

**FINAL
(VERSION 4)**

**COMMONWEALTH OF THE NORTHERN MARIANA
ISLANDS JOINT MILITARY TRAINING**

UTILITIES STUDY

VOLUME II: ELECTRICAL POWER



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

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Table of Contents

ACRONYMS AND ABBREVIATIONS.....iii

CHAPTER 1. INTRODUCTION.....1-1

1.1 OVERVIEW1-1

 1.1.1 Goals and Objectives1-1

1.2 BACKGROUND INFORMATION.....1-5

1.3 FUTURE DEMAND (6-YEAR FORECAST)1-7

1.4 U.S. MILITARY DEMAND/CUMULATIVE DEMAND1-8

1.5 REGULATORY SETTING1-8

CHAPTER 2. EVALUATION OF PUBLIC POWER GENERATION.....2-1

**2.1 EVALUATION OF POWER GENERATION SOURCES – EXISTING
 TINIAN POWER PLANT2-1**

2.2 ALTERNATIVE ENERGY SOURCES2-2

2.3 DEFICIENCIES AND RECOMMENDATIONS2-2

**CHAPTER 3. POWER TRANSMISSION/DISTRIBUTION FOR THE PROPOSED
ACTION3-1**

3.1 SCOPE3-1

3.2 GENERAL REQUIREMENTS AND CONSIDERATIONS3-1

3.3 ADDITIONAL REQUIREMENTS3-2

 3.3.1 Standby Generators.....3-2

 3.3.2 Sustainability Approaches3-2

3.4 RECOMMENDED CONCEPTUAL ELECTRICAL DISTRIBUTION PLANS.....3-3

CHAPTER 4. POTENTIAL IMPACTS AND ISSUES4-1

**4.1 SUMMARY OF ELECTRICAL TRANSMISSION AND DISTRIBUTION
 WORK4-1**

4.2 DISCUSSION OF IMPACTS4-1

CHAPTER 5. REFERENCES.....5-1

List of Figures

Figure	Page
Figure 1.1-1. Commonwealth of the Northern Mariana Islands and Guam.....	1-2
Figure 1.1-2. Island of Tinian and the Military Lease Area.....	1-3
Figure 1.1-3. Island of Pagan.....	1-4

List of Tables

Table	Page
Table 1.2-1. Power-Generating Facility on Tinian	1-7
Table 1.3-1. 6-Year Plus Forecast of Future Electrical Demand on Tinian.....	1-7
Table 2.1-1. Tinian Power Plant Outages	2-1
Table 4.2-1: Estimated Volume of Soil to be Disturbed during Construction.....	4-1

List of Appendices

- Appendix A Current Demand Load Data
- Appendix B Meeting Notes
- Appendix C Demand Estimates and Calculations
- Appendix D Tinian Power Plant Outage Data
- Appendix E Additional Unified Facilities Criteria Distribution System Requirements
- Appendix F Electrical Conceptual Distribution Plans

LIST OF ACRONYMS AND ABBREVIATIONS

CNMI	Commonwealth of the Northern Mariana Islands	MSA	Munitions Storage Area
CUC	Commonwealth Utilities Corporation	MW	megawatt
EO	Executive Order	NMIAC	Northern Mariana Islands Administrative Code
IBB	International Broadcasting Bureau	RTA	Range and Training Area
kV	kilovolt	U.S.	United States
LEED	Leadership in Energy and Environmental Design	UFC	Unified Facilities Criteria
		USDOJ	United States Department of the Interior
		V	volt

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CHAPTER 1.

INTRODUCTION

1.1 OVERVIEW

The purpose of this report is to provide information regarding the electrical power utility 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 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 (DoN 2014) 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 of existing electrical power requirements, 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 CNMI Joint Military Training Environmental Impact Statement/Overseas Environmental Impact Statement, 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 CNMI Joint Military Training Environmental Impact Statement/Overseas Environmental Impact Statement as a potential future action. This study addresses both training tempos.

1.1.1 Goals and Objectives

The goals of this Volume II electrical power utility study are as follows:

- Evaluate power requirements of the proposed action.
- Determine adequacy of the public power company's capacity to support the proposed action.
- Evaluate sustainability approaches and various electrical power generation options.
- Evaluate electrical power transmission and distribution options.

This study includes preliminary design information such as conceptual development plans, single line diagrams, load calculations, and drawings that define proposed tie-in points to the existing public electrical power utility system. The focus of this electrical power utility study is on Tinian because Pagan currently lacks any electrical power infrastructure. The training on Pagan is proposed as expeditionary and would be supported by portable electrical generators or other temporary power sources provided by the training units as required. The main areas in the proposed action for Tinian are the base camp, the Munitions Storage Area (MSA), added port facilities, training ranges, and added facilities at Tinian International Airport for the end state. This study recommends improvements and modifications that would support the requirements of the proposed action and potential future increased training tempo.

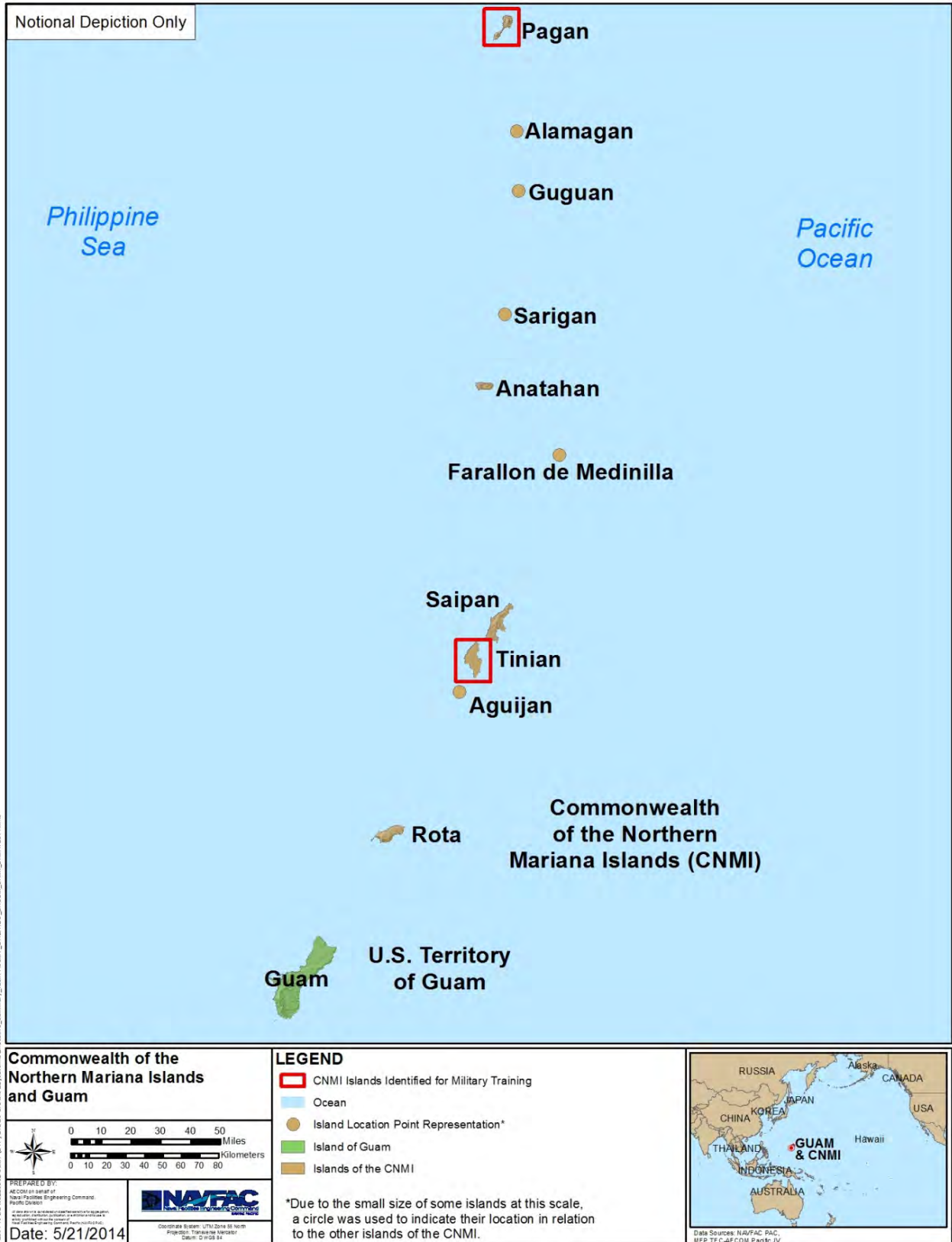


Figure 1.1-1. Commonwealth of the Northern Mariana Islands and Guam

Source: DoN 2014.



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

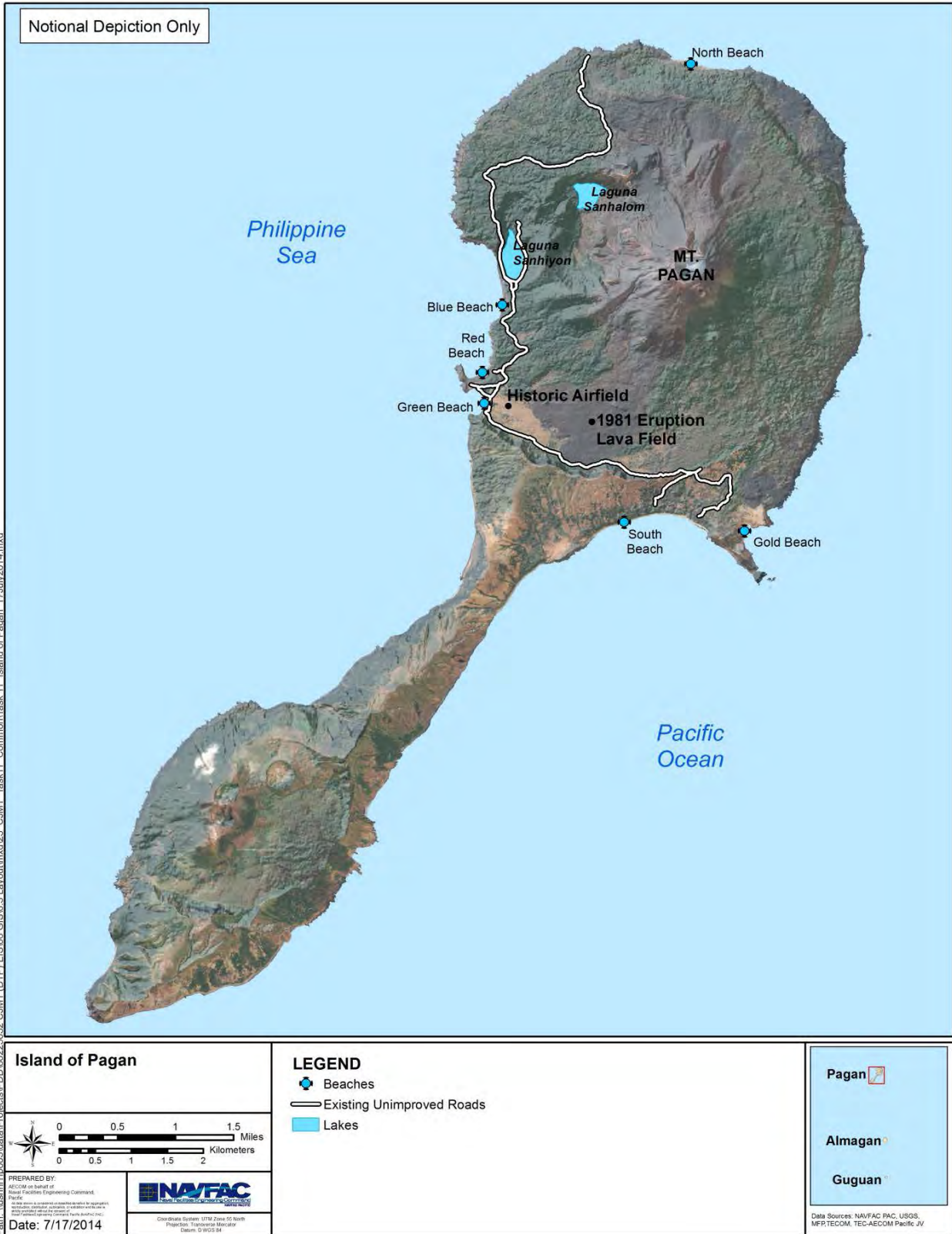


Figure 1.1-3. Island of Pagan

Source: DoN 2014.

1.2 BACKGROUND INFORMATION

Tinian has an existing island-wide electrical power system owned by the Commonwealth Utilities Corporation (CUC), a public corporation. The system is operated and maintained by Telesource CNMI, Inc., under contract with the CUC. This system includes the electrical generation units and distribution infrastructure, which includes overhead and underground transmission and distribution lines, manholes, transformers, substations, and meters used to provide and measure power to island customers.

The Tinian Power Plant is shown in Photo 1.2-1.

The existing electrical generation system at the power plant consists of the following components:

- Four 4.16-kilovolt (kV), 2.5-megawatt (MW) diesel generators
- Two 4.16 kV, 5 MW diesel generators
- Two exhaust stacks:
 - One 90-foot-tall (27-meter) stack to service four 2.5-MW generators
 - One 175-foot-tall (53-meter) stack to service two 5-MW generators
- An aboveground fuel delivery pipeline from the existing diesel fuel storage tank at the Port of Tinian to a diesel storage tank (Photo 1.2-2), which is adjacent to the power plant facility
- Expansion capability for two additional 5-MW diesel generators (including space inside the existing generator building and tie-in points to the existing exhaust stack)



Photo 1.2-1. Tinian Power Plant



Photo 1.2-2. Fuel Storage Tank (tan) and Lube Oil Tanks (white)

The location, configuration, and electrical capacity are essential details for the evaluation of the Tinian Power Plant. The Tinian Power Plant is located in a single generation facility near the coast outside of San Jose, at 25 feet (7.6 meters) above mean sea level. The power plant has a total capacity of 20.0 MW, a maximum-available capacity of 17.0 MW (some units are de-rated), and an available capacity of 12.5 MW considering the maintenance scenario for one of the 4.5-MW units. (Note: Total available MW for the Tinian Power Plant was incorrectly listed as 17.5 MW in information provided by CUC as shown in Appendix A. The correct total for available MW at the power plant is actually 17.0 MW.) The 4160-volt (V) output from each of the six diesel generators listed above feeds switchgear that in turn feeds step-up transformers (Photo 1.2-3). The step-up transformers increase the 4160 V up to 13.8 kV and connect to the distribution switchgear that feeds the overhead 13.8 kV distribution lines for the island.



Photo 1.2-3. Power Plant Transformers

Other standby electrical power sources (owned, operated, and maintained by others) exist on Tinian but are not part of the island power grid. These include the power generation units at the Tinian Dynasty Hotel and Casino and the International Broadcasting Bureau (IBB) facility. The recent status of all Tinian public electrical power generators is provided in Appendix A and summarized in Table 1.2-1.

Table 1.2-1. Power-Generating Facility on Tinian

<i>Unit</i>	<i>Design MW</i>	<i>Available MW</i>	<i>Remarks</i>
Tinian Power Plant			
D/E No. 1	5.0	4.5	Operational
D/E No. 2	5.0	4.5	Standby
D/E No. 3	2.5	2.0	Standby
D/E No. 4	2.5	2.0	Standby
D/E No. 5	2.5	2.0	Standby
D/E No. 6	2.5	2.0	Standby
<i>Totals</i>	<i>20.0</i>	<i>17.0¹</i>	

Note:

¹ Total available MW for the Tinian Power Plant was incorrectly listed as 17.5 MW in the information provided by Commonwealth Utilities Corporation (shown in Appendix A). The total of 17.0 MW shown in this table for the Tinian Power Plant is correct.

Legend: D/E = diesel engine; MW = megawatt; No. = number.

Source: Data provided by Commonwealth Utilities Corporation in 2012 (Appendix A).

1.3 FUTURE DEMAND (6-YEAR FORECAST)

The 6-year plus forecast of electrical power demand on Tinian to support the proposed action plus the airport end state is shown in Table 1.3-1. This table includes the maximum peak load on the island and the estimated new U.S. military and nonmilitary peak loads associated with the proposed action. The existing peak demand for the Tinian Power Plant is 4.5 MW, according to the information provided by CUC as shown in Appendix A. This peak demand includes the load from the existing IBB operations. The IBB would remain in its current location in Alternative 1 of the proposed action. In Alternatives 2 and 3, the IBB facility would be relocated to another site either on Tinian or on another island. If IBB is relocated to another island the average overall load on the island would be reduced by approximately 0.75 MW, the average load of the IBB (see *Telesource 12/12/13 Meeting Notes* in Appendix B). The estimated proposed electrical loads shown in Table 1.3-1 include the proposed RTA and the supporting facilities including the base camp, MSA, the port facilities, and the Tinian International Airport end state improvements. There are no other anticipated projects that would increase the electrical demand (see *Telesource 12/12/13 Meeting Notes and CUC 12/10/13 Meeting Notes* in Appendix B).

Table 1.3-1. 6-Year Plus Forecast of Future Electrical Demand on Tinian

<i>Item</i>	<i>Description</i>	<i>MW</i>
1	Existing peak demand	4.5
2	Base camp	1.17
3	RTA	0.06
4	MSA	0.18
5	Biosecurity facility and Tinian port bulk fuel storage tank	0.09
6	Tinian International Airport end state improvements	1.28
7	Other future nonmilitary load forecast	0
<i>Total Tinian Demand</i>		<i>7.28</i>
<i>Tinian Power Plant Effective Capacity</i>		<i>12.5</i>

Legend: MSA = Munitions Storage Area; MW = megawatts; RTA = Range and Training Area.

Source: DoN 2014.

1.4 U.S. MILITARY DEMAND/CUMULATIVE DEMAND

Table 1.3-1 shows the electrical-load projections for the proposed action on Tinian, based on the CNMI EIS/OEIS (Appendix C shows demand estimates and calculations). The electrical-load projections are the same for all alternatives. The U.S. military's electrical power demands are based on the Unified Facilities Criteria (UFC). Actual demand would be expected to be lowered by energy conservation efforts required by various executive orders, sustainability efforts, and best management practices to achieve Leadership in Energy and Environmental Design (LEED) Silver certification. The available effective capacity of the existing Tinian Power Plant is 12.5 MW. Therefore, the power plant has adequate capacity to provide the electrical power demand requirements of 7.03 MW presented in Table 1.3-1. (Note: At the time of preparation of this study, appropriate demand information for Tinian International Airport end state improvements was not available. Demand calculations for this facility were determined based on assumptions and are not expected to be significantly different when full facility definition is available; it is not expected to exceed the capacity of the Tinian Power Plant.

1.5 REGULATORY SETTING

The CUC is a public corporation that owns and provides power, water, and wastewater services for the CNMI. CNMI Public Law 15-35 (NMIAC 2006) established the Public Utilities Commission as the agency for regulatory purposes such as approval of prices, fees, charges, and terms/services for the CUC.

The CUC is subject to all applicable regulatory requirements, including the following:

- Clean Air Act
- Clean Water Act
- Resource Conservation and Recovery Act
- Safe Drinking Water Act
- CNMI Wastewater Treatment and Disposal Rules and Regulations
- CNMI Underground Injection Well regulations
- CNMI Water Quality Standards

The CNMI Division of Environmental Quality administers air emission permits and enforces regulations as required for electrical power generation facilities in the CNMI. A permit was issued on August 24, 2000, to operate the generators at the Tinian Power Plant. This permit expired on August 30, 2005. The Air Quality Specialist at the Division of Environmental Air Quality left and because that position has not yet been filled, the operating permit has not been renewed.

CHAPTER 2.

EVALUATION OF PUBLIC POWER GENERATION

2.1 EVALUATION OF POWER GENERATION SOURCES – EXISTING TINIAN POWER PLANT

The CUC-owned Tinian Power Plant is approximately 15 years old and appears to be well maintained and in very good condition. Scheduled maintenance is estimated to occur over approximately 5.5 weeks per year, or about 10% of each year’s available hours. Diesel fuel is delivered to the power plant from an above-ground fuel delivery pipeline from the Port of Tinian’s fuel storage tank to a storage tank adjacent to the power plant facility. The expected design life for a diesel-fueled facility is 30 years.

Table 2.1-1 summarizes electrical power outages and lists the reported cause of each outage. The Tinian Power Plant experienced 12 outages between March 2011 and September 2013. Outage reports are included in Appendix D. The average downtime was 1 hour, 18 minutes. The causes of two of the outages are unknown. This summary covers a relatively short period of time and is not intended to provide a comprehensive evaluation of the Tinian Power Plant’s performance.

Table 2.1-1. Tinian Power Plant Outages

<i>Date</i>	<i>Outage Time</i>	<i>Total Time (hours: minutes)</i>	<i>Cause of Outage</i>
3/4/2011	4:25 p.m.	0:19	Island-wide power outage that occurred when the Generator 6 miniature F11 circuit breaker tripped off.
1/9/2012	4:25 a.m.	2:15	Feeder No. 3 tripped off at the 13.8 kV Substation. Cause: The Phase A & B overcurrent relay tripped off.
5/23/2012	10:00 a.m.	2:15	IBB feeder tripped off at the 4160 V switchgear, Phase B & C; cause of outage unknown.
5/30/2012	4:23 p.m.	0:19	Island-wide power outage that occurred when Engine No. 5 shut down due to mechanical overspeed.
7/18/2012	7:18 a.m.	0:46	Feeder No. 3 tripped off at the 13.8 kV Substation; cause of outage unknown.
7/22/2012	10:10 a.m.	1:00	Feeder No. 3 tripped off at the 13.8 kV Substation as a result of a distribution problem. The line crew found out that a line was down near Mobil.
5/24/2013	11:15 a.m.	0:40	Feeder No. 3 tripped off at the 13.8 kV Substation when a pole fell down at Marpo Heights 1 area.
8/12/2013	6:10 p.m.	1:05	The IBB feeder tripped off as a result of overcurrent from the IBB site.
8/12/2013	9:50 p.m.	1:00	Feeder No. 3 tripped off at the 13.8 kV Substation because of lightning that hit some of the Marpo Heights 1 area.
8/18/2013	11:19 a.m.	0:21	Island-wide power outage that was caused by a UPS failure.
8/21/2013	3:50 a.m.	1:44	Feeder No. 3 tripped off at the 13.8 kV Substation when a pole-top pin was down near the old CUC.
9/9/2013	5:14 p.m.	1:56	Feeder No. 3 tripped off at the 13.8 kV Substation and 4160 V switchgear on Phases B & C and N because of an issue on the distribution side.

Legend: CUC = Commonwealth Utilities Corporation; IBB = International Broadcasting Bureau; kV = kilovolt; No. = number; UPS = uninterruptible power supply; V = volt.

Source: Data provided by Telesource in 2013 (Appendix D of this Volume II electrical power utility study).

According to Telesource, the generators at the Tinian Power Plant were certified as low-nitrous-oxide units when installed. These generators were originally permitted on August 24, 2000; however, the operating permits expired on August 30, 2005, and have not been renewed.

The CUC has issued a general request for proposals to design, build, operate, and finance projects to reduce the high energy costs in the CNMI. One project with promising potential is to build a liquefied-natural-gas power plant on Saipan with an undersea transmission cable to Tinian (*CUC 12/10/13 Meeting Notes* in Appendix B).

2.2 ALTERNATIVE ENERGY SOURCES

A major concern about conventional power generation is the dependence on fossil fuels. The use of renewable energy can reduce dependence on fossil fuels and their deleterious effect on the environment. The volatility of fossil fuel prices, the impact of fossil fuels on the environment, and the geographical isolation of the CNMI create a need to further develop renewable sources of energy. In 2010, the U.S. Department of the Interior’s (USDO) Office of Insular Affairs joined with the National Renewable Energy Laboratory to provide technical assistance by conducting a technical energy assessment titled *Commonwealth of the Northern Mariana Islands Initial Technical Assessment Report* (USDI 2011). This assessment report identifies renewable-energy opportunities in the CNMI, including wind, solar, geothermal, biomass, and micro hydropower, and supports the development of a strategic plan to reduce the CNMI’s dependence on fossil fuels. The U.S. Department of the Interior’s assessment report recommends the following steps to implement these opportunities:

- Identify available land areas for renewable-energy development.
- Conduct studies of wind speed and direction.
- Conduct feasibility studies for solar photovoltaic installations.
- Develop implementation programs for solar water heating for residential, commercial, and appropriate government buildings.
- Conduct further studies to determine biomass opportunities and waste-to-energy potential.

The National Renewable Energy Laboratory’s assessment and research provides the foundation for implementing a strong energy plan. The CUC stated that it has been approached by developers and has had discussions regarding a potential wind farm of 50–70 MW on Tinian and a power cable to Saipan. No other proposed projects on Tinian are related to renewable energy and the electric utility (*CUC 12/10/13 Meeting Notes* in Appendix B).

2.3 DEFICIENCIES AND RECOMMENDATIONS

The existing Tinian Power Plant’s capacity would be adequate to provide the reliable and necessary electrical power for the proposed action. This study recommends using this power plant and constructing the required infrastructure to distribute power to the required locations as discussed in Chapter 3.

CHAPTER 3.

POWER TRANSMISSION/DISTRIBUTION FOR THE PROPOSED ACTION

3.1 SCOPE

This chapter develops conceptual plans for electrical power requirements and power distribution solutions related to the proposed action. Conceptual plans define the required electrical distribution within the base camp and for island-wide electrical distribution and connections.

3.2 GENERAL REQUIREMENTS AND CONSIDERATIONS

The electrical power distribution recommendations for the proposed action are based on the in-progress master-planning documents and the general guidelines and requirements for power distribution design at U.S. military facilities as defined in UFC 3-550-01, *Exterior Electrical Power Distribution* (Department of Defense 2012a). A summary of applicable portions of this UFC document is provided in Appendix E. This report is based on the most current information from each source.

Load requirements for the proposed action were calculated on a watts-per-square-foot basis. A demand factor of 0.3 has been applied to the total anticipated connected loads for the base-camp facilities to factor an expected coincident demand load. At this level of calculation, no additional spare capacity is included.

Calculations of electrical loads were prepared from facility lists provided by the master-planning group. These calculations, shown in Appendix C, establish the electrical loads used to prepare the utility plans in this report. The facilities listed in Appendix C are categorized into five groups:

- The first group consists of facilities to be located within the base camp. These facilities would be fed from a proposed new switching station within the base camp.
- The facilities in the second group include facilities within the MSA. The MSA is located near the base camp on the west side of 8th Avenue. These facilities would be fed from the proposed new switching station within the base camp.
- The third group of facilities in Appendix C is the facilities at the ranges. These facilities would be fed from the proposed new switching station within the base camp.
- The facilities related to the Tinian International Airport end state improvements are shown in the fourth group. (Note: At the time of this report, the facility requirements for the Tinian International Airport improvements were not fully defined. Therefore, demand calculations for these facilities were estimated using assumptions.) These facilities would be fed from the proposed new switching station within the base camp.
- The fifth group consists of the port facilities, including the biosecurity facility and vehicle wash-down facility, and the vehicle and equipment-ready fuel storage facilities. These facilities would be fed from existing local overhead power lines.

Load requirements shown in Appendix C are based on facility planning, not on a per-capita basis. The loads were calculated using watts-per-square-foot demand from the UFC 800 Series (Department of

Defense 2012b). The total demand (or peak coincident demand) anticipated for the various facilities is identified in Appendix C.

Distribution-equipment sizing was prepared based on the calculations in Appendix C. This sizing represents planning requirements established in the UFC to meet anticipated building loads plus 25% spare capacity. These calculations were used to select the distribution transformers (the units located near buildings and facilities) and switchgear for switching stations. Emergency backup generators were sized to meet anticipated critical/emergency-demand load from the buildings or facilities expected to require such redundant power.

3.3 ADDITIONAL REQUIREMENTS

3.3.1 Standby Generators

All occupied buildings require emergency power for life-support systems such as emergency lighting and fire alarm systems, as required by the National Electrical Code. This source of emergency power is typically provided by local battery systems that include emergency ballasts for lighting or battery backup systems within fire alarm panels. Some of the proposed facilities are mission critical and would require standby generators to provide a higher level of reliability for the facilities' electrical requirements. These facilities have greater emergency-load requirements because they are expected to continue to operate during power blackouts.

Centralized and distributed (decentralized) generator systems were considered for the proposed distribution plan. A centralized system would use a larger single generator that would be centrally located to supply generator power to several buildings. The advantages of a centralized system would include slightly greater efficiency, fewer units to maintain, and fewer fuel delivery points. However, because of the higher voltages required to distribute power from a centralized generator system, transformers would be required. A distributed system of generators would use smaller generator systems or individual generators that would be located near the buildings served. The advantage of a distributed system would be a lower distribution cost due to the elimination of transformers. In addition, a distributed system of generators would limit the number of buildings affected during system maintenance or generator failure and would eliminate the need to operate a large generator to power a small mission-critical building when power is interrupted.

The locations of facilities requiring emergency power would be spread out in the base camp and not grouped in one location. These facilities would include the Base/Squadron Headquarters, the Austere Dining Facility, and other support facilities including the wastewater treatment plant, lift station, and water pump station.

A centralized system in the base camp would have a high cost of electrical distribution because of the distances between the mission-critical facilities. It is recommended that the generator system for the base camp would be a distributed generator system with individual generators located near each mission-critical facility. Appendix C lists the generator kilowatt sizes for these facilities.

3.3.2 Sustainability Approaches

The LEED Silver goal for facility design is expected to reduce the demand for energy and it is expected that energy reduction measures would result in 10% lower demand levels if LEED principles are applied to all proposed facilities.

The National Defense Authorization Act of 2010 (U.S. Congress 2010) requires compliance with the UFC when making improvements to utility systems that support the proposed action. UFC-3-400-01 (including Change 3, *Energy Conservation*, dated February 2008 [Department of Defense 2008]) requires the U.S. military to comply with the Energy Policy Act of 2005 (U.S. Congress 2005) and the specific provisions that would result in a reduction in power demand. These provisions would be incorporated into the planning, design, and construction of facilities that support the proposed action and would include the following items:

- Facility planning, design, and construction would comply with American Society of Heating, Refrigerating, and Air-Conditioning Engineers Standard 90.1, which would include a stricter consumption level that is 30% below this standard.
- All energy-consuming products would be either ENERGY STAR qualified or Federal Energy Management Program recommended. Energy-consuming products would also be designated as using “low standby power” as required by Executive Order 13221 (EO 2001).
- The following relevant energy conservation measures would be considered and incorporated:
 - Optimizing building orientation to reduce cooling loads or energy loads to cool the buildings
 - Optimizing building insulation
 - Sealing building envelopes for airtightness
 - Using “cool roof” technology
 - Using motion detectors to reduce lighting and to set back cooling in unoccupied buildings
 - Using natural lighting

As stated previously, load requirements for the proposed action were calculated on a watts-per-square-foot basis. Implementing energy conservation and improvements in efficiency for all U.S. military construction would help to reduce the overall power demand for the proposed action.

3.4 RECOMMENDED CONCEPTUAL ELECTRICAL DISTRIBUTION PLANS

Based on the overall demand calculation for the Tinian Power Plant shown in Table 1.3-1, the existing power plant would support the planned loads for all three proposed alternatives. The existing 13.8 kV overhead line which feeds the existing IBB facility, runs from the Tinian Power Plant and up 8th Avenue. The portion of the existing 13.8kV overhead line that runs north of 86th St would be replaced with a new underground duct bank because the operational requirements of the new training facilities make these existing overhead lines hazardous. The existing 13.8kV overhead line south of 86th Street would remain in the proposed infrastructure. Relying on the existing overhead line is more economical but also more risky because the overhead lines are subject to terrestrial exposure and are more vulnerable to weather events and acts of terrorism or vandalism. As an option, the existing 13.8kV overhead line from 86th Street to the Tinian Power Plant could be replaced with a new underground duct bank. The proposed 13.8 kV underground line would run up 8th Avenue from the power plant and feed the base camp, the MSA, and the RTA. Overhead distribution lines are planned in some areas in the MLA away from surface danger zones where the risk of damage from training events was deemed acceptable because of the high cost of trenching and the noncritical nature of the training mission. Electrical power to the port facilities would be provided by tapping into existing overhead electrical service lines that feed the port area. Improvements at Tinian International Airport would include overhead distribution fed from the switching

station at the base camp. These facilities would tap off a proposed 13.8 kV overhead line with pole mounted switches to feed the distribution transformers for each facility or group of facilities. The IBB facility would remain connected to the existing 13.8 kV overhead line until the proposed 13.8 kV underground line is constructed, to minimize downtime caused by the switchover. The existing 13.8 kV overhead line would be removed after the switchover to the proposed underground line. Under Alternative 1, the IBB would remain at its current location and would continue to operate from the proposed 13.8 kV underground line. Under Alternatives 2 and 3, the IBB would be relocated to a new location on Tinian or another island. The proposed action alternatives can be found in Chapter 2 of the CJMT EIS/OEIS (DoN 2014).

The single line diagram of the base camp can be found in Appendix F. The system includes a distribution loop capable of feeding from either side of the switchgear. This design enhances system reliability because the loads can be served from either side of the switchgear if one side needs to be maintained or repaired.

The recommended conceptual electrical distribution plans are shown in Appendix F. The plan for the base camp shows the location of the switching station and the 13.8 kV overhead distribution loop; this is the same for all three proposed alternatives. Individual distribution transformers (not shown at this level of detail) are used to step down the voltage of 13.8 kV to the building voltage, which are typically 120/208 V or 277/480 V systems. Appendix F also shows the proposed island-wide electrical distribution for each of the three alternatives.

CHAPTER 4. POTENTIAL IMPACTS AND ISSUES

4.1 SUMMARY OF ELECTRICAL TRANSMISSION AND DISTRIBUTION WORK

The proposed alternatives would involve similar work in each area for the electrical transmission and distribution system:

- Underground trenching for conduits/cables and installation of poles for overhead power distribution cables
- Installation of pole-mounted and pad-mounted transformers
- Installation of pole-mounted and pad-mounted isolation switches
- Related cutting and patching of areas affected by installation of the overhead and underground distribution system components

Some IBB facilities may experience downtime in their electrical service for the switchover of power from the existing overhead line to the proposed underground line. This problem could be minimized with advance coordination and plans for the IBB to use its own generators during the switchover. New transformers, switchgear, and underground and overhead power lines would be constructed at the sites of the base camp, the MSA, the RTA, and the port facilities for each of the three alternatives, and for the proposed end state improvements at Tinian International Airport. Potential impacts associated with the construction of these proposed improvements would include the following:

- Visual impacts associated with the addition of equipment at switching stations, local step-down transformers for each facility, and new overhead distribution in some areas
- Impacts associated with the construction activities that consist primarily of vegetation clearance for utility poles and overhead line installations and trenching for underground duct banks. These include vehicular traffic impacts (e.g., lane closures, rerouting of traffic lanes, and traffic delays) resulting from construction along roadways

4.2 DISCUSSION OF IMPACTS

The potential impacts of underground and overhead lines were estimated by determining the volume of soil disturbed for the trenching of the proposed underground duct banks, based on a minimum depth of approximately 42 inches (107 centimeters) and an average width of 36 inches (91 centimeters), and soil disturbance for power pole installations (Table 4.2-1).

Table 4.2-1: Estimated Volume of Soil to be Disturbed during Construction

<i>Alternative</i>	<i>Site Location</i>	<i>Volume of Disturbance (cubic yards [cubic meters])</i>
All alternatives	Base camp	6928 [5297]
All alternatives	MSA	18 [14]
All alternatives	Port facilities	2.6 [2]
Future potential project	End State Tinian International Airport	2507 [1917]
All alternatives	Range Training Facilities	5023 [3841]

Legend: MSA = Munitions Storage Area.

Source: DoN 2014.

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CHAPTER 5. REFERENCES

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- EO. 2001. Presidential Executive Order No. 13221. *Energy Efficient Standby Power Devices*. 31 July.
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- USDI. 2011. *Commonwealth of the Northern Mariana Islands, Initial Technical Assessment Report*. Office of Insular Affairs. NREL/TP-7A40-50906. Prepared by Ian Baring-Gould, Randolph Hunsberger, Charles Visser, and Philip Voss. July.

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Appendix A
Current Demand Load Data

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TINIAN POWER PLANT			
UNIT	DESIGN MW	AVAILABLE MW	REMARKS
D/E No. 1	5	4.5	Operational
D/E No. 2	5	4.5	Stand-by
D/E No. 3	2.5	2.0	Stand-by
D/E No. 4	2.5	2.0	Stand-by
D/E No. 5	2.5	2.0	Stand-by
D/E No. 6	2.5	2.0	Stand-by
Totals	20	17.5	

TINIAN DYNASTY			
UNIT	DESIGN MW/KW	AVAILABLE MW	REMARKS
D/E No. 1	1.2	1.1	Operational/Standby
D/E No. 2	1.2	1.1	Operational/Standby
D/E No. 3	400KW	300KW	Operational/Standby
Totals	2.8 KW	2.5 KW	

IBB ENGINES			
UNIT	DESIGN MW	AVAILABLE MW	REMARKS
D/E No. 1	1	1	Operational/Standby
D/E No. 2	1	1	Operational/Standby
D/E No. 3	1	1	Operational/Standby
D/E No. 4	1	1	Operational/Standby
D/E No. 5	1.2	1.2	Operational/Standby
D/E No. 6	1.2	1.2	Operational/Standby
D/E No. 7	1.2	1.2	Operational/Standby
D/E No. 8	1.2	1.2	Operational/Standby
Totals	8.8	8.8	

Pertinent Data in MW	
Total Installed Capacity	31.6
Total Available Power	28.8
Peak Demand	4.5
Standby Power, yesterday	24.3

1 and 2
 Dist. Voltage Feeder #.160V
 Dist. Voltage Feeder 3 and 4 13.8 V

REC'D FROM CLIC ON
 12/04/2012
 (BRIAN BEARDEN)
 J.R. Keith

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Appendix B
Meeting Notes

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**Commonwealth of the Northern Mariana Islands (CNMI) Joint Military Training (CJMT)
Environmental Impact Statement (EIS)/Overseas EIS (OEIS)
Project Meeting Notes
December 10, 2013
1100-1200 Chamoran Standard Time (ChST)**

Attendees:

Commonwealth Utilities Corporation (CUC): G. Camacho, R. V. Cano, W. Young
TEC-AECOM Pacific Joint Venture (JV): P. Diaz, S. Keith

Agenda and Notes

1. Introductions
2. Purpose and Scope: S. Keith described that the purpose of the meeting was to obtain information for preparation of the CJMT EIS regarding the electrical utility on Tinian. This information would be used to depict the current situation of this utility, future planned projects and electrical demand that are currently known, and assess potential impacts to that utility by the proposed action. It was explained that this was only one of several EIS efforts currently under way and that this particular joint training initiative was not related to the other proposed actions.
3. General – completed, on-going, and future projects which could affect the electrical utility on Tinian.
 - a. The CUC members said there are no recently completed or on-going projects regarding the electrical utility.
 - b. One potential future project is that developers have approached CUC about a potential wind farm of 50 to 70 MW on Tinian with a power cable to Saipan. Nothing is firm, just discussions at this point in time.
 - c. The CUC does have a general RFP issued for design/build/operate/finance proposals to reduce the high energy costs in the CNMI. The most promising potential seems to be a liquefied natural gas power plant on Saipan with an undersea transmission cable to Tinian.
 - d. There are no other potential projects on Tinian that the CUC personnel present were aware of.
4. Electrical
 - a. Distribution conductor sizes will be provided by TeleSource CNMI, Inc. (TeleSource), the independent power producer on Tinian. The CUC personnel in attendance said the conductor size from the power plant to the IBB facility is a 556 Aluminum Conductor up 8th Avenue to the IBB.
 - b. Requested the single line diagram internal to the power plant. This will be provided by TeleSource.
 - c. Asked for existing peak loads on each of the 4 feeder circuits. This information will be provided by TeleSource. The CUC personnel in attendance said the overall Tinian peak load was about 4 MW with the IBB peak load at 1.5 MW. This peak only occurs for

roughly 5 to 10 minutes at a time. The matching of the feeder names (Feeders 1 through 4 versus CUC-1, CUC-2, CPA, and VOA) will be provided by TeleSource.

- d. Asked if the CNMI Ports Authority (CPA) circuit is still at 4160V as shown in previously obtained one line diagram. TeleSource will provide current information.
 - e. Requested unscheduled system outage history and any other reliability data for the Tinian power system. G. Camacho did not think there are any reports, but we should ask TeleSource for this information.
 - f. A load projection for 6 years out was requested. The “Technical Assessment Report” (July 2011) Table 3 Page 5 indicated the 2015 Peak Load Forecast was 6.0MW. Is this forecast including DoD and Civilian? Response was that TeleSource will provide this information.
 - g. Requested location and age of electrical transformers within the Military Lease Area. TeleSource will provide this information.
5. Action Items:
- a. CUC requested that we share with them any information received from TeleSource, Inc. S. Keith promised to do this and has done so.
 - b. AECOM will meet with Jeff Barr of TeleSource while on Tinian.

Scan of the Attendance Sign-in Sheet:

MEETING ATTENDANCE LIST

CNMI Joint Military Training EIS/OEIS - SITE VISIT DEC 2013

Date/Time: December 10, 2013
 Location: CUC Power Plant, Saipan
 Topic: Electrical

NAME	ORGANIZATION/TITLE	E-MAIL	OFFICE PHONE	CELL PHONE
Steve Keith	AECOM	STEPHEN.KEITH@AECOM.COM	SAIPE	285-220-4598
Pete Diaz	AECOM	pete.diaz@aecom	671-477-8324	
Wallon Young	CUC	wallon.y@yale.edu	670-285-2006	670-322-4130
RICHARD V. CANO	CUC	richard.cano@ucgoc.org	670-322-9243	670-285-6093
GARY CAMACHO	CUC	gary.camacho	664-7503	483-7122

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**Commonwealth of the Northern Mariana Islands (CNMI) Joint Military Training (CJMT)
Environmental Impact Statement (EIS)/Overseas EIS (OEIS)
Project Meeting Notes
December 12, 2013
0900-1030 Chamoran Standard Time (ChST)**

Attendees:

TeleSource CNMI, Inc.: C Arumacodi, J. Barr, M. Enriquez, J. Pangelinan
TEC-AECOM Pacific Joint Venture (JV): S. Keith, R. Schlutz

Agenda and Notes

1. Introductions
2. Purpose and Scope: S. Keith described that the purpose of the meeting was to obtain information for preparation of the CJMT EIS regarding the electrical utility on Tinian. This information would be used to depict the current situation of this utility, future planned projects and electrical demand that are currently known, and assess potential impacts to that utility by the proposed action. It was explained that this was only one of several EIS efforts currently under way and that this particular joint training initiative was not related to the other proposed actions.
3. General – completed, on-going, and future projects which could affect the electrical utility on Tinian.
 - a. The TeleSource members know of no current, on-going, or future projects regarding the electrical utility except the plan to convert the 4160V service (highlighted in pink on provided sketch) to a 13.8KV service during 2014.
4. Electrical
 - a. Distribution conductor sizes will be provided by TeleSource, Inc., the independent power producer on Tinian. The TeleSource personnel in attendance confirmed that the conductor size from the power plant to the IBB facility is a 556.5 Aluminum multi-strand and called Feeder 4. Feeder 3 is #4 copper and most wiring is 4/0 aluminum conductor.
 - b. Requested the single line diagram internal to the power plant. This was provided by TeleSource.
 - c. Need existing peak loads on each of the 4 feeder circuits. This information was provided by TeleSource and is the following:
 - i. Feeder 1 & 2 combined peak is about 0.5MW with an average of 0.35MW.
 - ii. Feeder 3 has a peak of 2.2MW and an average of 1.78MW.
 - iii. Feeder 4 (IBB) has a peak of 1.4MW and an average of 0.75MW.

Also feeders 1, 2, 3, and 4 correspond to CUC-1, CUC-2, CPA, and VOA, respectively.

- d. Asked if the CNMI Ports Authority (CPA) circuit is still at 4160V as shown in previously obtained one line diagram (attached). TeleSource indicated that the CPA circuit is at 13.8KV.
 - e. Requested unscheduled system outage history and any other reliability data for the Tinian power system. TeleSource provided outage reports for 2011 through current date of 2013.
 - f. A load projection for 6 years out was requested. The “Commonwealth of the Northern Mariana Islands Initial Technical Assessment Report” (Ian Baring-Gould, Randolph Hunsberger, Charles Visser, and Philip Voss, July 2011, Technical Report NREL/TP-7A40-50906) Table 3 Page 5 indicated the 2015 Peak Load Forecast was 6.0MW. Is this forecast including DoD and Civilian? TeleSource said they would be lucky should peak loads hit 6.0MW by 2015. They know of no future sources that might offer increased power usage. Should DoD add 2 MW of demand and IBB remain in place, 6.0MW might be reached. They indicated that in the past the peak was getting close to 10 MW, their total capacity at that time, and that is when the decision and expansion to an installed level of 20MW generating capacity was made. Shortly after that expansion, electric rates were almost doubled and usage plummeted. Their current forecast is for demand to remain the same, except for the DoD action and any changes to the IBB operations.
 - g. Requested location and age of electrical transformers within the Military Lease Area (MLA). TeleSource said there are only 2 transformers in the MLA serving an agricultural water well along 8th Avenue a short distance north of the airport. They don’t know the age but condition seems fine. Only other transformers within the MLA are at the IBB facility.
5. Other Information Shared
- a. The transmission line around the west end of the airport is direct buried. It runs about 8 feet to 10 feet outside the airport security fence. It was installed with detector tape above it. IBB is responsible for the maintenance of this underground section. Termites have eaten some of the insulation and repairs have been required twice in 10 years. The line is 750KcMIL by Pirelli and a specification sheet was provided along with installation sketches. No CAD is available unless CUC has made CAD files from the sketches. Installation required rock breakers to do the trenching.
 - b. J. Barr’s wife now owns TeleSource CNMI, Inc., having purchased the entity from prior owners several years ago. They are in the process of revising the name to Marianas Energy Technology, Inc.
 - c. J. Barr discussed the operating permit and provided a copy of the expired permit. He said the generating units were certified as low NOx (nitrous oxides) units. With the loss of the DEQ air specialist some years ago (reportedly hired by EPA Region 9), the DEQ air program is at a standstill. Thus the operating permit has not been renewed and expired in 2005.
6. Action Items:
- a. None – all requested information that is available was provided.

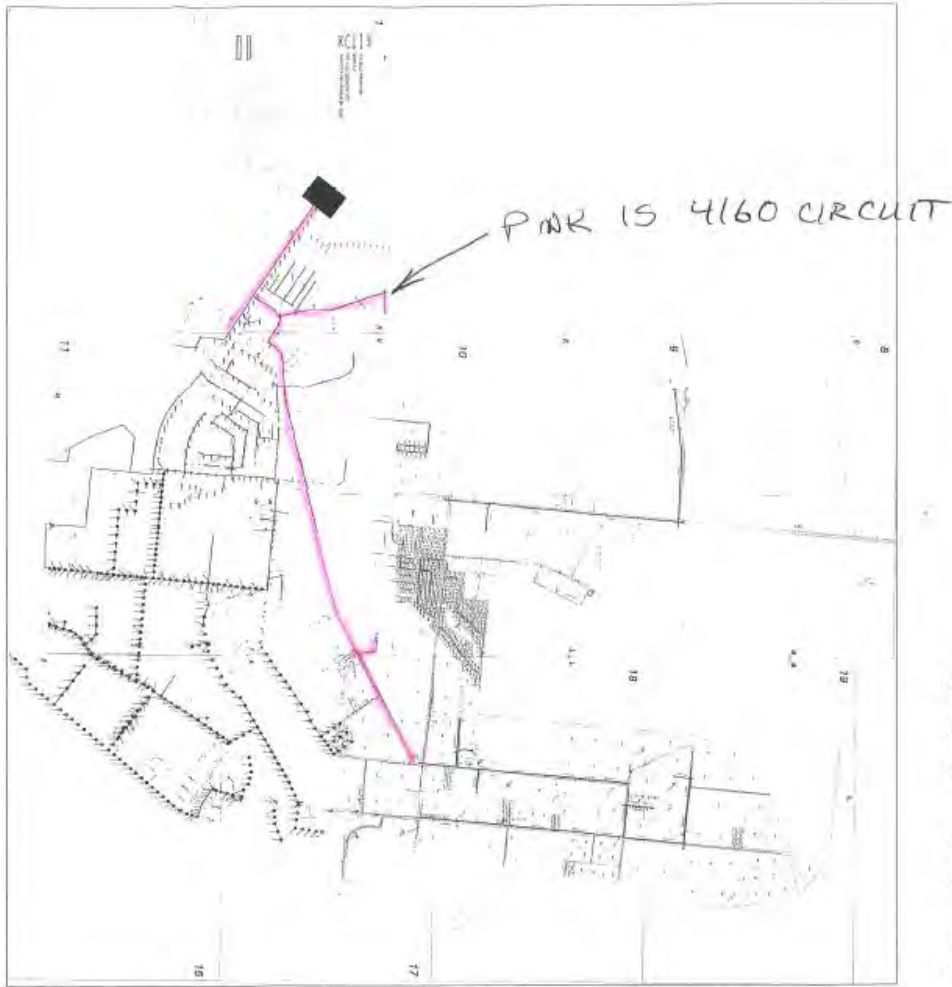
Scan of the Attendance Sign-in Sheet:

MEETING ATTENDANCE LIST

CNMI Joint Military Training EIS/OEIS - SITE VISIT DEC 2013

Date/Time: 12-12-13 9:00 AM
 Location: TIANAN Power Plant
 Topic: ELECTRICAL SYSTEM

NAME	ORGANIZATION/TITLE	E-MAIL	OFFICE PHONE	CELL PHONE
STEPHEN KEITH	AECOM/PRST MGR	STEPHEN.KEITH@AECOM.COM	SAME →	88-220-4598
Richard Schlutz	AECOM/ ^{SECURITY} SPEC VISIT	richard.schlutz@aecocom.com	567-7763	214-349-5013
MARIO ENRIQUETA	TELESOURCE			
JERRICA PANGELINAN	TELESOURCE CNMI	admin.meti@picom.com	433-4501	287-2293
CHRISTIAN ARJUNARAJA	"	christy.meti@picom.com		287-4505
Jeffrey L. Saw	"	jeff.meti@picom.com	433-4501	(678) 287-4502



FROM CUC 12-12-13
Steve Rieck

Appendix C
Demand Estimates and Calculations

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Appendix D
Tinian Power Plant Outage Data

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Source: Telesource
 12-12-13
 12 PAGES

TELESOURCE SYSTEM OUTAGE REPORT

TO	Plant Manager	STATION	TINIAN POWER PLANT	DATE	9-Sep-13
FROM	Shift Supervisor	OUTAGE No	OR 11 2013	TIME	17 hrs 14 min

CAUSE OF OUTAGE

FeederNo.3 tripped off at 13.8KV Substation and 4160V Switchgear on Phase B& C and N due to distribution side **X**

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED	GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/> CUC			<input type="checkbox"/> 1		
<input type="checkbox"/> VOA			<input type="checkbox"/> 2		
<input checked="" type="checkbox"/> DYNASTY	Breaker open	19:10	<input type="checkbox"/> 3		
<input type="checkbox"/>			<input type="checkbox"/> 4		
<input type="checkbox"/>			<input type="checkbox"/> 5		
<input type="checkbox"/>			<input type="checkbox"/> 6		

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	CHRISTY	Line patrol was carried out. It was heavy raining, wind and Lightening
2	JIMMY	
3	FILIFE	
4	OMAR	
5	JASON	

RECOMMENDATION:

* Somewhat long??
 "communication"

DATE AND TIME SYSTEM FULLY RESTORED				TOTAL OUTAGE TIME			LOGGED BY:	
DATE:	9-Sep-13	TIME:	19 Hr 10 Min	0	Days	1:56	Hrs	OMAR
FORM No:				REV No: 0				

TELESOURCE SYSTEM OUTAGE REPORT

TO	Power Plant Manager	STATION	TINIAN POWER PLANT	DATE	21-Aug-13 ✓
FROM	Shift Supervisor	OUTAGE No	OR 09, 2013	TIME	3 hrs 50 min

CAUSE OF OUTAGE

FEEDER # 3 TRIPPED OFF AT 13.8 KV SUBSTATION DUE TO POLE TOP PIN DOWN NEAR OLD CUC ✖

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED		GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/>	CUC			<input type="checkbox"/>	1	
<input type="checkbox"/>	VOA			<input type="checkbox"/>	2	
<input checked="" type="checkbox"/>	DYNASTY	breaker open at 13.8 kv substation		<input type="checkbox"/>	3	
<input type="checkbox"/>				<input type="checkbox"/>	4	
<input type="checkbox"/>				<input type="checkbox"/>	5	
<input type="checkbox"/>				<input type="checkbox"/>	6	
<input type="checkbox"/>						

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	Jeff Barr		
2	Christian		
3	Mario.		
4	Jimmy		
5	Leo / Jason		

RECOMMENDATION:

[Handwritten Signature]

DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	21-Aug-13	TIME:	5 Hr 42 Min	0	Days	1hr. 44	Min.	LEO
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FORM No: _____ REV No: 0

TELESOURCE SYSTEM OUTAGE REPORT

TO	Power Plant Manager	STATION	TINIAN POWER PLANT	DATE	18-Aug-13
FROM	Shift Supervisor	OUTAGE No	OR 08, 2013	TIME	11 :19 AM

CAUSE OF OUTAGE

ISLAND WIDE POWER OUTAGE DUE TO UPS FAILURE.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED		GEN	PROTECTION OPERATED	TIME RESTORED
<input checked="" type="checkbox"/>	CUC	OPEN	11:40	<input type="checkbox"/>	1	
<input checked="" type="checkbox"/>	VOA	OPEN	11:50	<input type="checkbox"/>	2	
<input checked="" type="checkbox"/>	DYNASTY	OPEN	11:52	<input type="checkbox"/>	3	
<input type="checkbox"/>				<input type="checkbox"/>	4	
<input type="checkbox"/>				<input checked="" type="checkbox"/>	5	G5 SHUTDOWN 12:00
<input type="checkbox"/>				<input type="checkbox"/>	6	
<input type="checkbox"/>						

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	JEFF BARR		
2	CHRISTIAN		
3	JIMMY C.U.C.		
4	PREM		
5	JASON		

RECOMMENDATION:

[Signature]

o.s.

DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	18-Aug-13	TIME:	11 :50 AM	0	Days	0:21	MIN	PREM
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TELESOURCE SYSTEM OUTAGE REPORT

TO	Plant Manager	STATION	TINIAN POWER PLANT	DATE	12-Aug-13
FROM	Shift Supervisor	OUTAGE No	OR 06, 2013	TIME	9:50PM

CAUSE OF OUTAGE Feeder # 3 tripped off at 13.8 KV Substation due to Lightning hit some of the marpo heights 1area.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	BREAKER CLOSE		GEN	PROTECTION OPERATED	BREAKER CLOSE
<input type="checkbox"/> CUC				<input type="checkbox"/> 1		
<input type="checkbox"/> VOA				<input type="checkbox"/> 2		
<input checked="" type="checkbox"/> DYNASTY	Breaker open at 13.8 kv substation	22:50		<input type="checkbox"/> 3		
<input type="checkbox"/>				<input type="checkbox"/> 4		
<input type="checkbox"/>				<input type="checkbox"/> 5		
<input type="checkbox"/>				<input type="checkbox"/> 6		
<input type="checkbox"/>						

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	JEFF BARR	LINE PATROL WAS CARRIED OUT BY TOD DUE TO HEAVY RAINING AND
2	CHRISTIAN	THUNDER.
3	MARIO	
4	JIMMY C.U.C.	
5	PREM	

RECOMMENDATION:

OK.

DATE AND TIME SYSTEM RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	12-Aug-13	TIME:	10 :50 PM	0	Days	1:00	Hr	PREM
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FORM No:

REV No: 0

TELESOURCE SYSTEM OUTAGE REPORT

TO	Plant Manager	STATION	TINIAN POWER PLANT	DATE	12-Aug-13
FROM	Shift Supervisor	OUTAGE No	OR 07, 2013	TIME	6:10 PM

CAUSE OF OUTAGE VOA FEEDER TRIPPED OFF DUE TO OVER CURRENT FROM VOA SITE.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED	GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/> CUC			<input type="checkbox"/> 1		
<input checked="" type="checkbox"/> VOA	OVER CURRENT RELAY	19:15	<input type="checkbox"/> 2		
<input type="checkbox"/> DYNASTY			<input type="checkbox"/> 3		
<input type="checkbox"/>			<input type="checkbox"/> 4		
<input type="checkbox"/>			<input type="checkbox"/> 5		
<input type="checkbox"/>			<input type="checkbox"/> 6		
<input type="checkbox"/>					

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	JEFF BARR	LINE PATROL WAS CARRIED OUT BY LINE CREW.
2	CHRISTIAN	
3	MARIO	
4	JIMMY C.U.C.	
5	PREM	

RECOMMENDATION:

[Handwritten Signature]

OK

DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	12-Aug-13	TIME:	7 :15 PM	0	Days	1:05	MIN	PREM
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FORM No:

REV No: 0

TELESOURCE SYSTEM OUTAGE REPORT

TO	Power Plant Manager	STATION	TINIAN POWER PLANT	DATE	24-May-13
FROM	Shift Supervisor	OUTAGE No	OR 04 '13	TIME	11 hrs 15 min

CAUSE OF OUTAGE

Feeder # 3 tripped off at 13.8 KV Substation due to pole fell down at marpo heights 1.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED		GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/>	CUC			<input type="checkbox"/>	1	
<input type="checkbox"/>	VOA			<input type="checkbox"/>	2	
<input checked="" type="checkbox"/>	DYNASTY	Breaker open at 13.8 kv substation		<input type="checkbox"/>	3	
<input type="checkbox"/>				<input type="checkbox"/>	4	
<input type="checkbox"/>				<input type="checkbox"/>	5	
<input type="checkbox"/>				<input type="checkbox"/>	6	
<input type="checkbox"/>						

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	Jeff Barr		
2	Mario		
3	Jimmy		
4	Oscar		
5	Leo		

RECOMMENDATION:

** Public Notice - tree trimming / cutting or removal*

(notify us ahead of time) → accountability owner

** CUC*

DATE AND TIME SYSTEM FULLY RESTORED				TOTAL OUTAGE TIME			LOGGED BY:		
DATE:	24-May-13	TIME:	11 Hr 55 Min	0	Days	0:40	Min.	LEO	

TELESOURCE SYSTEM OUTAGE REPORT

TO	Plant Manager	STATION	TINIAN POWER PLANT	DATE	22-Jul-12
FROM	Shift Supervisor	OUTAGE No	OR8' 12	TIME	10 hrs 10 min

CAUSE OF OUTAGE

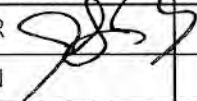
FEEDER# 3 Tripped off at 13.8Kv substation due to distribution problem. Line crew has found out a line was down near to Mobil

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED		GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/>	CUC			<input type="checkbox"/>	1	
<input type="checkbox"/>	VOA			<input type="checkbox"/>	2	
<input checked="" type="checkbox"/>	DYNASTY	NEUTRAL	10:10	<input type="checkbox"/>	3	
<input type="checkbox"/>				<input type="checkbox"/>	4	
<input type="checkbox"/>				<input type="checkbox"/>	5	
<input type="checkbox"/>				<input type="checkbox"/>	6	
<input type="checkbox"/>						

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	JEFF BARR		
2	CHRISTIAN		
3	JIMMY		
4	MARIO		
5			

RECOMMENDATION:

DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	22-Jul-12	TIME:	11 Hr 10 Min	0	Days	1:00	Hrs	prem
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FORM No:

REV No: 0

TELESOURCE SYSTEM OUTAGE REPORT

TO	Power Plant Manager	STATION	TINIAN POWER PLANT	DATE	18-Jul-12
FROM	Shift Supervisor	OUTAGE No	OR7 '12	TIME	7 hrs 18 min

CAUSE OF OUTAGE

FEEDER 3 TRIPPED OFF @ 13.8 Kv SUBSTATION. CAUSE OF OUTAGE IS UNKNOWN.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED	GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/> CUC			<input type="checkbox"/> 1		
<input type="checkbox"/> VOA			<input type="checkbox"/> 2		
<input checked="" type="checkbox"/> DYNASTY	NEUTRAL	8:04	<input type="checkbox"/> 3		
<input type="checkbox"/>			<input type="checkbox"/> 4		
<input type="checkbox"/>			<input type="checkbox"/> 5		
<input type="checkbox"/>			<input type="checkbox"/> 6		
<input type="checkbox"/>					

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	JEFF BARE		
2	CHRISTIAN		
3	MARIO		
4	JIMMY		
5			

RECOMMENDATION:

DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	18-Jul-12	TIME:	8 Hr	4 Min	0	Days	0:46	Min.	ETERN
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FORM No:

REV No: 0

TELESOURCE SYSTEM OUTAGE REPORT

TO	Plant Manager	STATION	TINIAN POWER PLANT	DATE	May 30 2012
FROM	Shift Supervisor	OUTAGE No		TIME	16hrs. 23min.

CAUSE OF OUTAGE

ISLANDWIDE POWER OUTAGE, ENGINE # 5 SHUTDOWN ON MECHANICAL OVERSPEED.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	BREAKER CLOSE		GEN	PROTECTION OPERATED	BREAKER CLO
<input checked="" type="checkbox"/> CUC		1642 Hrs.		<input type="checkbox"/> 1		
<input checked="" type="checkbox"/> VOA		1646 Hrs.		<input type="checkbox"/> 2		
<input checked="" type="checkbox"/> DYNASTY		1647 Hrs.		<input type="checkbox"/> 3		
<input type="checkbox"/>				<input type="checkbox"/> 4		
<input type="checkbox"/>				<input type="checkbox"/> 5		
<input type="checkbox"/>				<input type="checkbox"/> 6		
<input type="checkbox"/>						

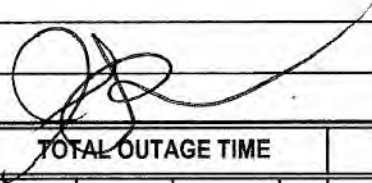
PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	JEFF BARR		
2	JIMMY C.U.C.		
3	MARIO		
4			
5			

RECOMMENDATION:

OK.



DATE AND TIME SYSTEM RESTORED				TOTAL OUTAGE TIME		LOGGED BY:
DATE:	30-May-12	TIME:	16 Hr 42 Min	Days	19 Mins.	R.M.DUNGCA

TELESOURCE SYSTEM OUTAGE REPORT

TO	Power Plant Manager	STATION	TINIAN POWER PLANT	DATE	23-May-12
FROM	Shift Supervisor	OUTAGE No	OR3 '12	TIME	10 hrs 0 min

CAUSE OF OUTAGE

IBB feeder tripped off at 4160V switchgear, Phase B & C cause unknown.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED		GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/>	CUC			<input type="checkbox"/>	1	
<input checked="" type="checkbox"/>	VOA		0:15	<input type="checkbox"/>	2	
<input type="checkbox"/>	DYNASTY			<input type="checkbox"/>	3	
<input type="checkbox"/>				<input type="checkbox"/>	4	
<input type="checkbox"/>				<input type="checkbox"/>	5	
<input type="checkbox"/>				<input type="checkbox"/>	6	
<input type="checkbox"/>						

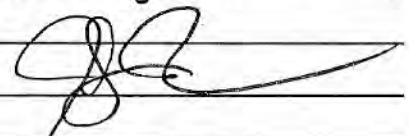
PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	JEFF		
2	MARIO		Waiting for the representative from CUC.
3	CUC		
4			
5			

RECOMMENDATION:

** Talked to CUC about representation ⇒ to re-energize **



DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	24-May-12	TIME:	12 Hr	15 Min	0	Days	2:15	Hrs	OMAR
-------	-----------	-------	-------	--------	---	------	------	-----	------

TELESOURCE SYSTEM OUTAGE REPORT

TO	Power Plant Manager	STATION	TINIAN POWER PLANT	DATE	9-Jan-12
FROM	Shift Supervisor	OUTAGE No	OR 1'12	TIME	4 hrs 25 min

CAUSE OF OUTAGE

Feeder # 3 tripped off at 13.8 kv Substation, Cause Phase A & B, over Current Relay tripped off.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED		GEN	PROTECTION OPERATED	TIME RESTORED
<input type="checkbox"/>	CUC			<input type="checkbox"/>	1	
<input type="checkbox"/>	VOA			<input type="checkbox"/>	2	
<input checked="" type="checkbox"/>	DYNASTY	OPEN		<input type="checkbox"/>	3	6:40
<input type="checkbox"/>				<input type="checkbox"/>	4	
<input type="checkbox"/>				<input type="checkbox"/>	5	
<input type="checkbox"/>				<input type="checkbox"/>	6	
<input type="checkbox"/>						

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	CHRISTIAN	
2	STEVE CABRERA	<i>Heavy windy & raining</i>
3	MARIO	
4	OMAR	
5	ARNEL	

RECOMMENDATION:

*Wind and rain, heavy. Gust exceed 40MPH. Observe
preparation proceed according to storm criteria.*

[Signature]

DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	9-Jan-12	TIME:	6 Hr 40 Min	0	Days	2:15	Hrs	OMAR.
-------	----------	-------	-------------	---	------	------	-----	-------

FORM No:

REV No: 0

TELESOURCE SYSTEM OUTAGE REPORT

TO	Power Plant Manager	STATION	TINIAN POWER PLANT	DATE	4-Mar-11
FROM	Shift Supervisor	OUTAGE No	OR 03'11	TIME	16 hrs 25 min

CAUSE OF OUTAGE

Island Wide Power Outage due to Generator 6 Miniature F11 Circuit Breaker Tripped Off.

EQUIPMENT AFFECTED

FDR	PROTECTION OPERATED	TIME RESTORED		GEN	PROTECTION OPERATED	TIME RESTORED
<input checked="" type="checkbox"/>	CUC	BREAKER TRIPPED	16:46	<input type="checkbox"/>	1	
<input checked="" type="checkbox"/>	VOA	BREAKER TRIPPED	16:44	<input type="checkbox"/>	2	
<input checked="" type="checkbox"/>	DYNASTY	BREAKER TRIPPED	16:44	<input type="checkbox"/>	3	
<input type="checkbox"/>				<input type="checkbox"/>	4	
<input type="checkbox"/>				<input type="checkbox"/>	5	
<input type="checkbox"/>				<input checked="" type="checkbox"/>	6	BREAKER TRIPPED 16:44
<input type="checkbox"/>						

PERSONNEL NOTIFIED:

REASONS FOR DELAY (IF ANY) IN RESTORING POWER:

1	Christian		
2	Jimmy		
3	Wilson		
4	Etern		
5	Roberto, Carlos		

RECOMMENDATION:

Acknowledged.



DATE AND TIME SYSTEM FULLY RESTORED

TOTAL OUTAGE TIME

LOGGED BY:

DATE:	4-Mar-11	TIME:	16 Hr 44 Min	0	Days	0:19	Hrs	ETERN MAHILUM
-------	----------	-------	--------------	---	------	------	-----	---------------

FORM No:

REV No: 0

Appendix E
Additional Unified Facilities Criteria Distribution System
Requirements

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ADDITIONAL UNIFIED FACILITIES CRITERIA DISTRIBUTION SYSTEM REQUIREMENTS

Summaries of other applicable Unified Facilities Criteria requirements, as selected based on the purpose and level of detail of this study, are provided in this appendix.

Unified Facilities Criteria 3-550-01, *Exterior Electrical Power Distribution* (Department of Defense 2012).

- Criteria for electric distribution lines would be based on the requirements of agency criteria. Distribution lines would be sized to meet current demand load, future loads, and line-loss factors.
- Electrical distribution would be underground construction where overhead distribution is operationally hazardous.
- Electrical distribution would be underground construction unless specifically identified as not practical to reduce impacts because of typhoon or super typhoon events.
- Where underground systems are provided, the following standards would be followed (Note: the MLA is considered an industrial use area due to the use of heavy vehicles for training purposes and need for long life):
 - In industrial and densely populated areas, cables would be installed in underground duct lines with manholes. Ducts would be concrete encased.
 - In lightly populated areas, cable would be placed in non-concrete-encased ducts.
 - The use of a non-concrete-encased direct-buried duct would be limited to long untapped runs in lightly populated areas where the reliability requirements are low; or the facilities served by the cables have a short-term life; or for other reasons that would justify the use of the more economical direct-buried installations.
- Voltage drops on the distribution system would comply with the minimum-voltage requirements of American National Standards Institute C84.1. Voltage drops on the low-voltage distribution system would comply with the recommendations of the National Electrical Code.
- For new facilities/feeders with estimated demands based on requirements, which are based on master-planning documents and estimated feeder lengths based on the site plan, a determination of circuit requirements would be made. Feeders would be large enough to allow a growth factor of 25% of the design maximum demand.
- Existing feeders connected to new loads would be evaluated to determine the current load and capacity for additional load. Feeders determined to be too small would be replaced or new feeders would be added in lieu of using the existing feeder.
- Pad-mounted, metal-enclosed switchgear (air-, oil-, gas-, or vacuum-insulated) would be used to provide group-operated, load-break switch operation, sectionalizing points for large underground distribution systems, and overcurrent protection (fuses) for lateral feeders from a main feeder.

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Appendix F
Electrical Conceptual Distribution Plans

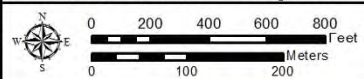
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Notional Depiction Only

- Communications Tower (200 ft.)
- ADN Facility
- Proposed Electrical Switching Station
- Proposed Electrical Power Distribution**
 - Proposed Above-ground Base Camp Primary Distribution
 - Proposed Above-ground Base Camp Secondary Distribution
 - Proposed Above-ground Distribution to Switch Station
 - Proposed Above-ground Distribution to MSA
 - Proposed Above-ground Distribution to IBB
 - Existing Above-ground Distribution from Powerplant
 - Existing Below-ground Distribution from Powerplant
 - Proposed Above-ground Airfield Distribution

- ### Airfield Layout Plan (ALP) Legend
- #### ALP Features (End State)
- AD/ACG Facility
 - Type II Hangar
 - AF Maintenance Facility
 - Air Traffic Control Tower
 - Hot Fuel Pits
 - Taxiway/Apron Access
 - Military Taxiway (23m)
 - Paved Shoulder (7.5m)
 - Unpaved Shoulder (7.5m)
 - AD/AG C-17 Parking Apron
 - Aircraft Parking Apron
 - Airfield - Infield

Tinian Base Camp Proposed Electrical Distribution System



PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command
RF20C

This drawing is a notional depiction of the proposed project. It is not intended to be used for construction or as a contract document. The design is preliminary and subject to change. The user of this drawing assumes all responsibility for its use.



Date: 9/10/2014

LEGEND

- Proposed Road Centerline
- Proposed Gate Locations
- Proposed Base Camp Perimeter Fencing
- Proposed Facility Structures
- Stormwater Culvert
- Stormwater Ditch
- Stormwater Retention Basins
- Low Impact Development Features
- Wash Rack Effluent Treatment Ponds

- Package WWTP/ Lift Station
- Wastewater Disposal Field
- Proposed Short-term MSA Fencing
- Proposed Vehicle Driveways
- Helicopter Landing Pad
- Permanent Utilities Pads
- Temporary Tent Platforms
- Landscaped Open Space

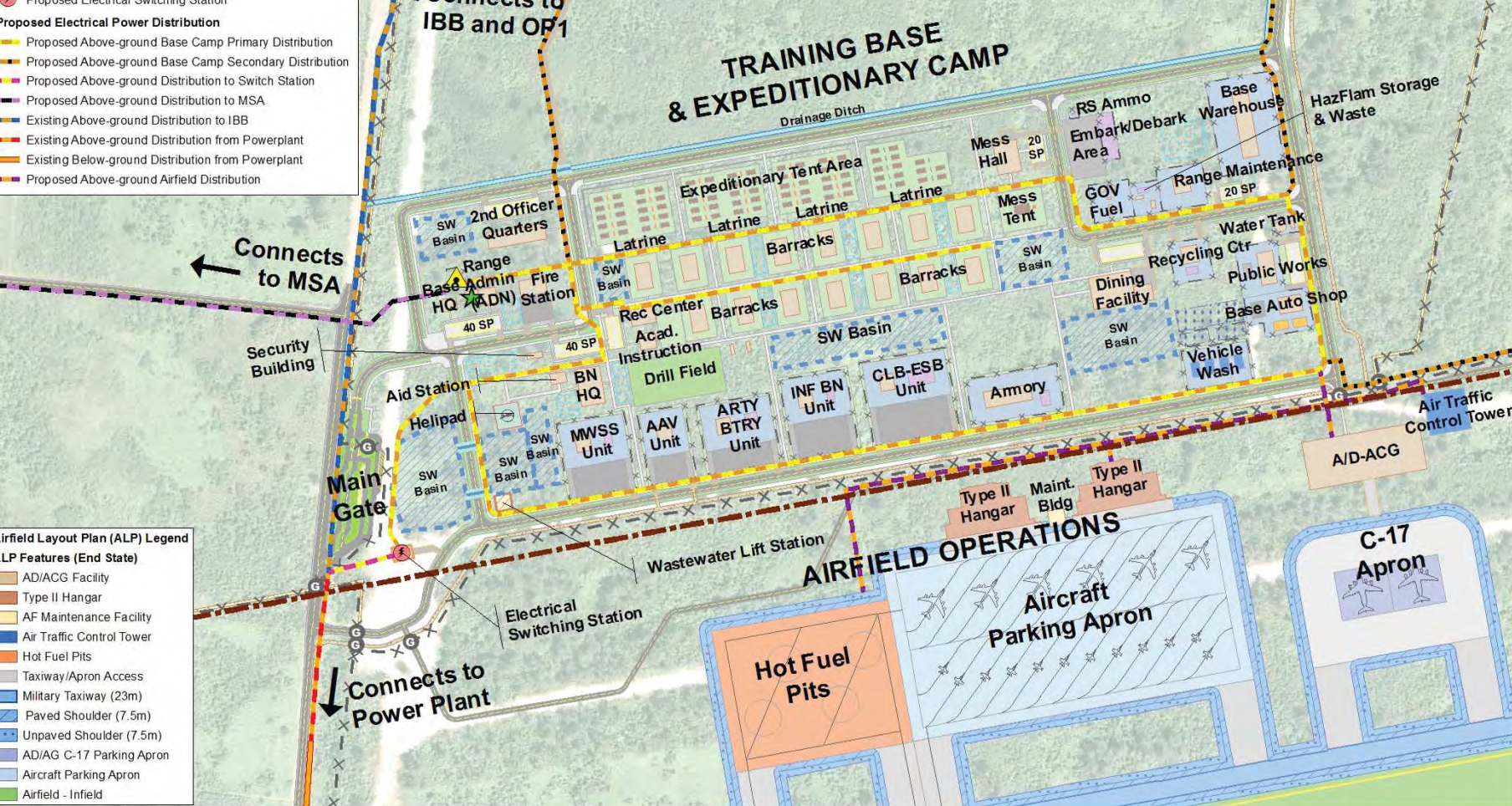
- Vehicle Grease Racks
- Vehicle Wash Racks
- Open Storage Area
- Laydown Areas (Embark/Debark)
- Operational Pavement Areas
- Sidewalks
- Proposed Vehicle Parking
- Organizational Vehicle Parking
- Vehicle Driveways

- Tracked Vehicle Trail (Gravel)
- Tracked Vehicle Road Crossing
- Road Parkway
- Proposed Paved Road
- Proposed Road Shoulder (Gravel)
- Perimeter Patrol Road
- Drill Field
- Tent Area AT/FP Barrier Wall
- Military Lease Area Boundary

Data Sources:
NAVFAC PAC,
NFP, TE COM,
TE C-AECOM Pacific JV

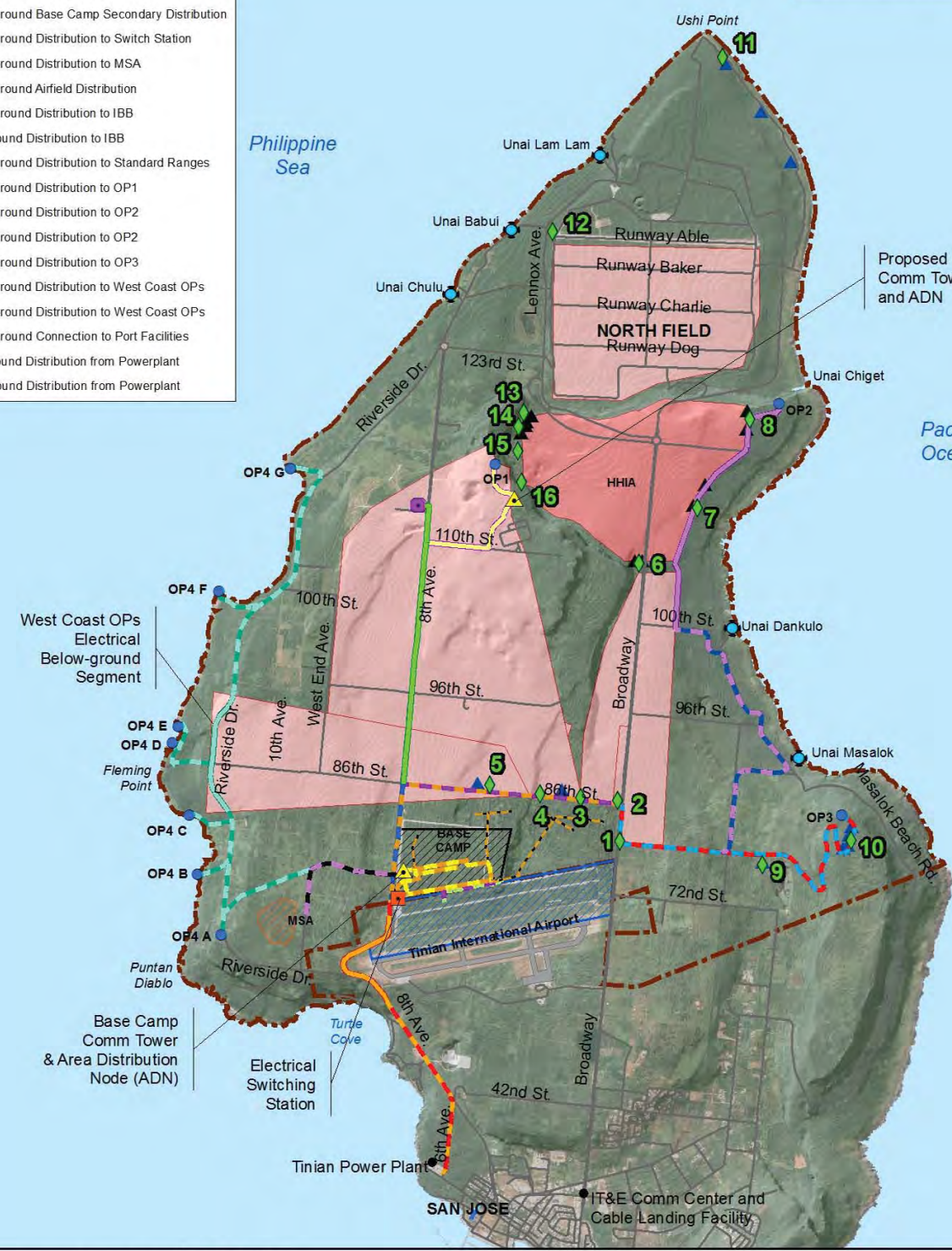


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- Proposed Electrical Power Distribution**
- Proposed Above-ground Base Camp Primary Distribution
 - Proposed Above-ground Base Camp Secondary Distribution
 - Proposed Above-ground Distribution to Switch Station
 - Proposed Above-ground Distribution to MSA
 - Proposed Above-ground Airfield Distribution
 - Proposed Below-ground Distribution to IBB
 - Existing Above-ground Distribution to IBB
 - Proposed Above-ground Distribution to Standard Ranges
 - Proposed Below-ground Distribution to OP1
 - Proposed Above-ground Distribution to OP2
 - Proposed Below-ground Distribution to OP2
 - Proposed Above-ground Distribution to OP3
 - Proposed Below-ground Distribution to West Coast OPs
 - Proposed Above-ground Distribution to West Coast OPs
 - Proposed Above-ground Connection to Port Facilities
 - Existing Below-ground Distribution from Powerplant
 - Existing Above-ground Distribution from Powerplant

Notional Depiction Only



**Tinian Base Camp and Ranges
Proposed Electrical Utilities
Routing and Facilities**

0 2,000 4,000 6,000 Feet
0 500 1,000 1,500 2,000 Meters

PREPARED BY:
AE/COM on behalf of
Naval Facilities Engineering Command
RF30F

NAVFAC
Naval Facilities Engineering Command

Coordinate System: UTM/Zone 55 North
Projection: Transverse Mercator
Datum: D NAD 83

Date: 9/10/2014

LEGEND

- Existing IBB Electrical Transformer
- Proposed Base Camp Switching Station
- Communication Tower (200 ft.) & ADN
- Shore-Powered Range Communications*
- Proposed Range Observation Towers*
- Artillery Gun Positions
- Mortar Positions
- Potential Amphibious Landing Beaches
- Existing Roads
- Live-Fire Ranges (Alt 2)
- High Hazard Impact Area
- Proposed MSA Area
- Proposed Military Airfield Operations Area
- Proposed Base Camp Boundary
- Military Lease Area

* All Observation Posts (OP) include shore-power communication and electrical connections. Shore-power phones are fed power through the communication line, no secondary electrical is needed.

TINIAN

San Jose

Data Sources: NAVFAC PAC, MFR/TECOM, TEC-AECOM Pacific JV

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