FINAL
(VERSION 4)

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS JOINT MILITARY TRAINING NOISE STUDY

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

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EXECUTIVE SUMMARY

ES.1 OVERVIEW

The purpose of this report is to provide specific information related to noise 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 map of the CNMI, with a focus on Tinian, Saipan, and Pagan. Noise is expected on Tinian and Pagan because the proposed activities would be based on the two islands. Although no activity would be planned to occur on Saipan, noise generated by live-fire exercises on Tinian would likely be heard on Saipan under some weather conditions.

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 Environmental Impact Statement/Overseas Environmental Impact Statement (CJMT EIS/OEIS) for the proposed action. Proposed actions on Tinian are unit level training requirements, while actions on Pagan focus on combined level training requirements.

ES.2 METHODOLOGY

This study evaluates and reports potential noise impacts that would be generated by the proposed action and an evaluation of potential environmental effects associated with the CJMT EIS/OEIS proposed action and alternatives. This noise study was prepared in adherence to the Noise Control Act of 1972, U.S. Occupational Safety and Health standards, and Department of the Navy instructions; Chief of Naval Operations Instruction (OPNAVINST) 3550.1A, Range Air Installations Compatible Use Zones Program for air-to-ground operations at training areas and OPNAVINST 11010.36C, Air Installations Compatible Use Zones Program for airfield operations (Department of the Navy 2008a, b). Results of this study will be used to provide information to support the CJMT EIS/OEIS being prepared in compliance with the National Environmental Policy Act.

On Tinian, three alternatives were identified for unit level training and each varies in the number and location of some of the ranges. However, the same amount of ammunition would be used regardless of the alternative; aircraft operations would also be the same for all three alternatives, noise effects would be similar in areas where noise may be heard outside of the Military Lease Area. This applies to construction, traffic, and waterborne activities. For these reasons, the alternatives are described together with the differences pointed out for each noise source. Additionally, because Tinian lies only 3 miles (6 kilometers) from Saipan, some noise generated from proposed operations could be heard on Saipan; where that is the case, they were identified in this report. For the two Pagan combined level alternatives, the same approach was taken—when differences between the two alternatives occurred, they were identified and reported. The same amount of ammunition would be used regardless of the alternative and aircraft operations would be similar. Pagan does not support long-term residences, schools, churches, or hospitals so there is no discussion of noise impacts on people and human points of interest.

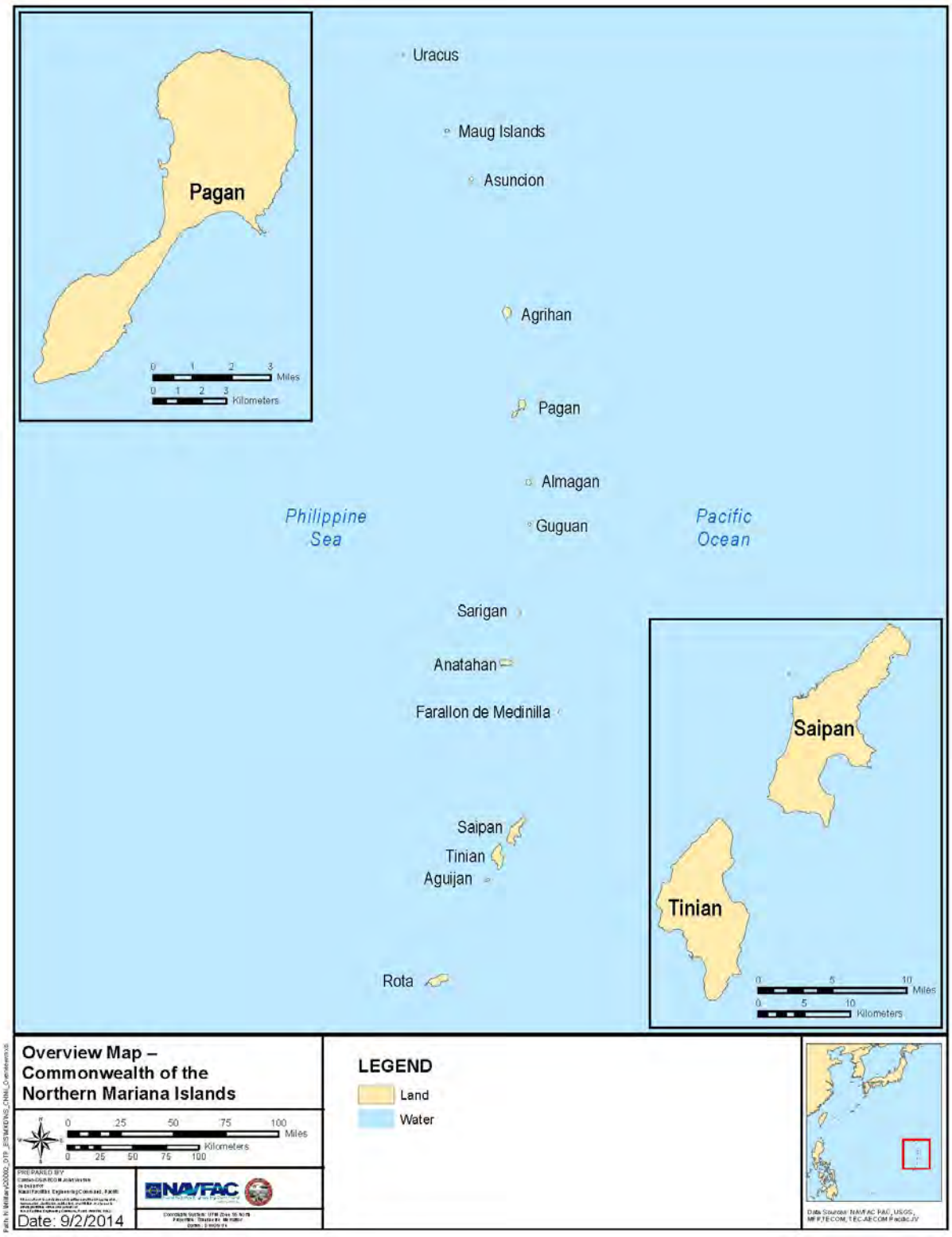

Figure ES-1 Overview of the CNMI

ES3.1 ES.3 RESULTS

A brief summary of results for potential construction and operational generated noise for both Tinian and Pagan alternatives are provided in this section. Refer to Chapter 6 for detailed descriptions of the noise results on Tinian, and Chapter 7 for the results on Pagan.

TINIAN

ES3.1.1 Construction

On-shore construction projects would occur primarily in the Military Lease Area, but some construction projects would occur at the Tinian port as well. For construction within the Military Lease Area, residents in San Jose and on Saipan would be too far from the source to hear any additional noise above background levels. However, proposed construction at the port could expose the nearest residences in San Jose to noise levels up to 65.6 decibels during daylight hours, which is below the U.S. Environmental Protection Agency recommended noise level of 75 decibels. These noise levels would be short-term in duration and occur primarily when the loudest construction activities occur, such as site grading and excavation.

Underwater noise from construction would occur at Unai Chulu when the amphibious vehicle approach areas are being constructed. However, this noise would be short term and occur within the intertidal environment of Unai Chulu where the noise environment would be dominated by surf noise.

In summary, noise generated by construction activities would be short term and would result in less than significant impacts on people and other receptors on Tinian or Saipan.

ES3.1.2 Operations

ES3.1.2.1 Live-Fire Training

Noise contours generated by small-caliber weapons training would be confined to the Military Lease Area and there would be no population exposed to noise levels greater than 65 decibels A-weighted Day-Night Average Sound Levels. For Peak noise, about 411 acres (166 hectares) under Alternative 1 and 600 acres (243 hectares) under Alternatives 2 and 3 lie outside the Military Lease Area over land. However, this area lies entirely within Tinian International Airport property and no populations would be affected.

For large-caliber noise, only 4% of total large-caliber weapons operations would be conducted during nighttime hours (i.e., between 10:00 p.m. and 7:00 a.m.). For C-weighted Day-Night Average Sound Levels, noise over 62 decibels would not reach any residences on Tinian or Saipan and no population would be affected. No representative points of interest would be exposed to Peak noise levels greater than 110 decibels during neutral weather conditions so complaint risks are low. Under unfavorable weather conditions, points of interest outside the Military Lease Area would have Peak noise levels generating mostly low-complaint risk areas, with the exception of Marpo Valley northeast of Marpo Heights, which would have moderate complaint risk levels. Additionally, regardless of the alternative, when weather conditions are unfavorable, the following points of interest on Saipan would be exposed to Peak noise levels between 115 and 130 decibels (C-weighted): two residential areas, two schools, one resort, and one other (Agingan Point). It is probable that these noise levels would generate moderate complaint risks. In summary, live-fire training noise impacts would be less than significant.

ES3.1.2.2 Aircraft Operations

The proposed action involves military aircraft operations including rotary- and fixed-wing transport aircraft, attack helicopters, and fighter aircraft. Proposed annual airfield operations would total 11,664

and generate noise contours that extend outside the Military Lease Area. These operations have the potential of exposing approximately 10 homes and 40 people in Marpo Heights to noise levels greater than 65 decibels A-weighted Day-Night Average Sound Levels. These would be the only residential points of interest exposed to noise levels greater than 65 decibels A-weighted Day-Night Average Sound Levels. There would be no population exposed to noise levels with the potential to cause hearing loss. Classroom learning impacts would be well below recommended levels because the schools are sufficiently far away from the noise generating activities. Speech interference and sleep disturbance would be possible in Marpo Heights and Marpo Valley. Although there would be only about 10 homes affected, these noise increases would be considered significant.

ES3.1.2.3 Waterborne Activities

Waterborne noise would be generated at and near the beaches proposed for use and in the Port of Tinian. At the beaches, Landing Craft Air Cushion vessels and Amphibious Assault Vehicles would create elevated noise levels. However, these levels would not be loud enough to affect human receptors at beaches outside the Military Lease Area on Tinian or on Saipan. Amphibious Assault Vehicles would also operate within the port and create noise levels similar to those made by heavy trucks. Also in the port, noise would be produced before and after exercises when personnel and equipment would be transported to and from Tinian for the exercises. These noise levels would be consistent with port operations, be short term in nature, and only last while actively unloading and loading equipment and personnel; therefore, noise levels would be less than significant.

ES3.1.2.4 Traffic

Vehicular traffic associated with the proposed action would include trips between the port and base camp by vehicles belonging to each unit arriving for training and by the permanently-based vehicles for range operations and maintenance. Noise from vehicles operating in the port during arrival and departure activities would create traffic noise with a maximum average level of 64 decibels at 50 feet (15 meters). All major traffic would normally occur only just before and immediately after a training exercise when traffic would increase. Noise levels during these Peak traffic periods would be less than significant.

ES3.1.2.4 Occupational Noise

Occupational noise exposure prevention procedures such as hearing protection and monitoring would be required at the Military Lease Area in compliance with all applicable Occupational Safety and Health Administration and U.S. military occupational noise exposure regulations. Because strict adherence to these procedures and regulations is required of military and civilian personnel, no significant impacts would be expected.

ES3.2 PAGAN

ES3.2.1 Construction

Construction activities for the Pagan alternatives, including all components such as targets, trails, bivouac area, ranges, and airfield improvements would not affect any populations on Pagan, as there are no permanent residents on Pagan. No underwater construction is planned. Construction noise impacts would be less than significant on Pagan.

ES3.2.2 Operations

ES3.2.2.1 Live-Fire Training

Noise would be generated on Pagan by both small- and large-caliber munitions expenditures, with up to 665,500 small-caliber rounds and 27,400 large-caliber rounds fired per year. For small-caliber weapons noise, both Pagan alternatives would have the potential to expose approximately 1,811 acres (732 hectares) under Pagan Alternative 1 and 2,066 acres (837 hectares) under Alternative 2 to A-weighted Day-Night Average Sound Levels, respectively. Peak noise levels would affect 8,500 acres (3,500 hectares) under both alternatives. Pagan Alternatives 1 and 2 would expose about 8,883 acres (3,595 hectares) and 8,344 acres (3,377 hectares) to noise levels 62 decibels and greater, respectively. Noise levels on Pagan would be increased by live-fire operations by small- and large-caliber weapons; however, there is no population exposed to these elevated noise levels so impacts would be less than significant.

ES3.2.2.2 Aircraft Operations

Subsonic (i.e., flying slower than the speed of sound) aircraft operational noise levels of 65 decibels A-weighted Day-Night Average Sound Levels and greater would encompass 4,761 acres (1,928 hectares). Similar to live-fire noise levels, no people would be exposed to these elevated noise levels. Sonic booms associated with supersonic operations (i.e., traveling at or faster the speed of sound) would be rare, occurring about 30 times per year. This equates to about 2.5 sonic booms per month, for approximately 1 minute each time. Because the occurrences would be rare, and not impact any populations, subsonic and supersonic activities would result in less than significant impacts from aircraft operations.

ES3.2.2.3 Waterborne Activities

Waterborne operational noise by landing craft and amphibious assault vehicle operations would be similar to those described for Tinian, but operate in the waters around Pagan. No human receptors would be exposed to these increased, but short-term, noise levels; therefore, less than significant impacts from waterborne activities are anticipated.

ES3.2.2.4 Traffic

Traffic would be minimal on Pagan and there would be no significant noise impacts.

ES3.2.2.5 Occupational Noise

Occupational noise exposure prevention procedures such as hearing protection and monitoring would be required in compliance with all applicable Occupational Safety and Health Administration and U.S. military occupational noise exposure regulations. Because strict adherence to these procedures and regulations is required of military personnel, no significant impacts would be expected.

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Commonwealth of the Northern Mariana Islands
Joint Military Training
Noise Study

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ACRONYMS AND ABBREVIATIONS

ADNL	A-weighted Day-Night Average Sound Levels
CDNL	C-weighted Day-Night Average Sound Levels
CJMT	CNMI Joint Military Training
CNMI	Commonwealth of the Northern Mariana Islands
dB	decibel
EIS	Environmental Impact Statement
LUPZ	Land Use Planning Zone
OEIS	Overseas Environmental Impact Statement
OPNAVINST	Chief of Naval Operations Instructions
RTA	Range and Training Area
U.S.	United States

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CHAPTER 1
INTRODUCTION

The purpose of this report is to provide information regarding the noise 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 Environmental Impact Statement/Overseas Environmental Impact Statement (CJMT 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 for the noise study to meet the proposed action. Figure 1.1-1 provides an overview of the CNMI with a focus on Tinian, Saipan, and Pagan.

This report presents the existing noise environment and compares it to noise generated by proposed live-fire exercises, aircraft operations, construction, traffic, and occupational considerations. The study includes discussions and analyses about noise and the various metrics used to describe noise, the models used to calculate noise, the effects of noise, the methodology of determining impacts, and the results of the analyses. The focus of this study is to report potential effects to humans from proposed activities.

The results of this study will be applied to biological and cultural resources, as well as other applicable resources to evaluate impacts. This evaluation will be provided in the CJMT EIS/OEIS.

1.1 DEFINITION OF RESOURCE

1.1.1 Sound

Sound is the stimulation of our hearing organs produced by sound waves transmitted through the air or other medium. Sound waves are small pressure fluctuations caused by vibrations. Two key measurements of these pressure fluctuations are how often fluctuations change, or frequency, and the magnitude of the pressure changes, or loudness. Human hearing generally covers fluctuations between frequencies of 20 and 20,000 hertz, with higher frequencies interpreted as having a higher pitch. Frequency is a measure of wave cycles per unit of time. Cycles per second, expressed as hertz, is the standard unit of measurement for sound wave frequency. Sound waves move outward in all directions from the source, dissipating as the distance from the source lengthens (inversely proportional to the square of the distance to the source). Sound waves can also be affected and dissipated or enhanced by wind, ground cover, and temperature; and high frequency sounds dissipate more quickly than low frequency sounds.

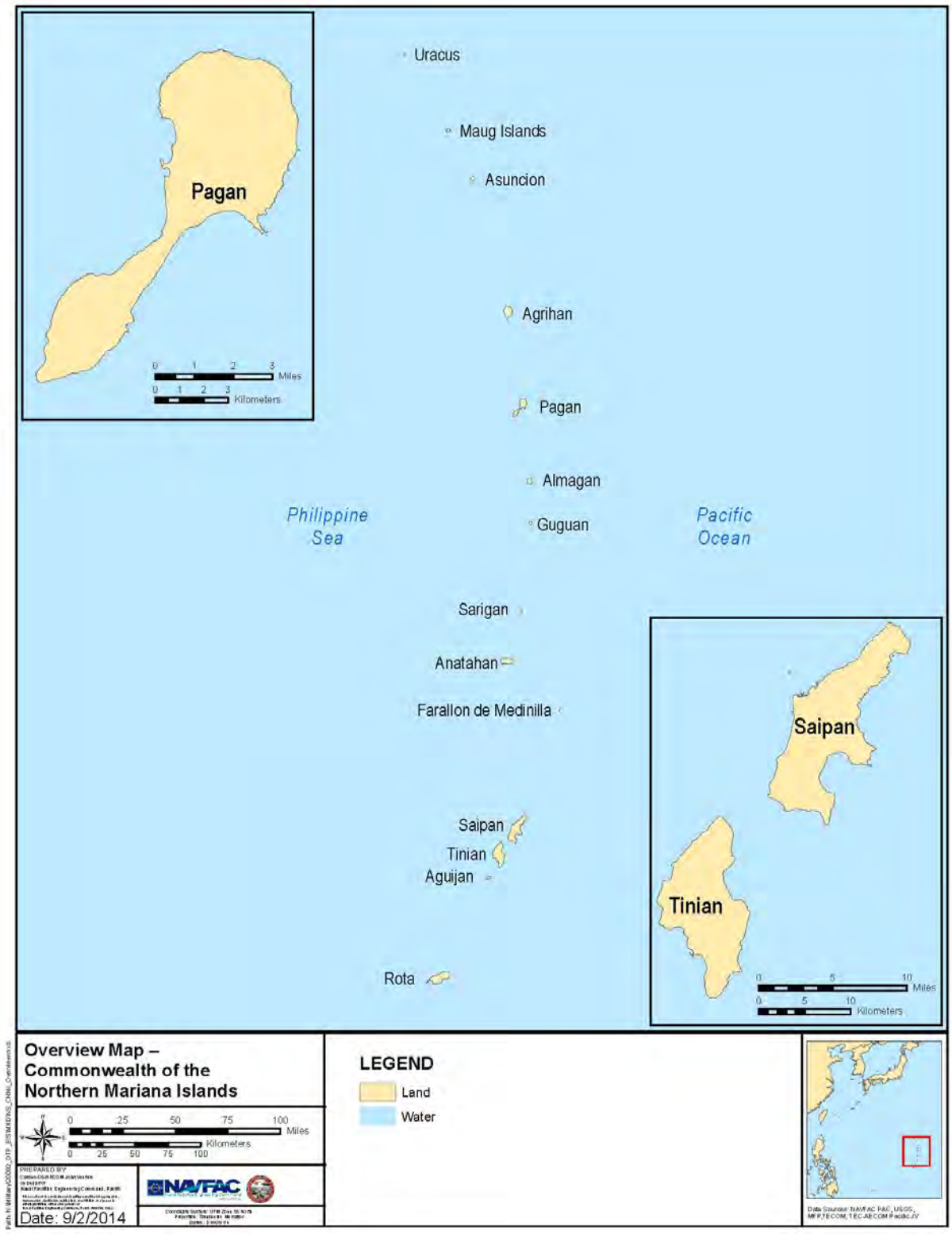

Figure 1.1-1 Overview of the CNMI

Typically measured in decibels, loudness measures the relative magnitude of a sound. The decibel is a logarithmic unit of measurement that expresses the magnitude of a physical quantity, like sound, relative to a specified or implied reference level based on atmospheric pressure. Because decibel expresses a ratio of two quantities with the same unit, it is a dimensionless unit. Decibels are often abbreviated as dB and modified by the weighting factors A or C as described in Section 1.1.2 as dBA or dBC. In this study, decibels are spelled out in the text but some figures and tables may use the abbreviations for brevity.

Not all people are affected the same way by the same sounds. In varying situations, common sounds can become unwanted sound and interfere with our speech, disturb our sleep, or interrupt a routine task. When this occurs, these sounds become noise (Army Center for Health Promotion and Preventive Medicine 2006). Just as some people find hard rock music annoying, others find it enjoyable. Figure 1.1-2 shows typical intensity levels for common sounds.

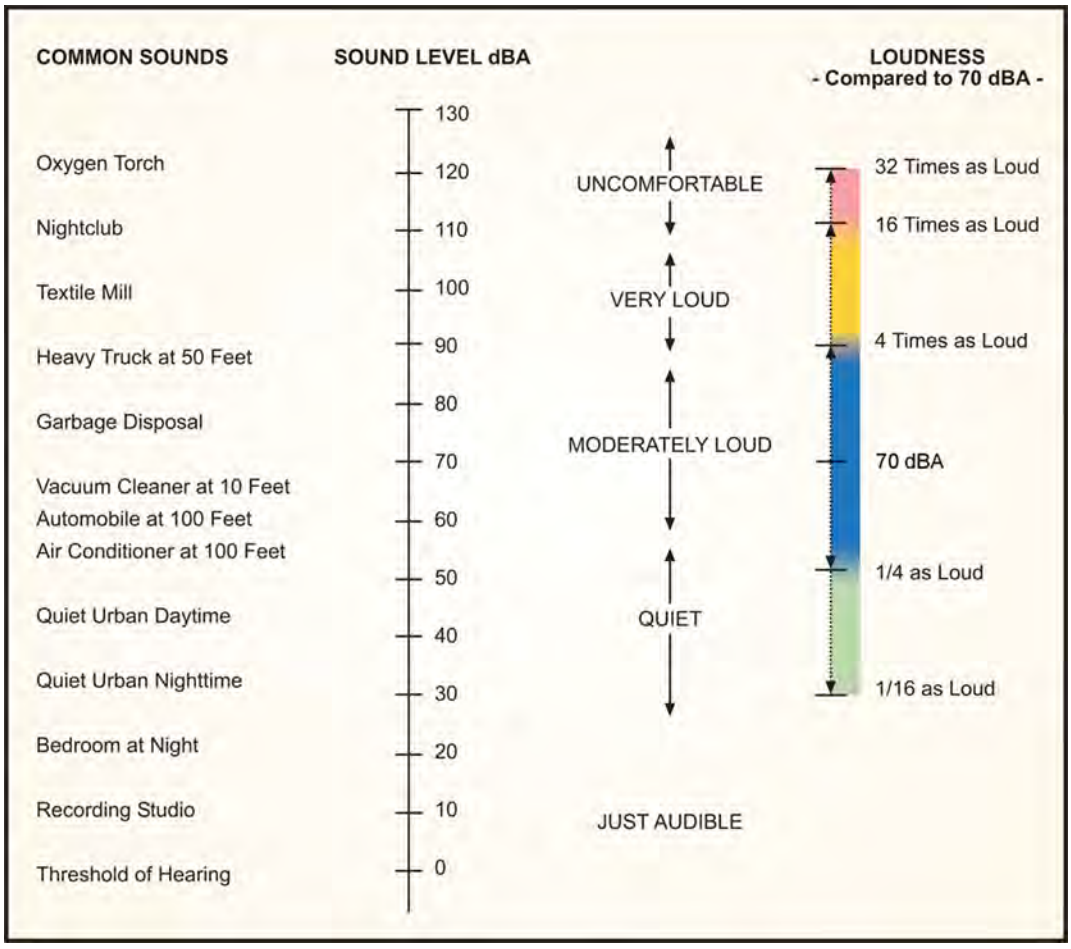

Figure 1.1-2 A-weighted Sound Levels of Common Sounds
Sources: Derived from Harris (1979) and Federal Interagency Committee on Aviation Noise (1997).

Because sound-level intensity is logarithmic, the decibel levels of multiple sources of sound are not additive. In fact, doubling a noise source would only generate a 3-decibel increase. For example, a receptor under a flight path of one jet airliner 500 feet (152 meters) overhead would experience 115 decibels; if two jetliners passed side-by-side, the receptor would experience 118 decibels not 230 decibels. In addition, the decibel level of a sound decreases (or attenuates) exponentially as the distance from the source increases. For a single point source, like a construction bulldozer, the sound level

decreases by approximately 6 decibels for each doubling of distance from the source. Sound that originates from a linear, or line source, such as a passing vehicle, attenuates by about 3 decibels for each doubling of distance where no other features such as vegetation, topography, or obstructions absorb or deflect the sound. Depending upon their nature, the ability of such features to reduce noise levels may range from minimal to substantial.

Underwater noise differs from airborne noise because a sound wave's principal characteristics such as speed, intensity, and frequency depend upon the density of the medium through which the sound wave travels. For purposes of this analysis, the most applicable mediums are air and water. For example, the density of air at sea level and 77 degrees Fahrenheit (25 degrees Celsius) is about 2.0 pounds per cubic yard (1.2 kilograms per cubic meter), compared to seawater which has an average density of 1,729 pounds per cubic yard (1,025 kilograms per cubic meter). Seawater is almost 1,000 times denser than air, and as a result, sound measurements need to take into account the media through which it is traveling. To measure the intensity of sound in the air, the sound pressure measurement of 20 micro Pascal was applied. This is the lowest sound pressure that is perceptible to the human ear. For water, scientists have agreed to use a sound pressure of 1 micro Pascal to measure the intensity of noise underwater; this approach was used in the analysis.

1.1.2 Frequency Weighting (A and C weighting)

A number of factors affect the manner the human ear perceives sound. These include the actual noise level, the frequencies involved, the period of noise exposure, and changes or fluctuations in noise levels during exposure. There are several noise frequency weighting measures to correlate the frequency characteristics from typical noise sources to the perception of human ears. The most common frequency measures include the following:

- *A-weighted Scale*. The human ear cannot perceive all pitches or frequencies equally well; these measures are adjusted or weighted to compensate for the human lack of sensitivity to low-pitched and high-pitched sounds. This adjusted unit is known as the A-weighted decibel. Evaluation of noise sources related to transportation (e.g., aircraft and vehicles) and to small-caliber weapons firing (up to .50-caliber) uses the A-weighted scale.
- *C-weighted Scale*. The C-weighted scale measures the low-frequency components of noise. It is used for evaluating impulsive noise and vibrations generated by sonic booms, explosive charges, and large-caliber weapons, such as artillery and mortars.

Noise levels from one scale cannot be added or converted mathematically to levels in another weighting scale.

1.1.3 Noise Metrics

Because of continuous versus impulsive types of noise, variations in frequency and period of noise exposure, and the fact that the human ear cannot perceive all pitches and frequencies equally well, noise from military operations is measured using several metrics that reflect different noise characteristics. Common metrics used in this CJMT Noise Study are as follows:

- *Day-Night Average Sound Level* – This metric is the energy-averaged sound level measured over a 24-hour period, with a 10-decibel penalty added to noise events occurring between 10:00 p.m. and 7:00 a.m. (environmental nighttime hours). Day-Night Average Sound Levels are obtained by averaging the sound exposure values for a given 24-hour period, with louder values receiving emphasis. This is the preferred noise metric of the U.S. Department of Housing and Urban Development, Federal Aviation Administration, U.S. Environmental Protection Agency, and

Department of Defense. These agencies use this metric for evaluation of land use compatibility and as a measurement of the annoyance of an affected population. The 10-decibel penalty is added for night operations because noise is considered to be more annoying than similar noise levels during the daytime. Aircraft and small-caliber weapons noise levels are measured using the A-weighted scale as denoted by A-weighted day-night average sound level or ADNL. For large-caliber and explosive munitions, the C-weighted scale is applied and is denoted as C-weighted day-night average sound level or CDNL).

- *Peak Noise Level* – For impulsive sounds, the true instantaneous sound pressure is of interest. For munitions, explosions, and sonic booms this is the Peak pressure of the shock wave and can be represented in decibels and/or in physical units of pounds per square foot. Peak noise levels do not use either A- or C-weighting. The Peak metric is typically used for small-caliber and large-caliber weapons-generated noise and is measured by the single event Peak level that is likely to be exceeded by 15% of the firing events, or Peak 15. Large-caliber weapons generate low-frequency noise such that weather conditions can influence how much sound will travel. Unfavorable weather conditions allow for greater noise propagation by wind blowing from the noise source towards receptors. Neutral weather conditions exhibit very light or no winds, which do not propagate as strongly as unfavorable conditions. Small-caliber weapons are higher frequency and not as influenced by weather conditions.

- *Sound Exposure Level* – This metric represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. This metric provides a measure of total sound exposure of the entire acoustic event, but it does not directly represent the sound level heard at any given time (like maximum sound level). Analysis of speech interference and sleep disturbance employs this exposure metric.

- *Equivalent Sound Level* – For longer periods of time, total sound is represented by the equivalent continuous sound pressure level. This is the constant noise level that would result in the same total sound energy (or the same energy used in sound exposure level) being produced over a given period. This metric is used to evaluate noise levels at representative points of interest that occur during a 9-hour time period.

- *Maximum Sound Level* – The highest A-weighted integrated sound level measured during a single event, in which the sound level changes value with time (e.g., an aircraft overflight), is called the maximum A-weighted sound level. For instance, during an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. This metric defines the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is generally defined as 1/8 second, and is denoted as "fast" response (American National Standards Institute 1988). Slowly varying or steady sounds are generally measured over a period of 1 second, denoted "slow" response. This metric will be used in speech interference analysis, which is defined and discussed in Section 3.2. Although maximum sound level provides some measure of the intrusiveness of the event, it does not completely describe the total event because it does not account for the length of time that the sound is heard.

- *Number of Events Above a Threshold Level* – This metric provides the total number of noise events that exceed a selected noise level threshold during a specified length of time (Department of Defense Noise Working Group 2009). For this analysis, a point of interest was identified, the noise level threshold defined, and then the number of events that exceed the threshold for that particular point of interest presented. For example, the noise environment at a point of interest

where 10 events exceed a sound exposure level of 90 decibels, over a given period of time, would be represented by the nomenclature NA90SEL (10).

Underwater Noise – Noise produced and transmitted under water is usually expressed in terms of the root-mean-squared sound pressure levels. This method takes the square root of the average squared sound pressure values over a time interval. The duration of this time interval can have a strong effect on the measured root-mean-squared sound pressure for a given sound, especially where pressure levels vary significantly, as during an impulse (Department of the Navy 2013).

CHAPTER 2
NOISE MODELING

The following is a summary of the methodology used to analyze the potential noise impacts associated with the proposed action. This noise analysis addresses changes in the noise environment resulting from the proposed action and uses modeling software to determine the breadth of impacts from noise generated by construction activities and training operations.

The time of day is important for noise modeling because noise generated by military operations between 10:00 p.m. and 7:00 a.m. is penalized 10 decibels. This penalty accounts for greater noise sensitivity of receptors during environmental nighttime hours.

Noise generated by construction and operations at the airfields, in the airspace, and on the training facilities cannot be calculated using a single modeling software and the results cannot be combined because different noise metrics apply to the various activities. This section describes the modeling software used depending on the noise-generating source.

For some noise generating activities such as landing craft air cushion vehicles, amphibious assault vehicles, and landing boat operations, analytical calculations and/or empirical methods were used. This approach was taken because there are no applicable noise models for these waterborne activities.

2.1 CONSTRUCTION

Construction noise was calculated using the Federal Highway Administration's Road Construction Noise Model. Construction noise is generated by the use of heavy equipment on job sites and is short-term in duration (i.e., only during the construction period). Heavy equipment use normally occurs sporadically throughout daytime hours. The Road Construction Noise Model uses the list presented in Table 2.1-1 for representative samples of construction equipment and associated noise levels, adjusted for the percentage of time equipment would typically be operated at full power at a construction site. The noise model averages these samples and presents the A-weighted Maximum Sound level at 50 feet (15 meters).

Table 2.1-1. Example Noise Levels of Typical Construction Equipment

Equipment Description	*Impact Device*[1]	*Percent Equipment Use Factor*[2]	*A-weighted Maximum Sound Level at 50 feet*[3] *(in decibels)*	*Number of Data Samples*[4]
Backhoe	No	40	78	372
Clam Shovel (dropping)	Yes	20	87	4
Compactor (ground)	No	20	83	57
Compressor (air)	No	40	78	18
Concrete Mixer Truck	No	40	79	40
Concrete Saw	No	20	90	55
Crane	No	16	81	405
Dozer	No	40	82	55
Dump Truck	No	40	76	31
Excavator	No	40	81	170
Front End Loader	No	40	79	96
Generator	No	50	81	19
Impact Pile Driver	Yes	20	101	11
Jackhammer	Yes	20	89	133

Table 2.1-1. Example Noise Levels of Typical Construction Equipment

Equipment Description	*Impact Device*[1]	*Percent Equipment Use Factor*[2]	*A-weighted Maximum Sound Level at 50 feet*[3] *(in decibels)*	*Number of Data Samples*[4]
Pavement Scarifier	No	20	90	2
Paver	No	50	77	9
Roller	No	20	80	16
Scraper	No	40	84	12
Vibratory Pile Driver	No	20	101	44

Note: [1]Indication whether or not the equipment is an impact device.
[2]For modeling purposes, this acoustical use factor used the percent of time the equipment is running at full power at a typical construction site.
[3]This is the actual measured noise level at 50 feet (15 meters) for each piece of equipment, based on hundreds of measurements, and averaged. Performed at the Central Artery/Tunnel, Boston, Massachusetts work sites.
[4]Samples were averaged to derive the noise levels.
Source: U.S. Department of Transportation 2006.

Construction noise varies greatly depending on the construction process, type, and condition of equipment used, and layout of the construction site. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment like impact devices such as jackhammers and pile drivers.

With the exception of safety standards for construction workers, the Department of Defense does not have a formal policy for management of construction noise but follows Occupational Health and Safety Act standards. Construction noise is typically confined within a military installation's boundary, occurs during daylight hours, and is only present during the period of construction. There are no local CNMI requirements for construction noise that would apply to the proposed construction activities.

2.2 OPERATIONS

2.2.1 Munitions

For this study, the following software models were used to evaluate noise levels generated at the small- and large-caliber ranges. For modeling purposes, weapons up to and including .50 caliber are defined as small-caliber weapons and 20 mm and larger are defined as large-caliber weapons. Live-fire ordnance noise was calculated using the Small Arms Range Noise Assessment Model (Version 2.6.2003-06-06) and the Blast Noise Impact Assessment modeling program (Version 2009-11-30). Both of these models were developed by the U.S. Army and are the standard for calculating range noise.

- The Small Arms Range Noise Assessment Model calculates and displays noise contour bands (in A-weighted Day-Night Average Sound Level) for firing operations at small-caliber ranges (Army 2003). It considers the type of weapons and ammunition, number of rounds fired, range attributes such as size and barriers, time of day fired, and direction of both muzzle and projectile. It also calculates the Peak noise levels and displays contour bands.
- The model BNOISE2 calculates and portrays noise contour bands for C-weighted Day-Night Average Sound Levels events for large-caliber weapons (Army 2009). It considers the weapons, ammunition, rounds fired, time of day fired, range size, and direction of both the muzzle and projectile. Peak noise levels under unfavorable and neutral weather conditions are also calculated using BNOISE2.

2.2.2 Aircraft

It is important to note that all of the noise models employed to analyze aircraft noise draw from a database of actual aircraft noise measurements and sonic booms. These models are most appropriate for comparing "before-and-after" noise impacts, which would result from proposed changes or alternative actions, when the calculations are made in a consistent manner. Current aircraft operations at the airport, including civilian and occasional military aircraft have been modeled. The proposed action models the aircraft proposed for this action added to the existing baseline operations to predict the future noise environment. The models allow noise predictions without the need for actual implementation or noise monitoring for the proposed action and alternatives.

2.2.2.1 Airfield and Airspace

The Department of Defense uses several software programs to model noise exposure for operations generated by military aircraft and engine run-up activities, as well as any other aircraft. NOISEMAP is the primary program for operations around an airfield and is the parent program used for plotting noise contours. Noise contours generated by NOISEMAP are used in support of the Air Installation Compatible Use Zone program and National Environmental Policy Act documentation.

For this noise study, aircraft noise was modeled using a variety of programs:

- NOISEMAP to calculate noise levels around the Tinian International Airport, North Field, and the Pagan airfield (i.e., the airfield environment).
- MRNMAP for aircraft activities in Special Use Airspace (i.e., outside the airfield environment).
- Rotorcraft Noise Model was used for rotary-wing landing zones, drop zones, and general hovering activity.

NOISEMAP models fixed-wing aircraft and Rotorcraft Noise Model is used for rotary-wing operations at landing zones. Aircraft can approach landing zones from any direction but during landings and take-offs, the aircraft need to point into the wind. Included with NOISEMAP is a plotting software program, NM_PLOT, which combines and presents contours, generated by NOISEMAP, MRNMAP, and Rotorcraft Noise Model, within the same figure.

2.2.2.2 Subsonic

Subsonic flight activity includes aircraft operations flying at less than the speed of sound. In Special Use Airspace and over the ranges the model considers the following factors in the noise analysis; flight operations, flight durations, flight areas and/or tracks, flight profiles, and climatological data. Modeled flight operations are summarized in each alternatives' section. For the defined airspace units, noise levels were calculated from the MRNMAP program, using similar algorithms as NOISEMAP. The plotting software, NMPLOT can plot the outputs from NOISEMAP, Rotary Noise Model, and MRNMAP on the same figure as combined noise contours. This noise study presents plotted and tabulated levels for both baseline and proposed operations.

2.2.2.3 Supersonic

Modeling of supersonic flight activity, aircraft traveling at or greater than the speed of sound, considers the following factors: airspace geometry, flight operations, flight durations, flight areas, flight profiles (altitude distribution and maneuver characteristics), and atmospheric effects. Very few supersonic operations are proposed and this Noise Study just identifies the number of booms per month. Supersonic flight is proposed in the area around Pagan, but not around Tinian.

2.2.3 Traffic Noise

Traffic noise was calculated using Traffic Noise Model 2.5. On a well-traveled highway, motor vehicles can be described as an acoustic line source. While the noise from an individual vehicle is transient in nature, heavy use on most roadways makes the road a continuous noise source. Construction vehicle noise to and from the construction sites, as well as operational vehicle use to and from the Military Lease Area, are included in this analysis. The Federal Highway Administration is the principal agency managing transportation noise.

CHAPTER 3
NOISE EFFECTS

This section discusses the effects of noise on humans, including psychological effects such as annoyance, speech interference, effects on children and learning, and sleep disturbance, as well as physical effects like hearing loss and nonauditory health effects (e.g., stress response, blood pressure, and heart rate).

3.1 ANNOYANCE

The primary effect of range and aircraft noise on exposed communities is long-term annoyance, defined by the U.S. Environmental Protection Agency as any negative subjective reaction on the part of an individual or group. The scientific community has adopted the use of long-term annoyance as a primary indicator of community response and there is a consistent relationship between Day-Night Average Sound Levels and the level of community annoyance (Federal Interagency Committee on Noise 1992). Resulting from annoyance level, land use compatibility criteria have been established in noise zones for areas surrounding airports and military ranges.

3.2 SPEECH INTERFERENCE

Speech interference can cause disruption of routine activities, such as enjoying radio or television programs, telephone use, or family conversation, giving rise to frustration or irritation. In extreme cases, speech interference may cause fatigue and vocal strain to individuals who try to communicate over the noise. In this noise study, speech interference is measured by the number of daily outdoor events (from 7:00 a.m. to 10:00 p.m.) that exceed 90 decibels maximum sound level at selected points of interest as recommended by the Department of Defense Noise Working Group (Department of Defense Noise Working Group 2013a). This metric also accounts for noise levels with windows opened or closed.

3.3 CLASSROOM INTERRUPTIONS

Research suggests that environments with sustained high background noise can have variable effects, including effects on learning and cognitive abilities and various noise-related physiological changes for children. Research on the impacts of noise on the cognitive abilities of school-aged children has received attention in recent years. Several studies suggest that noise can affect the academic performance of schoolchildren. Physiological effects in children exposed to noise and the potential for health effects have been the focus of limited investigation (Department of Defense Noise Working Group 2009).

Analyses for school-aged children are similar to speech interference by using the indoor number of events exceeding 50 decibels maximum sound level, but also an added restriction of using an outdoor Equivalent Noise Level of 60 decibels over 9 hours. This represents a level that a person with normal hearing can clearly hear a speaker (teacher) speaking at a level of 50 decibels within a classroom setting.

3.4 SLEEP DISTURBANCE

For this analysis, sleep disturbance uses the sound exposure level noise metric and calculates the probability of awakening from single noise events. These are based upon the particular type of weapon or aircraft and include the bullet size in the case of small-caliber weapons, the amount of explosives in large-caliber rounds, and aircraft flight profile, power setting, speed, and altitude. All of these are evaluated from the source relative to the receptor. The results are then presented as a percent probability of people awakening (U.S. Environmental Protection Agency 1974).

3.5 POTENTIAL HEARING LOSS

People living in high noise environments for an extended period (40 years is typically used) can be at risk for hearing loss called Noise Induced Permanent Threshold Shift. The Noise Induced Permanent Threshold Shift defines a permanent change in hearing level, or threshold, caused by exposure to noise (U.S. Environmental Protection Agency 1982). There is no known evidence that a Noise Induced Permanent Threshold Shift of less than 5 decibels is perceptible or has any practical significance for the individual affected. According to U.S. Environmental Protection Agency (1974), changes in hearing level of less than 5 decibels are generally not considered noticeable or significant. The preponderance of available information on hearing loss risk is from the workplace (i.e., adults), to employees exposed to continuous noise throughout the day, for many years.

The Department of Defense policy directive requires that hearing loss risk be estimated for any at-risk population, defined as the population exposed to noise levels 80 decibels and greater (Department of Defense Noise Working Group 2013b). The Department of Defense generally uses the 80 decibels Day-Night Average Sound Level as a threshold to identify the exposed population who may be at the most risk of possible hearing loss from military-generated noise (U.S. Environmental Protection Agency 1982; Department of Defense Noise Working Group 2013b). However, it should be recognized that characterizing noise exposure in terms of Day-Night Average Sound Level overestimates hearing loss risk but suffices when nighttime operations are 5% or less than the total operations. When nighttime operations are greater than 5%, the Equivalent Noise Level over 24 hours is recommended for calculating potential hearing loss because hearing loss is a physical phenomenon due to the sound level and independent of annoyance.

3.6 NONAUDITORY HEALTH EFFECTS

Studies have been conducted to examine the nonauditory health effects of aircraft noise exposure, focusing primarily on stress response, blood pressure, birth weight, mortality rates, and cardiovascular health. Exposure to noise levels produced by military operations that are higher than those normally in the community can elevate blood pressure and stress hormone levels. However, the response to such loud noise is typically short: after the noise goes away, the physiological effects reverse and levels return to normal. In the case of repeated exposure to military noise, the connection is not as clear. The results of most cited studies are inconclusive, and it cannot be stated that a causal link exists between military noise exposure and the various type of nonauditory health effects that were studied (Department of Defense Noise Working Group 2013c).

3.7 OCCUPATIONAL EFFECTS

In terms of noise effects in the workplace, the National Institute for Occupational Safety and Health published a criteria document with a recommended exposure limit of 85 decibels (A-weighted) as an 8-hour time-weighted average in 1972. This exposure limit was reevaluated in 1998 when the National Institute for Occupational Safety and Health made recommendations that went beyond conserving hearing by focusing on the prevention of occupational hearing loss. Following the reevaluation using a new risk assessment technique, another criteria document was published in 1998, which reaffirmed the 85-decibel recommended exposure limit (National Institute for Occupational Safety and Health 1998).

CHAPTER 4
ANALYSIS METHODOLOGY

4.1 REGULATORY FRAMEWORK

The Department of Defense employs two programs that address adherence to the Noise Control Act of 1972 and U.S. Environmental Protection Agency Guidance: (1) the Range Air Installations Compatible Use Zones (Chief of Naval Operations Instruction [OPNAVINST] 3550.1A) for air-to-ground operations at training areas, and (2) the Air Installations Compatible Use Zones (OPNAVINST 11010.36C) for airfield operations (Department of the Navy 2008a, b). The Range Air Installations Compatible Use Zones and Air Installations Compatible Use Zones programs: (1) help military installations determine noise generated by military training and operations; (2) evaluate how the noise from these operations may impact adjacent communities and associated activities; and (3) assist military planners with assessing existing and proposed land uses on an installation. For ground training noise, the Marine Corps adheres to guidance dated June 29, 2005 (*Memorandum from Assistant Deputy Commandant, Installations and Logistics (Facilities), Headquarters United States Marine Corps. Subject: Ground Training Noise Guidance for Marine Corps Installations*, Marine Corps 2005).

4.2 METHODOLOGY

This noise analysis addresses changes in the noise environment caused by implementing the proposed action. The modeling software described in Section 2 was used to determine noise generated by construction activities and training operations under the action and no-action alternatives. To ascertain the breadth of impacts the results were then compared to baseline conditions to gauge the level of impacts. The land use types, people, and points of interest locations that would be exposed to elevated noise levels were identified, and potential impacts were presented. Depending on the source generating the noise, different noise modeling approaches were used. This section provides the inputs and other data used in the modeling specific for this project.

Twenty-two points of interest on Tinian, 19 on Saipan, and 14 on Pagan were selected for specific noise level calculations to identify potential impacts. Selection of the various locations for points of interest included residential areas, schools, churches, and "other" considerations. These "other" considerations were determined to be of interest for one or more of the following: biological species and/or habitat, cultural resources, visual resources, land use, and recreational resources. Noise impacts for these "other" resource areas are described in detail in their respective chapter in the CJMT EIS.

Noise impacts were assessed at and around the airfields/airports for areas affected by 65 decibels and greater Day-Night Average Sound Levels in terms of acreage, population, points of interest, and households. U.S. Census Bureau 2010 population data for Tinian and Saipan were used to identify the population affected by noise due to proposed activities. This study evaluates noise effects on population according to Election District and through photographic review. Identifying, and then comparing noise levels to the proportion of an Election District provides one method of determining the magnitude of impacts. For locations characterized by low or inconsistent population densities, actual houses were counted using aerial photographs and then the U.S. Census population multiplier (people per household) was applied. Google Earth satellite imagery was initially used to identify these points and then they were verified by a site visit.

Noise generated by construction and operations at the airfields, in the airspace, and at the training facilities are calculated using different modeling software because different noise metrics apply to the different activities. Applying "A-weighting" simulates the sensitivity of the human ear to flight activity, construction activities, and traffic, whereas "C-weighting" applies to impulsive sounds, such as munitions blasts, to predict the potential for secondary effects such as structure shaking, window rattling, and vibrations. Noise levels for these different environments also cannot be combined because they each have different averaging times and evaluation criteria.

4.2.1 Construction

Inputs to the construction noise model used distances from the construction zone to the nearest receptors by measuring the distances on geographical information system software. Based upon the type of construction, the appropriate construction equipment was modeled. The closest point on the construction site to closest point at the receptor determined the distance modeled.

4.2.2 Operations

It is important to note that all of the noise models draw from a database of actual weapon and aircraft noise measurements. These models are most appropriate for comparing "before-and-after" noise impacts, which would result from the proposed action or alternatives, when the calculations are made in a consistent manner. The models allow noise predictions without the need for actual implementation or noise monitoring for the proposed action and alternatives.

4.2.2.1 Live-Fire Training

Inputs to the range noise models include location of both the target and the firing point, type of munition, and the annual number of rounds anticipated. This assessment also includes aircraft delivered ordnance and the flight profiles of the aircraft including speed and direction of the aircraft during ordnance delivery.

4.2.2.2 Aircraft Operations

For airfield environments, input data include average daily airfield flight operations, runway/pad use, flight tracks and their utilization, and flight profiles. Flight tracks are the paths aircraft take over the ground while in the air. Flight profiles describe the operating state of the aircraft (e.g., altitude, power setting, and speed) at points along each flight track. The most up-to-date flight profiles and airfield course rules were used in the noise modeling. Aircraft not operating at the airfield includes; military aircraft operating in the Special Use Airspace and rare operations using the North field, and overhead excursions by civilian aircraft.

4.2.2.3 Waterborne Activities

Noise generated by Amphibious Assault Vehicles and Landing Craft Air Cushion vessels were hand calculated because no specific modeling software has been developed for these types of noise generators.

4.2.2.4 Traffic

Inputs to the traffic model included the types of vehicles ranging from automobiles to heavy trucks and buses, the estimated speed of the vehicles, the distance from the centerline of the traffic lane to the receptor, and the type of road surface (i.e. asphalt or concrete).

4.3 DETERMINATION OF SIGNIFICANCE

Because the proposed action involves construction and operational aspects, noise was evaluated by applying several metrics. Each aspect has its own level of significance. For instance, construction noise generally falls under the purview of occupational health and safety regulatory standards, and operational aspects are evaluated in relation to specific federal agency non-regulatory evaluation criteria.

4.3.1 Construction

For residents living near construction activities associated with the proposed action, the U.S. Environmental Protection Agency recommends permissible construction noise levels be based on noise averaged over 8- and 24-hour periods, therefore, the A-weighted decibel scale is used. Because daily construction durations are about 8 hours, the limit for 365 days per year exposure is 75 decibels. This 75-decibel exposure recommendation applies when ambient (i.e., background) noise levels outside of working hours are less than 60 decibels, otherwise, the 24-hour standard of 70 decibels is used to determine whether noise due to construction activities would be considered significant.

4.3.2 Operations

One method to determine significance compares acceptable land use compatibility with varying degrees of noise zones. A significant impact would be creating noise zones which have incompatible land usage in areas previously considered compatible for sensitive land uses such as residential, schools, houses of worship, etc. The military assigns three noise zones to identify whether land uses are compatible with noise generated by their activities (Army 2007). These zones are defined below and presented in tabular form in Table 4.3-1. Note that these zones apply to aircraft operations, small-caliber range noise, and large-caliber range noise depending upon the noise metric employed. Compatibility refers to the land usage within noise zones. For example, residential areas would be incompatible with higher noise zones where industrial uses would be fine within the same higher noise zones.

- *Zone I.* Includes all areas around a noise source in which Day-Night Average Sound Levels are less than 65 decibels A-weighted or 62 decibels C-weighted, and the small-caliber Peak is below 87 decibels. This area is usually compatible with all types of land use activities (e.g., homes, schools, and hospitals). Zone I on maps are areas that are neither Zone II nor Zone III which are the only two zones plotted. Land Use Planning Zone (LUPZ) contours are a subset of a Zone I area with noise levels between 57 and 62 decibels C-weighted that are compatible with any land use. Land use planners often use this area as a buffer around military ranges. For example, although residential areas would be considered compatible within this planning zone, allowing a high density apartment complex being built would certainly invite noise complaints on days of higher than normal range activities (i.e., when noise levels are elevated).
- *Zone II.* Consists of an area where the Day-Night Average Sound Levels are between 65 and 75 decibels A-weighted or 62 and 70 decibels C-weighted or the small-caliber Peak is between 87 and 104 decibels. Exposure to noise within this zone is normally considered incompatible with noise-sensitive homes, schools, and hospitals. Acceptable land uses within Zone II include activities such as industrial, manufacturing, transportation, and resource production (e.g., industrial parks, factories, highways).
- *Zone III.* An area around the noise source in which the Day-Night Average Sound Level is greater than 75 decibels A-weighted or 70 decibels C-weighted, or the small-caliber Peak exceeds 104 decibels are defined as Zone III and is considered incompatible with most land uses.

Table 4.3-1. Noise Zones and Sensitive Land Use Compatibility

Zone	*A-weighted decibel / C-weighted decibel / Small-Caliber Peak 15 decibel*	*Sensitive Land Use Compatibility Level*
I	<65 / <62 / <87	Compatible
II	65 to 75 / 62 to 70 / 87 to 104	Normally Incompatible
III	>75 / >70 / >104	Incompatible

Sources: U.S. Army 2007.

Land uses such as residences, schools, hospitals, places of worship, parks, and playgrounds would be considered normally incompatible land uses if they are exposed to average sound levels of 65 to 75 decibels in the A weighted scale or 62 to 70 decibels in the C-weighted scale. The U.S. Army also considers Peak noise levels between 87 and 104 decibels normally incompatible with these types of land uses. Normally incompatible or compatible with restrictions refer to residences, schools, and etc. that are built without additional sound reduction features. These would be considered incompatible within Noise Zone II. If the facility is designed and constructed to abate noise levels to acceptable levels in accordance with land use planning standards it would be compatible within the Noise Zone for which it was designed. Areas exposed to noise levels greater than these average and Peak noise levels are always considered incompatible.

Noise exposure levels are expressed as noise contour bands in 5-decibel increments in ADNL, beginning at 65 decibels, and ending at 85 decibels or greater. In accordance with *Range Installations Compatible Use Zones* and *Air Installations Compatible Use Zones* (OPNAVINST 3550.1A and 11010.36C, respectively), land use compatibility is assessed through estimating and overlaying different noise level contour bands on land use maps and categorizing land uses as compatible, compatible with restrictions (e.g., a land use would be compatible if extra noise attenuating materials were installed in a home), or incompatible with noise zones. Table 4.3-2 shows typical land uses, the noise zone and level, and then shows whether the land uses are compatible with the noise level. Noise contours for large-caliber weapons and explosives (e.g., mortar and grenade rounds), and percussive construction equipment (jackhammers and pile drivers) are developed using the C-weighted scale to determine the land use zones. For this analysis, the noise environment around the ranges, airfields, and training areas on Tinian and Pagan uses noise contours to portray the noise levels.

Table 4.3-2. Land Use Compatibility by Noise Contours and Type of Use

Noise Zone in Day-Night Average Sound Levels	*I*	*II*		*III*	
Aviation/Small-Caliber Munitions (A-weighted)	*<65*	*65-70*	*70-75*	*75-80*	*>80*
Large-Caliber Weapons/Explosives (C-weighted)	*<62*	*62-70*		*>70*	
Commercial	Yes	Yes	Yes[2]	Yes[2]	No
Industrial	Yes	Yes	Yes	Yes[2]	Yes[2]
Open/Agricultural	Yes	Yes	Yes	Yes	Yes[1]
Recreational	Yes	Yes	Yes	No	No
Residential	Yes	Yes[2]	No	No	No

Note: [1]Open land acceptable.
[2]With noise attenuation features.

Although not a significance criteria, a gauge of noise impacts is to determine the risk of receiving complaints from percussive noise through measuring the Peak 15 noise levels (hereafter referred to as "Peak"). In Table 4.3-3, there would be a low risk of generating complaints for Peak noise that is less than 115 decibels, but a higher risk of complaints for Peak noise greater than 130 decibels. For Peak levels exceeding 140, there is a potential for physiological damage to unprotected human ears and structural damage (Army 2007).

Table 4.3-3. Large-Caliber Weapons and Explosives

Risk of Complaints	***Peak 15 decibel***
Low	< 115
Moderate	115 - 130
High	> 130

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CHAPTER 5
AFFECTED ENVIRONMENT

5.1 TINIAN

The current noise environment on Tinian is typical of a small rural town or suburban area. Over half of Tinian's population resides in San Jose on the southern end of the island. Other residential areas include Marpo Heights, Marpo Valley, Carolinas Heights, and Carolinas Village; there are no resident populations residing inside the Military Lease Area. As of the 2010 U.S. Census the total population was 3,136 people. Schools on Tinian include Tinian Elementary School, Tinian High School, and Northern Marianas College. Figure 5.1-1 shows an overview of Tinian and its proximity to Saipan.

Although infrequent, most noise-generating activities stem from existing military aviation, marine, and ground-based training activities that occur in the Military Lease Area once or twice per year. Other noise contributors include civil and commercial aircraft operations at Tinian International Airport, cargo vessel operations at the port, and aircraft activities in regional airspace.

5.1.1 Live-Fire Training

During the infrequent military training activities, ground-based training, mostly non-live fire, occurs primarily in the Military Lease Area. A limited amount of small arms are employed during training using either simulated munitions and firing live ammunition. The small-caliber weapons firing produces Peak noise levels of 90 to 100 decibels at 500 feet (152 meters) and 80 to 90 decibels at 1,000 feet (305 meters) for the most common types of small-caliber weapons (5.56 and 7.62 millimeter, and .50 caliber). These activities occur well within the Military Lease Area and noise is imperceptible to populations outside military boundaries. Sound dissipates at the rate of 6 decibels per doubling of the distance from the source. The distance from where the small arms are employed, to the closest population in the village of Marpo Heights, is approximately 4 miles (6 kilometers). At this distance, the noise level reduces to a Peak of 65 decibels (or Noise Zone I), well within the compatibility limits (see Table 4.3-1).

Small unit field exercises and expeditionary warfare training occurs primarily on the northern portion of the Military Lease Area, including an expeditionary airfield at North Field. On the southern portion of the Military Lease Area, limited military training primarily consists of reconnaissance exercises. With the maximum noise levels at about 65 decibels, none of these activities generates noise levels exceeding Noise Zone I outside of military boundaries, therefore adjacent land uses are considered compatible. In fact, under current conditions, all of Tinian is considered to be in Noise Zone I, except in the immediate vicinity of the airport.

5.1.2 Airfield Operations

North Field in the Military Lease Area is an unimproved expeditionary World War II-era airfield used for military vertical and short-field landings. North Field is also used for expeditionary training including helicopter insertion and extraction, and other airfield-related training. Pyrotechnics are authorized for use throughout the main North Field area. These activities all create noise, as do the small-caliber weapons and a limited amount of aircraft operations. These activities are infrequent and do not generate perceptible noise levels for populated areas to the south in San Jose or to the north in Saipan.

Figure 5.1-1 Overview of Tinian

Operations at the North Field were evaluated but there are so few operations that the noise contour plotting software (which cannot plot noise levels below 55 decibels) could not be applied. Using NOISEMAP, noise levels fall well below 65 decibels day-night average sound level (or Noise Zone I) and, therefore, are considered compatible with all land uses.

Tinian International Airport, located just south of the Military Lease Area boundary, is a commercial airport that in 2012 had 49,116 annual flight operations (46,206 air taxi, 2,376 general aviation flights, 58 commercial, and 476 military flight operations) (Federal Aviation Administration 2013). At that time, there were four single-engine aircraft and two multi-engine aircraft based at the airport that provided limited airfield services; however, this service by Freedom Air is no longer running. Now, single-engine air taxi charter operations are flown by Star Marianas Airlines and make up the majority of the operations at Tinian International Airport. Although rare, some of the commercial flights are large charter jets such as Boeing 747 or 767.

Figure 5.1-2 shows the baseline noise contours for Tinian International Airport. Although military operations comprise a small proportion of the total annual operations, military jets, such as the FA-18 are about 30 decibels louder than the civilian aircraft operating at Tinian. Because decibels are logarithmic, this translates to the noise of one FA-18 operation roughly equaling 1,000 Piper Cherokee (similar to the air taxi) operations. As such, the noise environment at Tinian International Airport is dominated by the occasional military aircraft when they are operating at the airfield.

Tinian International Airport averages 140 daily aircraft operations (e.g., takeoffs and landings), consisting of air taxi/inter-island flights to and from Tinian and Rota using single-engine aircraft and overflights above Tinian (Air Force 2012). Saipan International Airport is unlikely to contribute to the noise environment in residential areas of Tinian, south of the Military Lease Area. Although there are aircraft operating over the Military Lease Area, these operations are infrequent and are done at approximately 2,100 feet (640 meters) in altitude where noise levels would not exceed 65 decibels day-night average sound level (or Noise Zone I) and are considered compatible with all land uses.

Under baseline conditions, one Special Use Airspace unit (an Air Traffic Controlled Assigned Airspace with a floor of 39,000 feet [11,887 meters] above mean sea level) and several airport departure and arrival routes produce aircraft-generated noise. These levels are negligible and do not perceptibly contribute to the baseline noise environment. These activities do not generate noise levels exceeding 65 decibels day-night average sound level and are considered compatible (i.e., fall within Noise Zone I) with all land uses.

Table 5.1-1 (following the figure) shows the noise levels at representative points of interest under current noise conditions generated by aircraft operations at Tinian International Airport. This noise study analyzes the noise on human receptors located in residential areas and schools. Analyses for the noise impacts on other resource areas can be found in the CJMT EIS/OEIS. All sensitive human receptors (i.e., in residential areas or in schools) are located well away from areas affected by 65 decibel levels or louder.

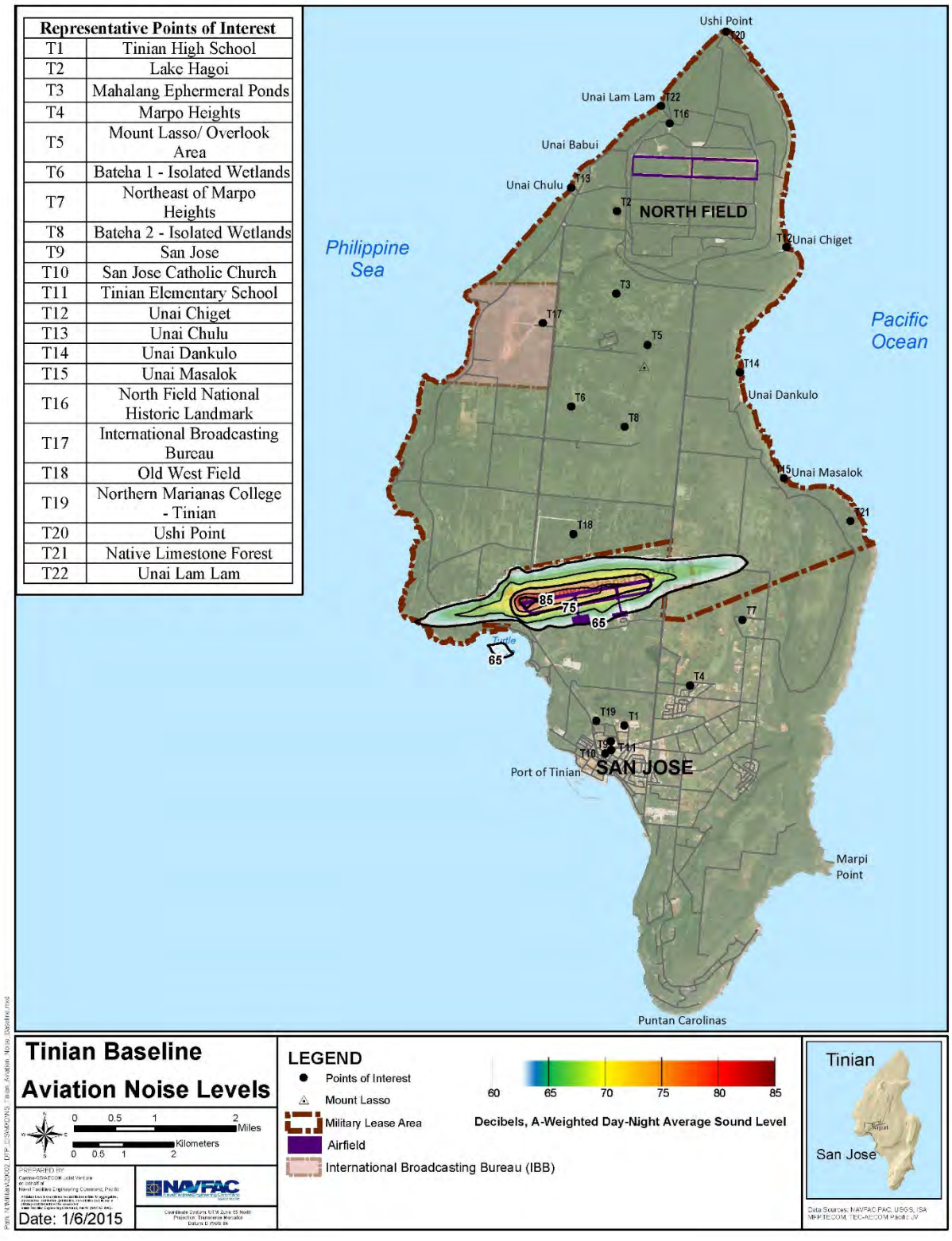

Figure 5.1-2 Baseline Aviation Noise Levels in the Tinian

(in A-weighted Day-Night Average Sound Levels)

Table 5.1-1. Baseline Noise Levels at Representative Points of Interest

Tinian Points of Interest			*A-weighted Day-Night Average Sound Level (decibels)*
Identification Number	***Description***	***Type***	
T1	Tinian High School	School	36.7
T2	Lake Hagoi[1]	Other	44.1
T3	Mahalang Ephemeral Ponds	Other	39.5
T4	Marpo Heights	Residential	45.4
T5	Mount Lasso/Overlook Area	Other	40.7
T6	Bateha 1 - Isolated Wetlands	Other	38.8
T7	Northeast of Marpo Heights	Residential	48.5
T8	Bateha 2 - Isolated Wetlands	Other	45.6
T9	San Jose	Residential	37.3
T10	San Jose Catholic Church	Church	37.1
T11	Tinian Elementary School[2]	School	36.9
T12	Unai Chiget	Other	35.4
T13	Unai Chulu	Other	44.0
T14	Unai Dankulo	Other	47.0
T15	Unai Masalok	Other	48.8
T16	Northfield National Historic Landmark	Other	41.2
T17	International Broadcasting Bureau	Administrative	41.8
T18	Old West Field	Other	54.6
T19	Northern Marianas College - Tinian	School	37.2
T20	Ushi Point	Other	36.3
T21	Native Limestone Forest	Other	50.0
T22	Unai Lam Lam	Other	39.0

Notes: [1]Shaded Points of Interests are located within the Military Lease Area.
[2]Please note that noise levels at House of Taga would be a little greater than noise levels that the Tinian Elementary School is exposed to and a little less than what is found in San Jose.

5.1.3 Airspace Operations

In rural and open areas, the analysis of effects is vastly different from areas near population centers. In areas underlying airspace, public concerns typically include effects to wildlife, marine mammals, domestic animals, natural soundscapes, and outdoor recreation.

Subsonic Noise

There is currently one Special Use Airspace unit (an Air Traffic Controlled Assigned Airspace with a floor of 39,000 feet above mean sea level) and several airport departures and arrival routes that produce aircraft-generated noise.

Supersonic Noise

Under baseline conditions, no supersonic operations are conducted over Tinian, Saipan, or in overwater airspace adjacent to the two islands.

5.1.4 Waterborne Activities

Currently, there are occasional Amphibious Assault Vehicle landings at the Port of Tinian. While these operations are rare, during the operations, temporarily single event noise levels are 88 A-weighted decibels at 100 feet (30 meters). These noise levels are single events and not an average noise level used for compatibility. While average noise levels exceeding 65 decibels are considered incompatible with sensitive land uses, these areas are at least 1,000 feet (305 meters) from the port so that noise levels decrease before they reach sensitive land uses. To put it into perspective, noise levels from an Amphibious Assault Vehicle would be about as loud as two dump trucks operating in the harbor area. Therefore, sensitive land uses are not exposed to incompatible noise levels under baseline conditions. In the waters around Tinian, small fishing and dive boats operate and a cargo vessel makes regular trips between the Saipan and Tinian ports (in 2010, ferryboat operations between Tinian and Saipan ceased operations). Fishing and dive boats, as well as the cargo vessel operations generate noise levels that are low enough to be considered compatible with adjacent land uses.

5.1.5 Traffic

All roads on Tinian currently experience very light traffic volumes. According to the CNMI Comprehensive Highway Master Plan prepared in 2008, the largest traffic volumes were on Broadway, Canal, and Grand Streets in San Jose with annual daily trips of 1,470, 1,520, and 2,240, respectively (Commonwealth Department of Public Works 2008). Traffic volume on all other roads, including those in the harbor, is well below 500 annual daily trips. Traffic volumes this low, contribute very little to the noise environment and do not exceed 65 decibels Day-Night Average Sound Level. Again, all land uses within Noise Zone I are considered compatible.

5.2 PAGAN

Pagan is located in the northern portion of the CNMI and Figure 1.1-1 shows its relationship the island chain. Currently there are no military ground- or air-based operations occurring on Pagan. The island's residents were evacuated from the island after the 1981 eruption of Mount Pagan; however, visitors have temporary encampments on the island. Man-made noise-generating activities (all-terrain vehicles, generators, and occasional aircraft) are rare and only temporary. The only constant noise source is naturally occurring and includes wind, surf, and wildlife. Acoustically, this area is typical of a rural or wilderness setting with ambient noise levels between 35 and 45 decibels A-weighted (U.S. Environmental Protection Agency 1978). Therefore, no noise contours were generated for Pagan baseline conditions.

CHAPTER 6
TINIAN UNIT LEVEL RANGE AND TRAINING AREA

This section describes the noise impacts from establishing a unit level RTA on Tinian. Three alternatives were identified for unit level training and each varies in the number and location of some of the ranges. However, the same amount of ammunition would be used regardless of the alternative; aircraft operations would also be similar for all three alternatives, and in areas where noise may be heard outside of the Military Lease Area. This applies to construction, traffic, and waterborne activities. For these reasons, the alternatives are described together with the differences pointed out for each noise source. In addition, noise may be heard on the neighboring island of Saipan, so noise levels on this island were provided where applicable. No residences lie within the Military Lease Area but tourism, recreation, and cultural sites do occur. These areas would be accessible after implementation of the proposed action; however, due to safety reasons these areas would be closed to public access during active military operations. While noise would be audible inside the Military Lease Area at these locations, there would be no visitors when noise occurs.

6.1 CONSTRUCTION

6.1.1 On Land

Noise modeling from construction activities is measured in decibels using the A-weighted scale and varies with the type of equipment used and how long it runs (see Table 2.1-1). Earth-moving equipment (e.g., graders, excavators, dozers) and impact devices (e.g., pile drivers and jackhammers) are examples of heavy (large) equipment. Smaller construction equipment includes generators, concrete saws, and compressors. As presented in Chapter 2, equipment and other construction activities typically generate noise levels ranging from 70-90 decibels at a distance of 50 feet (15 meters) (U.S. Department of Transportation 2006). Construction noise modeling averaged noise levels over 1 hour, assumed that equipment numbers were consistent throughout the workday, and were operating in the same area.

Construction related to all Tinian proposed alternatives (including all components such as ranges, landing zones, base camp, roads, trails, and utility/communication lines) and North Field improvements in the Military Lease Area would be too distant to affect residential properties or points of interest (such as schools, houses of worship, and hospitals), outside of the Military Lease Area.

Under the Tinian alternatives, military airport facilities and infrastructure construction and improvements would be implemented. It was assumed that 20 pieces of construction equipment would be used. At Tinian International Airport, noise generated from construction activities could be potentially perceptible to residents of San Jose. Noise levels of 82 decibels at 100 to 500 feet (30 to 152 meters) from the construction site would be generated. The nearest noise-sensitive receptor is Tinian Middle/High School, located about 6,400 feet (1,950 meters) from the proposed construction area. Noise levels at the school would be 49 decibels.

At the Port of Tinian, proposed improvement activities would occur closer to San Jose, thereby increasing the potential to expose residents and noise-sensitive receptors to construction-related noise. However, port improvement activities and road construction could generate short-term and temporary noise levels of 65.6 decibels at the nearest residents in the port area, still within acceptable levels of noise. Construction noise impacts would be compatible with residential areas, and would not affect schools, places of

worship, and hospitals (i.e., sensitive receptors). Therefore, construction noise levels on land would be less than significant.

6.1.2 Underwater

Noise would be caused by construction equipment dredging the nearshore substrate at Unai Chulu to construct a landing ramp for Amphibious Assault Vehicles. The ramp would have a flat surface approximately 12 feet (4 meters) deep and a slope at 15 degrees to 3 feet (1 meter) deep. At Unai Chulu, the overall width of the ramp would be 154 feet (50 meters). The dredging would employ a crane dredge for the flat portion and an excavator for the sloped portion. Sheet piles would be driven to create a causeway to access the sloped portion and steel piles would be driven to build a temporary trestle to dredge the flat area. No blasting would be required. The duration for the proposed construction could take approximately 8 months.

Comparative operations that measured dredging noise with a limestone bottom were used to estimate dredging noise levels. The highest typical in-water noise levels for excavation dredging of limestone material measured a root mean squared noise at 179 decibels referenced to (abbreviated to re) 1 micro Pascal at 3 feet (1 meter) (Reine et al. 2014). Underwater noise is based upon sound pressure levels with a base reference pressure of 1 micro Pascal. This differs from airbourne noise that references 20 micro Pascal, thus underwater noise is expressed as "decibels re 1 micro Pascal." Estimated noise levels for either a 24-inch (.6-meter) steel pipe or 24-inch (0.6-meter) sheet pile using recent measurements from other projects for impact pile diving indicate Sound Exposure Levels of approximately 190 decibels re 1 micro Pascal at 33 feet (10 meters) and approximately 177 decibels re 1 micro Pascal root mean squared (Illingworth and Rodkin 2007). Vibratory pile driving of steel sheet piles yielded noise level results 25-30 decibels quieter than impact pile driving.

Underwater noise would not affect human receptors because a perimeter would be established to prevent recreational divers from entering areas of high underwater noise levels. Therefore, noise impacts to human receptors due to underwater construction would be less than significant.

6.2 OPERATIONS

6.2.1 Live-Fire Training

Live-fire training includes small- and large-caliber weapons fired from ground positions and from the airspace by aircraft training over the RTA. The unit level RTA includes small ranges such as a Combat Pistol Range for ground-based training, up to a large high hazard impact area that supports both small- and large-caliber weapons use from the ground and the air.

6.2.1.1 Small-Caliber Weapons

Small-caliber weapons proposed for use include .50 caliber and smaller rounds. Estimated ammunition fired on the proposed small-caliber ranges would total 5,049,643 annually. Table 6.2-1 lists the ranges and training complexes, the weapons used at each, ammunition type, and when the rounds would be expended (Army Public Health Command 2014). Figure 6.2-1 presents all Tinian alternatives, A-weighted Day-Night Average Sound Level noise contour bands generated by small-caliber weapons. Figure 6.2-2 illustrates the contours under all Tinian alternatives for Peak noise levels.

Table 6.2-1. All Tinian Action Alternatives Representative Annual Small-Caliber Ammunition Expenditure Estimates[1]

Facility	*Weapon/Ammunition*	*Annual Expenditure*		*Total Annual Expenditure*
		Day 7:00 a.m. – 10:00 p.m.	*Night 10:p.m. – 7:00 a.m.*	
Combat Pistol Range	9 mm	5,232	1,308	6,540
	.45 cal	2,400	600	3,000
	12 gauge shotgun	16,416	4,104	20,520
	5.56 mm	30,320	7,580	37,900
Multi-Purpose Automated Unknown Distance Range	5.56 mm	1,000,150	250,038	1,250,188
	7.62 mm	503,770	125,943	629,713
	.50 cal	115,107	28,777	143,884
Light Anti-Armor	9mm AT-4 trainer	11,021	2,755	13,776
Battle Sight Zero Range	9 mm	5,760	1,440	7,200
	5.56 mm	30,904	7,726	38,630
	7.62 mm	7,296	1,824	9,120
	12 gauge shotgun	9,600	2,400	12,000
Infantry Platoon Battle Course	9 mm AT-4 trainer	66	16	82
	5.56 mm	755,456	188,864	944,320
	7.62 mm	225,280	56,320	281,600
Multi-Purpose Range Complex	5.56 mm	320,353	80,088	400,441
	7.62 mm	43,795	10,949	54,744
	.50 cal	42,304	10,576	52,880
Tank/Fighting Vehicle Multi-Purpose Range Complex	5.56 mm	53,088	13,272	66,360
	7.62 mm	6,720	1,680	8,400
	.50 cal	23,520	5,880	29,400
Battle Area Complex, Live-fire and Movement Range, and Urban Assault Course/Military Operations in Urban Terrain	9 mm AT-4 trainer	20	5	25
	5.56 mm	458,752	114,688	573,440
	7.62 mm	200,960	50,240	251,200
Convoy Live-fire Range	5.56 mm	45,504	11,376	56,880
	7.62 mm	5,760	1,440	7,200
	.50 cal	20,160	5,040	25,200
Close Air Support Range (Air-to-Ground Range)	7.62 mm	60,000	15,000	75,000
	.50 cal	40,000	10,000	50,000
Total		**4,039,714**	**1,009,929**	**5,049,643**

Note: mm – millimeter; cal – caliber; AT4 – Anti-Tank weapon.
[1]For noise modeling, there is a 10-decibel penalty applied to operations occurring during environmental nighttime hours (i.e., 10:00 p.m. and 7:00 a.m.

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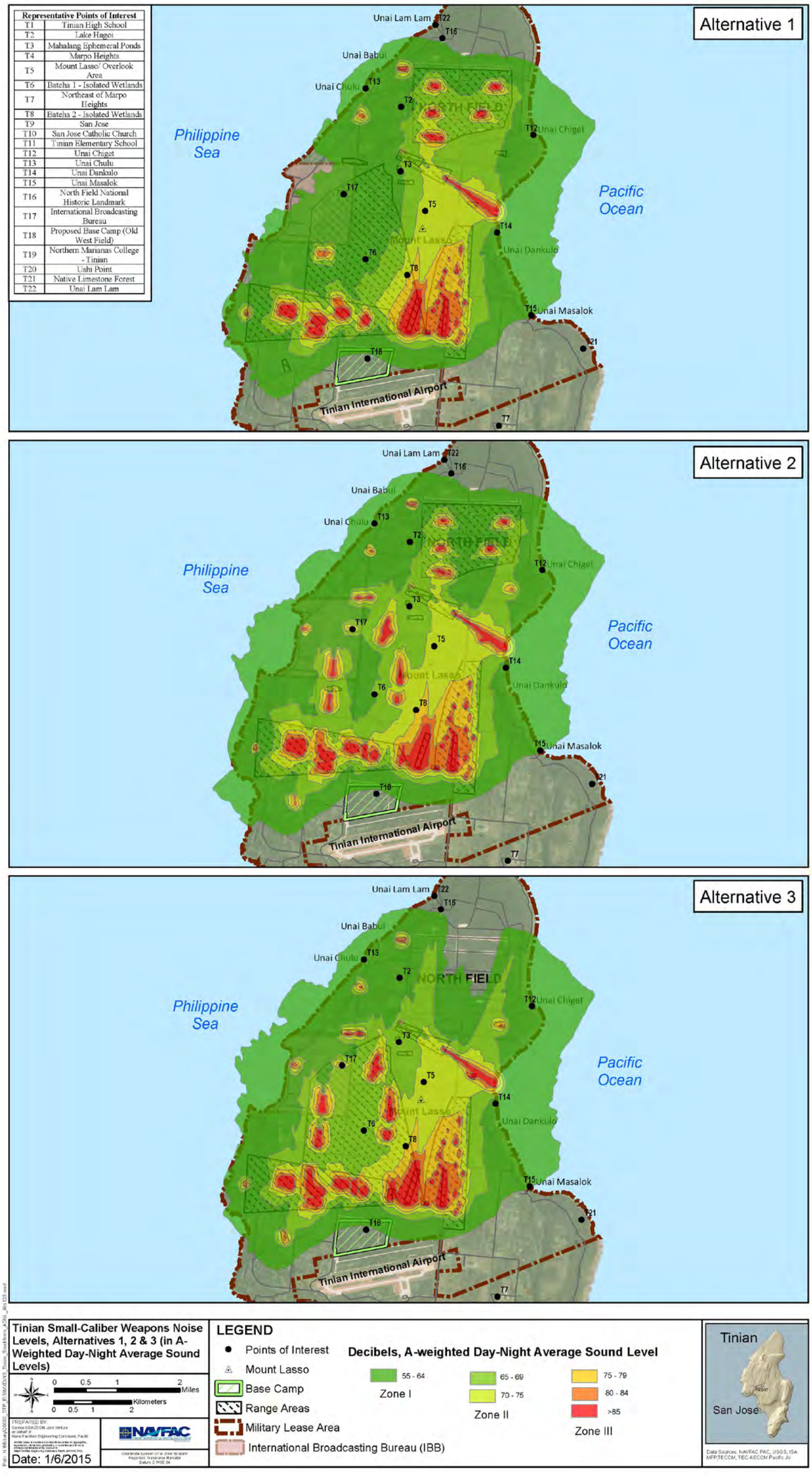

Figure 6.2-1 Tinian Small-Caliber Weapons Noise Levels, Alternatives 1, 2, and 3 *(A-weighted)*

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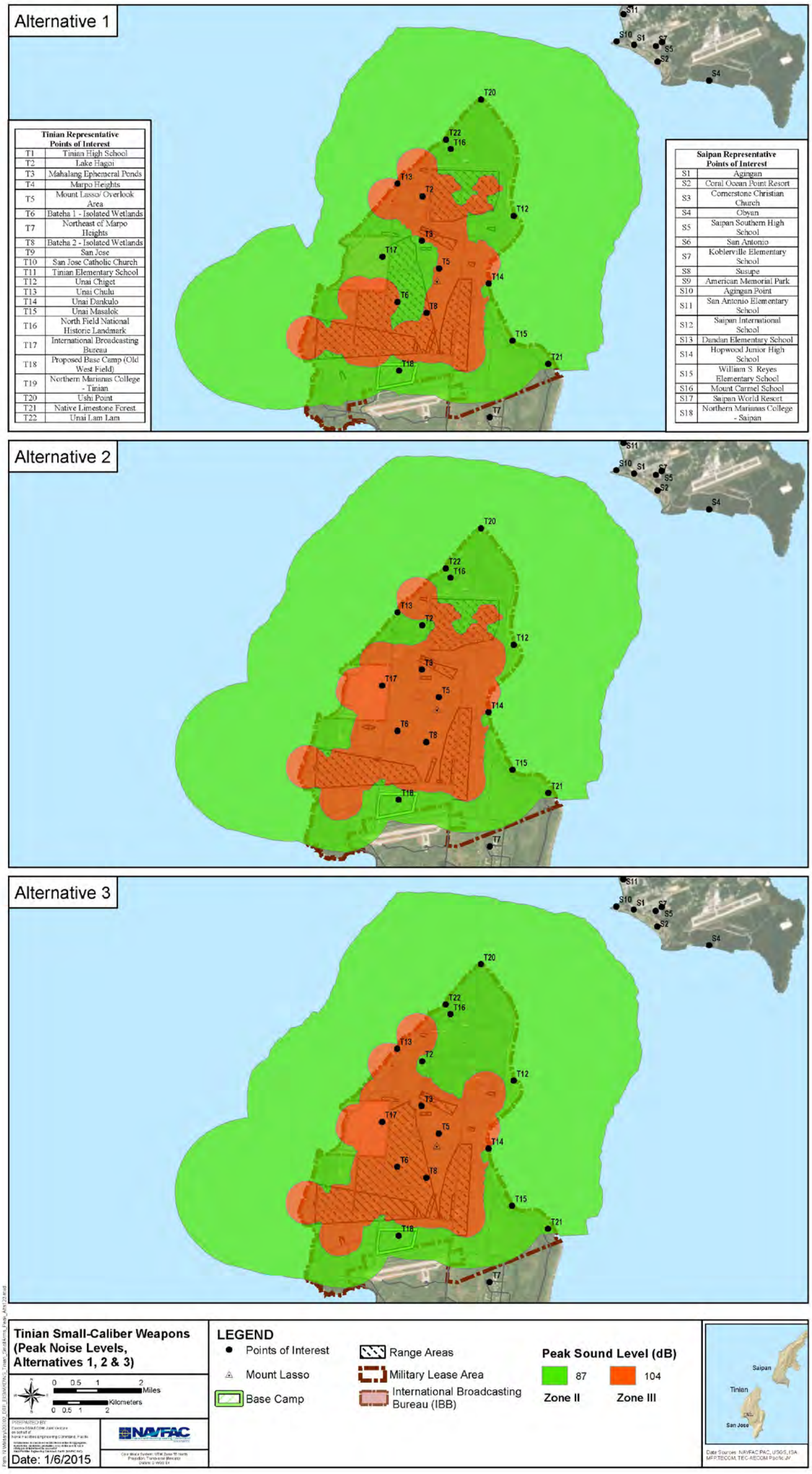

Figure 6.2-2 Tinian Small-Caliber Weapons Noise Levels, Alternatives 1, 2, and 3 *(Peak)*

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Tables 6.2-2 and 6.2-3 provide the acres and population exposed to small-caliber generated noise in A-weighted Day-Night Average Sound Levels and Peak noise levels, respectively for all three alternatives. Projected noise at representative points of interest under Alternative 1 is presented in Table 6.2-4, for Alternative 2 in Table 6.2-5, and for Alternative 3 in Table 6.2-6.

Table 6.2-2. Area and Population Affected by Small-Caliber Weapons Noise for All Tinian Alternatives
(in A-weighted Day-Night Average Sound Levels)

Zone	***Noise Levels (in decibels)***	***Acres/Hectares***		
		Alternative 1	***Alternative 2***	***Alternative 3***
Within the Military Lease Area				
II	65 – 69	2,532/1,025	2,696/1,091	2,914/1,179
	70 – 74	1,459/590	1,769/716	1,645/666
III	75 – 79	693/280	862/349	810/328
	80 – 84	444/180	570/231	533/216
	85+	425/172	530/214	548/222
Total		**5,553/2,247**	**6,427/2,601**	**6,444/2,610**
Area and Population Outside the Military Lease Area				
II	65 – 69	0/0 and 0 population all alternatives		
	70 – 74			
III	75 – 79	0/0 and 0 population all alternatives		
	80 – 84			
	85+			
Total		**0/0**	**0/0**	**0/0**
Off shore				
Not Applicable	65 – 69	15/6	15/6	15/7
	70 – 74	12/5	12/5	12/5
	75 – 79	5/2	5/2	5/2
	80 – 84	2/1	2/1	2/1
	85+	2/1	2/1	2/1
Total		**36/15**	**36/15**	**36/15**

Table 6.2-3. Area and Population Affected by Small-Caliber Weapons Noise for All Tinian Alternatives
(in Peak Noise Levels)

Noise Levels (in decibels)	***Acres/Hectares***		
	Alternative 1	***Alternative 2***	***Alternative 3***
Within the Military Lease Area			
Zone II			
87 – 104	7,897/3,196	6,010/2,432	6,422/2,599
Zone III			
>104	6,898/2,792	9,032/3,655	8,623/3,490
Total	**14,795/5,988**	**15,042/6,087**	**15,045/6,089**
Area and Population Outside the Military Lease Area			
Zone II			
87 – 104	411/166 0 population	600/243 0 population	600/243 0 population

Table 6.2-3. Area and Population Affected by Small-Caliber Weapons Noise for All Tinian Alternatives
(in Peak Noise Levels)

Noise Levels (in decibels)	*Acres/Hectares*		
	Alternative 1	*Alternative 2*	*Alternative 3*
Zone III			
>104	0/0	0/0	0/0
Total	**411/166**	**600/243**	**600 /243**
Off shore			
87 – 104	26,025/10,532	28,362/11,478	27,316/11,054
>104	607/246	492/199	672/272
Total	**26,632/10,788**	**28,854/11,677**	**27,988/11,326**

Note: Small-caliber peak noise is not dependent upon weather conditions and there are not separate calculations for unfavorable and neutral weather conditions.

Table 6.2-4. Tinian Alternative 1 Representative Points of Interest Affected by Small-Caliber Weapons Noise on Tinian
(in A-weighted Day-Night Average Sound Level and Peak)

Point of Interest			*A-weighted Day-Night Average Sound Levels (ADNL)*			*Peak*		
Identification Number	*Description*	*Type*	*Decibel*	*Zone*	*Points of Interest Conflict*	*Decibel*	*Zone*	*Points of Interest Conflict*
T1	Tinian High School	School	< 50	I	No	< 80	I	No
T2	Lake Hagoi	Other	63	I	NA	108	III	NA
T3	Mahalang Ephemeral Ponds	Other	63	I	NA	102	II	NA
T4	Marpo Heights	Residential	< 50	I	No	< 80	I	No
T5	Mount Lasso/Overlook Area	Other	71	II	NA	106	III	NA
T6	Bateha 1 - Isolated Wetlands	Other	63	I	NA	105	III	NA
T7	Northeast of Marpo Heights	Residential	< 50	I	No	83	I	No
T8	Bateha 2 - Isolated Wetlands	Other	75	III	NA	108	III	NA
T9	San Jose	Residential	< 50	I	No	< 80	I	No
T10	San Jose Catholic Church	Church	< 50	I	No	< 80	I	No
T11	Tinian Elementary School	School	< 50	I	No	< 80	I	No
T12	Unai Chiget	Other	60	I	NA	96	II	NA
T13	Unai Chulu	Other	61	I	NA	106	III	NA
T14	Unai Dankulo	Other	64	I	NA	104	III	NA
T15	Unai Masalok	Other	55	I	NA	96	II	NA
T16	North Field National Historic Landmark	Other	55	I	NA	98	II	NA
T17	International Broadcasting Bureau	Administrative	57	I	NA	95	II	No
T18	Proposed Base Camp	Base Camp	54	I	NA	92	II	No

Table 6.2-4. Tinian Alternative 1 Representative Points of Interest Affected by Small-Caliber Weapons Noise on Tinian

(in A-weighted Day-Night Average Sound Level and Peak)

Point of Interest			*A-weighted Day-Night Average Sound Levels (ADNL)*			*Peak*		
Identification Number	***Description***	***Type***	***Decibel***	***Zone***	***Points of Interest Conflict***	***Decibel***	***Zone***	***Points of Interest Conflict***
	(Old West Field)							
T19	Northern Marianas College	School	< 50	I	No	< 80	I	No
T20	Ushi Point	Other	< 50	I	NA	97	II	NA
T21	Native Limestone Forest	Other	< 50	I	NA	91	II	NA
T22	Unai Lam Lam	Other	54	I	NA	95	II	NA

Note: NA – not applicable, see annotation number 1 and shading denotes points of interest inside the Military Lease Area.
[1]Other includes sites with cultural, biological, recreational, or other concerns that are unrelated to human factors and are addressed in the applicable resource section of the CJMT EIS/OEIS.
[2]Noise level threshold is 50 decibels A-weighted day-night average sound level (or decibel ADNL).
[3]Small-caliber ADNL Noise Zones defined as: Zone I (< 55 decibel ADNL; 55-64 decibel ADNL); Zone II (65-69 decibel ADNL; 70-74 decibel ADNL); and Zone III (75-79 decibel ADNL; 80-84 decibel ADNL; > 85 decibel ADNL).
Source: Army Public Health Command 2014.

Table 6.2-5. Tinian Alternative 2 Representative Points of Interest Affected by Small-Caliber Weapons Noise on Tinian

(in A-weighted Day-Night Average Sound Level and Peak)

Point of Interest			*A-weighted Day-Night Average Sound Levels (ADNL)*			*Peak*		
Identification Number	***Description***	***Type***	***Decibel***	***Zone***	***Points of Interest Conflict***	***Decibel***	***Zone***	***Points of Interest Conflict***
T1	Tinian High School	School	< 50	I	No	< 80	I	No
T2	Lake Hagoi	Other	63	I	NA	100	II	NA
T3	Mahalang Ephemeral Ponds	Other	67	II	NA	104	III	NA
T4	Marpo Heights	Residential	< 50	I	No	< 80	I	No
T5	Mount Lasso/Overlook Area	Other	71	II	No	106	III	No
T6	Bateha 1 - Isolated Wetlands	Other	65	II	NA	107	III	NA
T7	Northeast of Marpo Heights	Residential	< 50	I	No	83	I	No
T8	Bateha 2 - Isolated Wetlands	Other	75	III	NA	108	III	NA
T9	San Jose	Residential	< 50	I	No	< 80	I	No
T10	San Jose Catholic Church	Church	< 50	I	No	< 80	I	No
T11	Tinian Elementary School	School	< 50	I	No	< 80	I	No
T12	Unai Chiget	Other	59	I	No	96	II	No

Table 6.2-5. Tinian Alternative 2 Representative Points of Interest Affected by Small-Caliber Weapons Noise on Tinian
(in A-weighted Day-Night Average Sound Level and Peak)

Point of Interest			*A-weighted Day-Night Average Sound Levels (ADNL)*			*Peak*		
Identification Number	***Description***	***Type***	***Decibel***	***Zone***	***Points of Interest Conflict***	***Decibel***	***Zone***	***Points of Interest Conflict***
T13	Unai Chulu	Other	61	I	No	106	III	No
T14	Unai Dankulo	Other	64	I	No	104	III	No
T15	Unai Masalok	Other	55	I	No	96	II	No
T16	North Field National Historic Landmark	Other	55	I	No	98	II	No
T17	International Broadcasting Bureau	Administrative	***	***	No	***	***	No
T18	Proposed Base Camp (Old West Field)	Transient Lodging	54	I	No	95	II	No
T19	Northern Marianas College	School	< 50	I	No	< 80	I	No
T20	Ushi Point	Other	< 50	I	NA	97	II	NA
T21	Native Limestone Forest	Other	< 50	I	NA	91	II	NA
T22	Unai Lam Lam	Other	54	I	NA	95	II	NA

Note: NA – not applicable, see annotation number 1 and shading denotes points of interest inside the Military Lease Area.
***Under Alternatives 2 and 3 the International Broadcasting Bureau mission is relocated.
[1]Other includes sites with cultural, biological, recreational, or other concerns that are unrelated to human factors and are addressed in the applicable resource sections of the CJMT EIS/OEIS.
[2]Noise level threshold is 50 decibel ADNL and 80 decibel Peak.
[3]Small-caliber Peak Noise Zones defined as: Zone I (< 55 decibel ADNL; 55-64 decibel ADNL); Zone II (65-69 decibel ADNL; 70-74 decibel ADNL); and Zone III (75-79 decibel ADNL; 80-84 decibel ADNL; > 85 decibel ADNL).
Source: Army Public Health Command 2014.

Table 6.2-6. Tinian Alternative 3 Representative Points of Interest Affected by Small-Caliber Weapons Noise on Tinian
(in A-weighted day-Night Average Sound Level and Peak)

Point of Interest			*A-weighted Day-Night Average Sound Levels (ADNL)*			*Peak*		
Identification Number	***Description***	***Type***	***Decibel***	***Zone***	***Points of Interest Conflict***	***Decibel***	***Zone***	***Points of Interest Conflict***
T1	Tinian High School	School	< 50	I	No	< 80	I	No
T2	Lake Hagoi	Other	62	I	NA	100	II	NA
T3	Mahalang Ephemeral Ponds	Other	66	II	NA	105	III	NA
T4	Marpo Heights	Residential	< 50	I	No	< 80	I	No
T5	Mount Lasso/Overlook Area	Other	71	II	NA	106	III	NA
T6	Bateha 1 - Isolated	Other	67	II	NA	106	III	NA

Table 6.2-6. Tinian Alternative 3 Representative Points of Interest Affected by Small-Caliber Weapons Noise on Tinian
(in A-weighted day-Night Average Sound Level and Peak)

Point of Interest			*A-weighted Day-Night Average Sound Levels (ADNL)*			*Peak*		
Identification Number	***Description***	***Type***	***Decibel***	***Zone***	***Points of Interest Conflict***	***Decibel***	***Zone***	***Points of Interest Conflict***
	Wetlands							
T7	Northeast of Marpo Heights	Residential	< 50	I	No	83	I	No
T8	Bateha 2 - Isolated Wetlands	Other	75	III	NA	108	III	NA
T9	San Jose	Residential	< 50	I	No	< 80	I	No
T10	San Jose Catholic Church	Church	< 50	I	No	< 80	I	No
T11	Tinian Elementary School	School	< 50	I	No	< 80	I	No
T12	Unai Chiget	Other	58	I	NA	96	II	NA
T13	Unai Chulu	Other	61	I	NA	103	II	NA
T14	Unai Dankulo	Other	64	I	NA	104	III	NA
T15	Unai Masalok	Other	55	I	NA	96	II	NA
T16	North Field National Historic Landmark	Other	55	I	NA	98	II	NA
T17	International Broadcasting Bureau	Administrative	***	***	***	***	***	***
T18	Proposed Base Camp (Old West Field)	Base Camp	54	I	No	95	II	No
T19	Northern Marianas College	School	< 50	I	No	< 80	I	No
T20	Ushi Point	Other	< 50	I	NA	97	II	NA
T21	Native Limestone Forest	Other	< 50	I	NA	91	II	NA
T22	Unai Lam Lam	Other	57	I	NA	95	II	NA

Note: NA – not applicable, see annotation number 1 and shading denotes points of interest inside the Military Lease Area.
[1]Other includes sites with cultural, biological, recreational, or other concerns that are unrelated to human factors and are addressed in the applicable resource sections of the CJMT EIS/OEIS.
[2]Noise level threshold is 50 decibels A-weighted day-night average sound level (or decibel ADNL).
[3]Small-caliber ADNL Noise Zones defined as: Zone I (< 55 decibel ADNL; 55-64 decibel ADNL); Zone II (65-69 decibel ADNL; 70-74 decibel ADNL); and Zone III (75-79 decibel ADNL; 80-84 decibel ADNL; > 85 decibel ADNL).
Source: Army Public Health Command 2014.

Noise generated by small-caliber weapons would not expose any acres, population, or points of interest to noise levels 65 decibels or greater on Saipan under A-weighted or Peak noise levels. This is the case for all three Tinian alternatives.

On Tinian, A-weighted Day-Night Average Sound Levels under Alternatives 1, 2, and 3 would not expose any acres or people outside of the Military Lease Area to noise levels 65 decibels and greater. In terms of Peak noise levels, outside of the Military Lease Area, Alternative 1 would expose 411 acres (166 hectares) but no people to noise levels between 87 and 104 decibels. Alternatives 2 and 3 would expose 600 acres and no people to Zone II noise levels (i.e., 87 to 104 decibels). No people or acres would be exposed to small-caliber weapons Peak noise levels in Zone III outside of the Military Lease Area. Two

representative points of interest within and none outside the Military Lease Area would be newly exposed to Noise Zone II A-weighted noise levels (i.e., 65 to 74 decibels) under Alternative 1, and three each under Alternatives 2 and 3.

For Peak noise exposure, six points of interest are located in Noise Zone III under Tinian Alternatives 1 and 2 and five under Tinian Alternative 3, but none would experience significant noise impacts or be considered incompatible land uses. This is because access during training operations would be restricted when noise of these levels is generated.

Noise generated by small-caliber weapons would not impact people or lands on Saipan under any of the three alternatives.

6.2.1.2 Large-Caliber Weapons

Large-caliber weapons employed under the proposed action include most large weapons available for U.S. military issue. They include live hand grenades, mortars, artillery, and bombs. Table 6.2-7 lists the range facilities, weapons, and ammunition and the anticipated annual expenditure. Under all Tinian alternatives, 101,135 large-caliber rounds of ground-delivered munitions and an additional 50,000 large-caliber rounds of air-delivered munitions would be fired in an average year. The area and population exposed to C-weighted Day-Night Average Sound Levels and Peak noise levels are shown in Tables 6.2-8 through 6.2-10 and illustrated in Figures 6.2-3 through 6.2-5.

Three alternatives for range operations are proposed but noise results are identical for population affected under all three alternatives yet all three vary slightly in acreage. The acreage differences lie completely within the Military Lease Area or off shore. For Tinian Alternatives 1, 2, and 3, large-caliber impulse noise was measured using the C-weighted day-night average sound levels and Peak noise levels. Under all Tinian alternatives only unpopulated areas on Tinian would be newly exposed to Noise Zone II levels. Noise Zone II would not reach Saipan and no area would be exposed to Noise Zone II.

Table 6.2-7. All Tinian Alternatives Representative Annual Large-Caliber Ammunition Expenditure Estimate[1]

Facility	***Weapon/Ammunition***	***Annual Expenditure***		***Total Expenditure***
		Day 7:00 a.m. – 10:00 p.m.	***Night 10:p.m. – 7:00 a.m.***	
Hand Grenade Range	Hand Grenade, HE	3,190	0	3,190
Artillery Indirect Gun Positions: Group A	155 mm Howitzer, HE	4,951	206	5,157
	155 mm Howitzer, Inert	625	26	651
	120 mm Mortar, HE	2,403	100	2,503
	120 mm Mortar, Inert	1,214	51	1,265
Artillery Indirect Gun Positions: Group B	155 mm Howitzer, HE	6,289	262	6,551
	155 mm Howitzer, Inert	794	33	827
	120 mm Mortar, HE	3,053	127	3,180
	120 mm Mortar, Inert	1,543	64	1,607
Artillery Indirect Gun Positions: Group C	155 mm Howitzer, HE	1,888	0	1,888
	155 mm Howitzer, Inert	238	0	238
	120 mm Mortar, HE	917	0	917
	120 mm Mortar, Inert	463	0	463
Mortar Gun Positions	60 mm Mortar, HE	1,394	58	1,452
	60 mm Mortar, Inert	484	20	504
	81 mm Mortar, HE	1,567	65	1,632

Table 6.2-7. All Tinian Alternatives Representative Annual Large-Caliber Ammunition Expenditure Estimate[1]

Facility	*Weapon/Ammunition*	*Annual Expenditure*		*Total Expenditure*
		Day 7:00 a.m. – 10:00 p.m.	*Night 10:p.m. – 7:00 a.m.*	
	81 mm Mortar, Inert	910	38	948
Light Anti-Armor	AT-4, HE	372	0	372
	LAW, HE	372	0	372
	LAW, Inert	3,456	0	3,456
	SMAW, HE	256	0	256
	SMAW, Inert	544	0	544
Grenade Launcher Range	40 mm Grenade, HE	54,250	0	54,250
Infantry Platoon Battle Course	LAW, Inert	392	16	408
	SMAW, Inert	392	16	408
	60 mm Mortar, Inert	1,167	49	1,216
Tank/Fighting Vehicle Multi-Purpose Range Complex	25 mm Gun, Inert	3,226	134	3,360
Battle Area Complex, Live-fire and Movement Range, and Urban Assault Course/Military Operations in Urban Terrain	60 mm Mortar, Inert	307	13	320
	LAW, Inert	230	10	240
	SMAW, Inert	77	3	80
Convoy Live-Fire	25 mm Gun, Inert	2,880	0	2,880
Total Ground to Ground Ordnance		99,844	1,291	101,135
Close Air Support Range (Air-to-Ground Range)	20 mm Gun, Inert	21,375	1,125	22,500
	25 mm Gun, Inert	21,375	1,125	22,500
	2.75 inch Rocket, Inert	2,375	125	2,500
	5 inch Rocket, Inert	2,375	125	2,500
Total Air to Ground Ordnance		47,500	2,500	50,000
Total Large-Caliber		**147,344**	**3,791**	**151,135**

Notes: HE – High Explosive; Inert (e.g., illuminated, smoke, Training Practice); AT4 – Anti-Tank Weapon; LAW – Light Anti-Armor Weapon; and SMAW – Shoulder Mounted Assault Weapon

[1]For noise modeling, there is a 10-decibel penalty applied to operations occurring during environmental nighttime hours (i.e., 10:00 p.m. and 7:00 a.m.).

Table 6.2-8. All Tinian Alternatives Area and Population on Tinian and Saipan Affected by Large-Caliber Weapons Noise

(in C-weighted Day-Night Average Sound Levels)

Noise Levels (in decibels)	*Acres/Hectares*				*Population[1]*	
	Tinian Military Lease Area	*Tinian Non-Military Lease Area*	*Off shore*	*Saipan*	*Tinian*	*Saipan*
Tinian Alternative 1						
Zone II						
62-70	5,644/2,284	1,300/526	27,681/11,202	0/0	0/0	0/0
Zone III						
>70	8,861/3,586	0/0	2,557/1,035	0/0	0/0	0/0
Total	**14,505/5,870**	**1,300/526**	**30,238/12,237**	**0/0**	**0/0**	**0/0**

Table 6.2-8. All Tinian Alternatives Area and Population on Tinian and Saipan Affected by Large-Caliber Weapons Noise
(in C-weighted Day-Night Average Sound Levels)

Noise Levels (in decibels)	*Acres/Hectares*				*Population*[1]	
	Tinian Military Lease Area	*Tinian Non-Military Lease Area*	*Off shore*	*Saipan*	*Tinian*	*Saipan*
Tinian Alternative 2						
Zone II						
62-70	6,045/2,446	1,267/513	26,369/10,671	0/0	0/0	0/0
Zone III						
>70	8,599/3,480	0/0	2,322/940	0/0	0/0	0/0
Total	**14,644/5,870**	**1,267/513**	**28,691/11,611**	**0/0**	**0/0**	**0/0**
Tinian Alternative 3						
Zone II						
62-70	5,986/2,422	1,300/526	26,559/10,748	0/0	0/0	0/0
Zone III						
>70	8,680/3,513	0/0	2,338/946	0/0	0/0	0/0
Total	**14,666/5,935**	**1,300/526**	**28,897/11,694**	**0/0**	**0/0**	**0/0**

Note: [1]Population on Tinian is outside Military Lease Area lands.
Source: Army Public Health Command 2014.

Large-caliber weapons generate low frequency noise that is affected by wind and weather conditions much more than the higher frequency small-caliber weapon noise so peak large-caliber weapon noise is calculated for unfavorable and neutral weather conditions. The weapons containing the greatest amount of explosives are used to determine the extent of the noise complaint peak contours. In this case, the 155 millimeter high explosive rounds are used for these calculations. Unfavorable weather conditions for noise propagation occur when the wind is blowing towards the receptor. The Mariana Islands lie in tropical latitudes with nearly constant trade winds blowing from the east and rarely reversing direction. In terms of noise propagation, winds blowing from the southwest would create an unfavorable weather condition for Saipan and wind blowing from the north would create unfavorable wind conditions on Tinian. Interviews with Commonwealth Port Authority personnel operating both the Tinian and Saipan International Airports state that runways are used 85-90% of the time towards the east and 10-15% towards the west.

Under neutral weather conditions (Table 6.2-9), about 520 acres (210 hectares) outside of Military Lease Area boundaries under all Tinian alternatives would experience Peak noise conditions and thus have the potential for increased risk of complaints (i.e., people may be annoyed and complain about noise generated within the RTA). However, the noise levels only affect unpopulated areas adjacent to the Military Lease Area. Under unfavorable weather conditions (Table 6.2-10), the population, and the area exposed to increased risk of complaints grow. Under all Tinian alternatives, 1,223 people would be exposed to Peak noise levels greater than 115 decibels. Although the affected population would be the same for all alternatives, the area affected under Tinian Alternatives 2 and 3 varies slightly but not affecting populated areas.

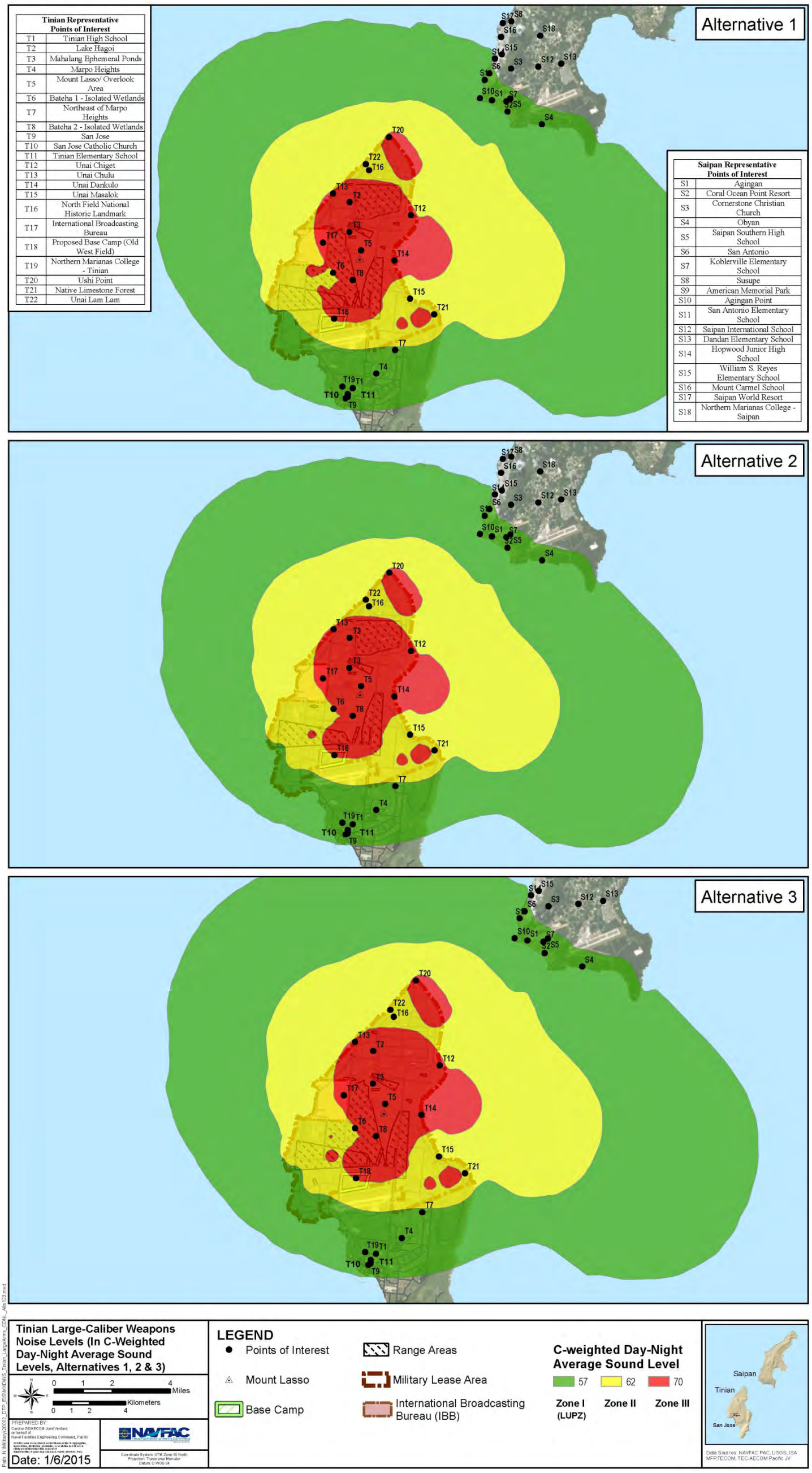

Figure 6.2-3 Tinian Large-Caliber Weapons Noise Levels, Alternatives 1, 2 and 3 *(C-weighted)*

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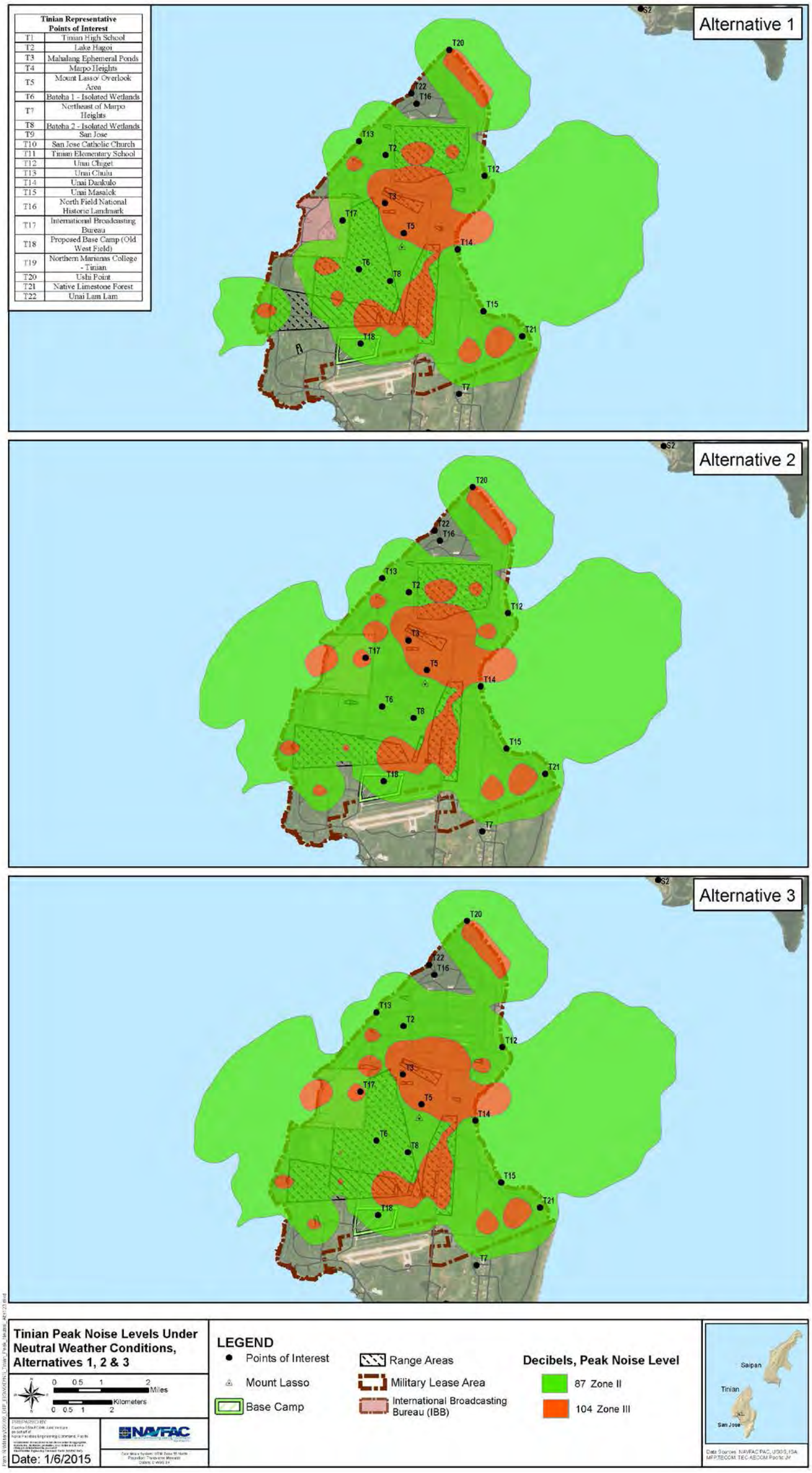

Figure 6.2-4 Tinian Large-Caliber Peak Noise Levels Under Neutral Weather Conditions, Alternatives 1, 2 and 3

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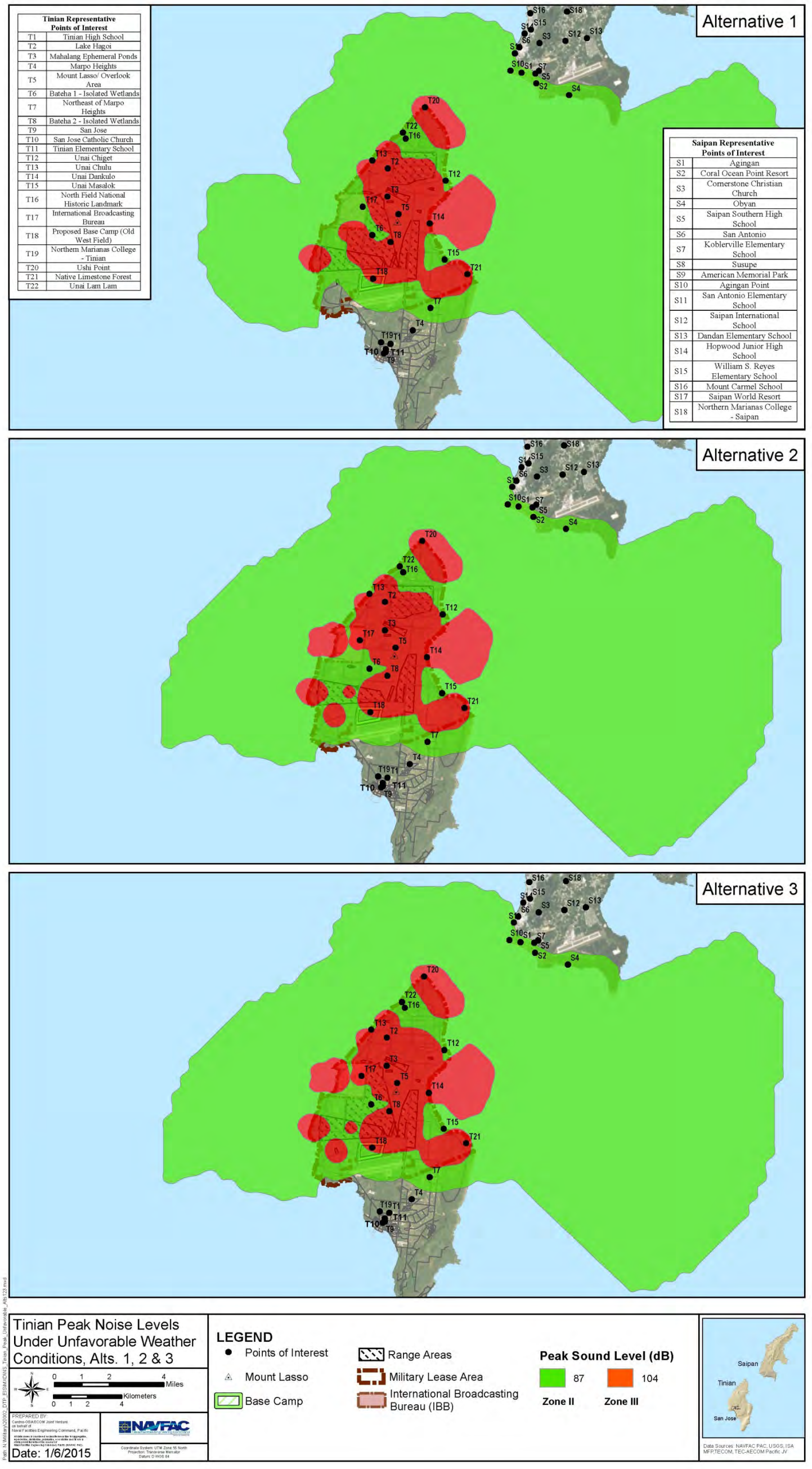

Figure 6.2-5 Tinian Large-Caliber Peak Noise Levels Under Unfavorable Weather Conditions, Alternatives 1, 2 and 3

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Table 6.2-9. All Tinian Alternatives Acres/Hectares and Population Affected by Large-Caliber Weapons Noise - Risk Complaint Neutral Weather

(in Peak Noise Levels)

Peak Noise Levels (in decibels)	*Acres/Hectares*						*Population*	
	Alternative 1		*Alternative 2*		*Alternative 3*		*All Alternatives*	
	Tinian	*Saipan*	*Tinian*	*Saipan*	*Tinian*	*Saipan*	*Tinian*	*Saipan*
Off shore								
115	11,582/4,687		15,115/2,070		15,115/2,070		NA	NA
130	408/165		552/223		547/221		NA	NA
Total	**11,990/4,852**		**15,667/2,293**		**15,662/2,291**		**NA**	**NA**
On shore								
Within the Military Lease Area								
115	8,592/3,477	0	9,902/4,007	0	10,157/4,110	0	0	0
130	3,669/1,485	0	3,938/1,594	0	3,683/1,490	0	0	0
Total	**12,261/4,962**	**0**	**13,840/5,601**	**0**	**13,840/5,600**	**0**	**0**	**0**
Outside the Military Lease Area								
115	521/211	0	521/211	0	519/210	0	0	0
130	0	0	0	0	0	0	0	0
Subtotal	**521/211**	**0**	**521/211**	**0**	**519/210**	**0**	**0**	**0**
Total	**12,782/5,173**		**14,361/5,812**		**14,359/5,810**			**0**

Table 6.2-10. All Tinian Alternatives Acres/Hectares and Population Affected by Large-Caliber Weapons Noise - Risk Complaint Unfavorable Weather

(in Peak Noise Levels)

Peak Noise Levels (in decibels)	*Acres/Hectares*						*Population*	
	Alternative 1		*Alternative 2*		*Alternative 3*		*All Alternatives*	
	Tinian	*Saipan*	*Tinian*	*Saipan*	*Tinian*	*Saipan*	*Tinian*	*Saipan*
Off shore								
115	105,272/42,602		111,014/44,926		111,014/44,926		NA	NA
130	4,518/1,828		5,233/2,118		5,223/2,114		NA	NA
Total	**109,790/44,430**		**116,247/47,044**		**116,237/47,040**		**NA**	**NA**
On shore								
Within the Military Lease Area								
115	4,884/1,976	NA	5,032/2,036	0	5,074/2,053	0	0	0
130	9,879/3,998	NA	10,201/4,128	0	10,159/4,111	0	0	0
Total	**14,763/5,974**	**NA**	**15,233/6,164**	**0**	**15,233/6,164**	**0**	**0**	**0**
Outside the Military Lease Area								
115	2,297/930	1,552/628	2,399/970	1,552/628	2,398/970	1,552/628	80	1,143
130	130/53	0	130/53	0	130/53	0	0	0
Subtotal	**2,427/983**	**1,552/628**	**2,529/1,023**	**1,552/628**	**2,528/1,023**	**1,552/628**	**80**	**1,143**
Total	**18,742/7,585**		**19,314/7,816**		**19,313/7,815**			**1,223***

Points of interest on Tinian and Saipan exposed to large-caliber C-weighted Day-Night Average Sound Level, and Peak noise levels under neutral and unfavorable weather conditions are presented in Tables 6.2-11 through 6.2-14.

Table 6.2-11. Tinian Representative Points of Interest Affected by Large-Caliber Weapons Noise for All Tinian Alternatives

(in C-weighted Day-Night Average Sound Levels)

Point of Interest (Points of Interest)			***CDNL***		
Identification Number	***Description***	***Type[1]***	***Decibel***	***Zone[2]***	***Points of Interest Conflict***
T1	Tinian High School	School	58	LUPZ	No
T2	Lake Hagoi	Other	77	III	NA
T3	Mahalang Ephemeral Ponds	Other	89	III	NA
T4	Marpo Heights	Residential	59	LUPZ	No
T5	Mount Lasso/Overlook Area	Other	85	III	NA
T6	Bateha 1 - Isolated Wetlands	Other	70	III	NA
T7	Northeast of Marpo Heights	Residential	61	LUPZ	No
T8	Bateha 2 - Isolated Wetlands	Other	71	III	NA
T9	San Jose	Residential	58	LUPZ	No
T10	San Jose Catholic Church	Church	58	LUPZ	No
T11	Tinian Elementary School	School	58	LUPZ	No
T12	Unai Chiget	Other	72	III	NA
T13	Unai Chulu	Other	71	III	NA
T14	Unai Dankulo	Other	78	III	NA
T15	Unai Masalok	Other	66	II	NA
T16	North Field National Historic Landmark	Other	68	II	NA
T17	International Broadcasting Bureau	Administrative	72	III	No[3]
T18	Proposed Base Camp (Old West Field)	Base Camp	70	III	No[4]
T19	Northern Marianas College - Tinian	School	58	LUPZ	No
T20	Ushi Point	Other	73	III	NA
T21	Native Limestone Forest	Other	67	II	NA
T22	Unai Lam Lam	Other	67	II	NA

Note: Shading denotes points of interest inside the Military Lease Area and NA – not applicable, see annotation number 1. Noise levels are similar for all three alternatives, only T8 and T18 increased by 1 decibel under Alternative 3.

[1]Other includes sites with cultural, biological, recreational, or other concerns that are unrelated to human factors and are addressed in the applicable resource sections of the CJMT EIS/OEIS.

[2]Demolition and large-caliber Noise Zones defined as: Land Use Planning Zone (57-62 decibels C-weighted day-night average sound level or decibel CDNL); Zone I (<57 decibel CDNL); Zone II (62-70 decibel CDNL); and Zone III (>70 decibel CDNL)

[3]Not classified as a noise-sensitive land use.

[4]Point of interest is human but is a tactical training location and therefore, the land use is compatible.

Source: Army Public Health Command 2014.

Table 6.2-12. Saipan Representative Points of Interest Affected by Large-Caliber Weapons Noise for All Tinian Alternatives
(in C-weighted Day-Night Average Sound Levels)

Point of Interest (Points of Interest)			***CDNL***		
Identification Number	***Description***	***Type[1]***	***Decibel***	***Zone[2]***	***Points of Interest Conflict***
S1	Agingan	Residential	59	LUPZ	No
S2	Coral Ocean Point Resort	Resort	59	LUPZ	No
S3	Cornerstone Christian Church	Church	56	Zone I	No
S4	Obyan	Residential	59	LUPZ	No
S5	Saipan Southern High School	School	58	LUPZ	No
S6	San Antonio	Residential	58	LUPZ	No
S7	Koblerville Elementary School	School	59	LUPZ	No
S8	Susupe	Residential	55	Zone I	No
S9	American Memorial Park	Other	51	Zone I	NA
S10	Agingan Point	Other	60	LUPZ	NA
S11	San Antonio Elementary School	School	58	LUPZ	No
S12	Saipan International School	School	55	Zone I	No
S13	Dandan Elementary School	School	54	Zone I	No
S14	Hopwood Junior High School	School	57	LUPZ	No
S15	William S. Reyes Elementary School	School	56	Zone I	No
S16	Mount Carmel School	School	56	Zone I	No
S17	Saipan World Resort	Transient Lodging (Resort)	56	Zone I	No
S18	Northern Marianas College - Saipan	School	54	Zone I	No

Note: The Points of Interest noise levels are the same for all three alternatives. NA – not applicable, see annotation number 1.
[1]Other includes sites with cultural, biological, recreational, or other concerns that are unrelated to human factors and are addressed in the applicable resource sections of the CJMT EIS/OEIS.
[2]Demolition and large-caliber Noise Zones defined as: Land Use Planning Zone (57-62 decibels C-weighted day-night average sound level or decibel CDNL); Zone I (<57 decibel CDNL); Zone II (62-70 decibel CDNL); and Zone III (>70 decibel CDNL)
Source: Army Public Health Command 2014.

On Tinian, all receptors outside the Military Lease Area would be exposed to C-weighted Day-Night Average Sound Levels within the Land Use Planning Zone portion of the Zone I noise levels. Large-caliber range noise would be audible in populated areas of Tinian but all at levels compatible with any type of land usage. Within the Military Lease Area, noise levels at the points of interest would be in both Zones II and III. Under neutral and unfavorable weather conditions, points of interest outside the Military Lease Area would have Peak noise levels generating mostly low complaint risk areas with the exception of the areas in Marpo Valley northeast of Marpo Heights, which would be moderate in unfavorable weather conditions. In the Military Lease Area, noise levels would be consistent with moderate to high complaint risks but since there are no populations there would be no complaints from this area.

Representative points of interest on Saipan would experience C-weighted Day-Night Average Sound Levels less than 62 decibels and be within Zone I areas with about half within the Land Use Planning Zone portion of Zone I. On Saipan, no representative points of interest would be exposed to Peak noise levels greater than 110 decibels during neutral weather conditions and have low complaint risks. Additionally, regardless of the alternative, when weather conditions are unfavorable, the following points of interest would be exposed to Peak noise levels between 115 and 120 decibels (C-weighted) on Saipan:

two residential areas, two schools, one resort, and one other (Agingan Point) site potentially creating moderate complaint risks.

Table 6.2-13. Tinian Representative Points of Interest Affected by Large-Caliber Weapons Noise for All Tinian Alternatives
(in Peak Noise Levels)

Point of Interest			*Neutral Weather*			*Unfavorable Weather*		
Identification Number	***Description***	***Type[2]***	***Decibel[3]***	***Zone[4]***	***Points of Interest Conflict***	***Decibel[3]***	***Zone[4]***	***Points of Interest Conflict***
T1	Tinian High School	School	< 110	Low	Low	110	Low	Low
T2	Lake Hagoi	Other	124	Moderate	NA	135	High	NA
T3	Mahalang Ephemeral Ponds	Other	138	High	NA	147	High	NA
T4	Marpo Heights	Residential	100	Low	Low	111	Low	Low
T5	Mount Lasso/Overlook Area	Other	134	High	High	145	High	NA
T6	Bateha 1 - Isolated Wetlands	Other	117	Moderate	NA	130	Moderate	NA
T7	Northeast of Marpo Heights	Residential	112	Low	Low	123	Moderate	Moderate
T8	Bateha 2 - Isolated Wetlands	Other	119	Moderate	NA	131	High	NA
T9	San Jose	Residential	< 110	Low	Low	110	Low	Low
T10	San Jose Catholic Church	Church	< 110	Low	Low	< 110	Low	Low
T11	Tinian Elementary School	School	< 110	Low	Low	< 110	Low	Low
T12	Unai Chiget	Other	119	Moderate	Moderate	129	Moderate	NA
T13	Unai Chulu	Other	116	Moderate	Moderate	131	Moderate	NA
T14	Unai Dankulo	Other	127	Moderate	Moderate	138	High	NA
T15	Unai Masalok	Other	116	Moderate	Moderate	127	Moderate	NA
T16	North Field National Historic Landmark	Other	112	Low	Low	122	Moderate	NA
T17	International Broadcasting Bureau[1]	Administrative	118	Moderate	Moderate	128	Moderate	Moderate
T18	Proposed Base Camp (Old West Field)	Transient Lodging	121	Moderate	Moderate	133	High	NA[5]
T19	Northern Marianas College - Tinian	School	< 110	Low	Low	110	Low	Low
T20	Ushi Point	Other	129	Moderate	NA	140	High	NA
T21	Native Limestone Forest	Other	123	Moderate	NA	135	High	NA
T22	Unai Lam Lam	Other	110	Low	NA	121	Moderate	NA

Note: Shading denotes points of interest inside the Military Lease Area and NA – not applicable, see annotation 1. The points of interest noise levels are nearly identical for all three alternatives, only T6 differs (126 decibels for both Alternatives 2 and 3).
[1]Under Alternatives 2 and 3 the International Broadcasting Bureau mission is removed.
[2]Other includes sites with cultural, biological, historical, or recreational concerns that are not related to human factors such as health or annoyance are addressed in the applicable resource section of the Environmental Impact Statement.
[3]Noise level threshold is 110 decibel Peak.
[4]Complaint risk areas defined as: low risk of complaints <115 decibel Peak; moderate risk of complaints 115-130 decibels Peak; and high risk of complaints > 130 decibel Peak.
[5]Point of interest is human but is a tactical training location and therefore, the complaint risk correlation does not apply.
Source: Army Public Health Command 2014.

Table 6.2-14. Saipan Representative Points of Interest Affected by Large-Caliber Weapons Noise for All Tinian Alternatives

(in Peak Noise Levels)

Point of Interest (Points of Interest)			***Neutral Weather***			***Unfavorable Weather***		
Identification Number	***Description***	***Type[1]***	***Decibel[2]***	***Zone[3]***	***Points of Interest Conflict***	***Decibel[2]***	***Zone[3]***	***Points of Interest Conflict***
S1	Agingan	Residential	< 110	Low	Low	117	Moderate	Moderate
S2	Coral Ocean Point Resort	Resort	< 110	Low	Low	117	Moderate	Moderate
S3	Cornerstone Christian Church	Church	< 110	Low	Low	< 110	Low	Low
S4	Obyan	Residential	< 110	Low	Low	120	Moderate	Moderate
S5	Saipan Southern High School	School	< 110	Low	Low	113	Low	Low
S6	San Antonio	Residential	< 110	Low	Low	114	Low	Low
S7	Koblerville Elementary School	School	< 110	Low	Low	115	Moderate	Moderate
S8	Susupe	Residential	< 110	Low	Low	< 110	Low	Low
S9	American Memorial Park	Other	< 110	Low	Low	< 110	Low	NA
S10	Agingan Point	Other	< 110	Low	NA	117	Moderate	NA
S11	San Antonio Elementary School	School	< 110	Low	Low	115	Moderate	Moderate
S12	Saipan International School	School	< 110	Low	Low	< 110	Low	Low
S13	Dandan Elementary School	School	< 110	Low	Low	< 110	Low	Low
S14	Hopwood Junior High School	School	< 110	Low	Low	112	Low	Low
S15	William S. Reyes Elementary School	School	< 110	Low	Low	< 110	Low	Low
S16	Mount Carmel School	School	< 110	Low	Low	112	Low	Low
S17	Saipan World Resort	Transient Lodging	< 110	Low	Low	111	Low	Low
S18	Northern Marianas College - Saipan	School	< 110	Low	Low	< 110	Low	Low

Note: The points of interest noise levels are the same for all three alternatives and NA – not applicable, see annotation number 1.

[1]Other includes sites with cultural, biological, or other concerns that are unrelated to human factors and are addressed in the applicable resource sections of the CJMT EIS/OEIS.

[2]Noise level threshold is 110 decibel Peak.

[3]Complaint risk areas defined as: low risk of complaints <115 decibel Peak; moderate risk of complaints 115-130 decibel Peak; and high risk of complaints > 130 decibel Peak.

Source: Army Public Health Command 2014.

6.2.2 Aircraft Operations

6.2.2.1 Airfields

Proposed aircraft operations at the airport stem from the need to deliver military personnel and equipment to Tinian and for training. Table 6.2-15 presents the proposed number of annual military operations for day and night at the airport and at North Field. An operation consists of either a take-off or a landing and each count as one operation. These operations would be in addition to the current operations at Tinian International Airport. Of the 11,664 annual operations, 75% would occur during environmental daytime hours (7:00 a.m. to 10:00 p.m.) and 25% during the environmental nighttime hours (10:00 p.m. to 7:00a.m.).

Table 6.2.-15. Annual Airfield Military Operations[1] at Tinian International Airport and North Field for All Tinian Alternatives

Aircraft Type[2]	*Tinian International Airport*			*North Field*			*Total*		
	Day	***Night***	***Total***	***Day***	***Night***	***Total***	***Day***	***Night***	***Total***
Transport Tilt-rotor	720	280	1,000	320	80	400	1,040	360	1,400
Transport Rotary Wing	680	280	960	280	80	360	960	360	1,320
Attack Helo	520	240	760	120	40	160	640	280	920
Transport Fixed Wing	800	400	1,200	800	400	1,200	1,600	800	2,400
Unmanned	200	100	300	200	100	300	400	200	600
Fighter	1,600	400	2,000	Not applicable			1,600	400	2,000
Heavy commercial transport	24	0	24	Not applicable			24	0	24
Fighter - Field Carrier Landing Practice	2,500	500	3,000	Not applicable			2,500	500	3,000
Total	**7,044**	**2,200**	**9,244**	**1,720**	**700**	**2,420**	**8,764**	**2,900**	**11,664**

Note: [1]Operations include a takeoff or a landing and each are counted as one operation. A take-off and a landing are two operations.
[2]Examples of aircraft types: Transport Tilt-rotor – MV-22; Transport Rotary Wing – CH-53; Attack Helicopter – AH-1 and AH-64; Transport Fixed Wing – C-130, KC-135, and C-17: Unmanned Aerial System – RQ-7; and Fighter – F-18, AV-8, and F-35.

Table 6.2-16 presents baseline and all Tinian alternatives acres and population for areas within the Military Lease Area, outside the Military Lease Area, and off shore exposed to A-weighted noise levels equal to or greater than 65 decibels. Most of the acreage exposed to 65 decibels or greater outside the Military Lease Area is on Tinian International Airport property. However, a small portion of the acreage skirts the edge of Marpo Heights affecting about 10 homes (see point of interest T4 on Figure 6.2-6). Figure 6.2-6 displays the noise contour bands. Similar to the live-fire range population calculations, to determine the population by contour band, this analysis used aerial photography and counted actual houses. The U.S. Census population multiplier for Tinian (Marpo Heights) of 3.77 people per household was used to determine the number of people affected.

Table 6.2-16. All Tinian Alternatives Noise Exposure at and around Tinian International Airport Compared to Baseline Levels
(in A-weighted Day-Night Average Sound Levels)

Zone	*Noise Levels (in decibels)*	*Baseline*		*Alternatives 1, 2, and 3*	
		Acres/ Hectares	*Population*	*Acres/ Hectares*	*Population*
Within the Military Lease Area					
II	65 – 69	59/24	NA	2,733/1,106	NA
	70 – 74	0/0	NA	2,775/1,123	NA
III	75 – 79	0/0	NA	1,636/662	NA
	80 – 84	0/0	NA	334/135	NA
	85+	0/0	NA	3/1	NA
Total		**59/24**	**NA**	**7,481/3,027**	**NA**
Area and Population Outside the Military Lease Area					
II	65 – 69	361/146	0	1,292/523	40
	70 – 74	194/79	0	375/152	0
III	75 – 79	133/54	0	334/165	0
	80 – 84	31/13	0	389/157	0
	85+	0/0	0	547/221	0
Total		**719/291**	**0**	**2,937/1,189**	**40**
Off shore					
Not Applicable	65 – 69	0	NA	1,621/656	NA
	70 – 74	0	NA	1,099/445	NA
	75 – 79	0	NA	506/205	NA
	80 – 84	0	NA	1/0	NA
	85+	0	NA	0/0	NA
Total		**0**	**NA**	**3,227/1,306**	**NA**

NOISEMAP and its plotting software can combine different aircraft generated noise levels, provided the same area and noise metrics are used, and model the results on identical geographical grids. Figure 6.2-6 and Table 6.2-17 include noise generated at the Tinian International Airport and the North Field as well as aircraft operating at the landing zones and dispersed operations in the Tinian Military Operations Area and Restricted Areas, R-7203 A/B/C/X/Y/Z.

When compared to baseline conditions, noise levels of 65 decibels and greater would increase and potentially affect 2,937 more acres (1,189 hectares) outside the Military Lease Area under all Tinian alternatives. The aerial photography inspection revealed that there are approximately ten households and 40 people affected by aircraft noise greater than 65 decibels under the proposed alternatives.

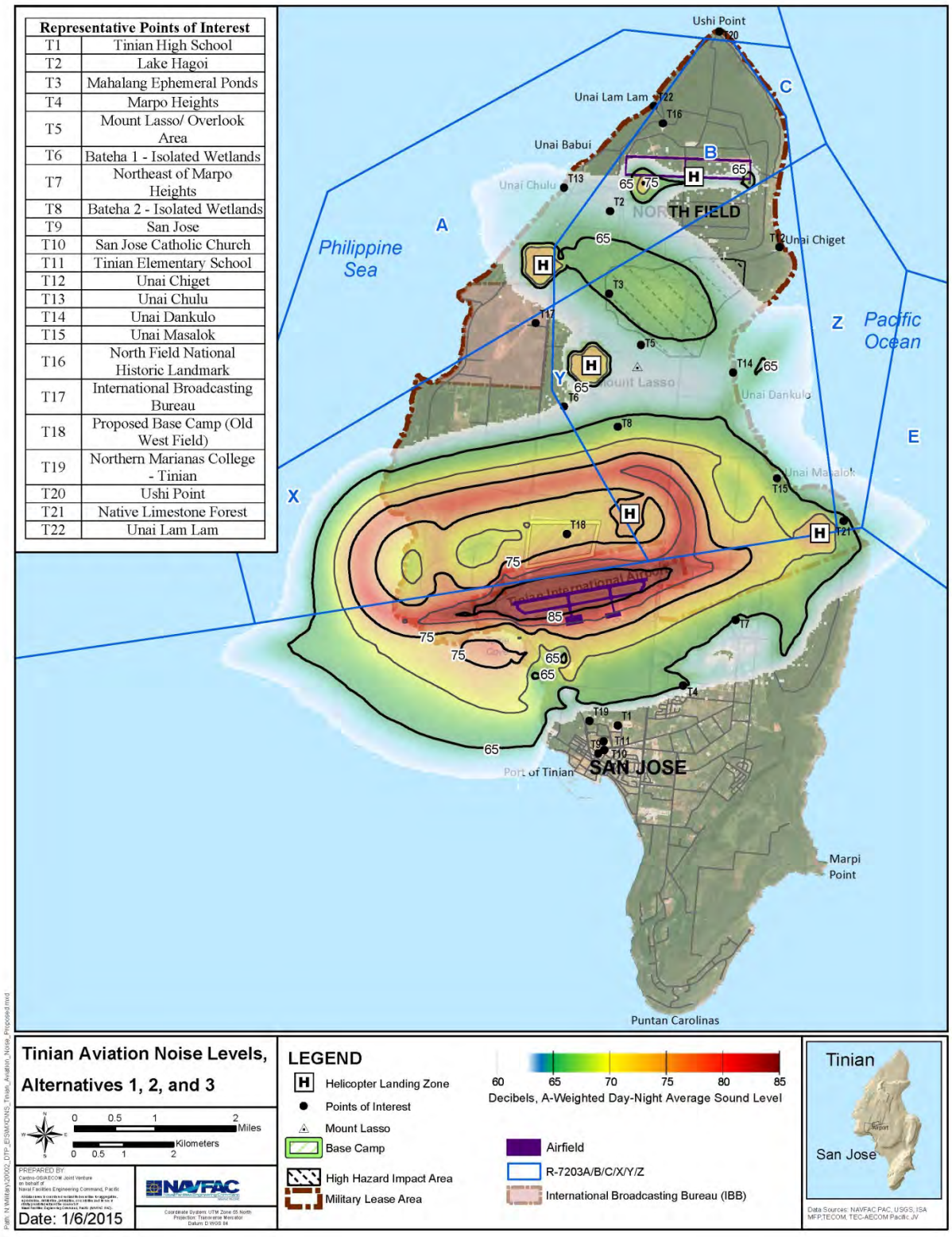

Figure 6.2-6 Airfield and Airspace Noise Levels for All Tinian Alternatives

(in A-weighted Day-Night Average Sound Levels)

Decibel levels for representative points of interest are provided in Table 6.2-17. Under all of the Tinian alternatives, of the 22 total points of interest, six would experience increases of noise levels above 65-decibel noise contour bands when compared to baseline conditions. The six points of interest include one residential receptor at Marpo Heights (T4), four others within the Military Lease Area, and the proposed base camp for transient lodging (T18).

Table 6.2-17. All Tinian Alternatives Airfield and Airspace Noise Levels
(in A-weighted Day-Night Average Sound Levels)

Points of Interest			***Decibels***		
Identification Number	***Description***	***Type***	***Baseline***	***Proposed***	***Change from Baseline***
T1	Tinian High School	School	37.6	55.6	18.0
T2	Lake Hagoi	Other[1]	44.1	63.4	19.3
T3	Mahalang Ephemeral Ponds	Other	39.5	65.4	25.9
T4	Marpo Heights	Residential	45.4	65.2	19.8
T5	Mount Lasso/Overlook Area	Other	40.7	63.9	23.2
T6	Bateha 1 - Isolated Wetlands	Other	38.8	61.9	23.1
T7	Northeast of Marpo Heights	Residential	48.5	64.8	16.3
T8	Bateha 2 - Isolated Wetlands	Other	45.6	66.6	21.0
T9	San Jose	Residential	37.3	54.1	16.8
T10	San Jose Catholic Church	Church	37.1	54.3	17.2
T11	Tinian Elementary School	School	36.9	54.8	17.9
T12	Unai Chiget	Other	35.4	57.8	22.4
T13	Unai Chulu	Other	44.0	63.4	19.4
T14	Unai Dankulo	Other	47.0	64.0	17.0
T15	Unai Masalok	Other	48.8	66.0	17.2
T16	North Field National Historic Landmark	Other	41.2	57.9	16.7
T17	International Broadcasting Bureau	Administrative	41.8	60.8	19.0
T18	Proposed Base Camp[2] (Old West Field)	Transient Lodging	54.6	72.4	17.8
T19	Northern Marianas College - Tinian	School	37.2	58.0	20.8
T20	Ushi Point	Other	36.3	49.6	13.3
T21	Native Limestone Forest	Other	50.0	65.5	15.5
T22	Unai Lam Lam	Other	39.0	56.7	17.7

Notes: Shading indicates points of interest are in Military Lease Area.
[1]Access to sites in the Military Lease Area would only occur when adjacent ranges are not in use and noise levels would be lower when people are allowed access.
[2]Point of interest is human but is a tactical training location and therefore, the land use is compatible.

6.2.2.2 Airspace Operations

Aviation Training. Two types of generalized flight activity comprise the aviation training noise analysis: low-altitude hovering and landing activities at landing zones, and subsonic fixed- and rotary-wing aircraft operations within the Special Use Airspace. Aircraft can approach landing zones from any direction, but during landings and take-offs, the aircraft normally point into the wind. Noise levels due to this activity were modeled and associated landing zones are included in Figure 6.2-6.

Special Use Airspace. Dispersed aircraft activities within this airspace are modeled and superimposed on Figure 6.2-6 displaying projected noise levels in the proposed SUA. Under Tinian Alternatives 1, 2, and 3, noise generated by military aircraft operating in the Tinian Military Operations Area and Restricted

Areas, R-7203A/B/C/X/Y/Z would generate noise predominately in the Military Lease Area and noise levels would increase when compared to baseline conditions as shown in Table 6.2-17. However, no additional population over the 40 people identified for airfield noise would be affected by noise levels of 65 decibels and greater.

6.2.3 Operations Noise Effects

Supplemental noise metrics identify potential noise effects from range activities and aircraft overflights. These impacts include potential hearing loss, speech interference, classroom interruptions, and sleep disturbance.

6.2.3.1 Speech Interference

This aspect of supplemental noise metrics is primarily associated with causing community annoyance. Speech interference is measured by outdoor sound levels of at 60 decibels equivalent sound level at representative locations during the daytime between 7:00 a.m. and 10:00 p.m. This measure also accounts for a 12 to 24 decibel sound attenuation provided by buildings with windows opened or closed, respectively and considers the average noise levels. Individual sound events provide another measure of speech interference by determining the number of sound events of at least 90 decibels at the representative locations during the daytime. Table 6.2-18 presents indoor speech interference under baseline conditions at representative locations.

Table 6.2-18. All Tinian Alternatives Indoor Speech Interference Events at Representative Locations on Tinian

Points of Interest			***Decibels – Equivalent Sound Levels***			***Number of Events Greater than 90 decibels***
Identification Number	***Description***	***Type***	***Outdoor***	***Windows Closed***	***Windows Open***	
T4	Marpo Heights	Residential	60.6	36.6	48.6	4
T7	Northeast of Marpo Heights	Residential	60.5	36.5	48.5	12
T9	San Jose	Residential	50.4	26.4	38.4	3

Under all Tinian alternatives, aircraft operations would generate noise levels in areas away from the airport environment that could interfere with activities such as talking or listening to the television or radio. At the residential areas listed in Table 6.2-18, the highest outdoor A-weighted Day-Night Sound Levels would be just over 60 decibels. There is a reduction of 24 decibels with windows closed and 12 decibels with windows open and the highest indoor sound level would be above 40 decibels. The highest levels expected from a single fly over would be in the Marpo Valley area northeast of Marpo Heights. The number of noise events over 90 decibels would be a maximum of 12 daily events on an average day or less than once per hour. Generally, these noise events would occur on average, a few times per day during the 20 weeks of training, but flying operations would not be the same from day to day. This would result in some days having very few events, and other days several events.

6.2.3.2 Classroom Interruptions

For classroom interruption analysis, a threshold on indoor background, equivalent sound levels of 40 decibels, and a limit on single events of 50 decibels of maximum sound levels were applied. These limits translate to an outdoor equivalent sound level of 60-decibels continuous level and an outdoor maximum sound level of 65 and 75 decibels to obtain the 40-decibel equivalent sound level threshold. The equivalent noise level averaged over the nine hours during normal school hours (i.e., 8:00 a.m. to 5:00 p.m.) determines classroom disruption (Department of Defense Noise Working Group 2009). Table

6.2-19 presents the potential for speech interfering events for schools potentially affected by aircraft-generated noise under all Tinian alternatives.

Table 6.2-19. All Tinian Alternatives Classroom Speech Interference Events at and around Tinian International Airport

School	*Outdoor Equivalent Noise Level (9 hours)*	*Indoor Noise Levels*	
		Windows Closed	*Windows Open*
		Equivalent Noise Level (9 hours)	*Equivalent Noise Level (9 hours)*
Tinian High School	50.9	26.9	38.9
Tinian Elementary School	50.6	26.6	38.6
Northern Marianas College - Tinian	50.6	26.6	38.6

Note: Assumes a 24-decibel reduction for windows closed and a 12-decibel reduction for windows open.

Relative to baseline conditions, equivalent sound levels (9 hours) would be an imperceptible increase at the Tinian schools. Speech interference events, with windows open, would not change from the zero experienced under baseline conditions.

6.2.3.3 Sleep Disturbance

Sleep disturbance is assessed by determining the probabilities of awakenings indoors with the windows closed. Table 6.2-20 lists the probabilities of awakening events between the hours of 10:00 p.m. to 7:00 a.m. under all Tinian alternatives. The probability of awakening indoors ranges from 1-7% with windows closed and from 3-12% with windows open.

Table 6.2-20. All Tinian Alternatives Indoor Sleep Disturbance at Representative Residential Locations

Representative Location	*Percent Probability of Awakening (10:00 p.m. – 7:00 a.m.) – Windows closed and open*	
	Windows Closed	*Windows Open*
Marpo Heights	4-5%	7-8%
Northeast of Marpo Heights	6-7%	11-12%
San Jose	1-2%	3-4%

Potential Hearing Loss. Under all Tinian alternatives, no population would be exposed to the 24-hour equivalent noise levels of 80 decibels and greater; therefore, no potential hearing loss impacts would occur.

6.2.4 Waterborne Activities

Waterborne activities include Amphibious Assault Vehicles, Landing Craft Air Cushion, Landing Craft Utility vessels, and Light Armored Vehicles used for training on the beaches. Large vessel operations in the Port of Tinian would include a High Speed Vessel, ships, and a self-propelled barge for transporting personnel and equipment to Tinian. Amphibious Assault Vehicles would also use the port for going ashore and transiting to the training area.

6.2.4.1 Shore Operations

Of all the vessels planned for use, the Landing Craft Air Cushion operations would be the loudest. These vessels ride on a cushion of air generated by powerful engines, driving fans that elevate the vessel above the water. Landing Craft Air Cushions generate maximum noise levels of 98 decibels at 200 feet (61 meters) during ground run-up conditions and sound exposure levels up to 104 A-weighted decibels at 40 knots (Naval Surface Warfare Center Panama City Division 2009). Under the proposed action alternatives, Landing Craft Air Cushion vehicles would operate at amphibious landing beaches and near

shore of the Military Lease Area and generate noise levels of about 74 decibels during ground run-up conditions and 80 decibels at 40 knots. For safety purposes, visitors would not have access to beach or nearby areas when training exercises are occurring. However, visitors may be allowed to have access to adjacent beaches. Under any of the Tinian alternatives, Landing Craft Air Cushion vehicles that would operate at one of the amphibious landing beaches and near shore of the Military Lease Area would generate noise audible at the nearest adjacent beach. For example, Landing Craft Air Cushion vehicles operating at Unai Babui would generate noise levels of about 74 decibels during ground run-up conditions and 80 decibels at 40 knots (74 kilometers per hour) at Unai Chulu. However, the public would not have access to the amphibious landing beach training areas and, therefore, would not be exposed to elevated noise levels created by these activities. Amphibious Assault Vehicles would be the next loudest vessels with sound exposure levels of about 87-88 decibels moving on water or land, and around 72 decibels at a distance of 100 feet (30 meters) while at idle. Landing craft and Light Armored Vehicles would be used but are smaller and have less horsepower and resulting noise levels lower than either the Landing Craft Air Cushion or the Amphibious Assault Vehicles.

6.2.4.2 Seaport Operations

Port operations would occur at the beginning and end of a 2-week training cycle as one of the potential transportation options for military service personnel and equipment embarkation/debarkation points. Tinian port operations would include simultaneous operations by a Joint High Speed Vessel, other ships, a barge, and Landing Craft Utility boats. When in port, there probably would be diesel generators for shipboard electrical requirements. Arriving and departing the port would be at 5 knots and operating at low engine speeds and thus not generate elevated noise levels. Noise from visiting vessels would be consistent with normal port vessels and persist when loading and unloading for a day or two. The vessels would be equipped with roll-on, roll-off capabilities meaning wheeled vehicles would be driven onto and off the vessels as opposed to requiring crane operations to unload the ships. Amphibious Assault vehicles would also use the port and generate noise as described above. The nearest residence would be over 200 feet from the planned route for the vehicle to transit to the training area and the noise levels would be less than 66 decibels. Noise levels would be consistent with traffic noise described below.

6.2.5 Traffic

Vehicular traffic associated with the proposed action would be trips between the harbor and base camp by permanently based vehicles and vehicles belonging to each unit and their organic equipment. Table 6.2-21 lists the number and type of equipment anticipated to accompany a representative unit training on Tinian. Table 6.2-22 shows the vehicles proposed for permanent storage/use on Tinian.

Table 6.2-21. Representative Vehicle Requirements

Vehicle Type	*Generic Unit*	*Generic Battalion Landing Team*
High Mobility Multipurpose Wheeled Vehicles (Humvee)	63	78[1] (8 are TOW)
Light Armored Vehicles	7	7
Medium Tactical Vehicle Replacement 7-ton Trucks	30	12
Amphibious Assault Vehicles (on Trailers)	14	15
Logistic Vehicle Systems	4	0
M77 155mm Howitzers (on Tow Trailers)	6	6
D7 Bulldozer	0	3
Medium Tactical Vehicle Replacement Dump Truck	0	1
Total	**124**	**122**

Note: Generic Marine Expeditionary Unit with 1,214 personnel. Generic Battalion Landing Team with 1,257 personnel.
[1]Eight of the Humvees are equipped with Tube-launched, Optically-tracked, Wire-guided (TOW) capabilities.
Source: Marine Forces Pacific 2013.

Table 6.2-22. Base Camp Motor Pool

Vehicle Type	*Number of Vehicles*
Buses (for troop transport)	8
Sedans (for use by permanent staff)	2
4-Wheel Drive Trucks (Light) - Service pick-ups for use by permanent staff (facilities and range maintenance)	15
Medium Tactical Vehicle Replacement 7-ton Trucks (range maintenance)	5
Commercial Flat Bed Trucks	5
D7 Bulldozer	2
Front End Loader	2
Medium Tactical Vehicle Replacement 7-ton Dump Truck	2
Rough Terrain Forklift	1
Rough Terrain Material Handling Equipment (for port and airfield use)	1
Extended Boom Forklift	1
Total	**64**

Source: Marine Forces Pacific 2013.

Most vehicle traffic outside of the Military Lease Area would be at the beginning and end of a 2-week training cycle with occasional trips by Amphibious Assault Vehicles conducting training within the harbor. Vehicles not permanently stationed on Tinian would be required to pass a biosecurity inspection at the proposed military biosecurity and washdown facility in the port area. As a result, vehicle traffic would be light and dispersed throughout the training period and throughout each day. The only period that vehicles would be moved in a concentrated period of time would be at the end of the training cycle when all personnel, equipment, and organic vehicles are transported from base camp to the port for loading onto the High Speed Vessel or other marine transport. Including round trips by buses and automobiles, the hourly maximum was estimated to be about 237 vehicles, assuming two trips per hour. This presents the maximum vehicle use within a concentrated period; personnel and equipment would likely not arrive or depart all at the same time. This would result in hourly equivalent noise levels of 64, 59, 56, and 54 decibels at 50, 100, 150, and 200 feet (15, 30, 46, and 61meters) from the roadway. Along the planned roadway, there are only a few homes less than 100 feet (30 meters) from the roadway. Noise levels would be below Federal Highway Administration level guidelines and Environmental Protection Agency guidelines and would potentially occur at these levels once every 2 weeks for a limited time. The most likely scenario would be for a more dispersed movement from base camp lasting most of the day and noise levels would be appreciably lower.

6.2.6 Occupational Noise

Occupational noise exposure prevention procedures such as hearing protection and monitoring would be required at the Military Lease Area in compliance with all applicable Occupational Safety and Health Administration and U.S. military occupational noise exposure regulations. As a result, these prevention measures minimize occupational hearing hazards, and no increased risk of hearing impacts from occupational noise would be expected.

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CHAPTER 7
PAGAN COMBINED LEVEL RANGE AND TRAINING AREA

This section describes the noise impacts due to establishing a combined level Range and Training Area on Pagan. There are two alternatives for the proposed action that vary the location of the ranges on Pagan. Activities associated with both Pagan alternatives include construction, small- and large-caliber weapons training, aircraft operations, waterborne activities, and occupational health noise. Generally, the alternatives differ only by range configuration and nearly all noise impacts are similar for both alternatives. The same amount of ammunition would be used regardless of the alternative and aircraft operations would be similar. This section describes the noise environment of the alternatives together and while most impacts would be the same for both alternatives, differences are described as applicable. Pagan does not support long-term residences, schools, churches, or hospitals so there is no discussion of noise impacts on people and human points of interest.

7.1 CONSTRUCTION

Noise levels (see Table 2.3-1) from equipment and other construction activities typically generate noise levels ranging from 70 to 90 decibels at a distance of 50 feet (15 meters) (U.S. Department of Transportation 2006). Construction noise modeling averaged noise levels over one hour, assumed that equipment numbers were consistent throughout the workday, and were operating in the same area.

Construction activities for the Pagan alternatives, including all components such as targets, trails, bivouac area, and ranges, and airfield improvements would not affect any populations or noise-sensitive receptors on Pagan. Visitors would be allowed on Pagan during construction but noise levels generated by construction activities at the airstrip would be approximately 55-60 decibels at Red Beach and about 68 decibels at Green Beach. No inwater construction would occur.

7.2 OPERATIONS

7.2.1 Live-Fire Training

Live-fire training includes small- and large-caliber weapons fired from ground positions, from naval ships, and from aircraft within the Pagan combined level RTA. This combined level RTA includes small ranges such as Combat Pistol Range supporting small-caliber munitions use, up to the larger high hazard impact areas that support large-caliber munitions delivered from the ground, air, and sea.

7.2.1.1 Small-Caliber Weapons

Weapons proposed for training under both Pagan alternatives include most small arms available for U.S. military issue. Up to 665,500 small-caliber rounds would be fired annually. A listing of the range type and small-caliber rounds expected to be expended is provided in Table 7.2-1. Small-caliber expenditures would be the same for both alternatives, but the range configuration differs between the alternatives. Figures 7.2-1 and 7.2-2 present Pagan alternatives A-weighted Day-Night Average Sound Level and Peak contours generated by small-caliber weapons, respectively (Army Public Health Command 2014). Table 7.2-2 provides the acres affected by small-caliber weapons noise in Noise Zones II and III (Army Public Health Command 2014). The Pagan alternatives would have the potential to expose approximately 1,811 acres (732 hectares) under Pagan Alternative 1 and 2,066 acres (837 hectares) under Alternative 2 to A-weighted Day-Night Average Sound Levels. Peak noise levels would affect 8,500 acres (3,500 hectares)

under both Pagan alternatives. Table 7.2-3 presents the small-caliber weapons noise points of interest under both Pagan alternatives in A-weighted Day-Night Average Sound Levels.

Table 7.2-1. All Pagan Alternatives Representative Annual Small-Caliber Expenditure Estimate

Facility	*Weapon/ Ammunition*	*Annual Expenditure*[1]		*Total Expenditure*
		Day 7:00 a.m. – 10:00 p.m.	*Night 10:00 p.m. – 7:00 a.m.*	
Battle Sight Zero Range	5.56 mm	8,460	2,115	10,575
	7.62 mm	12,800	3,200	16,000
Combined Arms Training Range to support Close Air Support and Naval Gun Fire Support	7.62 mm	27,200	6,800	34,000
	.50 cal	16,000	4,000	20,000
Engagement Zones	5.56 mm	297,600	74,400	372,000
	7.62 mm	140,864	35,216	176,080
	.50 cal	29,440	7,360	36,800
Small-Caliber Total		**532,364**	**133,091**	**665,455**

Note: mm – millimeter.
[1]There is a 10-decibel penalty applied to operations conducted during environmental nighttime hours of 10:00 p.m. to 7:00 a.m.

Table 7.2-2. All Pagan Alternatives Affected by Small-Caliber Weapons Noise
(in A-weighted Day-Night Average Sound Levels and Peak Noise Levels)

Noise Levels (in decibels)					
On shore					
Zone II					
A-weighted Day-Night Sound Levels	**Acres/Hectares**		**Peak Noise Levels**	*Acres/Hectares*	
	Alternative 1	**Alternative 2**		**Alternative 1**	**Alternative 2**
65 - 69	819/331	961/398	87-104	2,112/855	2,152/871
70 - 74	530/214	605/245			
Total Zone II	**1,349/545**	**1,566/634**	**Peak Total Zone II**	**2,112/855**	**2,152/871**
Zone III					
75 – 79	302/122	318/128	> 104	6,424/2,601	6,384/2,585
80 - 84	142/57	152/62			
>85	220/8	31/13			
Total Zone III	**464/187**	**500/203**	**Total Zone III**	**6,424/2,601**	**6,384/2,585**
Total On shore	**1,813/732**	**2,066/837**	**Total On shore**	**8,536/3,456**	**8,536/3,456**
Off shore					
Zone II					
65 - 69	4/2	4/2	87-104	10,745/4,350	10,802/4,373
70 - 74	0	0			
Total Zone II	**4/2**	**4/2**	**Peak Total Zone II**	**10,745/4,350**	**10,802/4,373**
Zone III					
75 – 79	0	0	> 104	893	837/339
80 - 84	0	0			
>85	0	0			
Total Zone III	**0**	**0**	**Total Zone III**	**893/362**	**837/339**
Total Off shore	**4/2**	**4/2**	**Total Off shore**	**11,638/4,712**	**11,639/4,712**

Note: Small-caliber peak noise is not dependent upon weather conditions and there are not separate calculations for unfavorable and neutral weather conditions.

Table 7.2-3. All Pagan Alternatives Small-Caliber Weapons Noise Points of Interest
(in A-weighted Day-Night Average Sound Levels)

Identification Number	***Point of Interest***	***Type of Points of Interest[1]***	***Alternatives 1 and 2***		
			Decibels	***Noise Zone[2]***	***Noise-Sensitive Points of Interest Conflict***
P1	Fruit Bat Colony 1	Other	< 50	I	NA
P2	Fruit Bat Colony 2	Other	< 50	I	NA
P3	Fruit Bat Colony 3	Other	64	I	NA
P4	Village/Main Camp/Airstrip Area	Transient Lodging	72	II	No[3]
P5	Upper Lake	Other	53	I	NA
P6	Southern Pagan	Other	< 50	I	NA
P7	South Beach	Other	64	I	NA
P8	Lower Lake	Other	66	II	NA
P9	Cultural Location 1	Other	64	I	NA
P10	Cultural Location 2	Other	56	I	NA
P11	Cultural Location 3	Other	< 50	I	NA
P12	Cultural Location 4	Other	< 50	I	NA
P13	Gold Beach	Other	54	I	NA
P14	North Beach	Other	< 50	I	NA

Notes: Points of interest noise levels are the same for both alternatives; NA – not applicable, see annotation number 1.

[1]Other Points of interest include sites with biological, cultural, recreational, or other concerns that are not related to human factors; refer to the CJMT EIS/OEIS for evaluation of these facets of noise effects.

[2]Noise level threshold is 50 decibels ADNL.

[3]Small-caliber ADNL Noise Zones defined as: Zone I (< 55 ADNL; 55-64 ADNL), Zone II (65-69 ADNL; 70-74 ADNL), and Zone III (75-79 ADNL; 80-84 ADNL; > 85 ADNL),.

[4]Points of interest are considered tactical training locations and therefore, compatible with projected noise levels.

7.2.1.2 Large-Caliber Weapons

Large-caliber weapons employed under the proposed action at Pagan include most large weapons available for U.S. military issue. They include live hand grenades, mortars, artillery, and bombs. Table 7.2-4 lists the range facilities, weapons and ammunition and the anticipated annual expenditure. Under both Pagan alternatives, 13,748 large-caliber rounds of ground-delivered ordnance and an additional 13,670 large-caliber rounds of air- and sea-delivered ordnance would be fired in an average year.

Table 7.2-4. All Pagan Alternatives Representative Annual Large-caliber Expenditure Estimate

Facility	***Weapon/Ammunition***	***Annual Expenditure[1]***		***Total Expenditure***
		Day 7:00 a.m. – 10:00 p.m.	***Night 10:00 p.m. – 7:00 a.m.***	
Field Artillery Direct Fire Range	155 mm Howitzer, HE	38	10	48
Indirect Fire Gun Positions	155 mm Howitzer, HE	435	109	544
	155 mm Howitzer, Inert	288	72	360
	120 mm Mortar, HE	160	40	200
	120 mm Mortar, Inert	192	48	240
Mortar Positions	60 mm Mortar, HE	384	96	480
	60 mm Mortar, Inert	96	24	120
	81 mm Mortar, HE	800	200	1,000
	81 mm Mortar, Inert	96	24	120
Engagement Areas	40 mm Grenade, HE	8,368	2,092	10,460
	25 mm Gun, Inert	128	32	160
	AT-4, HE	3	1	4
	SMAW, HE	6	2	8
	TOW, HE	3	1	4
Total Ground-to-Ground Ordnance		**10,997**	**2,751**	**13,748**
Combined Arms Training Range to support Close Air Support and Naval Gun Fire Support	20 mm Gun, Inert	800	200	1,000
	25 mm Gun, Inert	9,000	2,250	11,250
	2.75 inch Rocket, HE	400	100	500
	2.75 inch Rocket, Inert	100	25	125
	5 inch Rocket, HE	120	30	150
	MK-82 Bomb, HE	140	35	175
	MK-83 Bomb, HE	140	35	175
	MK-84 Bomb, HE	140	35	175
	5 inch Naval Gun, HE	96	24	120
Total Air-to-Ground Ordnance		**10,936**	**2,734**	**13,670**
Large-Caliber Total		**21,934**	**5,485**	**27,418**

Note: HE – High Explosive; Inert (i.e. illumination, smoke, training practice rounds; AT – Anti-Tank weapon; SMAW – Shoulder-Mounted Anti-tank Weapon; TOW – Tube-launched, Optically-tracked, Wire-guided anti-tank weapon.
[1]For noise modeling, a 10-decibel penalty is applied to operations conducted between 10:00 p.m. – 7:00 a.m.

For both Pagan alternatives, large-caliber impulse noise applies the C-weighted Day-Night Average Sound Level and Peak noise level metrics. The area affected by C-weighted, Peak Neutral Weather, and Peak Unfavorable Weather noise levels are listed in Table 7.2-5 for both Pagan alternatives. Figure 7.2-3 illustrates the noise contour bands of the projected C-weighted noise levels under both Pagan alternatives. Figure 7.2-4 depicts Peak noise level contour bands when there are neutral weather conditions and Figure 7.2-5 illustrates the contour bands when there are unfavorable weather conditions. Pagan Alternatives 1 and 2 would expose about 8,883 acres (3,595 hectares) and 8,344 acres (3,377 hectares) to noise levels 62 decibels and greater, respectively. Although visitors would be allowed in some areas outside the danger zones, no permanent populated areas are found on Pagan; therefore, there would be no impacts on population.

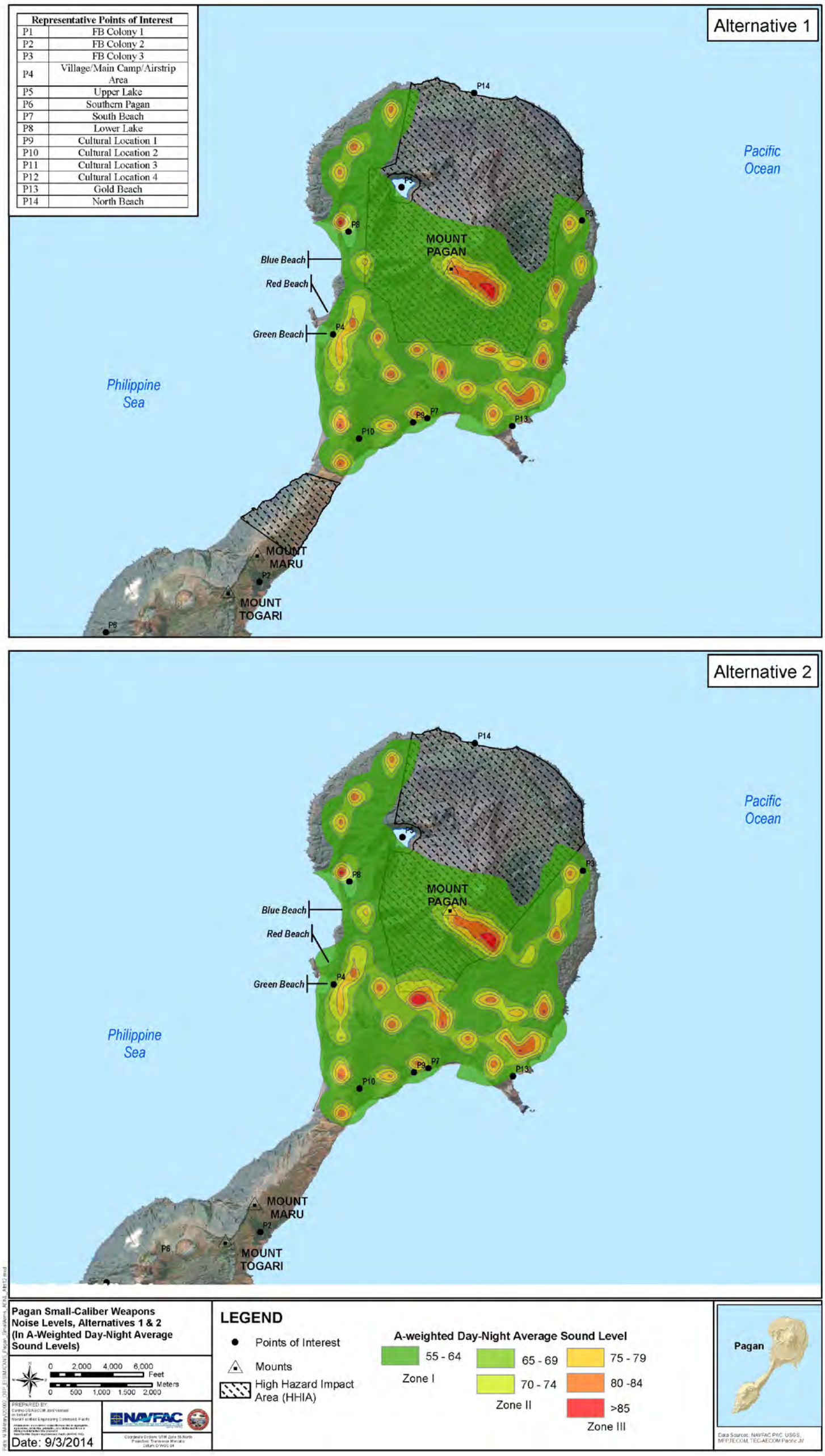

Figure 7.2-1 Pagan Small-Caliber Weapons Noise Levels, Alternatives 1 and 2 *(A-weighted)*

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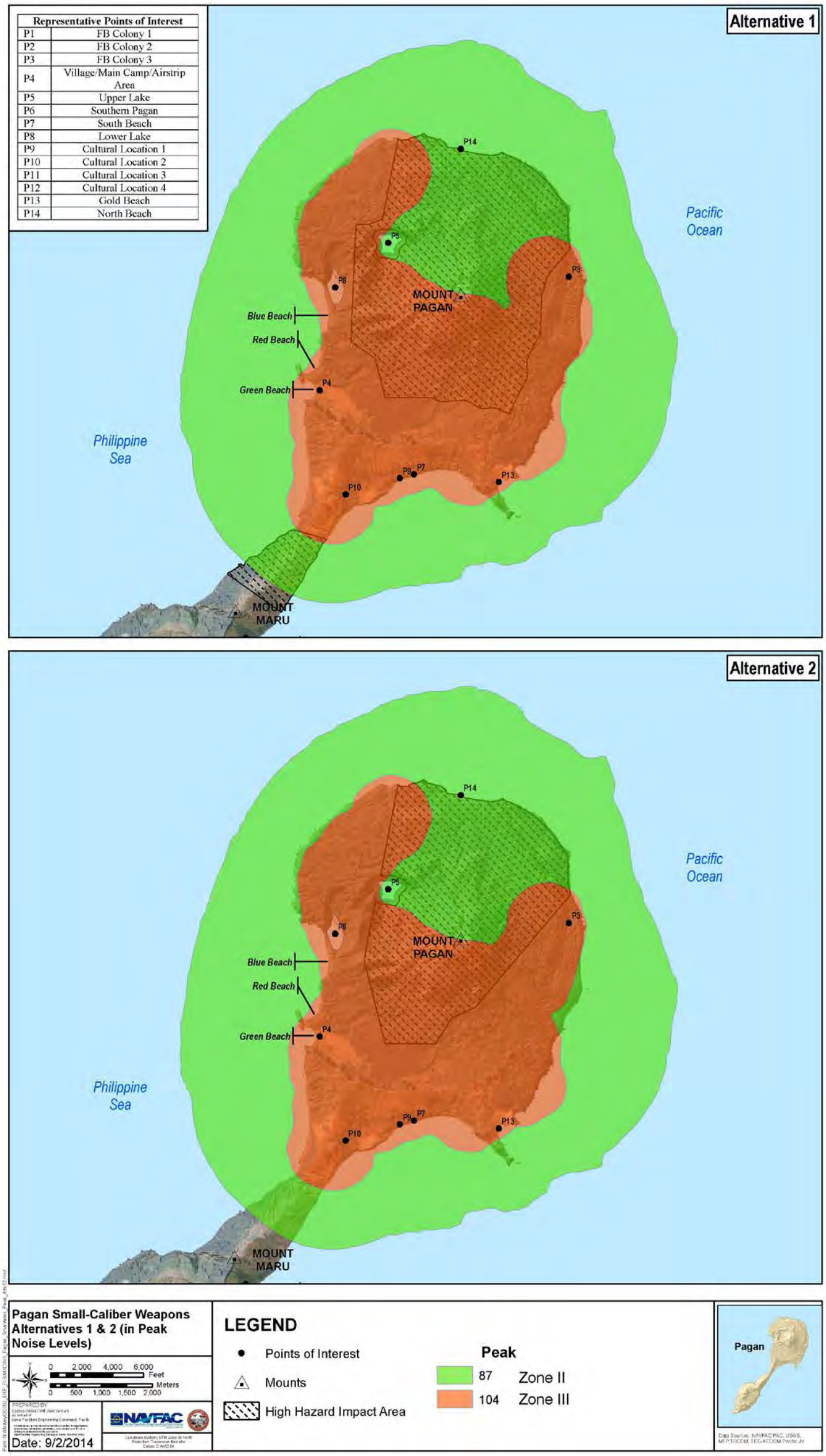

Figure 7.2-2 Pagan Small-Caliber Weapons Noise Levels, Alternatives 1 and 2 *(Peak)*

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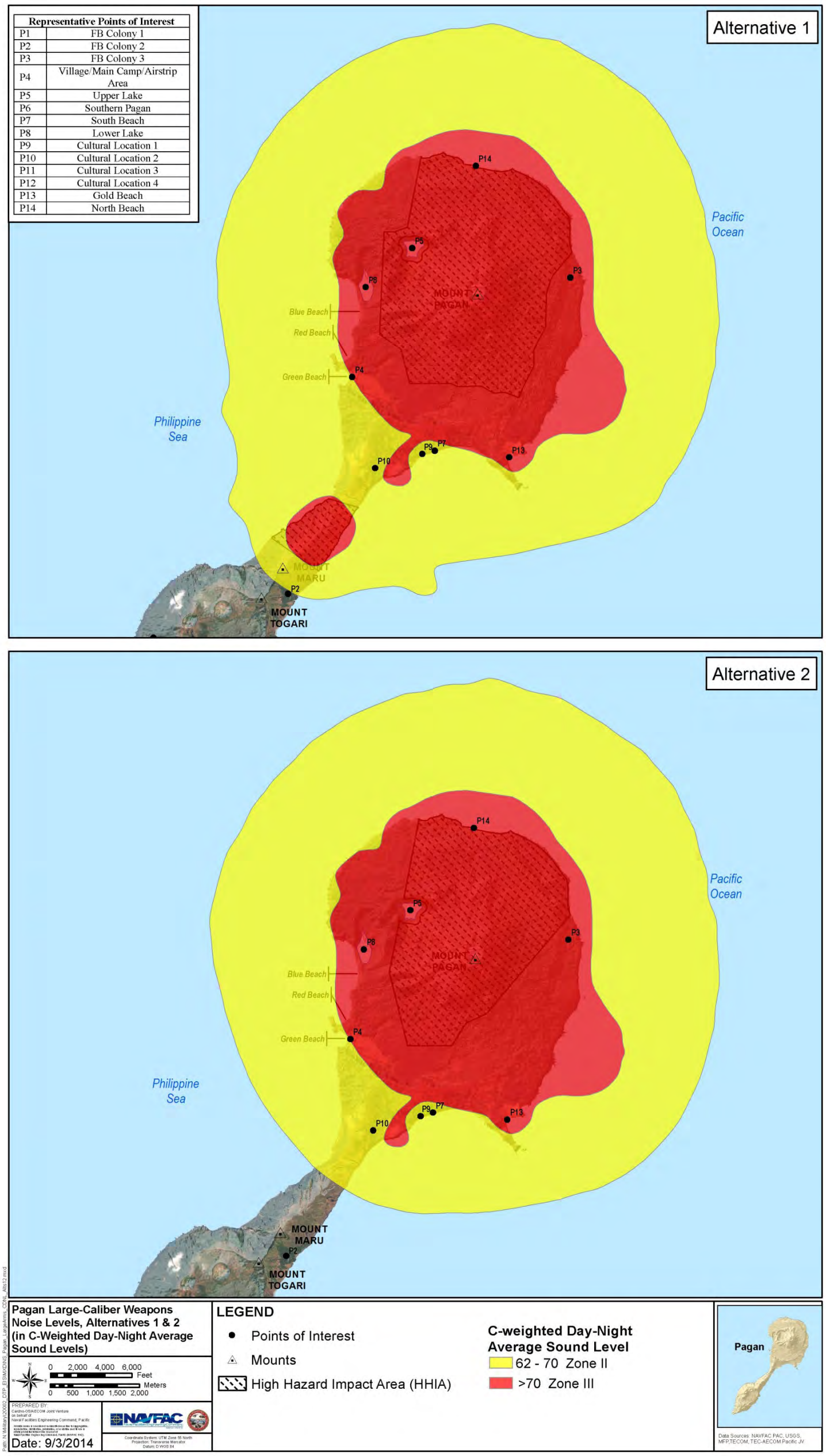

Figure 7.2-3 Pagan Large-Caliber Weapons Noise Levels, Alternatives 1 and 2 *(C-weighted)*

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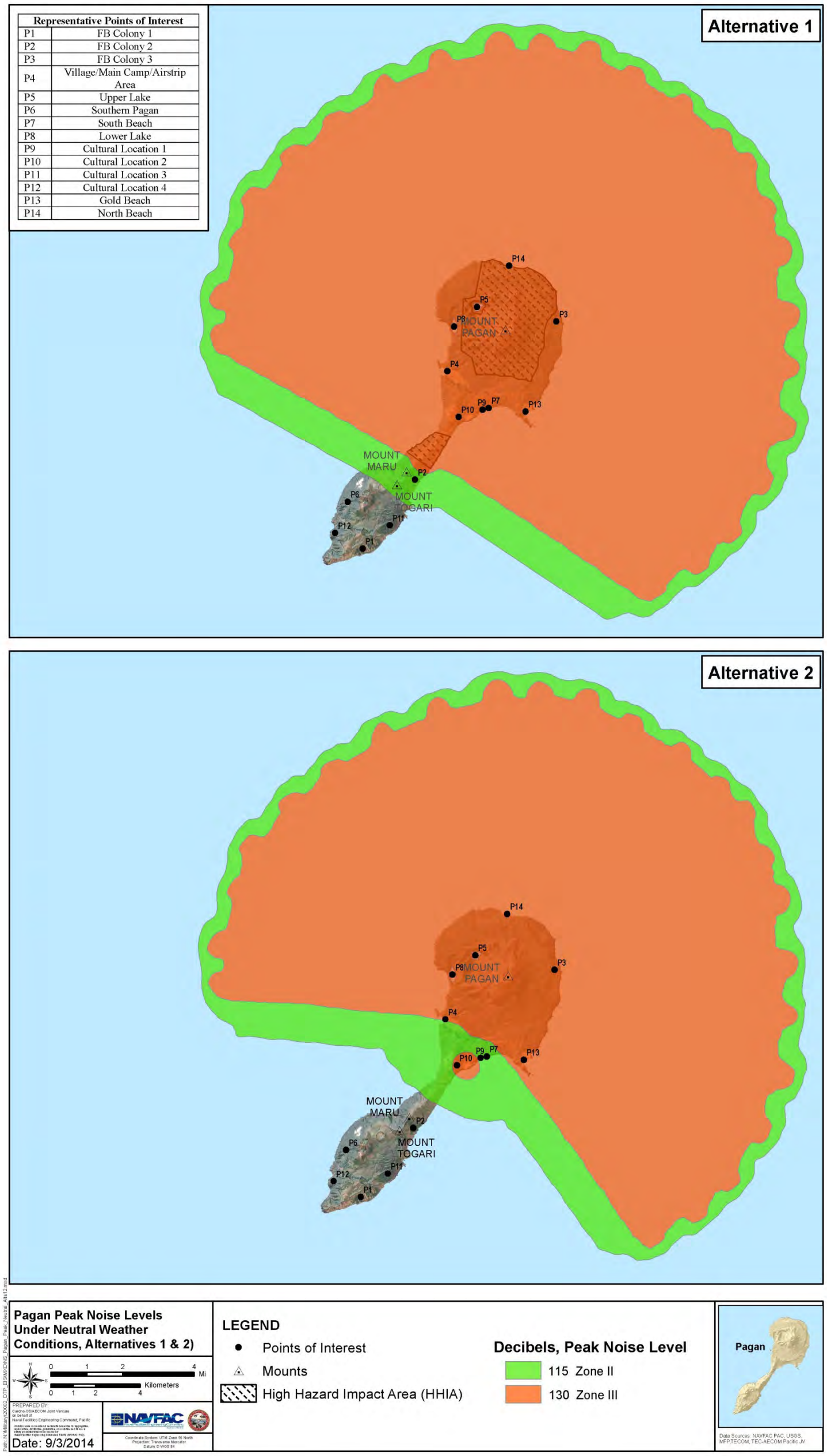

Figure 7.2-4 Pagan Large-Caliber Peak Noise Levels Under Neutral Weather Conditions, Alternatives 1 and 2

(in Peak Noise Levels for Neutral Weather Conditions)

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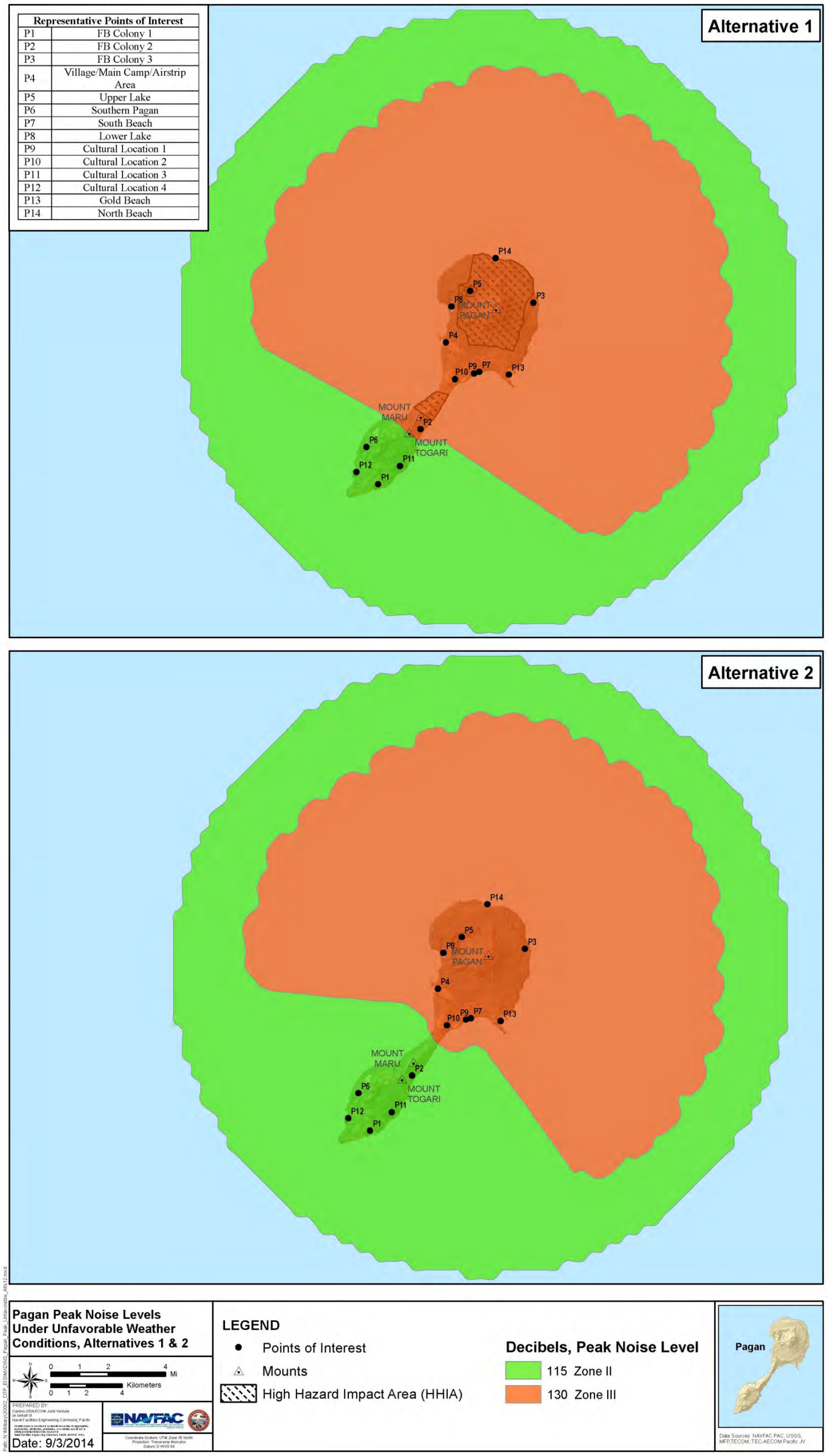

Figure 7.2-5 Pagan Large-Caliber Peak Noise Levels Under Unfavorable Weather Conditions, Alternatives 1 and 2

(in Peak Noise Levels for Unfavorable Weather Conditions)

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Table 7.2-5. All Pagan Alternatives Area Affected by Large-Caliber Weapons Noise
(in C-weighted day-night Sound Levels and Peak Noise Levels)

Noise Zone	*Acres/Hectares*		
	C-weighted Day-Night Average Sound Level	***Peak - Neutral***	***Peak Unfavorable***
Alternative 1			
On shore			
Zone II/Moderate Complaint Risk	1,120/453	744/301	2,655/1,075
Zone III/High Complaint Risk	7,763/3,142	8,749/3,542	9,138/3,700
Total	**8,883/3,595**	**9,493/3,843**	**11,793/4,774**
Off shore			
Zone II/Moderate Complaint Risk	17,846/7,222	17,3577,027	108,855/44,071
Zone III/High Complaint Risk	1,880/761	100,315/40,613	112,072/45,373
Total	**19,726/7,983**	**117,672/47,640**	**220,927/89,444**
Alternative 2			
On shore			
Zone II/Moderate Complaint Risk	943/382	1,069/433	3,521/1,426
Zone III/High Complaint Risk	7,401/2,995	7,393/2,993	8,272/3,349
Total	**8,344/3,377**	**8,462/3,426**	**11,793/4,774**
Off shore			
Zone II/Moderate Complaint Risk	16,618/6,725	19,127/7,744	119,492/48,377
Zone III/High Complaint Risk	1,822/737	88,996/36,031	101,436/41,067
Total	**18,440/7,462**	**108,123/43,774**	**220,928/89,445**

Note: Zone II (62-70 decibels); Zone III (>70 decibels for C-weighted Day-Night Average Sound Level); moderate risk of complaints (115-130 decibels); and high risk of complaints (> 130 decibels for Peak noise level).
Source: Army Public Health Command 2014.

Tables 7.2-6 and 7.2-7 present the C-weighted Day-Night Average Sound Levels and Peak noise levels at the representative points of interest on Pagan, respectively. All points of interest would be exposed to Zones II and III and be incompatible with residential and other sensitive land uses such as schools and hospitals; however, these do not exist on Pagan.

Table 7.2-6. All Pagan Alternatives Points of Interest from All Demolition and Large-Caliber Weapon Activity
(*in C-weighted Day-Night Average Sound Levels*)

Identification Number	***Point of Interest***	***Type of Points of Interest[1]***	***Alternative 1***			***Alternative 2***		
			Decibels	***Noise Zone[2]***	***Noise-Sensitive Points of Interest Conflict***	***Decibels***	***Noise Zone[1]***	***Noise-Sensitive Points of Interest Conflict***
P1	Fruit Bat Colony 1	Other	55	I	NA	55	I	NA
P2	Fruit Bat Colony 2	Other	62	II	NA	58	I	NA
P3	Fruit Bat Colony 3	Other	74	III	NA	74	III	NA
P4	Village/Main Camp/Airstrip Area	Transient Lodging	70	III	No[3]	70	III	No[3]
P5	Upper Lake	Other	76	III	NA	77	III	NA
P6	Southern Pagan	Other	56	I	NA	55	I	NA
P7	South Beach	Other	69	II	NA	69	II	NA
P8	Lower Lake	Other	74	III	NA	74	III	NA
P9	Cultural Location 1	Other	69	II	NA	69	II	NA
P10	Cultural Location 2	Other	69	II	NA	69	II	NA
P11	Cultural Location 3	Other	56	I	NA	56	I	NA
P12	Cultural Location 4	Other	55	I	NA	54	I	NA
P13	Gold Beach	Other	74	III	NA	74	III	NA
P14	North Beach	Other	78	III	NA	79	III	NA

Note: NA – not applicable, see annotation number 1.
[1]Other includes sites with biological, cultural, recreational, or other concerns that are not related to human factors and are addressed in the applicable resource sections of the CJMT EIS/OEIS.
[2]Demolition and large-caliber Noise Zones defined as: LUPZ (57-62 decibel CDNL); Zone I (<57 decibel CDNL); Zone II (62-70 decibel CDNL); and Zone III (>70 decibel CDNL)
[3]Point of interest is human but is a tactical training location and, therefore, considered compatible with these noise levels.
Source: Army Public Health Command 2014.

Table 7.2-7. All Pagan Alternatives Representative Points of Interest Affected by Large-Caliber Weapons Noise
(in Peak Noise Levels)

Point of Interest (Points of Interest)			*Alternative 1*		*Alternative 2*	
			Unfavorable Weather Conditions	*Neutral Weather Conditions*	*Unfavorable Weather Conditions*	*Neutral Weather Conditions*
Identification Number	*Description*	*Type*[1]	*Decibel*[2]	*Decibel*[2]	*Decibel*[2]	*Decibel*[2]
P1	Fruit Bat Colony 1	Other	120	< 110	120	< 110
P2	Fruit Bat Colony 2	Other	136	125	124	112
P3	Fruit Bat Colony 3	Other	> 150	147	> 150	147
P4	Village/Main Camp/Airstrip Area	Transient Lodging	139[2]	131[2]	139[2]	128[2]
P5	Upper Lake	Other	> 150	> 150	> 150	> 150
P6	Southern Pagan	Other	121	< 110	121	< 110
P7	South Beach	Other	137	134	137	126
P8	Lower Lake	Other	> 150	146	> 150	146
P9	Cultural Location 1	Other	139	134	139	127
P10	Cultural Location 2	Other	145	134	145	134
P11	Cultural Location 3	Other	121	< 110	121	< 110
P12	Cultural Location 4	Other	119	< 110	119	< 110
P13	Gold Beach	Other	> 150	145	> 150	145
P14	North Beach	Other	> 150	> 150	> 150	> 150

Notes: NA – not applicable, see annotation number 2.
[1]Other includes sites with cultural, biological, recreational, or other concerns that are unrelated to human factors and are addressed in the applicable resource sections of the CJMT EIS/OEIS.
[2]Noise level threshold is 110 decibel Peak.
[3]Complaint risk areas defined as: low risk of complaints <115 decibel Peak; moderate risk of complaints 115-130 decibels Peak; and high risk of complaints > 130 decibel Peak.
[4]Point of interest is considered a tactical training location and complaint risk correlation does not apply.
Source: Army Public Health Command 2014.

7.2.2 Aircraft Operations

7.2.2.1 Airfield Operations

Under both Pagan Alternatives, the same number of aircraft operations at the airfield would be used in support of training and delivering Service personnel and equipment to the island. Table 7.2-8 shows the number of proposed annual airfield operations on Pagan.

Table 7.2-8. All Pagan Alternatives Proposed Annual Airfield Military Operations

Aircraft Type[2]	*Day*	*Night*	*Total*
Transport Tilt-rotor	480	120	600
Transport Rotary Wing	1720	440	2,260
Attack Helo	760	200	960
Transport Fixed Wing	800	200	1,000
Unmanned	240	60	300
Total	**4,000**	**1,020**	**5,120**

Table 7.2-9 presents the area affected by noise levels equal to and greater than 65 decibels for both Pagan alternatives. Because there are no permanent residents on Pagan, estimates for affected population are not included.

Table 7.2-9. Noise Exposure at and Around the Airfield for All Pagan Alternatives
(in A-weighted Day-Night Average Sound Levels)

Contour Band (in decibels)	***Acres/Hectares***	
	On shore	***Off shore***
65 – 70	4,608/1,866	1,331/539
70 – 75	153/62	0
75 – 80	0	0
80 – 84	0	0
85+	0	0
Total	**4,761/1,928**	**1,331/539**

Pagan Alternatives 1 and 2 noise levels of 65 decibels and greater due to aircraft operations would encompass 4,761 acres (1,928 hectares). Figure 7.2-6 illustrates the noise contour bands for Pagan for aircraft related noise and Table 7.2-10 lists the representative points of interest in A-weighted Day-Night Average Sound Levels affected by both alternatives.

Table 7.2-10. All Pagan Alternatives Airfield and Airspace Noise Levels for Points of Interest
(in A-weighted Day-Night Average Sound Levels)

Points of Interest			
Identification Number	***Description***	***Type***	***Proposed***
P1	Fruit Bat Colony 1	Other	45.7
P2	Fruit Bat Colony 2	Other	48.7
P3	Fruit Bat Colony 3	Other	64.2
P4	Village/Main Camp/Airstrip Area	Transient Lodging	67.8
P5	Upper Lake	Other	64.8
P6	Southern Pagan	Other	48.6
P7	South Beach	Other	64.2
P8	Lower Lake	Other	67.9
P9	Cultural Location 1	Other	63.3
P10	Cultural Location 2	Other	63.5
P11	Cultural Location 3	Other	45.1
P12	Cultural Location 4	Other	48.3
P13	Gold Beach	Other	67.5
P14	North Beach	Other	60.2

7.2.2.2 Airspace Operations

Subsonic

Three types of generalized flight activity flying at subsonic rates (i.e., below the speed of sound) comprise the aviation training noise analysis: low-altitude hovering and landing activities at landing zones, and subsonic fixed- and rotary-wing, as well as tilt-rotor aircraft operations within Special Use Airspace. Besides the Pagan airfield, there would be 13 landing zones used by rotary-wing and tilt-rotor aircraft. It was estimated that at each landing zone there could be as many as 1,200 annual operations. See Figure 7.2-6 for the combined noise levels generated by aircraft within the airspace above Pagan and at the airfield and landing zones.

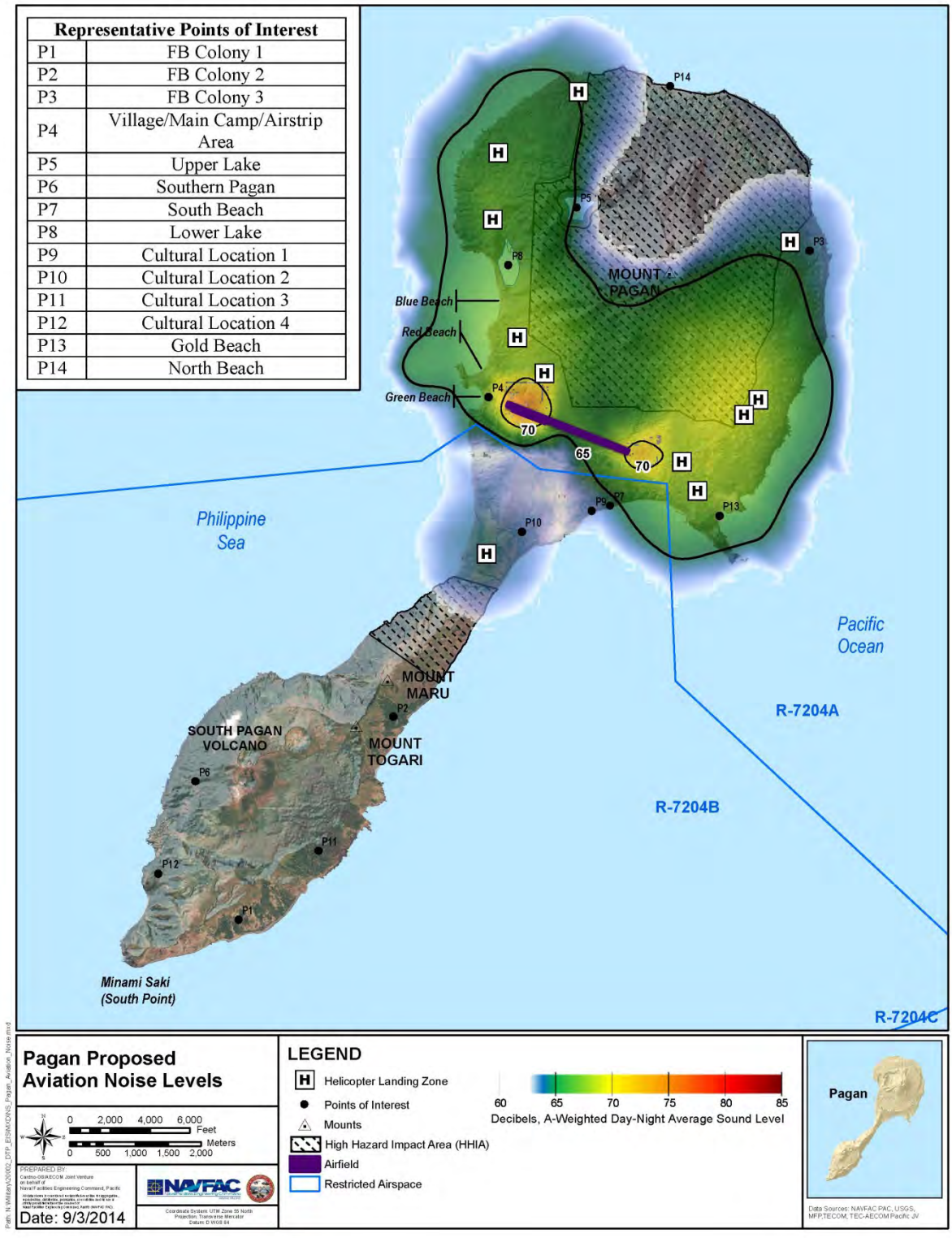

Figure 7.2-6 Airfield and Airspace Noise Levels for All Pagan Alternatives
(in A-weighted Day-Night Average Sound Levels)

Supersonic

Supersonic activities (i.e., aircraft flying faster than the speed of sound) would be allowed immediately above and in Special Use Airspace around Pagan. Supersonic activities would be rare, occurring about 30 times per year, for approximately one minute each time, and at least 10,000 feet above mean sea level. This equates to 2.5 sonic booms per month. Because the occurrences would be rare and over water and/or over the unpopulated island of Pagan, no human receptors would be affected by supersonic activities and thus no impacts from sonic booms.

7.2.3 Waterborne Activities

Landing craft operations would be similar to those described in Section 6.2.4, but operate on the waters around Pagan. No human receptors would be present to experience landing craft and ship to shore noise.

7.2.4 Traffic

Traffic would be minimal on Pagan and there would be no noise impacts due to traffic.

7.2.5 Occupational Noise

Occupational noise exposure prevention procedures such as hearing protection and monitoring would be required during training at the Pagan combined level RTA in compliance with all applicable Occupational Safety and Health Administration and U.S. military occupational noise exposure regulations. As a result, these prevention measures minimize occupational hearing hazards and no increased risk of hearing impacts from occupational noise would be expected to occur.

CHAPTER 8
CONCLUSION

8.1 TINIAN

8.1.1 Construction

On-shore construction projects would occur primarily in the Military Lease Area, but there would be some construction projects at the Tinian port as well. For construction within the Military Lease Area, residents in San Jose and Saipan would be too far from the source to hear any additional noise above background levels. However, proposed construction within the port could expose the nearest residences in San Jose to noise levels up to 65.6 decibels during daylight hours which is below the U.S. Environmental Protection Agency recommended noise level of 75 decibels. These noise levels would be short-term in duration, however, and occur primarily when the loudest construction activities occur, such as site grading and excavation.

Underwater noise from construction would occur at the beaches when the amphibious vehicle approach area is being constructed. Dredging can create noise levels of up to 162 decibels. However, this noise would be short term and occur within the intertidal environment of Unai Chulu and Unai Babui where the noise environment would be dominated by surf noise.

In summary, noise generated by construction activities would be short term and create less than significant impacts to people on Tinian or Saipan.

8.1.2 Operations

8.1.2.1 Live-Fire Training

Noise contours generated by small-caliber weapons training would be confined to the Military Lease Area and there would be no population exposed to noise levels greater than 65 decibels A-weighted Day-Night Average Sound Levels. For Peak noise, about 411 acres (166 hectares) under Alternative 1 and 600 acres (243 hectares) under Alternatives 2 and 3 lie outside the Military Lease Area over land. However, this area lies entirely within Tinian International Airport property and no populations would be affected.

For large-caliber noise, only 4% of total large-caliber weapons operations would be conducted during nighttime hours (i.e., between 10:00 p.m. and 7:00 a.m.). For C-weighted Day-Night Average Sound Levels, noise over 62 decibels would not reach any residences on Tinian or Saipan and no population would be affected. No representative points of interest would be exposed to Peak noise levels greater than 110 decibels during neutral weather conditions and it would therefore have low complaint risks. Under unfavorable weather conditions, points of interest outside the Military Lease Area would have Peak noise levels generating mostly low-complaint risk areas, with the exception of Marpo Valley northeast of Marpo Heights, which would have moderate complaint risk levels. Additionally, regardless of the alternative, when weather conditions are unfavorable, the following points of interest on Saipan would be exposed to Peak noise levels between 115 and 130 decibels (C-weighted): two residential areas, two schools, one resort, and one other (Agingan Point). It is probable that these noise levels would generate moderate complaint risks. In summary, live-fire training noise impacts would be less than significant.

8.1.2.2 Aircraft Operations

The proposed action involves military aircraft operations including rotary- and fixed-wing transport aircraft, attack helicopters, and fighter aircraft. Proposed annual airfield operations would total 11,664

and generate noise contours that extend outside the Military Lease Area. These operations have the potential of exposing 40 people in approximately 10 homes in Marpo Heights to noise levels greater than 65 decibels A-weighted Day-Night Average Sound Levels. These would be the only residential points of interest exposed to noise levels greater than 65 decibels A-weighted Day-Night Average Sound Levels. There would be no population exposed to noise levels with the potential to cause hearing loss. Classroom learning impacts would be well below recommended levels because the schools are sufficiently far away from the noise generating activities and incur less than significant impacts. Speech interference and sleep disturbance would be possible in Marpo Heights and Marpo Valley. Although there would be only about 10 homes affected, these noise increases would be considered significant.

8.1.2.3 Waterborne Activities

Waterborne noise would be generated at and near the beaches proposed for use, and in the Port of Tinian. At the beaches, Landing Craft Air Cushion vessels and Amphibious Assault Vehicles would create elevated noise levels. However, these levels would not be loud enough to affect human receptors at beaches outside the Military Lease Area on Tinian or on Saipan. In the port, noise would be produced before and after exercises when soldiers and equipment would be transported to Tinian for the exercises. Amphibious Assault Vehicles would occasionally also operate within the port. These noise levels would be consistent with port operations, be short term in nature, and only last while actively unloading and loading equipment and personnel; therefore, noise levels would be less than significant.

8.1.2.4 Traffic

Vehicular traffic associated with the proposed action would include trips between the port and base camp by vehicles belonging to each unit arriving for training and by the permanently-based vehicles for range operations and maintenance. Noise from vehicles operating in the port during arrival and departure activities would create traffic noise with a maximum average level of 64 decibels at 50 feet (15 meters). All major traffic would normally occur only just before and immediately after a training exercise when traffic would increase. Noise levels during these Peak traffic periods would be less than significant.

8.1.2.5 Occupational Noise

Occupational noise exposure prevention procedures such as hearing protection and monitoring would be required at the Military Lease Area in compliance with all applicable Occupational Safety and Health Administration and U.S. military occupational noise exposure regulations. Because strict adherence to these procedures and regulations is required of military and civilian personnel, no significant impacts would be expected.

8.2 PAGAN

8.2.1 Construction

Construction activities for the Pagan alternatives, including all components such as targets, trails, bivouac area, ranges, and airfield improvements would not affect any populations or noise-sensitive receptors on Pagan, as there are no permanent residents on Pagan. No underwater construction is planned. Construction noise impacts would be less than significant on Pagan.

8.2.2 Operations

8.2.2.1 Live-Fire Training

Noise would be generated on Pagan by both small- and large-caliber munitions expenditures, with up to 665,500 small-caliber rounds and 27,400 large-caliber rounds fired. For small-caliber weapons noise, both

Pagan alternatives would have the potential to expose approximately 1,811 acres (732 hectares) under Pagan Alternative 1 and 2,066 acres (837 hectares) under Alternative 2 to A-weighted Day-Night Average Sound Levels, respectively. Peak noise levels would affect 8,500 acres (3,500 hectares) under both alternatives. Pagan Alternatives 1 and 2 would expose about 8,883 acres (3,595 hectares) and 8,344 acres (3,377 hectares) to noise levels 62 decibels and greater, respectively. Noise levels on Pagan would be increased by live-fire operations by small- and large-caliber weapons; however, there is no population exposed to these elevated noise levels so impacts would be less than significant.

8.2.2.2 Aircraft Operations

Subsonic (i.e., flying slower than the speed of sound) aircraft operational noise levels of 65 decibels A-weighted Day-Night Average Sound Levels and greater would encompass 4,761 acres (1,928 hectares). Similar to live-fire noise levels, no people would be exposed to these elevated noise levels. Sonic booms associated with supersonic operations (i.e., traveling at or faster the speed of sound) would be rare, occurring about 30 times per year. This equates to about 2.5 sonic booms per month, for approximately 1 minute each time. Because the occurrences would be rare, over water, and not impact any populations, subsonic and supersonic activities would incur less than significant impacts from aircraft operations.

8.2.2.3 Waterborne Activities

Waterborne operational noise by landing craft and amphibious assault vehicle operations would be similar to those described for Tinian, but operate in the waters around Pagan. No human receptors would be exposed to these increased, but short-term, noise levels; therefore, less than significant impacts from waterborne activities are anticipated.

8.2.2.4 Traffic

Traffic would be minimal on Pagan and there would be no significant noise impacts.

8.2.2.5 Occupational Noise

Occupational noise exposure prevention procedures such as hearing protection and monitoring would be required in compliance with all applicable Occupational Safety and Health Administration and U.S. military occupational noise exposure regulations. Because strict adherence to these procedures and regulations is required of military personnel, no significant impacts would be expected.

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CHAPTER 9
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