FINAL
(VERSION 4)

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS JOINT MILITARY TRAINING

UTILITIES STUDY
VOLUME I: EXECUTIVE SUMMARY AND INTRODUCTION

Department of the Navy
Naval Facilities Engineering Command, Pacific
258 Makalapa Drive, Suite 100
JBPHH HI 96860-3134

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EXECUTIVE SUMMARY

The purpose of this report is to provide specific information related to electrical power, potable water, wastewater, and information technology/communications (IT/COMM) associated with the proposed action to establish a series of live-fire and maneuver ranges, training areas, and support facilities on the islands of Tinian and Pagan within the Commonwealth of the Northern Mariana Islands (CNMI). Figure ES-1 provides an overview of the CNMI, and Figure ES-2 and Figure ES-3 provide an overview of Tinian and Pagan, respectively.

The United States (U.S.) Pacific Command has identified unfilled unit level and combined level training requirements in the Western Pacific. U.S. Pacific Command designated U.S. Marine Corps Forces Pacific (a part of the Marine Corps) as Executive Agent to address the unfilled training requirements. To address these shortfalls, the U.S. Marine Corps is overseeing the development of the CNMI Joint Military Training (CJMT) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) for the proposed action. Proposed actions on Tinian would focus on unit level training requirements, while actions on Pagan would focus on combined level training requirements.

There are two different training tempos proposed for both Tinian and Pagan. The first training tempo is the proposed action presented in the CJMT EIS/OEIS, consisting of 20 weeks per year on Tinian and 16 weeks per year on Pagan. In the future, the training tempo might be increased to 45 weeks per year on Tinian and 40 weeks per year on Pagan and is addressed by the CJMT EIS/OEIS as a potential future action. This study addresses both training tempos.

STUDY GOALS

This *Utilities Study* was prepared to analyze the condition and capacity of existing utilities on Tinian and Pagan, describe the required utility services for the proposed training facilities and their operation, and make recommendations on how to provide those required utility services. The utilities studied include electrical power, potable water, wastewater, and IT/COMM. Volume I of the *Utilities Study* (this report) presents an Executive Summary and general introduction. Volumes II through V present the utility-specific analyses.

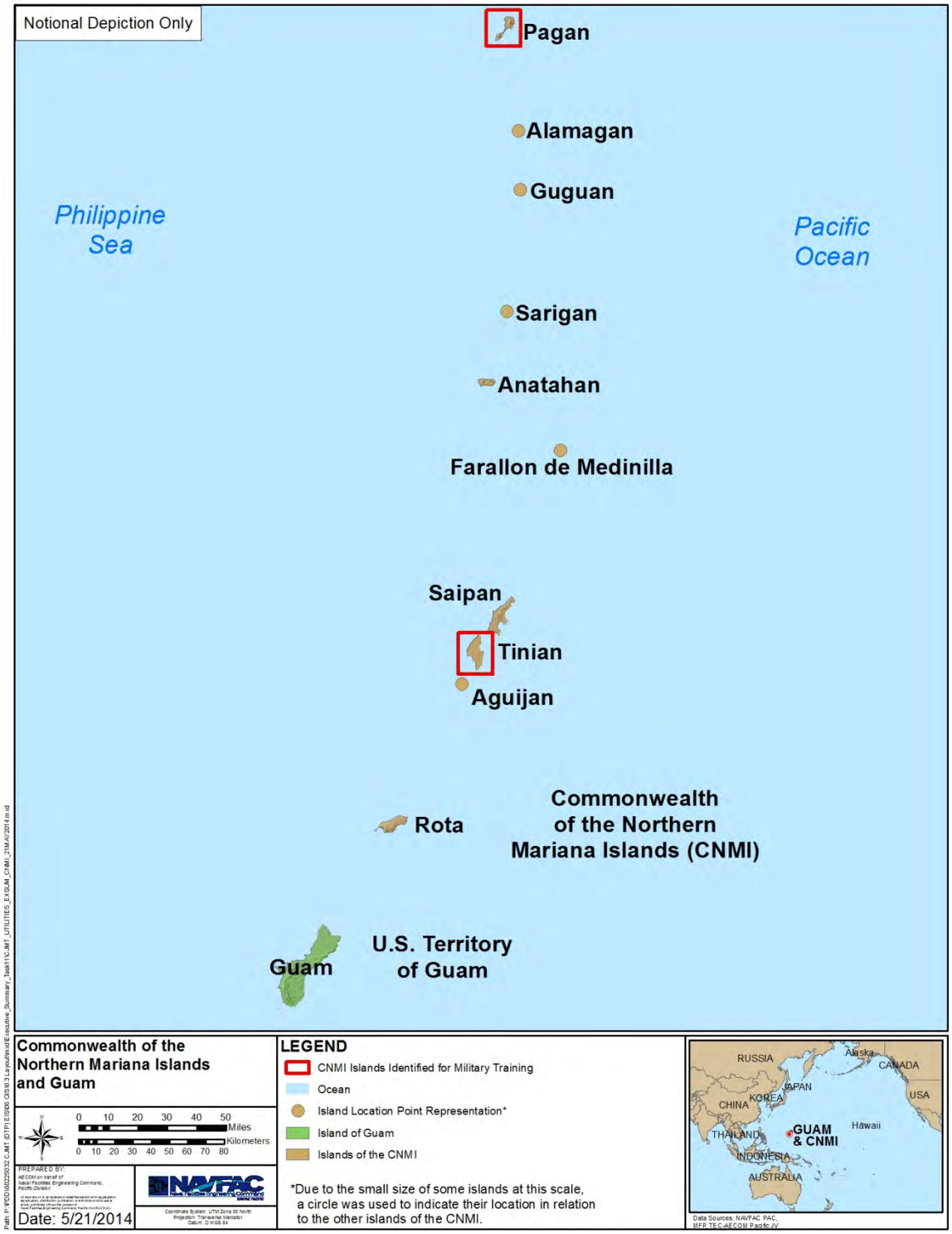

Figure ES-1. Commonwealth of the Northern Mariana Islands and Guam
Source: DoN 2014.

Figure ES-2. Island of Tinian and the Military Lease Area
Source: DoN 2014.

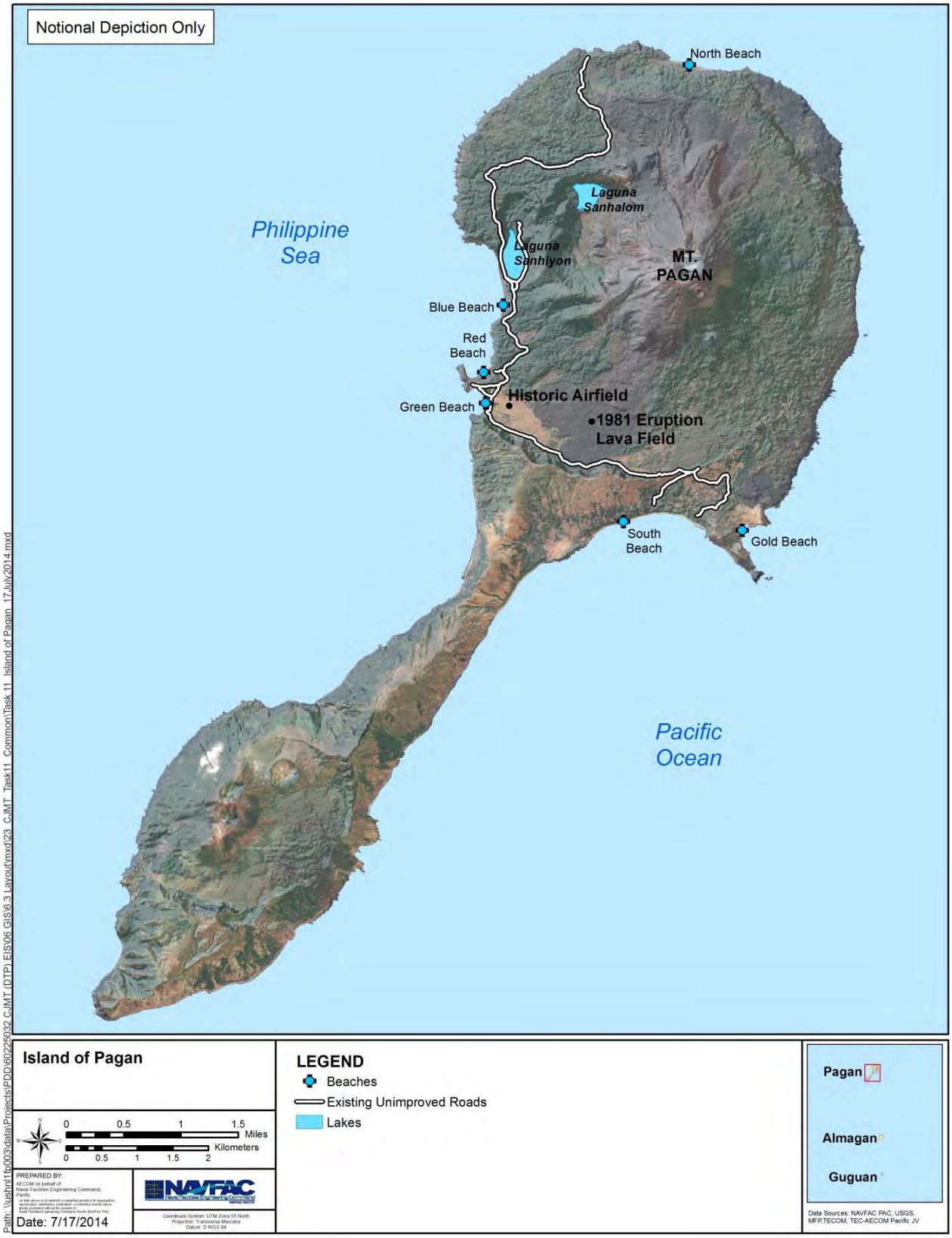

Figure ES-3. Island of Pagan
Source: DoN 2014.

TRAINING REQUIREMENTS - TINIAN

The assumptions used for the *Utilities Study* are consistent with the CJMT EIS/OEIS (DoN 2014c) and the *Unconstrained Training Concept for Tinian and Pagan* (DoN 2014a), current at the time this study was performed. Site visits were made to Tinian to gather information on the status of existing utilities. The analysis for Tinian is based on a training population of approximately 100 permanent personnel to manage and maintain the training facilities; a total training period of about 20 weeks per year with up to 1,500 trainees and the potential temporary surge of an additional 1,500 trainees on a modified bivouac basis for 2 weeks several times per year during part of the 20-week annual training duration.

Civilian demand for utilities is considered since the proposed action requirements could impact the utility services to the civilian sector. Between the years 2000 and 2010, the population of Tinian decreased from 3,540 to 3,136 (U.S. Census Bureau 2010). A socioeconomics study is currently being performed and has forecast various categories of island population changes, including baseline population changes, construction workers, operations workers, and training personnel. Ranges of low, medium, and high forecasts have been made and are shown in Table ES-1. Utility requirements for these population changes have been estimated and included in appropriate analyses. It is assumed that the construction contractor would provide a work camp with appropriate utilities including wastewater treatment and disposal. It is possible to build some of the proposed utilities for the base camp (water and wastewater) early for use by a work camp should the location be amenable for this approach. There may also a potential to use existing and available work camp facilities near the Tinian Dynasty Hotel and Casino.

Table ES-1. Total Forecast Tinian Population

Category	*Low*	*Medium*	*High*
Baseline Population	2,890	3,211	3,532
Population Change – Construction [1, 2]	477	537	596
Population Change – Operations [2]	143	192	242
Total Population Change	**620**	**729**	**838**
Population with the Proposed Action	3,510	3,940	4,370

Notes:
[1] Annual average during the 8-10 years of construction.
[2] Includes dependents of construction managers and operations workers.
Source: DoD 2014d, Table 5.1-3.

There is a future potential to ramp up the training tempo to 45 weeks per year for Tinian and expand facilities at the Tinian International Airport. At Tinian International Airport, an initial layout would be for expeditionary use, then transition to a permanent end state in support of the 45-week training tempo. For utilities, the maximum requirements govern the proposed solutions to prevent excessive future costs to expand utility infrastructure, so utility demands for the 45-week training tempo and end state airport facilities have been addressed in this study and its recommendations.

The main areas that would require utility services (i.e., the base camp, Munitions Storage Area [MSA], port facilities, and potential end state modifications to Tinian International Airport) are the same for all alternatives under analysis. Thus, only one representative utility routing plan is shown in this Executive Summary (Alternative 2) on Figure ES-4. There are no discernable differences in utility demands between the various alternatives. While the existing International Broadcasting Bureau (IBB) facilities would be relocated for two of the alternatives, the scheduling of that relocation and the proposed alternatives would likely result in an overlap for utility demand purposes. Therefore, the current power use from the IBB is included in the analysis for all alternatives. Note that the IBB only uses the public electrical power utility and no other public utility services.

Figure ES-4. Tinian - All Proposed General Utility Improvements
Source: DoN 2014.

TRAINING REQUIREMENTS - PAGAN

For planning purposes the training contingent on Pagan is anticipated to be about 3,000 persons for approximately 16 weeks per year, with a potential for short-term surges to 4,000 people. Training on Pagan would be on an expeditionary basis, requiring a minimal amount of permanent infrastructure. A refurbished airstrip, temporary daily munitions storage area, and provisions for tents are about the only anticipated permanent infrastructure, in addition to the recommendations of this *Utilities Study*. Pagan's population was evacuated to Saipan due to the May 1981 eruption of Mount Pagan, and the island has not been formally re-inhabited since. There is no resident population on Pagan but people visit for recreation and resource gathering. Visitors have been observed using temporary encampments on the island. As there are no existing utilities on Pagan, civilian utilities requirements have not been considered.

Utility requirements for proposed training activities on Pagan have been analyzed and recommendations included for providing those required services. The main areas that would require utilities infrastructure are the same for all alternatives under analysis. Thus, only one representative plan is shown in this Executive Summary (Alternative 1) on Figure ES-5. There are no differences in utility demands between the various alternatives.

There is a future potential to increase the training tempo to 40 weeks per year and provide expanded facilities for Pagan. The expanded facilities would include a breakwater and pier. The utility analyses for that higher tempo have been addressed in this study and the study recommendations.

OVERVIEW OF UTILITIES

Information below is summarized for each of the utility systems examined (i.e., electrical power, potable water, wastewater, and IT/COMM). The full analyses are presented in Volumes II through V.

Electrical Power - Tinian

Existing Conditions. Electrical power on Tinian is currently provided by a central power plant with diesel generators. The plant is owned by the Commonwealth Utilities Corporation (CUC). TeleSource CNMI, Inc., a private power producer, operates and maintains the power plant, transmission, and distribution systems. Allowing for maintenance, the existing system has an available capacity of about 12.5 megawatts (MW), with a current peak demand of about 4.5 MW.

The existing transmission and distribution systems are predominantly overhead with only a short section around the west end of the Tinian International Airport runway going north on 8th Avenue towards the IBB being directly buried underground. These systems appear to be adequately maintained. The entire system is providing a high level of reliable service to the island customers (see outage reports for last several years, Volume II, *Electrical Power*).

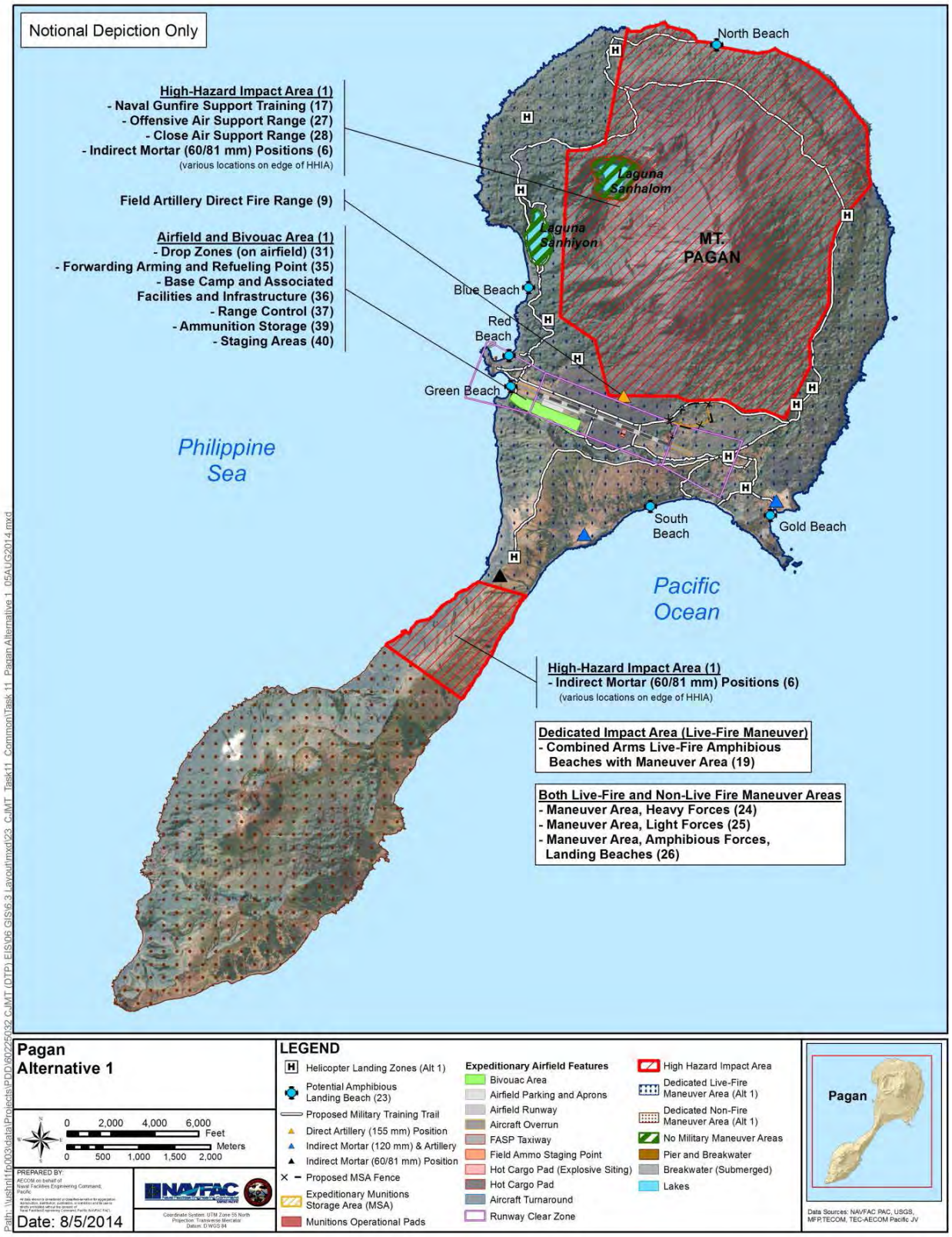

Figure ES-5. Pagan Alternative 1
Source: DoN 2014.

Requirements. The estimated maximum electrical power demand from the proposed action and potential future expansion is 2.78 MW, including the potential future Tinian International Airport improvements demand of 1.28 MW. Total system demand is estimated at 7.28 MW, versus the total effective generating capacity of 12.5 MW. Therefore, there is adequate available electrical power to supply the proposed training facilities and any induced civilian growth even if the IBB remains on Tinian with its current power usage.

The U.S. military's estimated electrical power requirements are based on the Unified Facilities Criteria (UFC). However, actual demand would be expected to be lower because of the energy conservation efforts required by various executive orders, sustainability efforts, best management practices, and Leadership in Energy and Environmental Design Silver certification requirements.

Recommendations. The recommended solution for U.S. military electrical power requirements for the proposed action is to rely on the existing private power producer, TeleSource CNMI, Inc., and construct the necessary infrastructure to distribute power to the required locations. The base camp would have a switching station fed directly from the power plant by the existing power line running up 8th Avenue. The MSA would also be supplied with power from the existing power line running up 8th Avenue. All observation posts and many range and supporting facilities would require electrical power. The distribution routings for these requirements are shown on the utilities routing plan, Figure ES-4, which is Alternative 2 but representative of Alternatives 1 and 3. Volume II includes the specific electrical routings for all alternatives. The proposed port facilities (biosecurity facility, vehicle washdown facility, vehicle inspection facility, and bulk fuel storage facility) would all require electrical power. Power would be provided to these facilities by connecting to the existing overhead power lines in the vicinity. The future potential Tinian International Airport facilities (fueling system, hot cargo pad, air traffic control tower, hangars, and expanded taxiways) would be provided electrical power from the switching station proposed for the base camp via a mix of overhead and underground power lines.

Alternative renewable sources of energy were analyzed, as described in Volume II, *Electrical Power*. These energy sources were not deemed sufficiently reliable to satisfy power demands without conventional backup sources, but alternative renewable energy sources should be considered to offset the use of hydrocarbon fuels and carbon emissions. Some alternative renewable energy sources, particularly solar photovoltaic and hot water systems, appear to be viable on Tinian if designed and installed to withstand typhoon-level winds and to be protected from damage by typhoon-driven objects.

During construction, there would be additional population on the island. However, since there is adequate generating capacity there should be no issues in providing electrical power services for this additional demand. The construction contractor would be responsible for providing a work camp with all required utility services, so any power distribution upgrades would be provided by the contractor.

Electrical Power - Pagan

Pagan currently lacks any electrical power infrastructure. The training on Pagan is proposed as expeditionary and would be supported by portable electrical generators, solar collectors, batteries, or other temporary electrical power sources as required. Therefore, no electrical infrastructure is proposed for Pagan.

Providing temporary electrical power during the construction phase would utilize the same solutions as presented for training.

Potable Water - Tinian

Existing Conditions. The water supply for Tinian is provided by the CUC. They directly manage the operation including supply wells, storage tanks, and distribution systems. The current water supply comes from one horizontal well, Maui Well Number (No.) 2. No other available methods of water extraction have been maintained. Previously, four vertical wells were held in operational reserve, but they have fallen into disrepair and are unavailable for water production. Previous plans to refurbish Maui Well No. 1 have been cancelled. The sole water source for Tinian, Maui Well No. 2, has been evaluated and deemed able to produce at least 1 million gallons per day (MGd) (3.79 million liters per day [MLd]) during dry months and 1.5 MGd (5.68 MLd) during wet months (USACE 2003). Average production during 2013 was approximately 1.14 MGd (4.31 MLd) based on data received from the CUC (as documented in the site visit minutes provided in Appendix C of Volume III, *Potable Water*). Maui Well No. 2 is equipped with four pumps, with three pumps operating the majority of the time, leaving one pump for maintenance redundancy.

Existing detailed technical information about the Tinian aquifer is not fully comprehensive. The groundwater at the Makpo potential wetland complex, where Maui Wells No. 1 and 2 are located, is quite shallow based on the design drawings contained in the meeting minutes with the CUC from the site visit on December 2013 contained in Volume III. Based on prior evaluations presented in Volume III of this *Utilities Study*, it appears that the entire aquifer would have adequate capacity to provide the necessary water for the proposed action. Currently, water quality from Maui Well No. 2 is marginal, with chloride levels approaching the secondary potable water quality standard of 250 parts per million (CUC 2011, 2012, 2013). Use of Maui Well No. 1 is a potential solution for providing water for the proposed action. However, Maui Well No. 1 might collect water from the same local source as Maui Well No. 2, and if this is the case, refurbishing Maui Well No. 1 might not be a desirable option as the additional water extraction could impact water quality. A different and preferred option would be to install new vertical wells at different locations within the Military Lease Area. A test of existing wells is planned to assess the anticipated production and quality of groundwater at proposed well field locations. Proposed new wells are subject to wellhead protection setback requirements as set forth by CNMI well drilling and well operation regulations and location would consider geologic, ecologic, and biologic conditions (e.g., faulting, sinkholes, conservation areas, etc.), future proposed land use, stormwater features, and local water quality issues. A study to evaluate groundwater under the direct influence of surface water is currently being performed by the CUC, with results available in the near future. If the aquifer or supply wells are deemed groundwater under the direct influence of surface water, additional water treatment would be required.

The existing water storage and distribution systems are not adequately maintained. There are two storage tanks, the 0.5 million gallon (1.9 million liter) Carolinas Heights tank and the 0.25 million gallon (0.9 million liter) tank at Marpo Heights. The telemetry system for the Marpo Heights tank does not work, so operators must manually check the water level and adjust a supply valve to prevent the storage tank from overflowing, which it does frequently. The water pressure in San Jose is too high. There is a pressure reducing station, which frequently needs repair for leaks. The unaccounted for water throughout the existing system is very high, at approximately 75% to 80%. Much of the distribution system is old and has thin-walled asbestos-cement (transite) and galvanized pipe. The above information was confirmed during a site visit in 2013, as documented in Appendix A of Volume III, *Potable Water*.

Requirements. The base camp, MSA, and port facilities are the only proposed areas requiring potable water service. None of the ranges and their supporting facilities would require potable water. Those water

needs for the base camp and MSA have been estimated at an average of 0.24 MGd (0.91 MLd) and a maximum of 0.46 MGd (1.7 MLd). The required water demand for the port facilities is from the vehicle washdown facility and the biosecurity facility. This demand is estimated at 22,181 gallons per day (gpd) (83,965 liters per day [lpd]), with the observation that the vehicle washdown facility would only be used sporadically to support vehicle embarkation. In addition, the potential future end state Tinian International Airport facilities would include a 24-hour manned air traffic control tower with approximately three employees present at any one time and two hangars with some office space. The estimated water demand for these airport facilities is 978 gpd (3,702 lpd). Fire protection water requirements would also be met by the capacity of the proposed system.

Recommendations. Because of the condition of the existing water system, a U.S. military standalone system is recommended to provide the potable water needs for the proposed U.S. military facilities at the base camp, MSA, and potential future airport end state improvements. The recommendation is to construct new vertical wells at appropriate locations and provide a dedicated water transmission system with a storage tank at the base camp area.

Because the port facilities are far from the base camp and the proposed U.S. military water system, use of the existing local CUC water distribution system is recommended for these facilities. The addition of a water loop using 6-inch (15-centimeter) diameter pipe connected to the local CUC distribution system is recommended, as shown in Figure ES-4.

The proposed potable water system is sized per UFC requirements; however, sustainability approaches should be considered to reduce potable water demand. Those approaches include low-flow water fixtures, waterless urinals, rainwater harvesting, recycling water in wash rack operations, and water conservation education.

During the anticipated construction period of 8 to 10 years, there would be a temporary additional potable water demand on the existing CUC water system for the construction workforce. Based on the *Socioeconomic Impact Assessment Study* (DoN 2014d), the proposed action would impact the island population as presented in Table ES-1. The estimated temporary potable water demand on the CUC water system for the construction workforce is approximately 58,669 gpd (222,085 lpd). The estimated increased permanent potable water demand on the CUC water system from the additional island population, operations personnel, and port facilities would be approximately 197,089 gpd (746,065 lpd), or about a 17% increase above current production. The current system should be able to meet this amount during wet season; however, during the dry season, the CUC system may not have the capacity to meet this increased demand and might require some system improvements, specifically in reducing unaccounted for water. This could have a major impact on the CUC system that might need to be addressed in the future by the CUC.

Potable Water - Pagan

Existing Conditions. Pagan currently lacks any potable water infrastructure. According to the CNMI Bureau of Environmental and Coastal Quality[1] (BECQ), there are two hand dug wells (DEQ 2013).

[1] The CNMI Department of Environmental Quality (DEQ) was recently reorganized along with the former Coastal Resources Management Office to form the Bureau of Environmental and Coastal Quality (BECQ). For purposes of the *Utilities Study*, both the DEQ and BECQ designations are used, depending on context.

However, water production and quality are unknown, and the Department of Environmental Quality (DEQ) has suggested that these be converted to groundwater sampling wells to monitor impact on groundwater.

Requirements. Potable water demand for the proposed training activities on Pagan would be primarily for drinking, personal hygiene, and cooking. Thus, the per capita demand would be relatively small, estimated at 5.45 gpd (20.6 lpd), for a total demand of 21,800 gpd (82,522 lpd) for the maximum 4,000 trainees. Per Volume III (*Potable Water*) of this study, a single Tactical Water Purification System (a military reverse osmosis system) is capable of producing adequate potable water to meet this requirement.

Recommendations. Because the training proposed for Pagan would be on an expeditionary basis, potable water would be provided by the training units using water totes or via portable reverse osmosis systems provided by the training units. The reverse osmosis systems can use ocean water or captured rainwater as a supply. Brine generated by the reverse osmosis units would be disposed of through injection wells as recommended by the CNMI BECQ. Rainwater harvesting would provide a higher quality water source for the reverse osmosis systems, enhancing the throughput and minimizing brine generation. With the rainfall on Pagan, this is a viable option and is recommended should the training tempo be increased to 40 weeks per year in the future. Rainwater harvesting would use permanently constructed cisterns or open reservoir-type ponds with the bottom lined with an impermeable liner for rainwater runoff collection. Both collection systems would require some form of pre-treatment and occasional maintenance to preserve adequate water quality. Minimal site grading and improvements may need to be done to direct rainwater for collection. For the proposed 16-week training tempo, construction of cisterns or ponds and their occasional maintenance is not deemed a cost-effective expenditure. It is recommended that the training units either haul in their potable water or utilize a portable reverse osmosis system with ocean water as the source.

During the construction of the minimal improvements proposed for Pagan, it is expected that expeditionary-type approaches would be implemented by the construction contractors in providing for the construction workforce. A portable reverse osmosis unit or hauling in potable water would be utilized.

Wastewater – Tinian

Existing Conditions. Tinian currently lacks a centralized wastewater collection, treatment, and disposal system. Most facilities use a septic tank and leaching field for their wastewater handling. Only one facility on Tinian (the Tinian Dynasty Hotel and Casino) uses a wastewater treatment system other than a septic tank system, and the system is coupled with a leaching field for treatment and disposal. Solid wastes, including septic tank waste, are taken to the Tinian Municipal Dump for disposal. However, the Tinian Municipal Dump is not a permitted Resource Conservation and Recovery Act (RCRA) Subtitle D solid waste facility and has been cited for violations of U.S. Environmental Protection Agency and CNMI solid waste management regulations.

There is an existing U.S. military septic tank/leaching field system just south of the IBB facility and just west of 8th Avenue. This was constructed and certified for use in 1999 to serve training exercises. It is sized to handle up to 2,500 military trainees with a permitted flow of 6,640 gpd (25,000 lpd) (DEQ 1999). Currently this existing septic tank and leaching system is not allowed for use by BECQ DEQ until the leaching field has been completely rehabilitated. Joint Region Marianas has plans to rehabilitate the leaching field in the near future for upcoming non-CJMT training events. This existing system could potentially be used during construction of the proposed facilities.

Requirements. The construction workforce is anticipated to add to the population of Tinian over a construction period of 8–10 years. During construction of the proposed action, the maximum construction workforce (workers and managers) anticipated is estimated at 571. The average daily wastewater flow for the construction workforce during working hours at the various construction sites is estimated at 1,370 gpd (5,186 lpd). The maximum number of construction workers could be as high as 548, who would most likely stay in dwelling units at the Tinian Dynasty Hotel and Casino, which has its own wastewater treatment plant. The average number of construction managers and their dependents could be as high as 49 and would likely stay outside of the Military Lease Area in civilian housing whose wastewater systems are local septic tank with leaching fields.

Under the proposed action, several areas developed on Tinian would require wastewater service. The proposed base camp would support 1,500 trainees in permanent facilities and an additional 1,500 surge trainees in tents. About 95 operations personnel would work year round at the base camp and training areas. Areas requiring wastewater service include the base camp, the MSA, port facilities, Tinian International Airport facilities (at end state), and ranges and supporting facilities. Based on the design criteria in the UFC, the base camp would generate domestic and industrial wastewater with varying average daily flow conditions depending on the number of personnel present, with a maximum of 197,052 gpd (745,922 lpd). The MSA would generate an estimated average daily domestic wastewater flow of 3,880 gpd (14,687 lpd). The port facilities would generate an estimated average daily industrial wastewater flow of 12,000 gpd (45,425 lpd) from the vehicle washdown area and an average daily wastewater flow of 576 gpd (2,180 lpd) from the biosecurity facility. The end state airport facilities would generate an additional estimated industrial wastewater flow of 680 gpd (2,574 lpd) that would be conveyed to the base camp wastewater system. Domestic wastewater flow for the airport (end state) is accounted for in the base camp wastewater estimate as it is based on the design population.

Recommendations. Once restored to proper operating conditions (currently in progress for other training exercises), the existing U.S. military-owned septic tank and leaching field system would be able to serve the construction workforce during working hours; however, it would not have the capacity to serve the workforce housing. Although Tinian has not been officially designated as a Class I Aquifer Recharge Area, for this volume, the design criteria for a proposed "other" wastewater treatment system on Tinian is for a system used for wastewater treatment capacities greater than 5,000 gpd (18,927 lpd). Potential use of available worker housing space at the Tinian Dynasty Hotel and Casino would enable the wastewater from worker housing to be treated and disposed of via the existing wastewater treatment facility at the Dynasty.

The recommended wastewater collection system for the Tinian base camp is a conventional gravity system, one pump station, and a force main. This collection system would consist of a total 16,847 feet (5,135 meters) of gravity mains, one pump station, and 2,939 feet (896 meters) of force main. The proposed wastewater treatment solution for the Tinian base camp is to install and operate a packaged treatment system defined as an "other wastewater disposal system" by CNMI regulations. A membrane bioreactor system is the recommended treatment technology to best address the stringent total nitrogen effluent limit required by the CNMI regulations. The recommended disposal method of the treated effluent from the base camp wastewater treatment plant would be through subsurface disposal using several leaching fields located downstream of the plant. According to BECQ DEQ, the use of a leaching field for an "other" wastewater treatment system on Tinian is permitted in the CNMI regulations because Tinian does not have a Class I Groundwater Management Zone designation. A septage receiving system at the plant would pretreat wastewater from septic and holding tanks before discharging into the treatment system.

Sludge generated by the wastewater treatment plant would need to be disposed of in a RCRA-compliant Subtitle D landfill. According to the *Solid Waste Study* (DoN 2014b), the construction of a new RCRA-compliant Subtitle D landfill is not a viable alternative for on-island disposal due to the lack of a mutually agreeable location between the CNMI and U.S. military. Thus, all U.S. military solid waste would have to be shipped off island to a RCRA Subtitle D permitted landfill, be handled in accordance with alternatives presented in the *Solid Waste Study* (DoN 2014b), or follow recommendations per any subsequent solid waste studies.

The recommended wastewater system for the MSA would be an individual wastewater disposal system consisting of a septic tank and leaching field.

At the port facilities, the vehicle washdown area should be equipped with a wash-water recycling system to minimize water requiring treatment. The recommended wastewater solution for the vehicle washdown area on Tinian would consist of a sedimentation basin with oil skimmer followed by an intermittent sand filtration system in accordance with UFC 4-214-03 (Department of Defense 2004). The treated effluent would be discharged to a retention basin that could be used for the vehicle washdown system. Portable toilets could be set up at the port area for use by workers and trainees processing vehicles and trainees from the transport vessels. These portable toilets, along with those proposed for the ranges and supporting facilities, would require periodic emptying, with wastewater taken to the packaged treatment plant at the base camp. The biosecurity facility at the port would be equipped with a holding tank to collect wastewater. This holding tank would be pumped out periodically and its contents taken to the proposed wastewater treatment facility at the base camp for treatment and disposal.

The only areas at the potential end state Tinian International Airport requiring wastewater services would be the control tower and offices at the hangars. The recommended wastewater system to service the control tower and the office areas for the hangars would be a sewer line connected to the base camp sewer system. During the actual proposed action airport use on an expeditionary basis, portable toilets would be used with wastewater transferred to the proposed wastewater treatment facility at the base camp.

Wastewater - Pagan

Existing Conditions. Pagan currently has no wastewater collection, processing, or disposal systems.

Requirements. The per capita domestic wastewater generation rate based on actual estimates is 2.4 gallons per capita per day (9.1 liters per capita per day), for a total generation of 9,600 gpd (36,340 lpd) for the maximum 4,000 trainees.

Recommendations. Because there are no existing wastewater systems on Pagan, the lack of certified contractors to provide portable toilets on Pagan, and the magnitude of the estimated domestic wastewater generation, human waste shall be disposed of according to field sanitation procedures (temporary burn-out latrines and urinals with soakage pits). Assuming a toilet to population ratio of 1:20, the estimated number of burn-out latrines for 4,000 military training personnel is 200. Chemical toilets requiring waste shipment to a wastewater treatment facility are also a viable option.

During the construction of the minimal improvements proposed for Pagan, it is expected that expeditionary-type approaches would be implemented by the construction contractor in providing for the construction workforce wastewater treatment requirements.

Information Technology/Communications - Tinian

Existing Conditions. Currently there is no U.S. military IT/COMM infrastructure on Tinian. Commercial IT/COMM services are provided by IT&E. An undersea fiber optic cable connects Tinian to other islands

in the CNMI and also to the Trans-Pacific cable hub in Guam (IT&E 2014). Tinian is thus provided phone, internet, and cell phone services.

Requirements. Required U.S. military IT/COMM infrastructure has been planned for the proposed Tinian training facilities based on requirements provided by Marine Corps Forces Pacific.

Recommendations. The recommended IT/COMM routings are shown in Figure ES-4.

Commercial telephone, internet, and cable television services would be provided to the base camp through infrastructure provided by the commercial utility providers. The cables are anticipated to be installed mostly overhead except for routing that crosses the runway clear zone, which would be installed underground if required. Inside the base camp, the cables for commercial telephone, internet, and cable television service would be distributed around the base camp through overhead pole-supported cabling.

Information Technology/Communications - Pagan

Existing Conditions. Pagan has no U.S. military or commercial IT/COMM services or infrastructure.

Requirements. Required U.S. military IT/COMM infrastructure for Pagan would be provided temporarily by the training units. No permanent U.S. military IT/COMM infrastructure would be constructed. No commercial IT/COMM would be required for Pagan.

Recommendations. Temporary bivouac-style U.S. military IT/COMM infrastructure would be provided by the training units.

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LIST OF ACRONYMS AND ABBREVIATIONS

BECQ	Bureau of Environmental and Coastal Quality
CJMT	CNMI Joint Military Training
CNMI	Commonwealth of the Northern Mariana Islands
CUC	Commonwealth Utilities Corporation
DEQ	Department of Environmental Quality
DoN	Department of the Navy
EIS/OEIS	Environmental Impact Statement/Overseas Environmental Impact Statement
gpd	gallons per day
IBB	International Broadcasting Bureau
IT/COMM	information technology/ communications
lpd	liters per day
MGd	million gallons per day
MLd	million liters per day
MSA	munitions storage area
MW	megawatt
No.	number
RCRA	Resource Conservation and Recovery Act
RTA	Range and Training Area
UFC	Unified Facilities Criteria
U.S.	United States
USACE	U.S. Army Corps of Engineers

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CHAPTER 1. INTRODUCTION

1.1 OVERVIEW

The purpose of this report is to provide information regarding the electrical power, potable water, wastewater, and information technology/communications requirements associated with a proposed action to establish a series of live-fire and maneuver ranges, training areas, and supporting facilities within the Commonwealth of the Northern Mariana Islands (CNMI) to address the United States (U.S.) Pacific Command Service Components' unfilled training requirements in the Western Pacific. These live-fire ranges, training courses, and maneuver areas collectively constitute a Range and Training Area (RTA). Under the proposed action, a unit level RTA is proposed for Tinian and a combined level RTA is proposed on Pagan. The proposed action includes construction, range management, expanded training and operations (to include combined-arms, live-fire, and maneuver training at the unit and combined levels), establishment of danger zones, designation of special use airspace, and acquisition and/or lease of land to support simultaneous and integrated training. The CNMI Joint Military Training (CJMT) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) is being prepared to assess the proposed action. This report focuses on existing ground, air, and marine infrastructure capacity and facility requirements, proposed projects, and methodology to meet the proposed action. Figure 1.1-1 provides an overview of the CNMI, and Figure 1.1-2 and Figure 1.1-3 provide overviews of Tinian and Pagan, respectively.

There are two different training tempos proposed for both Tinian and Pagan. The first training tempo is the proposed action presented in the CJMT EIS/OEIS, consisting of 20 weeks per year on Tinian and 16 weeks per year on Pagan. In the future, the training tempo might be increased to 45 weeks per year on Tinian and 40 weeks per year on Pagan and is addressed by the CJMT EIS/OEIS as a potential future action. This study addresses both training tempos.

1.1.1 Goal and Objectives

The goals of the *Utilities Study* pertain to the CNMI islands of Tinian and Pagan and include:

- Analyze the current condition, capacity, and regulatory situation of the existing utilities.
- Determine utility requirements for the proposed action and potential future expansion.
- Recommend upgrades to existing utilities or new utility infrastructure required to serve the proposed action and potential future expansion.
- Examine opportunities for the implementation of sustainable approaches to power and water utilization.
- Support development of a master plan for the proposed action.
- Support the analyses required by the CJMT EIS/OEIS (DoN 2014c).

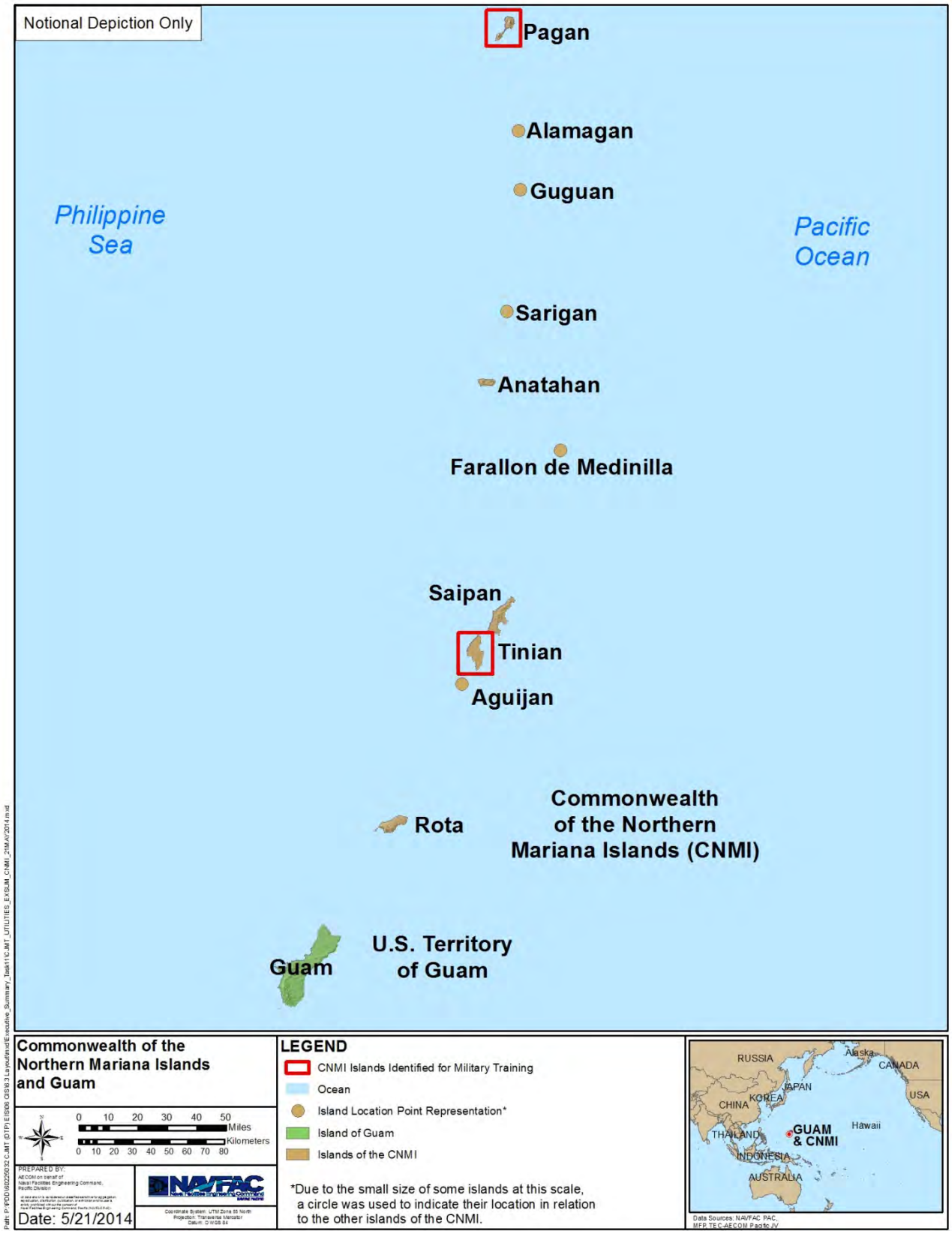

Figure 1.1-1. Commonwealth of the Northern Mariana Islands and Guam
Source: DoN 2014.

Figure 1.1-2. Island of Tinian and the Military Lease Area
Source: DoN 2014.

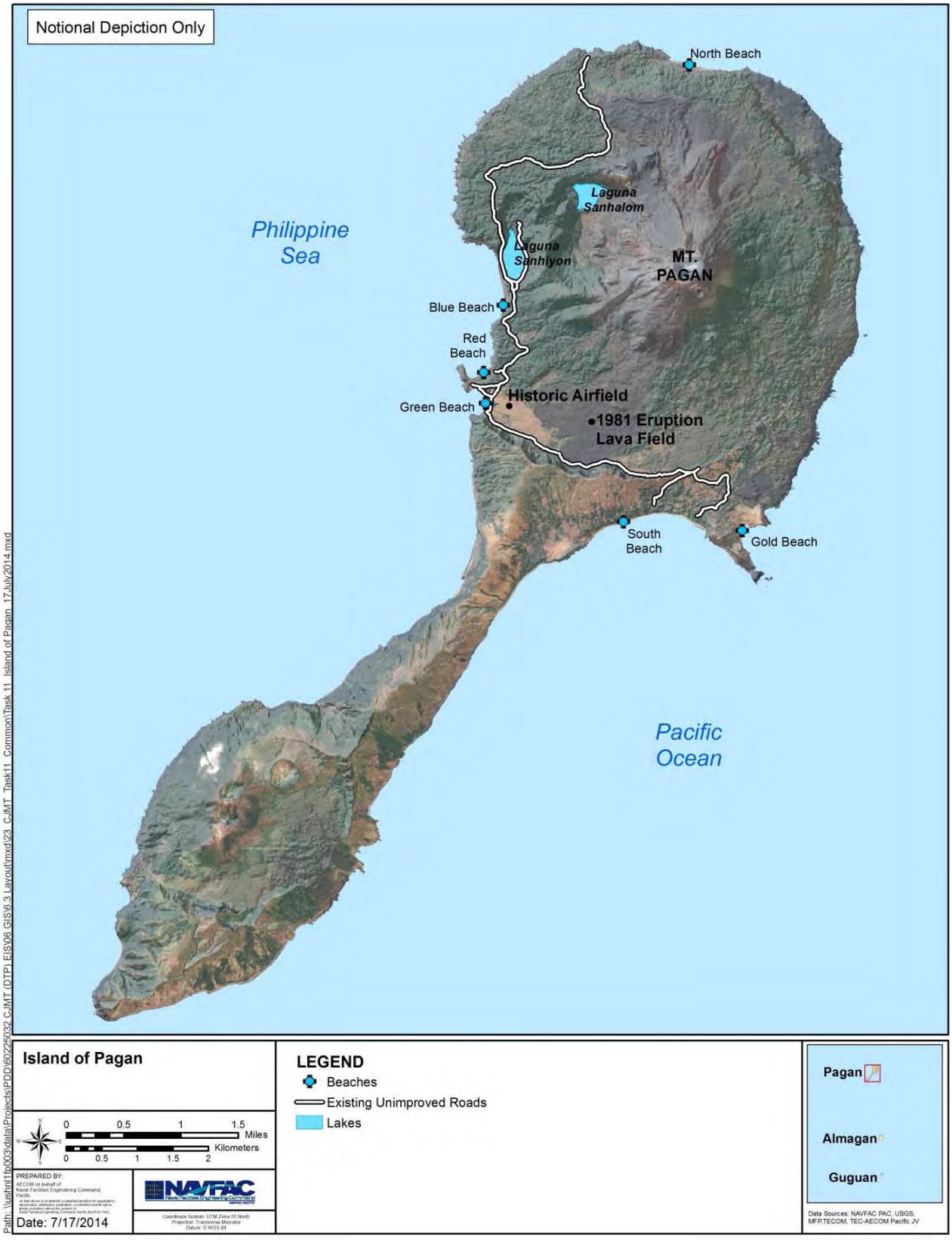

Figure 1.1-3. Island of Pagan
Source: DoN 2014.

1.2 BACKGROUND

The U.S. Pacific Command has identified unfilled unit level and combined level training requirements in the Western Pacific. U.S. Pacific Command designated U.S. Marine Corps Forces Pacific (a part of the Marine Corps) as Executive Agent to oversee the development and implementation of the proposed action. To address these shortfalls, the CJMT EIS/OEIS is assessing the proposed action. Actions on Tinian would focus on unit level training requirements, while actions on Pagan focus on combined level training requirements.

1.3 REQUIREMENTS

1.3.1 General Requirements

Utility requirements are based on and must meet the Unified Facilities Criteria requirements. Actual service needs might be lower through the use of sustainability approaches that conserve power, offset use of hydrocarbon fuels, conserve water, and generate less wastewater. Thus, one assumption for the *Utilities Study* is that proposed system solutions would meet the Unified Facilities Criteria requirements, but actual service needs can, and should, be reduced by the implementation of sustainability approaches.

Utility requirements were almost entirely based on the anticipated population using the facilities and the description of the facilities. For power, the estimate of requirements was based on the connected load from the facilities multiplied by an estimated diversity factor (i.e., not all connected loads would be on at the same time or at their full draw potential). Water and wastewater were estimated using a per capita requirement, industrial facility requirement, plus other factors such as water system leaks, maintenance, water needs to fight fires, and infiltration/inflow for wastewater collection systems. Thus, it is important to have an accurate description of the proposed facilities and expected population. The assumptions used in the *Utilities Study* for these elements were derived from the most recently available CJMT EIS/OEIS (DoN 2014c) and the *Unconstrained Training Concept for Tinian and Pagan* (DoN 2014a). The basic facilities requirements used are provided in each volume.

Civilian demand for utilities is considered since the proposed action requirements could impact the utility services to the civilian sector. Between the years 2000 and 2010, the population of Tinian decreased from 3,540 to 3,136 (U.S. Census Bureau 2010). A socioeconomics study is currently being performed and has forecast various categories of island population changes, including baseline population changes, construction workers, operations workers, and training personnel. Ranges of low, medium, and high forecasts have been made and are shown in Table 1.3-1. Utility requirements for these population changes have been estimated and included in appropriate analyses. There is also a potential to use existing and available work camp facilities near the Tinian Dynasty Hotel and Casino.

Table 1. Total Forecast Tinian Population

Category	***Low***	***Medium***	***High***
Baseline Population	2,890	3,211	3,532
Population Change – Construction [1, 2]	477	537	596
Population Change – Operations [2]	143	192	242
Total Population Change	**620**	**729**	**838**
Population with the Proposed Action	3,510	3,940	4,370

Notes:
[1] Annual average during the 8-10 years of construction.
[2] Includes dependents of construction managers and operations workers.
Source: DoN 2014d, Table 5.1-3.

1.3.2 Requirements – Tinian

The assumptions used for the *Utilities Study* are consistent with the CJMT EIS/OEIS (DoN 2014c) and the *Unconstrained Training Concept for Tinian and Pagan* (DoN 2014a) current at the time this study was performed. Site visits were made to Tinian to gather information on the status of existing utilities. The analysis for Tinian is based on a training population of approximately 100 permanent personnel to manage and maintain the training facilities; a total training period of about 20 weeks per year with up to 1,500 trainees; and the potential temporary surge of an additional 1,500 trainees on a modified bivouac basis for 2 weeks at a time up to several times per year during part of the 20-week annual training duration. The CJMT proposed action for Tinian would establish a base camp complete with barracks, vehicle maintenance, mess hall, vehicle fueling station, fuel storage, vehicle wash and grease racks, hazardous waste storage, hazardous materials storage, recreation center, transient quarters, and other facilities. Other areas on Tinian would include munitions storage, a permanent biosecurity and vehicle washdown facility near the port, a bulk fuel storage facility near the port, modifications of the Tinian International Airport, observation posts, and numerous ranges and supporting facilities. The modified bivouac basis for the surge population would include platforms for tents, electrical outlets adjacent to the tent platforms, showers, cafeteria, and bathrooms.

There is a future potential to ramp up the training tempo to 45 weeks per year for Tinian and expand permanent facilities at the Tinian International Airport. At the airport, the initial improvements could transition into a permanent layout in the future known as the end state. For utilities, the maximum requirements govern the proposed solutions in order to prevent excessive future costs to expand utility infrastructure; therefore, the higher training tempo and end state airport facilities have been addressed in this study and its recommendations.

1.3.3 Requirements - Pagan

For planning purposes, the training contingent on Pagan is expected to be about 3,000 persons, with a maximum of 4,000. Training on Pagan would be on an expeditionary basis, requiring a minimal amount of permanent infrastructure. A refurbished airstrip, temporary daily munitions storage, and provisions for tents are about the only anticipated permanent infrastructure. There are no authorized residents currently living on Pagan and no existing utilities. Thus, civilian utilities requirements have not been considered.

Utility requirements for proposed training activities on Pagan have been investigated and recommendations included for providing those required services on a bivouac basis to minimize permanent infrastructure.

There is a future potential to ramp up the training tempo to 40 weeks per year and provide expanded facilities for Pagan. The expanded facilities would include a breakwater and pier. The utility analyses for that higher tempo and expanded facilities have been addressed in this study and its recommendations.

1.4 ORGANIZATION

The *Utilities Study* is organized into several volumes, each complete with its own references and appendices. The volumes are intended to be standalone for user convenience. The volumes include:

- Volume I: Executive Summary and Introduction (this volume)
- Volume II: Electrical Power
- Volume III: Potable Water

- Volume IV: Wastewater
- Volume V: Information Technology/Communications

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CHAPTER 2. REFERENCES

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