes)	Fenceline changes will be noted. Signage and buoy placement are subject to the development of the range management plan which will be prepared in the future as part of a separate effort.
41	3-3	3.2-2	Figure 3.2-2		MCICOM	This is the only range tower designed to be within the SDZ for any LFTRC alternative. Suggest moving the location of this range tower back next to the JTE Site or further down the cliff line? If the intent is to mark the outside of the SDZ with the flashing red lights on top as well as provide a vantage for surveying the SDZ.	This tower is co-located with the existing Navigation light/tower on Ritidian Point. The existing tower will remain. An additional observation tower will be added south of the JTE site.
42	3-3; 3-5	3.2	Fig 3.2-2; 3.2-3	All	36 WG/XP	Major. General comment: while improved from previous versions, this is still an incomplete depiction of the constraints and restraints associated with the NWF LFTRC. Graphics (either one or both) should depict "North [VFR Entry] Point," AAFB's IFR traffic pattern and LZ/DZ approaches. Also, we are revising the location of our LZ/DZ based on long-term expectations for the AMDTF. Finally, we are working with USMC on the ECP and associated roads. I will send graphics of our current concepts to HAF for their review to determine if it would be relevant to include them with this submission.	PowerPoint graphics of the NWF Area Development Plan were received on 31 July from 36 WG/XP. The ECP depicted in Figure 3.2-2 NWF Alternative is consistent with what is shown on the NWF ADP. To avoid the possibility of depicting the constraints and restraints incorrectly, Figure 3.2-3 NWF Alternative Existing Conditions will not be updated until the GIS data is provided for the NWF Area Development Plan.
43	3-3	Fig 3.2-2			HAF/A7CI	Change "Pacific Regional…" to "Pacific Air Forces Regional…". Rationale: Incorrect Name change throughout document	Concur. Will update as noted.
44	3-6	3.2	3.2.2	8	36 WG/XP	Substantive. Add: " "…extend up to 2,965 ft…" Rationale: accommodates sectorization of R-7202 later on, something discussed by USMC and USAF planners.	Concur. Will update as noted.
45	3-6	3	3.2.2	11	HAF/A7CI	Ensure impacts to Air Force Operations are consistent with what is being drafted as part of SEIS Tiger Team. Rational: Ensures consistency.	Non-concur. This report has a different purpose than the SEIS. Severity of impacts and mitigation is part of the SEIS.
46	3-6	3.2	3.2.2	11	36 WG/XP	Admin. Delete: "VFRs…" Rationale: typo	Concur. Will update as noted.
47	3-6	3.2	3.2.2	12-13	36 WG/XP	Substantive. Add: "The RA would affect the AAFB radar traffic pattern, select instrument approach procedures, circling 12 procedures, minimum/emergency safe altitudes, helicopter rescue response routings, and helicopter Cliff Line…" Rationale: the proposed RA also affects initial approach fix holding altitude for several approaches at AAFB.	Concur. Will update as noted.
48	3-6	3.2.2		14-15	JGPO	Given that the AF and USMC have consulted on the issue. Add text to the effect that the USMC and AF to include 36th Wing have coordinated all operational requirements to be able to meet all mission requirements with NWF as the LFTRC alternative. PD and AF must review the new text.	Concur. Will update as noted. Additional time will be required to provide for PD and AF review.
49	3-6	3.2	3.2.2	15	36 WG/XP	Major. Add: "…and FAA. One initiative under consideration is lateral and vertical sectorization of R-7202, to allow enhanced flexibility in deconflicting concurrent air and LFTRC operations.	Non-concur. This report does not address details of mitigation measures or ongoing operational discussions.

NO.	PAGE	SECTION	PARAGRAPH	LINE	ORGANIZATION	COMMENT	ACTION / RESPONSE
						Rationale: an outcome of the USMC, USAF and DoN discussions at AAFB in late Jun 13.	
50	3-6	3.2.2	2	15	MCICOM	Change Marines, to "US Marine Corps"	Concur. Will update as noted.
51	3-6	3.2	3.2.3	17-18	NAVFACMAR DPRI AM	Please add additional clarification as to the entry into the NWF Alternative. Please confirm that the plan is to not construct a new manned ECP (Gate) in the AAFB Perimeter Fenceline.	Intent was to use existing ECP for NWF, but see comment 52 that indicates that intent is now to create a separate entrance.
52	3-6	3.2	3.2.3	17-20	36 WG/XP	CRITICAL. Change: To take advantage of existing NWF security operations, proposed entry to the LFTRC and PRTC would be through the existing NWF Gate off of Route 3A. Traffic would be routed along existing NWF roads to an existing road that would be improved to support LFTRC traffic. An internal LFTRC ECP would be constructed to control range access during hours of operation a new ECP, located to the northwest of the current NWF gate, off of Rte 3A. Specifics are a topic of ongoing discussions between USAF, USMC and DoN planners. Rationale: reflects agreements reached during talks between USMC, USAF and DoN planners at AAFB in late Jun 13. I will send graphics of our current concept to HAF for their review to determine if it would be relevant to include it with this submission.	Concur with text change. The ECP as shown on Figure 3.2-2 NWF Alternative is consistent with the NWF Area Development Plan provided by 36 WG/XP on 31 July 2013.
53	3-7	3.2	3.2.4	1	36 WG/XP	Major. Delete: "[Ranges were sited to minimize] impacts on the Air Force's existing PRTC, Landing Zone, and RED HORSE Squadron…" Rationale: while we have had productive discussions with USMC and DoN reps on deconfliction of LZ and DZ ops with the LFTRC, we are not yet to the point where we can claim the impacts are minimized.	Concur: Will update as noted. Yes, full deconfliction of LZ ops is ongoing but ranges were re-sited to minimize impacts.
54	3-7	3.2	3.2.4	2-3	36 WG/XP	Substantive. Delete: "...Range was re-sited to deconflict range operations with the Air Force's planned Milky Way site for its Joint Threat Emitter (JTE)." Rationale: site already exists. "Milky Way" is an obsolete description of the old ECM site that used to be in this location.	Concur. Will update as noted.
55	3-7; 3-17	3.2	3.2.4; Fig 3.2-8	7-13	36 WG/XP	Substantive. General comment: noise studies of the NWF LFTRC proposal need to factor in noise effects on the personnel working at the JTE site, and DoN needs to fund any associated mitigation thereof.	Concur. Will note that JTE site is Noise Zone 2 and will determine compatibility.
56	3-7	3.2.5	1	17-19	MCICOM	Suggest deleting this sentence and/or checking with Natural Resources team. It is not known that construction activities will have an impact and I don't see operational activities resulting in threats to special-status species that are not mitigated.	Information in this section was provided by Natural Resources Team. As noted in para 3.2.5., line 16-17, significance of impacts will be determined in the SEIS.
57	3-7	3.2.5	2	20	MCICOM	Change would to, "may"	Concur. Agree, discussed with EV (Natural Resources and NEPA Branch).
58	3-7	3.2.5	bullet 2	25-26	MCICOM	Is the Overlay Refuge being removing or is it being overlaid by the SDZ? Major biological impacts within the SDZ are not anticipated.	Non-concur. Ranges are being constructed on existing Overlay Refuge.
59	3-7	3.2.5		36	MCICOM	Suggest removing this bullet. Check with Natural Resources team for validity.	Non-concur. Information in this section was provided by Natural Resources Team. Will change line 34 to read, "Biological impacts may include the following:…"
60	3-7	3.2.5		37	MCICOM	Suggest changing would to, "may"	Concur. Agree, discussed with EV (Natural Resources and NEPA Branch).
61	3-8	3.2.7	1	8-9A	MCICOM	Proposed fencing below the cliff line is being replaced by signs.	Will update to note that signs below cliff line will warn of entry to SDZ.
62	3-8	3.2.7		11-12	JGPO	Provide discussion of the required buoys in the water where the SDZ overlaps the Phil Sea.	Concur, with adding comments about requirements for buoys to this section. Non-concur with providing any discussion on impacts and mitigation since that will be covered in the SEIS.
63	3-8	3.2	3.2.7	14-15	36 WG/XP	Substantive. Change: "If approved by the FAA, the proposed the Northwest Field R-7202 RA would be depicted on aeronautical charts and it would be the responsibility of pilots to comply with the provisions of the RA, unless otherwise cleared by the applicable control authority." Rationale: the first edit is admin. Second refers to the fact that there will be a range ops control facility that may be able to allow transit of aircraft through the RA for a variety of reasons. Previous comment adjudication indicated you would accept this added language, but it did not make it into the document.	Concur. Will update as noted.
64	3-19	3.2-9	Figure 3.2-9		MCICOM	Replace proposed fence line below the cliff with signs.	Fenceline will be removed from graphic. Actual Sign locations are not noted in this report and are subject to development in the range management plan to be prepared in the future as part of a separate effort.
65	2-23	2.6	6	22-26	NFP AM TC	Suggest changing to the following: Includes the value of land returned to the Government of Guam (GovGuam) in accordance with DoD's commitment to pursue a "Net Negative" strategy, which would mean that any land acquisition would be offset by returning underutilized DoD owned lands to the Government of Guam.	Concur. Will updated as noted.
66	3-27	3.3	Figure 3.3-2		MCICOM	Indicate area for signs delineating the SDZ below the cliff line out to the water.	Actual Sign locations are not noted in this report and are subject to development in the range management plan to be prepared in the future as part of a separate effort.
67	3-29	3.3	Figure 3.3-3		MCICOM	Two wells are missing wellhead protection zones.	Concur. Missing wellhead protection areas were determined to be on test wells vice production wells. No requirement for a protection area around test wells. Will remove

NO.	PAGE	SECTION	PARAGRAPH	LINE	ORGANIZATION	COMMENT	ACTION / RESPONSE
							test wells from graphic.
68	3-39	3.3.5	1	24	MCICOM	Suggest changing would to, "may" and check the wording of "impacts of invasive species" with the Natural resources team.	Concur. Agree, discussed with EV (Natural Resources and NEPA Branch).
69	3-39	3.3.5	2	26	MCICOM	Suggest changing would to, "may"	Concur. Agree, discussed with EV (Natural Resources and NEPA Branch).
70	3-39	3.3.5	bullet 4	32	MCICOM	Redundant of bullet 1. Suggest deleting or combining with bullet 1.	Non-concur. Information in this section was provided by Natural Resources Team. First bullet refers to limestone forest, 4th bullet refers to suitable habitat.
71	3-39	3.3.5	bullet 5	34	MCICOM	Check wording with Natural Resources team. I don't see how we can say that Rt15A would have invasive species impacts on all special-status species.	Non-concur. Information in this section was provided by Natural Resources Team. See response to comment #69.
72	3-40	3.3.5	bullet 6	2	MCICOM	Redundant of bullet 5. Suggest deleting.	Concur. Will delete lines 1 and 2.
73	3-52			2	CNIC N44	Could infill activity required for the magazine relocation area potentially affect Fena Valley Reservoir water quality?	Measure of affects and mitigation will be contained in the SEIS.
74	3-52			2	CNIC N44	Could the magazine relocation area potentially pose a future contamination risk to the Fena Valley Reservoir?	Measure of affects and mitigation will be contained in the SEIS.
75	3-53	3.4	Figure 3.4-2		MCICOM	Proposed Grading Contour in the legend should be changed from a line to a box to more easily identify the color.	Concur. Will change the line to a box with color identifier.
76	3-65	3.4.5	2	29, 32, 33	MCICOM	Change would to, "may"	Concur. Agree, discussed with EV (Natural Resources and NEPA Branch). Similarly, will change "would" to "may" for page 3-66, line #4 and removed for line #9.
77	3-66	3.4.5	bullet 5	8	MCICOM	Check wording with Natural Resources team. I don't see how we can say that this option would have invasive species impacts on all special-status species.	Non-concur. Information in this section was provided by Natural Resources Team. As noted in para 3.4.5., line 25-26, significance of impacts will be determined in the SEIS.
78	3-66	3.4.7	1	16	MCICOM	Add language about the posting of signage notifying transients of the SDZ and dangers.	Concur. Will update.
79	3-77	3.5	Figure 3.5-2		MCICOM	Need to depict signage or fence line continuing to current NMS boundary.	Non-concur. As noted fenceline continues to restrictive terrain. Sign locations subject to development of the range management plan to be prepared in the future as part of a separate effort.
80	3-81	3.5.5	bullet 2	35	MCICOM	Figure 3.5-3 depicts Recovery Habitat (Bat, Kingfisher), not Overlay Refuge.	Will update write-up on Page 3-81 and/or Figure 3.5-3 accordingly.
81	3-82	3.5.5	bullet 5	7	MCICOM	Change would to, "may"	Concur. Agree, discussed with EV (Natural Resources and NEPA Branch). Similarly, will change "would" to "may" for page 3-81, line #30.
82	3-82	3.5.5	bullet 8	13	MCICOM	Check wording with Natural Resources team. I don't see how we can say that this option would have invasive species impacts on all special-status species	Non-concur. Information in this section was provided by Natural Resources Team. As noted in para 3.5.5., line 28-29, significance of impacts will be determined in the SEIS.
83	3-82	3.5.7	1	23	MCICOM	Include wording regarding signage.	Concur. Will update.
84	3-100	3.6.5	1	11-12	MCICOM	Check wording with Natural Resources team regarding the spread of invasive species, with resulting threats to special-status species.	Non-concur. Information in this section was provided by Natural Resources Team. As noted in para 3.6.5., line 9-10, significance of impacts will be determined in the SEIS.
85	3-100	3.6.5	bullet 5	22	MCICOM	Suggest removing this bullet. Check with Natural Resources team for validity.	Non-concur. Information in this section was provided by Natural Resources Team. As noted in para 3.3.6., line 9-10, significance of impacts will be determined in the SEIS. Similarly to recommended changes for other alternatives, will change the word "would" to " may" for lines 13, 19, and 24.
86	3-119	3.6.7	1	2	MCICOM	Include wording regarding signage.	Concur. Will update.
87	3-135	Table 3.8-1			MCICOM	In Land/Sea/Air Space Availability, suggest changing non-DoD land to, "non-federal" land for each alternative. Also within Range Transients, suggest changing proposed fencing to, "proposed fencing and signage" for each alternative.	Concur. Will update.
88	3-135	Table 3.8-1	NWF Land use Compatibility		JGPO	Given that the AF and USMC have consulted on the issue. Add text to the effect that the USMC and AF to include 36th Wing have coordinated all operational requirements to be able to meet all mission requirements with NWF as the LFTRC alternative. PD and AF must review the new text.	See response to comment 48.
89	GENERAL				36 WG/XP	Major. General comment relating to Comment 164 on the adjudicated comment matrix from the 90% MC/FH Planning Report. Based on preliminary agreements reached between USMC. USAF and USN reps during talks at AAFB on 25-26 Jun 13, all parties agreed that access to the NWF LFTRC will be via a new ECP northwest of the current one. This will require restoration of much of Rte 3A as a cost factor. I wanted to make sure ALCON were aware of this discussion.	See response to comments 51 and 52.

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