CHAPTER 6. NOISE

6.1 AFFECTED ENVIRONMENT

The main sources of noise comprising the affected environment addressed in this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) are related to military operations (airfield operations, aviation training, and ground training), civilian aviation noise, construction noise, and noise from civilian and military ground vehicular traffic. Military airfield operations are predominantly those activities associated with the main runways at Andersen Air Force Base (AFB). Aviation training involves aircraft operations occurring away from the airfield. Ground training encompasses many types of activities, but live-fire activities are emphasized in analyzing the noise environment because they generate more noise than other ground-based activities. Heavy equipment used during construction activities is the primary source of construction noise. Traffic noise relates to vehicle movements on roadways around the island. The Federal Highway Administration (FHWA) has conducted a study analyzing traffic and associated noise and the results of that study are summarized in Volume 6 of this EIS/OEIS. The following sections discuss the baseline noise environment to assess the potential effects of noise that would be generated in each geographical area of interest on Guam if the proposed DoD action is implemented.

6.1.1 Definition of Resource

Sound is the stimulation of auditory organs produced by sound waves transmitted through the air or other medium. Sound waves are small pressure fluctuation waves caused by vibrations. 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 is the standard unit of measurement for sound wave frequency and is expressed as hertz. Sound waves move outward in all directions from the vibration source, dissipating as the distance from the source increases (inversely proportional to the square of the distance to the source). High frequency sounds dissipate more quickly. Dissipation also occurs due to wind, ground cover, and temperature.

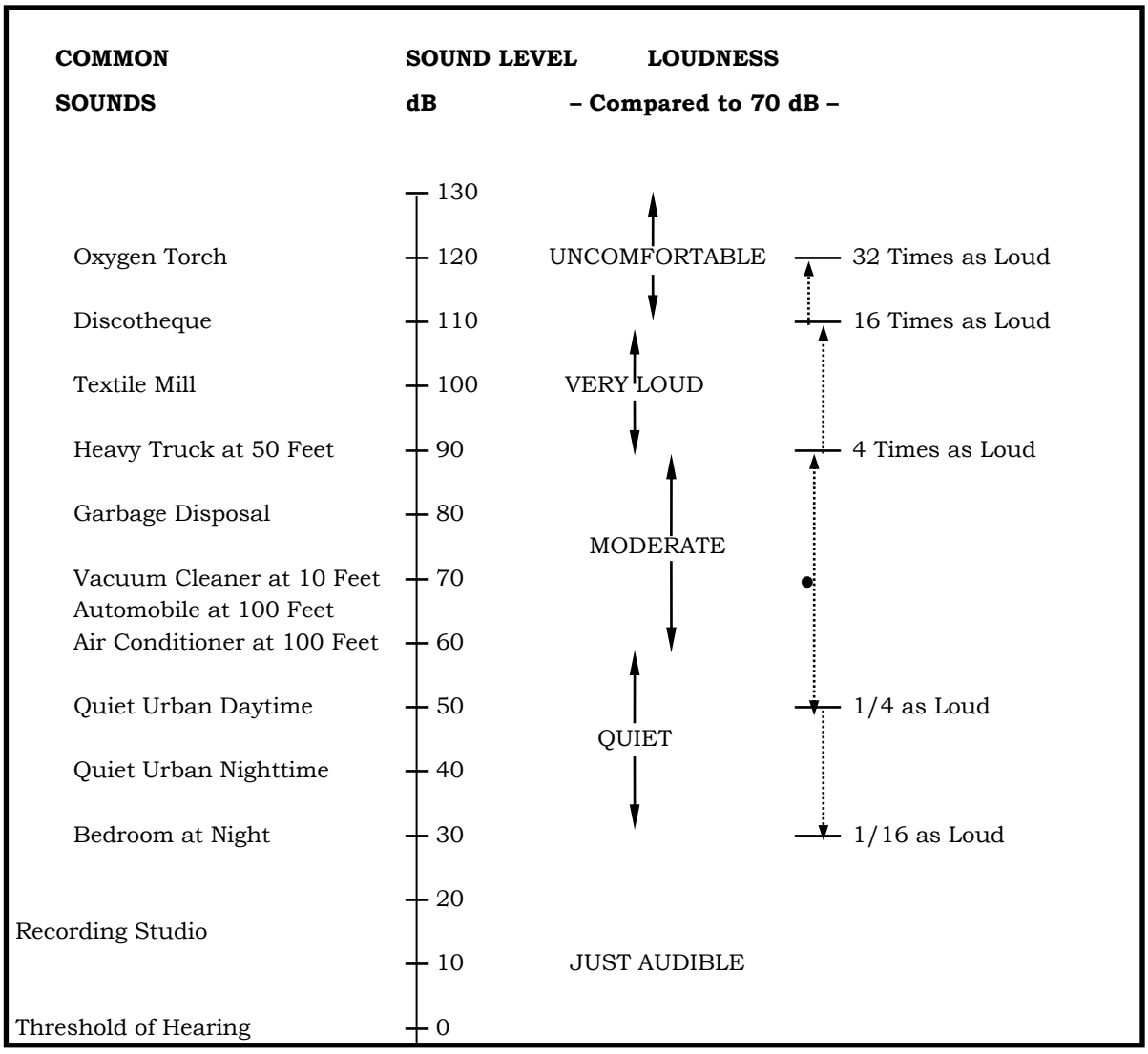
Loudness is the relative measure of the magnitude of a sound and is typically measured in decibels (dB). Decibels are the ratio of the intensity of the sound to a reference intensity based on atmospheric pressure. The dB is a logarithmic unit of measurement that expresses the magnitude of a physical quantity, like sound, relative to a specified or implied reference level. Since it expresses a ratio of two quantities with the same unit, it is a dimensionless unit.

Noise is unwanted or annoying sound and is not necessarily based on loudness. It comes from both natural and manmade sources. Noise can have deleterious effects on physical and psychological health, affect workplace productivity, and degrade quality of life. Military activities often involve the use of specialized equipment that cause noise, including aircraft, artillery, heavy vehicles, ships, and amphibious vehicles. The degree to which a sound is perceived to be noise may be influenced by the following factors:

- Frequency spectrum (300 to 4,800 hertz range has the highest potential for deleterious effects on humans)
- Intensity (loudness and frequency)
- Modulation (level of distortion)

- Time and place of occurrence
- Duration
- The individual's background

Figure 6.1-1 shows typical intensity levels for common sounds. Since 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 dB increase. For example, a receptor under a flight path with one jet airliner 500 feet (ft) (152 meters [m]) overhead would experience 115 dB; if two jetliners passed side-by-side, the receptor would experience 118 dB not 230 dB.



Source: Harris 1979, FICON 1992.

Figure 6.1-1. Typical A-Weighted Sound Levels of Common Sounds

Frequency Weighting

A number of factors affect sound, as the human ear perceives it. These include the actual level of noise, the frequencies involved, the period of exposure to the noise, and changes or fluctuations in noise levels during exposure. In order to correlate the frequency characteristics from typical noise sources to the

perception of human ears, several noise frequency weighting measures have been developed. The most common frequency measures include the following:

- *A-weighted Scale.* Since 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, or dBA. The dBA is used to evaluate noise sources related to transportation (e.g., traffic and aircraft) and to small arms firing (up to .50-caliber).
- *C-weighted Scale* – The C-weighted scale measures more of the low-frequency components of noise than does the A-weighted scale. It is used for evaluating impulsive noise and vibrations generated by explosive charges and large-caliber weapons (such as artillery, mortars). C-weighted noise levels are indicated by dBC.

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

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 noise metrics that reflect different noise characteristics. Common metrics used in this EIS/OEIS noise analysis are as follows:

- Day-Night Sound Level (DNL) – This metric cannot be measured directly; rather, it is calculated as the average sound level in decibels with a 10 dB penalty added to the nighttime levels (10 p.m. to 7 a.m.). This penalty accounts for the fact that noises at night sound louder because there are usually fewer noises occurring at night so generally nighttime noises are more noticeable. The DNL noise metric may be further defined, as appropriate, with a specific, designated time period (e.g., annual average DNL, average busy month DNL). This metric is recommended by the United States (U.S.) Environmental Protection Agency (USEPA), used by most federal agencies when defining their noise environment, and applied as a land-use planning tool for predicting areas potentially impacted by noise exposure. Noise levels due to aircraft activities use the A-weighted scale and are expressed as dBA DNL. Explosives use the C-weighted scale and are expressed as dBC DNL.
- Maximum Sound Level (L_{max}) – 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 or maximum sound level (L_{max}). L_{max} is given in units of dBA. The maximum sound level is important in judging the interference caused by a noise event such as participating in a conversation, TV or radio listening, sleep, or other common activities. Although it 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.
- Sound Exposure Level (SEL) – This metric is a measure of the total sound energy and is a sum of the sound intensity over the duration of exposure. The SEL provides a convenient single number that adds the total acoustic energy in a transient event and it has proven to be effective in assessing the relative annoyance of different transient sounds.
- Equivalent Sound Level (L_{eq}) - Another way of describing fluctuating sound is to describe the fluctuating sound heard over specific periods as if it had been a steady, unchanging sound. For this condition, the "equivalent sound level," L_{eq}, may be computed. L_{eq} is the constant

sound level that, in a given situation and period (e.g., 1 hour, denoted by $L_{eq}(1)$, or 24 hours, denoted as $L_{eq}(24)$), conveys the same sound energy as the actual time-varying sound.

- Peak Sound Level – The metric PK 15(met) is the single event peak level that is likely to be exceeded only 15% of the time, i.e. 85% certainty the noise will be within this range. This metric accounts for statistical variation in received single event peak noise level that is due to weather. It is the calculated without frequency weighting (i.e., unweighted as opposed to A- or C-weighted).

Noise Standards and Guidelines

The Marine Corps employs two programs that address adherence to the Noise Control Act of 1972 and USEPA Guidance: the Range Air Installation Compatible Use Zone (Office of the Chief of Naval Operations Instruction [OPNAVINST] 3550.1) for air-to-ground operations at training areas, and the Air Installation Compatible Use Zone (OPNAVINST 11010.36A) for airfield operations. The Range Air Installation Compatible Use Zone and Air Installation Compatible Use Zone programs: 1) help military installations in determining 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 assess existing and proposed land uses on an Installation. For ground training noise, the Marine Corps adheres to a guidance memo dated June 29, 2005 (Marine Corps 2005). In addition, Army Regulation 200-1 (Environmental Protection and Enhancement), Chapter 14 (Operational Noise) provides the guidance for evaluation of ground training noise at Marine Corps installations (Army 2007). Noise zones are used in land use planning around Marine Corps installations.

The following (and Table 6.1-1) describes these zones and the types of land use that are considered compatible within these zones (U.S. Army Center for Health Promotion and Preventive Medicine [USACHPPM] 2009, Army 2007):

- *Zone I.* Includes all areas around a noise source in which DNL is less than 65 dBA or 62 dBC, or the PK 15(met) exceeds 87 dB. This area is usually suitable for all types of land use activities (e.g., homes, schools, and hospitals). Zone I on maps are simply areas that are neither Zone II nor Zone III. LUPZ contours are a subset of a Zone I area with noise levels between 57 db CDNL and 62 dB CDNL that are compatible, but noise complaints could increase on days of higher than normal range activities.
- *Zone II.* Consists of an area where the DNL is between 65 and 75 dBA or 62 and 70 dBC, or the PK 15 (met) is between 87 to 104. Exposure to noise within this zone is normally considered incompatible with noise-sensitive land uses and use of the land within the zone should normally be limited to activities such as industrial, manufacturing, transportation, and resource production (e.g., industrial parks, factories, and highways).
- *Zone III.* Areas around the noise source in which the DNL is greater than 75 dBA or 70 dBC, or the PK 15 (met) exceeds 104 are defined as Zone III. The noise level within this zone is considered incompatible with noise sensitive land uses such as churches, schools, parks, and playgrounds.

Table 6.1-1. Noise Zones and Compatibility Levels

Zone	*Small Arms/Aviation A-weighted DNL*	*Explosives Day Night Average C-weighted DNL*	*Small Arms PK 15 (met) Peak Unweighted*	*Compatibility with Residential/Noise Sensitive Land Uses*
I	<65 dBA	<62 dBC	87 dB	Compatible
II	65 to 75 dBA	62 to 70 dBC	87 to 104 dB	Normally Incompatible
III	>75 dBA	>70 dBC	>104 dB	Incompatible

Sources: USACHPPM 2009, Army 2007.

DoD uses A-weighted DNL noise levels for compatible land use planning around military air installations. Noise exposure levels are expressed as noise contours presented in five dBA DNL increments beginning at 60 or 65 DNL, depending on the installation, up to 85 dBA DNL. In accordance with OPNAVINST 11010.36A, land use compatibility is assessed through estimating and overlaying different noise level contours on land use maps and categorizing land uses as compatible, compatible with restrictions, or incompatible with noise zones. Table 6.1-2 shows typical land use compatibilities each noise contour level. For this EIS/OEIS, noise contours are used to describe the noise environment around Andersen AFB and noise zones around the other areas of Guam proposed for use by the Marine Corps.

Table 6.1-2. Land Use Compatibility in the Airport Environs by Noise Contours

Noise Zone	*I*	*II*		*III*	
Aviation A-weighted DNL	*<65 DNL*	*65-70 DNL*	*70-75 DNL*	*75-80 DNL*	*>80 DNL*
Land Use					
Commercial	Yes	Yes	Yes[2]	Yes[2]	No
Industrial	Yes	Yes	Yes	Yes[2]	Yes[2]
Open/Agricultural	Yes	Yes	Yes	Yes[2]	Yes[1]
Recreational	Yes	Yes	Yes	No	No
Residential	Yes	Yes[2]	No	No	No

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

Noise contours for large caliber weapons and explosives (demolition activities and hand grenades) are developed using the C-weighted scale to determine the land use zones. Another analysis used for assessing explosive noise is complaint risk using PK 15 (met) peak noise levels as shown in Table 6.1-3.

Table 6.1-3 Large Caliber and Explosives Risk of Complaints Levels

Risk of Complaints	*Large Caliber Weapons/Explosives*
	PK15(met) dB Noise Contour
Low	< 115
Moderate	115 - 130
High	> 130

Construction Noise

Construction noise is generated by the use of heavy equipment on job sites and is short-term in duration (i.e., the duration of the construction period). Commonly, use of heavy equipment occurs sporadically throughout daytime hours. Table 6.1-4 provides a list of 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. 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, impact devices (e.g., jackhammers, pile drivers).

The dB 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 dBs for each doubling of distance from the source. Sound that originates from a linear, or 'line' source, such as a passing aircraft, attenuates by about 3 dBs for each doubling of distance where no other features such as vegetation, topography, or walls absorb or deflect the sound. Depending upon their nature, the ability of such features to reduce noise levels may range from minimally to substantially.

Table 6.1-4. Samples of Construction Noise Equipment

Equipment Description	*Impact Device*[1]	*Acoustical Usage Factor*[2] *(%)*	*Actual Measured L_{max} @ 50 feet*[3] *(dBA, slow) (Samples Averaged)*	*Number of Actual Data Samples*[4] *(Count)*
All Other Equipment > 5 HP	No	50	N/A	0
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
Grader	No	40	N/A	0
Impact Pile Driver	Yes	20	101	11
Jackhammer	Yes	20	89	133
Pavement Scarifier	No	20	90	2
Paver	No	50	77	9
Roller	No	20	80	16
Scraper	No	40	84	12
Tractor	No	40	N/A	0
Vibratory Pile Driver	No	20	101	44

Notes:

1. Indication whether or not the equipment is an impact device
2. The acoustical usage factor refers to the percentage of time the equipment is running at full power on the job site and is assumed at a typical construction site for modeling purposes
3. The measured "Actual" emission level at 50 feet for each piece of equipment based on hundreds of emission measurements performed on Central Artery/Tunnel, Boston MA work sites
4. The number of samples that were averaged together to compute the "Actual" emission level

Source: USDOT 2006.

With the exception of safety standards for construction workers, the Marine Corps does not have a formal policy for management of construction noise. Construction noise is typically confined within an installation boundary, occurs during daylight hours, and is only present during the period of construction. There are no local requirements for construction noise that would apply to the proposed construction activities.

Transportation Noise

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, the heavy use on most roadways makes the road a fairly continuous noise source. On Guam, the FHWA is the principal agency managing transportation noise.

The FHWA published a Roadway Construction Noise Model to predict noise levels adjusted from empirical data for construction operations to the actual distance of a receptor such as schools, churches, hospitals, and parks.

Under the Guam Department of Public Works (GDPW) policy, loudest hourly noise level L_{eq} (h) standards are established for traffic noise relative to land use activity categories, as summarized in Table 6.1-5.

Table 6.1-5. Guam Loudest Hourly Noise Standards for Transportation Noise and Land Use Activity

Activity Category	*L_{eq}[h] dBA*	*Description of Activity Category*
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, places of worship, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: FHWA 2009.

6.1.2 North

6.1.2.1 Andersen AFB

Airfield Operations

Andersen AFB Main Runway 06L/24R

The primary source of aircraft noise in the northern part of Guam is Andersen AFB, which supports Air Mobility Command flights for military personnel and their dependents. Andersen AFB is home to the 36th Wing, the 734th Air Mobility Support Squadron, Navy Helicopter Squadron 25 (HSC-25), and several other tenant organizations. Commercial aircraft may occasionally fly through Andersen AFB airspace, but only with permission from the Andersen AFB control tower (see Chapter 7, Airspace).

In 2006, there were 29,524 flight operations at Andersen AFB including departures, arrivals, overhead break arrivals, touch-and-go patterns, and ground-controlled approach patterns. The Air Force plans on increasing their use of the base as described in the recently completed Intelligence Surveillance, and Reconnaissance (ISR)/Strike EIS (PACAF 2006a). This action would be completed prior to implementation of the proposed action in this EIS/OEIS. For this reason, the baseline conditions assessed in this EIS/OEIS include the proposed increased Air Force operations, bringing the total number of annual airfield operations up to 68,139 by 2014. Of these 68,139 airfield operations, 18,951 are the based HSC-25 Squadron's MH-60S Knighthawk helicopters and 732 are transient operations generated by the air wing associated with the visiting aircraft carrier. The remainder is ISR/Strike and other local and transient operations as shown on Table 6.1-6.

Table 6.1-6. Baseline Flight Operations at Andersen AFB

Mission Group	*Aircraft Type*	*Current Operations (2006)*	*No-Action Alternative (2014)*
Based	Helicopter	18,951	18,951
	Jet	0	0
Visiting Aircraft Carrier Wing	Jet	602	602
	Propeller	52	52
	Helicopter	78	78
Transient ISR/Strike	Jet	NA	25,043
Other local and transient operations	Mix	9,841	23,413
Total		**29,524**	**68,139**

Source: Czech and Kester 2008.

Approximately 8% of airfield operations occur during the environmental nighttime hours between 10 p.m. and 6:59 a.m. Figure 6.1-2 shows existing noise contours at Andersen AFB. The majority of the area under the noise contours is located offshore to the northeast of the runway, but 14,787 acres (ac) (5,984 hectares [ha]) of land area are under the noise environment of Andersen AFB as defined by the estimated noise contours. Table 6.1-7 shows the number of acres onshore that are under each noise contour. Sensitive receptors of particular interest for noise analyses are schools, churches, hospitals, and parks. Under the existing noise contours, there is one school and several parks between the 60 and 65 dB DNL contour.

Table 6.1-7. Baseline (CY 2014) Noise Contour Acreage for Andersen AFB

Average Noise Level (DNL)	*Baseline (ac[ha])*
Within Andersen AFB	
60-65 dBA	2,981 (1,206)
65-70 dBA	968 (392)
70-75 dBA	1,848 (748)
75-80 dBA	1,143 (463)
80-85 dBA	945 (382)
>85 dBA	1,767 (715)
Total	9,652 (3,906)
Outside Andersen AFB	
60-65 dBA	6,940 (2809)
65-70 dBA	2,209 (894)
70-75 dBA	792 (321)
75-80 dBA	189 (76)
80-85 dBA	0 (0)
>85 dBA	0 (0)
Total	10,130 (4,100)
Total Onshore Acres	19,782 (8,005)

Source: Czech and Kester 2008.

Northwest Field (NWF)

Andersen AFB also has and operates aircraft on another runway, NWF. Noise sources in and around NWF include surface traffic and other ground-training activities. The south runway at NWF is used for fixed-wing aircraft operations and airborne operations, which include airdrop operations at a drop zone on the eastern end of the runway. The north runway is used for helicopter practice landings and airdrop operations at a drop zone on the eastern end of the runway.

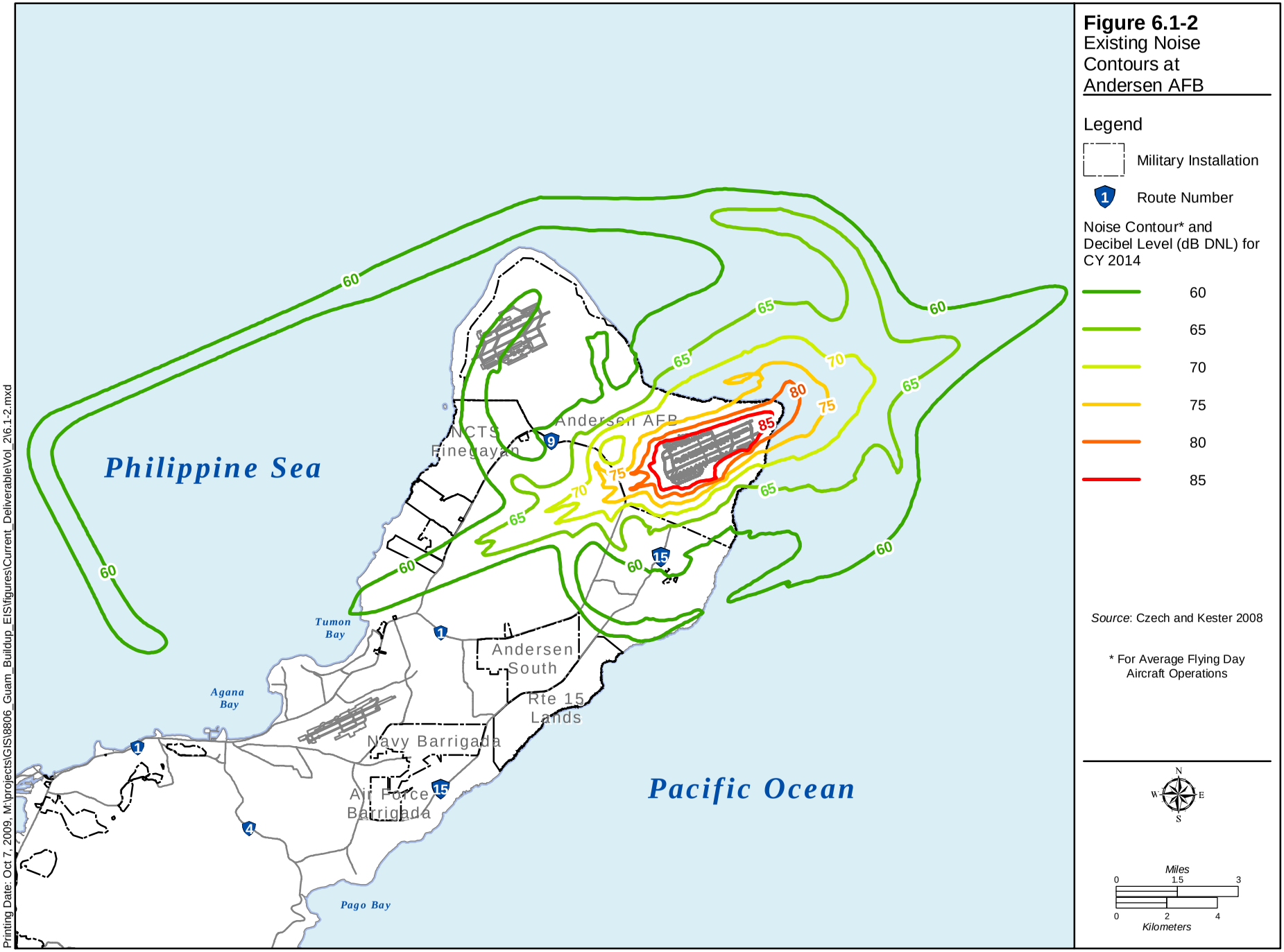


Figure 6.1-2
Existing Noise Contours at Andersen AFB

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Aircraft operations and ground-training activities at NWF are infrequent. During periods of no flying activity, noise results primarily from temporary military encampments and maneuver training by Army National Guard and Army Reserve personnel (Andersen AFB 2000).

Noise modeling for aircraft operations is not required by Air Force directives if the noise contours do not extend beyond the installation boundary, or if there are fewer than 10 jet or 25 propeller-driven aircraft operations per day. The level of aircraft operations at NWF is well below these thresholds (Andersen AFB 2000).

The number of aircraft involved in an operation, the length of the operation, and the distance from aircraft all directly affect the noise levels at locations of sensitive receptors. Based on the noise emission factor for the SH-60 helicopter, a single airborne helicopter will produce a peak pass-by noise level of about 94 dBA SEL at a distance of 100 ft (30 m) and about 75 dB at 1,000 ft (305 m). Two helicopters operating in the same general area at this distance may generate a combined noise level of up to 78 dBA, and three helicopters may generate a combined noise level of up to 80 dBA.

Aviation Training

For the purposes of this EIS/OEIS, aviation training includes related activities such as airlift operations, airdrops at landing zones, and other operations. While most aviation training is conducted in areas away from improved runways (i.e., at Andersen AFB), Familiarization/Instrument Training (FAM) and Field Carrier Landing Practice (FCLP) are two forms of aviation training that occur at improved runways.

The HSC-25 Squadron currently conducts FAM training at Andersen AFB. An improved airfield is required for autorotation and simulated engine-out approaches.

Approximately 77 airlift operations occur at NWF on Andersen AFB annually. Typical aircraft may include H-60, H-46, H-53, V-22, or C-130 variants and up to four of these aircraft can be used per operation. The sound levels from airlift operations involving a single helicopter reach up to 94 dBA SEL in the immediate vicinity of the operation (approximately 100 ft [30 m]). Two helicopters at this range produce SELs nearing 97 dBA and four aircraft operating in this defined area produce SELs nearing 100 dBA. However, the closest non-military land use area is over 1,640 ft (500 m) west of the airfield. No schools or hospitals occur in this zone. Scattered beachfront houses are located between the Pacific Ocean shoreline and the base boundary northwest of NWF. Receptors experience SELs of approximately 76 dBA for an operation with four helicopters due to the distance from the aircraft to the receptor.

According to Andersen AFB Tower personnel, less than seven FCLP operations were performed at Andersen AFB between January and December 2007 (an average of about one every 2 months), so FCLP operations were not modeled for any aircraft (Czech and Kester 2008).

Ground-Based Training

Ground-based training includes Exercise Command, Control and Communication, which provides primary communications training for command, control, and intelligence. It also provides critical interoperability and situation awareness information. Various facilities and infrastructure at Andersen AFB are used for this type of training. There are no live-fire activities and associated noise impacts currently occurring at Andersen AFB.

Force protection training includes Protect and Secure Area of Operations (Protect the Force). Force protection operations increase physical security of military personnel in the region to reduce their vulnerability to attacks. In combat environments, force protection includes offensive and defensive measures such as moving forces and building barriers, detection and assessment of threats, delay or denial

of access of the adversary to their target, appropriate response threats and attack, and mitigation of effects of attack. Ground Burst Simulators, smoke grenades, small arms blank ammunition, and 40 pound cratering charges are used as part the existing field training exercises (PACAF 2006b). In the region, NWF is the site for these training activities. Figure 6.1-3 shows the existing noise levels due to the detonation of the 40 pound cratering charges.

Noise sources associated with this ground-based training typically consist of operation of vehicles, generators, and other equipment, as well as human activity. Training events are intermittent, vary in duration, and are confined within the installation boundaries.

6.1.2.2 Finegayan

Airfield Operations

There are no airfields or airfield operations located at Finegayan.

Aviation Training

No aviation training is currently conducted at Finegayan.

Ground-Based Training

There is no current ground-based training occurring at Finegayan.

6.1.2.3 Non-DoD Land

Airfield Operations

There are no airfields or airfield operations located on non-DoD lands.

Aviation Training

No aviation training is currently conducted on non-DoD lands.

Ground-Based Training

There is no current ground-based training occurring on non-DoD lands in northern Guam.

6.1.2.4 Off Base Roadways

The proposed action includes on base roadway construction projects that would be implemented by the DoD. An affected environment description for on base roadway construction projects is included beneath the appropriate subheadings in other sections of this chapter. The following section describes the affected environment for off base roadway construction projects that would be implemented by FHWA.

Land uses along the project corridor that are noise sensitive include residential areas, schools, churches, parks, beaches, a golf course, and cemeteries. Sound levels measured at receptors along the project range between 54 and 73 dBA and were mostly in the middle to upper 60 dBAs; these measurements are considered typical for rural and/or suburban environments.

Regional Setting

Noise-sensitive land uses within the north region of Guam include multi- and single-family residences, parks, churches, schools, and outdoor recreational areas (e.g., golf courses).

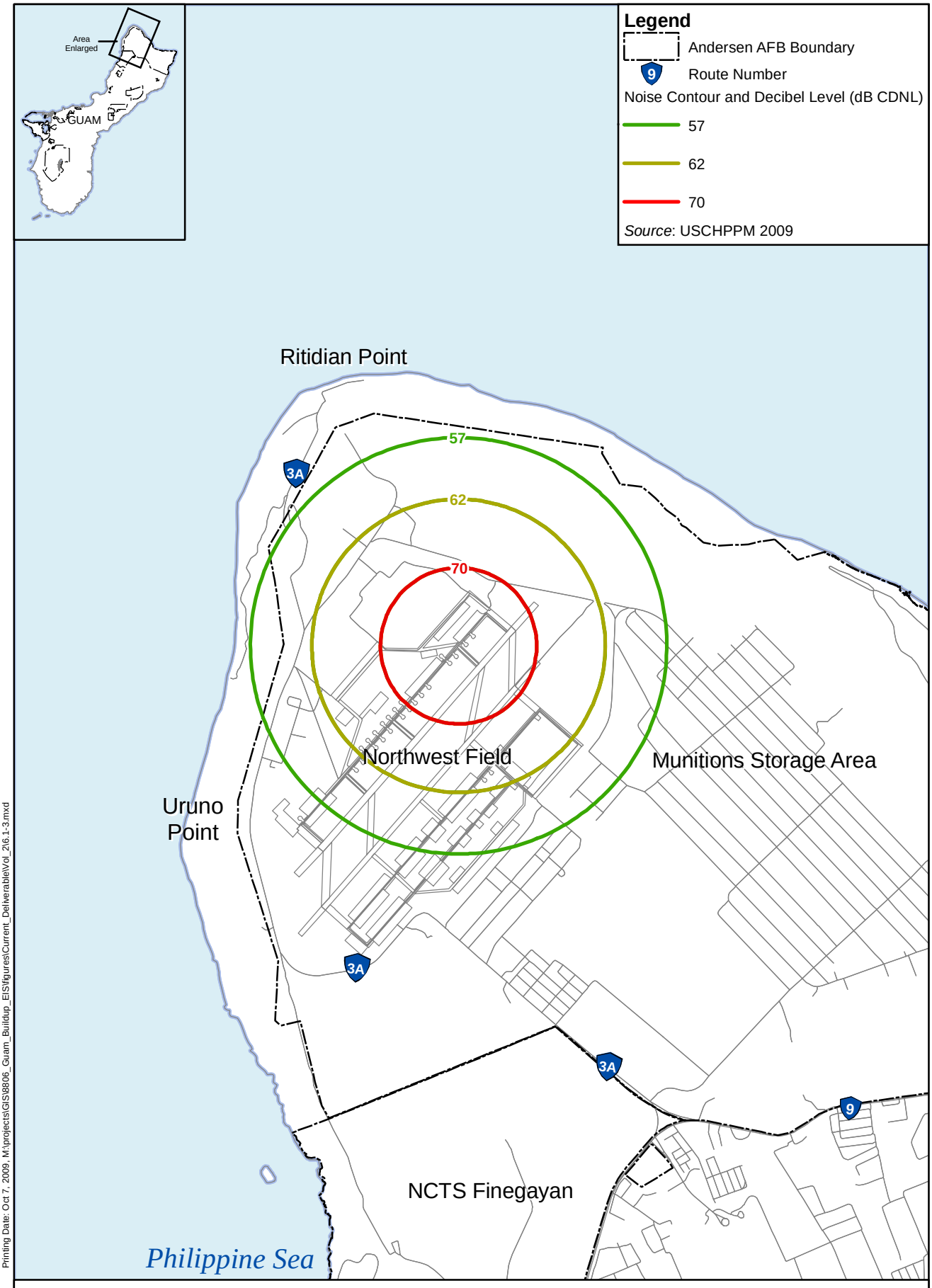

Figure 6.1-3
Existing Demolition Operational Noise Contours at Northwest Field

Project Setting

The road improvements within the north region of Guam would be along Route 3, Route 9, and the northern end of Route 1. The following noise-sensitive land uses are found along these routes:

- Route 3: Multi- and single-family residences, parks, a church, and Starts Golf Resort.
- Route 9: Predominately single-family residences with one multi-family residence, a church, and Mechanac Elementary School.
- Route 1: Predominately single-family residences, with a few multi-family residences, a church, and Dominican Catholic School.

Non-noise-sensitive land uses for all three routes consist of small commercial buildings, military, and undeveloped properties. Seven representative receptors were selected for noise measurements. They include three single-family residences, two multi-family residences, one school, and a military athletic training field. Existing sound levels were measured between 59 and 77 dBA, and they were primarily attributable to traffic. The results of these measurements are shown in Table 6.1-8 and Table 6.1-9.

6.1.3 Central

6.1.3.1 Andersen South

Airfield Operations

Currently, no airfield operations occur on Andersen South.

Aviation Training

Currently, no aviation training occurs on Andersen South.

Ground-Based Training

Andersen South open fields and wooded areas are used for basic ground maneuver training including routine training exercises, camp/tent setup, survival skills, land navigation, day/night tactical maneuvers and patrols, blank munitions and pyrotechnics firing, treatment and evaluation of casualties, fire safety, weapons security training, perimeter defense/security, and field equipment training. Vacant single-family housing and vacant dormitories are used for Military Operations on Urban Terrain (MOUT) training and small-unit tactics in support of vehicle and foot-based maneuver training. Noise generating activity associated with this training include vehicle use, use of breacher charges and pyrotechnics, and small arms firing. Although residential land use occurs along the Andersen South boundary, there are no noise issues as these operations are conducted at interior locations of the installation, away from the site boundary.

Table 6.1-8. Short-Term Noise Measurement Results

Site No.	*Street Address, City*	*Land Use*[1]	*Meter Location*	*Measurement Dates*	*Start Time*	*Measured L_{eq}, dBA*[2]	*Adjusted Peak-Hour L_{eq}, dBA*[3]	*Adjusted to Long-Term Site*
Central Region								
ST01	Fish Eye Park, Piti	REC	Park	March 24, 2009	9:57 a.m.	65.9	68.9	LT01
ST02	Asan Beach, Asan	REC	Beach	March 24, 2009	10:33 a.m.	61.3	64.3	LT01
ST03	Asan Park, Asan	REC	Park	March 23, 2009	6:04 p.m.	63.8	68.8	LT01
ST04	815 West Marine Drive, Agana	SFR	Front Yard	March 24, 2009	11:30 a.m.	72.3	76.3	LT01
ST06	Prince Park, Agana	REC	Park	March 24, 2009	11:27 a.m.	69	73	LT01
ST07	Tree City Park, Tamuning	REC	Park	March 24, 2009	1:53 p.m.	68.8	70.8	LT02
ST08	John F. Kennedy High School, Tamuning	SCH	Entrance	March 23, 2009	5:14 p.m.	63.6	66.6	LT02
ST15	678 Route 1, Yigo	SFR	Front Yard	March 25, 2009	2:19 p.m.	67.6	68.6	LT05
ST16	929 Route 1, Yigo	SFR	Side Yard	March 25, 2009	2:19 p.m.	65.7	66.7	LT05
ST17	Park, Yigo	REC	Park	March 25, 2009	1:23 p.m.	62.5	63.5	LT05
ST18	Condemned Condominiums, Dededo	MFR	Open Field	March 26, 2009	10:24 a.m.	61.5	63.5	LT06
ST19	Soccer Field, Harmon	REC	Open Field	March 26, 2009	11:16 a.m.	66.9	69.9	LT07
ST20	835 Route 16, Barrigada	SFR	Front Yard	March 31, 2009	4:04 p.m.	68.7	68.7	LT10
ST21	Army Sports Field Route 16, Barrigada	REC	Open Field	March 31, 2009	4:42 p.m.	67.8	67.8	LT10
ST23	184 Route 8, Barrigada	SFR	Front Yard	March 26, 2009	3:03 p.m.	72.4	75.4	LT08
ST25	Degracia Road and Route 10, Barrigada	SFR	Side Yard	March 27, 2009	10:29 a.m.	65.5	70.5	LT09
ST26	128B Route 10, Barrigada	SFR	Front Yard	March 27, 2009	10:29 a.m.	68.1	73.1	LT09
North Region								
ST10	Banyan Drive and South Finnegan, NCS	MFR	Open Field	March 23, 2009	4:20 p.m.	54.9	55.9	LT03
ST11	NCS Navy Campus, NCS	REC	Track	March 25, 2009	9:20 a.m.	55.9	56.9	LT04
ST12	145 Igaga, Agovesuer	MFR	Side Yard	March 25, 2009	9:20 a.m.	62.5	63.5	LT04
ST13	Nursery, Yigo	SFR	Side Yard	March 25, 2009	10:40 a.m.	71.8	74.8	LT05
ST14	Dominican Catholic School, Yigo	SCH	Play Area	March 25, 2009	10:40 a.m.	60.6	63.6	LT05

Legend: [1]- Land Use: SFR = single-family residence; MFR = multi-family residence; REC = recreation facility; SCH = school

Notes: [2]- All short-term measured noise levels were measured for a 20-minute period.

[3]- Measurements conducted during off-peak hours were adjusted to the peak-hour $L_{eq}(h)$ based on a comparison with long-term noise levels measured at a nearby measurement site listed in the last column.

Table 6.1-9. Long-Term Noise Measurement Results

Site No.	*Street Address, City*	*Land Use*[1]	*Meter Location*	*Measurement Dates*	*Start Time*	*Duration, Number of Hours*	*Measured Peak Hour L_{eq}, dBA*[2]	*Peak-Hour Time*
Central Region								
LT01	Asan Village, Asan	MFR	Rear Yard	March 23 – March 24, 2009	1:00 p.m.	24	64.0	7:00 a.m.
LT02	146 Ifilet Court, Liguan Terrace	SFR	Rear Yard	March 23 – March 24, 2009	2:00 p.m.	24	61.0	9:00 a.m.
LT05	122 Chicharica Court, Dededo	SFR	Rear Yard	March 24 – March 25, 2009	4:00 p.m.	24	59.0	3:00 p.m. & 6:00 p.m.
LT06	120 Calamento Court, Dededo	SFR	Rear Yard	March 25 – March 26, 2009	12:00 p.m.	24	63.0	6:00 a.m. – 7:00 a.m.
LT07	136 West Abois Court, Dededo	SFR	Rear Yard	March 25 – March 26, 2009	4:00 p.m.	24	62.0	4:00 p.m. – 5:00 p.m. & 7:00 a.m.
LT08	17A Mong, Toto Maiti	MFR	Rear Yard	March 26 – March 27, 2009	9:00 a.m.	24	64.0	7:00 a.m. & 4:00 p.m.
LT09	156 Adacao, Barrigada	SFR	Rear Yard	March 26 – March 27, 2009	1:00 p.m.	24	64.0	2:00 p.m.
LT10	101 Route 16, Barrigada	SFR	Front Yard	March 26 – March 27, 2009	4:00 p.m.	24	65.0	4:00 p.m.
North Region								
LT03	178 Route 3, Nis	SFR	Front Yard	March 23 – March 24, 2009	3:00 p.m.	24	68.0	7:00 a.m., 2:00 p.m., & 5:00 p.m.
LT04	1595 Aganton Gumas, Dededo	SFR	Front Yard	March 24 – March 25, 2009	3:00 p.m.	24	65.0	4:00 p.m. & 7:00 p.m.

Legend: [1]- Land Use: SFR = single-family residence; MFR = multi-family residence.
Notes: [2]- The highest measured hourly noise level recorded during the long-term measurement period.

The most intensive use at Andersen South currently occurs during exercises involving up to three Marine Corps companies utilizing Andersen South range for up to three weeks, which currently occurs twice a year. Blanks used in this training produce an estimated noise level of about 96 dBA at a distance of 500 ft (152 m) and about 90 dBA at a distance of 1,000 ft (305 m). Potential for community noise impacts would only arise with intense blank firing. For example, 1,400 blanks fired within an hour from the same approximate location produce an hourly L_{eq} of about 85 dBA at a distance of 750 ft (229 m), which would influence community DNLs in that vicinity. Such high intensity events, which may be distracting or annoying in nearby public areas, would be a rare occurrence at Andersen South. The noise impacts of existing and potential increased MOUT training at Andersen South was assessed in the Mariana Islands Range Complex (MIRC) EIS/OEIS (Navy 2009) and found that prolonged intense training activities occurring in close proximity to adjacent public lands for the duration of the event could elevate community noise levels, but is unlikely due to the infrequency of activities in these locations.

6.1.3.2 Barrigada

Airfield Operations

Currently, no airfield operations occur on Barrigada.

Aviation Training

No aviation training is currently conducted on Barrigada.

Ground-Based Training

Barrigada Communications Annex supports Field Training Exercises, MOUT training in unoccupied housing units, Explosive Ordnance Disposal/land demolition training. Open areas (former transmitter sites) provide command and control and logistics training; bivouac, vehicle land navigation, and convoy training; and other field activities. Small arms firing is the primary source of noise associated with this training. Land demolition training for location, excavation, identification, and neutralization of buried land mines involves teams locating inert land mines or Improvised Explosive Devices and then designate the target for destruction. Threats are neutralized using up to 2 pounds (lbs) (0.9 kilograms [kg]) simulated or live explosives. These operations are insulated to an interior location of the installation and are sporadic based on variable training conducted by various branches of the military. There is no current noise management issue associated with the existing ground operations at Barrigada.

6.1.3.3 Non-DoD Land

Airfield Operations

In this region, the primary source of aircraft noise comes from aircraft associated with Guam International Airport. The International Airport is operated by the Guam International Airport Authority, a public corporation and autonomous agency of Government of Guam. Located about 3.1 mi (5 km) northeast of Hagatna and approximately 4 mi (6.4 km) southwest of the proposed Andersen South Training Area. This airport handles nearly all of the commercial flights into and out of Guam and is the only civilian air transportation facility on Guam. Eight major airlines operate there, making it the hub of air transportation for Micronesia and the Western Pacific. There are 83 aircraft based at the field, mostly jet airplanes. Annual average aircraft operations average 108 per day, mostly commercial and air taxi (AirNav 2009).

Aviation Training

No aviation training is currently conducted on non-DoD lands.

Ground-Based Training

There is no current ground-based training occurring on non-DoD lands in central Guam.

Other Noise Sources

On the Route 15 lands, noise is generated from activities at the Guam International Raceway, which is Guam's only automobile raceway. The 250-acre parcel includes a 14 mi (39 km) dirt track, a 0.5 mi (0.8 km) asphalt "NASCAR" type track, a 1 mi (1.6 km) long off-road course, and a paved 2.25 mi (3.6 km) Formula Three track. Noise occurs in correlation with events, which include noise from vehicles racing and crowds. In 2009, more than 100 races and events are anticipated at the Raceway.

The events held most frequently are motocross and drag races. While not the majority of the racing that occurs at the Raceway, the stock car or "NASCAR" type racing likely produces the most noise disturbance. According to a study conducted on noise exposure levels at stock car racing events, an average noise level in the first row (20 ft/6 m from track) of a race is 106.2 dBA with a peak intensity of 109 dBA, while noise levels taken at 150 ft (46 m) from the track ranged from 96.5 to 104 dBA (Rose et al. 2008).

In addition to races, the Raceway hosts a number of special events every year including live music concerts, car shows, and driving schools. Some of these events are combined with races and draw attendances of over 5,000 people. Common music levels at larger venue outdoor concerts are usually 100 dBA from the mixer's position (Noise Council 1995).

6.1.3.4 Off Base Roadways

The proposed action includes on base roadway construction projects that would be implemented by the DoD. An affected environment description for on base roadway construction projects is included beneath the appropriate subheadings in other sections of this chapter. The following section describes the affected environment for off base roadway construction projects that would be implemented by the FHWA.

The road improvements within the central region of Guam would be along Route 8, Route 10, Route 16, and Route 27 and all but the northern section of Route 1. The noise sensitive land use along these routes includes multi and single-family residences, parks, beaches, churches, and schools. The noise sensitive land use for each route is as follows:

- The noise sensitive land use along Route 1 is a mix of single- and multi-family residences along with beaches, parks, churches and a cemetery.
- The noise sensitive land use along Route 8 is an even mix of single- and multi-family residences as well as a few motels.
- The noise sensitive land use along Route 16 is predominantly single-family residences and athletic fields for the nearby military base, as well as a few multi-family residences.
- The noise sensitive land use along Route 10 is predominantly single-family residences and Louis Puntalan Middle School, as well as a few multi-family residences.
- The noise sensitive land use along Route 27 is predominantly single-family residences, an athletic field, a few multi-family residences, and Juan Guerrero Elementary School.

The non-noise sensitive land use for Routes 8, 10, 16, and 27 consist of small commercial buildings and military and undeveloped properties. Within the central region, non-noise sensitive land use along Route 1 consists of small retail business, restaurants, office buildings, big box stores, and the Micronesia Mall and is comparable to a well developed suburb. A total of 25 representative receptors were selected for noise measurements. They include 13 single-family residences, three multi-family residences, one school,

and eight recreational sites consisting of parks and beaches. Existing sound levels measured were between 55 and 75 dBA and primarily due to traffic along the various Routes. The results of these measurements are shown above in Tables 6.1-8 and 6.1-9.

Roadway Project Locations

Regional Setting

Noise-sensitive land uses within the central region include multi- and single-family residences, parks, churches, schools, cemetery, and outdoor recreational areas (e.g., parks, beaches).

Project Setting

The proposed road improvements within the central region would occur along Routes 8, 10, 16, 27, and all but the northern section of Route 1. The following noise-sensitive land uses found along these routes include multi- and single-family residences, parks, beaches, churches, and schools:

- Route 1: A mix of single- and multi-family residences, along with beaches, parks, churches, and a cemetery.
- Route 8: An even mix of single- and multi-family resentences, as well as a few motels
- Route 16: Predominantly single-family residences and athletic fields for the nearby military base, as well as a few multi-family residences.
- Route 10: Predominantly single-family residences and Louis Puntalan Middle School, as well as a few multi-family residences.
- Route 27: Predominantly single-family residences and an athletic field, as well as a few multi-family residences and Juan Guerro Elementary School.

Non-noise-sensitive land uses for Routes 8, 10, 16, and 27 consist of small commercial buildings and military and undeveloped properties. Non-noise-sensitive land uses along Route 1 within the central region are extensive, comprising small retail business, restaurants, office buildings, big box stores, and the Micronesia Mall. Twenty-five representative receptors were selected for noise measurements, including 13 single-family residences, three multi-family residences, one school, and eight recreational sites consisting of parks and beaches. Existing sound levels were measured between 55 and 75 dBA, and they were primarily attributable to traffic. The results of these measurements are shown above in Table 6.1-8 and Table 6.1-9.

6.1.4 Apra Harbor

6.1.4.1 Harbor

Airfield Operations

No airfield operations currently occur at the harbor area.

Aviation Training

Assault support is a component of aviation training that involves actions required to airlift personnel, supplies, or equipment into or within a battle area. The Marine Corps provides helicopter assault support for command and control, troop lift/logistics, reconnaissance, search and rescue, medical evacuation, reconnaissance team insertion/extraction, and helicopter coordination and control functions. During combat conditions, assault support provides the mobility to focus and sustain combat power at decisive places and times and the capability to take advantage of fleeting battlespace opportunities. There are three levels of assault support: tactical, strategic, and operational. Polaris Point Field and Orote Point KD range

provide temporary sites from which assault support training can occur. From these temporary sites, the Marine Expeditionary Unit commander provides assault support to forces training within the MIRC.

Ground-Based Training

Other ground based training, including explosive ordnance disposal training for land demolition operations occur at Inner Apra Harbor, Gab Gab Beach, Reserve Craft Beach, Polaris Point Field, Orote Point Airfield/Runway, Orote Point CQC House, and Orote Point Radio Tower. The small charges used in the training at these locations have not resulted in a noise impact to surrounding communities (COMPACFLT 2009).

Noise levels due to ground-based training activities at Apra Harbor were assessed in the MIRC EIS/OEIS (Navy 2009b). The MIRC EIS/OEIS concluded that no noise management issues are related to these activities. Marksmanship exercises are used to train personnel in the use of all small arms weapons for the purpose of self defense and security. Basic marksmanship operations are strictly controlled and regulated by specific individual weapon qualification standards. Small arms include, but are not limited to, 9mm pistol, 12-gauge shotgun, and 7.62 mm rifles. Small arms firing can produce peak noise levels of 90 to 100 dB at 500 ft (152 m) and 80 to 90 dB at 1,000 ft (305 m) for the most common types of small arms. While the use of these arms can produce received sound levels up to 90 dBA SEL at 50 ft (15 m) for each round fired, these sound-generating events are not continuous, which minimizes their contribution to hourly L_{eq} values or community DNLs.

6.1.4.2 Naval Base Guam

Airfield Operations

The airfield at Orote Point and the Orote Point Triple Spot location, a helicopter landing zone on the Orote Point Airfield Runway, are sporadically used for KC-130 touch-and-go operations. These locations also support personnel transfer, logistics, parachute training, and a variety of training activities reliant on helicopter transport (COMPACFLT 2009). No data exist for the number of operations, but so few operations occur that noise contours have not been developed. Because the usage is sporadic, the existing noise levels are best characterized by SELs at the time of operations versus an average noise level contour. The SEL for a KC-130 overhead at 1,000 ft (305 m) is 92.1 dBA.

Aviation Training

Parachute insertions and air assault operations are conducted to insert troops and equipment by parachute and/or by fixed or rotary wing aircraft to a specified area. Typical aircraft may include from one to four H-60, H-46, H-53, V-22, or C-130. 26 of these operations occur annually at Orote Point Triple Spot, Polaris Point Field, or the NMS breacher house. Aircraft do not remain in the same area for an extended period of time, and operation altitudes are typically greater than 1,500 ft (457 m) above ground level (AGL). At that operating height, peak sound levels from H-60 or H-46 aircraft are approximately 80 dBA.

Ground-Based Training

Naval Special Warfare (NSW) Direct Action is either covert or overt action directed against an enemy force to seize, damage, or destroy a target and/or capture or recover personnel or material. Training operations are small-scale offensive actions including raids; ambushes; standoff attacks by firing from ground, air, or maritime platforms; designation or illumination of targets for precision-guided munitions; support for cover and deception operations; and sabotage inside enemy-held territory. Units involved are typically at the squad or platoon level staged on ships at sea. They arrive in the area of operations by helicopter or small rubber boats across a beach. Twenty-two Direct Action operations occur annually. The

majority of these Direct Action operations (15) occur at the Orote Point Close Quarters Combat (OPCQC) House in the Apra Harbor Naval Complex. Noise from helicopter insertions is transient and of short duration. Combined with the distance between operational areas and adjacent public land use, there is no contribution to the community noise levels on adjacent non-military land or effects to other sensitive receptors from aircraft noise during these operations.

6.1.4.3 Off Base Roadways

The proposed action includes on base roadway construction projects that would be implemented by the DoD. An affected environment description for on base roadway construction projects is included beneath the appropriate subheadings in other sections of this chapter. The following section describes the affected environment for off base roadway construction projects that would be implemented by FHWA.

Regional Setting

Noise-sensitive land uses within the Apra Harbor Region include outdoor recreational areas (e.g., parks, beaches).

Project Setting

Proposed roadway improvements within the Apra Harbor Region would occur on Routes 11 and 2A. Land uses along these routes consist of military and undeveloped properties. Because these are non-noise-sensitive land uses, noise measurements were not conducted.

6.1.5 South

6.1.5.1 Naval Munitions Site

Airfield Operations

Currently, no airfield operations occur on south Guam.

Aviation Training

Aviation training in the south is currently limited to a landing zone at Naval Munitions Site (NMS) that is used in association with airborne raid-type training associated with an adjacent breacher house. The over flight of a SH-60 helicopter (typical aircraft for such training activities) can produce single-event pass-by noise levels approaching 94 dBA, SEL at 100 ft (30 m) from the source. At distances beyond about 2,500 ft (762 m), noise from such a source would be at or below typical background noise levels for a daytime urban area (COMPACFLT 2009). Such training is infrequent and at an interior location within the installation, resulting in no community noise effect.

Ground-Based Training

MOUT training in the south is conducted at NMS breacher house. A concrete structure is used to train forces in maintaining mobility in areas with man-made obstacles. Specifically, Marines are trained in forced entry, including in the use of small explosive charges. No live fire weapons are authorized at this training site. Noise is intermittent, infrequent, and at an interior location within the installation, resulting in no community noise effect.

Land demolition operations occur at NMS breacher house, NMS Detonation Range, Fire Break # 3, NMS Galley Building 460, and the Southern Land Navigation Area in the southern region of Guam.

Land demolition activities take place approximately 136 times annually, with 82 of the activities culminating in the use of explosives to neutralize mines or unexploded ordnance. These 82 activities all

occurred at the NMS Demolition Range, which is located approximately 4,100 ft (1,250 m) from the closest public boundary. Typical peak noise levels associated with detonations of up to two pounds net explosive weight (NEW) are approximately 155 dBA at a distance of 492 ft (150 m) from the source. The received peak levels at the installation boundary without taking noise attenuation from terrain shielding or a berm into account would be expected to be approximately 137 dB, with the respective SEL being lower, as this is an extremely brief event. While individuals or non-human sensitive receptors exposed to these noise events may be startled if they are unaware of the source of the noise, the brevity of these received levels and relative infrequency of activities would not result in DNL contours extending onto adjacent public lands. The MIRC EIS/OEIS assessed the impacts to human sensitive receptors as low to minimal (COMPACFLT 2009). A Sniper Range at NMS is approved for up to .50 caliber sniper rifle fire, which is internal to the installation and does not present a current noise management issue.

6.1.5.2 Off Base Roadways

The proposed action includes on base roadway construction projects that would be implemented by the DoD. An affected environment description for on base roadway construction projects is included beneath the appropriate subheadings in other sections of this chapter. The following section describes the affected environment for off base roadway construction projects that would be implemented by the FHWA.

Regional Setting

Noise-sensitive land uses within south region include single-family residences, parks, churches, schools, and cemeteries.

Project Setting

The proposed road improvements within the south region would occur along Routes 2, 5, and 1 south of Route 11. Land uses along these routes consist of single-family residences, schools, cemetery, commercial, and undeveloped properties. While there are noise-sensitive land use along these routes, the proposed improvements would not involve significant widening of the routes (i.e., existing shoulder is to remain undisturbed); therefore, noise measurements were not conducted.

6.2 ENVIRONMENTAL CONSEQUENCES

This description of environmental consequences addresses all components of the proposed action for the Marine Corps on Guam. The components addressed include: Main Cantonment, Training, Airfield, and Waterfront. There are multiple alternatives for the Main Cantonment, Training-Firing Range, Training-Ammunition Storage, and Training-NMS Access Road. Airfield and Waterfront do not have alternatives. Although organized by the Main Cantonment alternatives, a full analysis of each alternative, Airfield, and Waterfront is presented beneath the respective headings. A summary of impacts specific to each alternative, Airfield, and Waterfront is presented at the end of this chapter. An analysis of the impacts associated with the off base roadways is discussed in Volume 6.

6.2.1 Approach to Analysis

Potential noise-generating events associated with the various alternatives were identified and the potential noise was estimated on the basis of published military information on noise sources. These estimated noise levels were reviewed to determine if they would represent a significant increase in the current ambient noise level, have an adverse impact on a substantial population of sensitive receptors, or be inconsistent with any relevant and applicable standards.

6.2.1.1 Methodology

To derive the noise level contours, widely applied and accepted noise models were used for evaluating small arms ranges, large caliber ranges, and airfields.

Airfield noise was estimated using NOISEMAP, which is used to generate noise level contours in DNL around an airfield. The model uses the aircraft type and number; takeoffs, landings, touch and go, as well as closed patterns; and time of operation to depict noise levels at an airfield.

The minimal NEW identified in the model BNOISE2 (see below) is 0.02 lbs (0.009 kg); therefore, anything with a NEW of less than 0.02 lbs (0.009 kg) was not considered in the modeling for ground-operations noise. This includes small explosive charges (less than ¼ lb (0.13 kg) TNT) to be used at the breacher and trainer house, as well as blanks and pyrotechnics and stun grenades to be used in maneuver training (which generally have a NEW of 0.072 lbs [.327 kg]). Although detonations at the proposed demolition range (see Section 2.3.2.1) would be up to 20 lbs (9.1 kg), TNT and fragmentation grenades would be authorized at the proposed grenade house (see Section 2.3.2.1). These noise sources were not modeled because the ranges would be sited at interior locations of the installation and would be minor contributors to cumulative noise exposure based on the proposed use of the ranges (i.e., during daylight hours approximately 2-3 consecutive days per month). For live-fire training at the five proposed small arms ranges, noise was calculated using the Small Arms Range Noise Assessment Model (SARNAM, Version 2.6.2003-06-06). For the proposed hand grenade range, noise was calculated using the BNOISE2 modeling program updated BNOISE model (BNOISE2, Version 1.3.2003-07-03).

SARNAM inputs for the range configuration alternatives analyzed included the location and configuration of each range (including number of lanes, distance between firing point and target), approximate number of days the range is utilized annually, weapons to be fired at each of the ranges, percent of night firing, and the information on the range physical features (e.g., absorption material, backstop height, and distance parameters for barriers, baffles, etc.). Land and water data are entered into the model because there is greater sound reflection as sound propagates over water than when sound propagates over land.

BNOISE2 model inputs for the two alternatives for the hand grenade range included information on the location and configuration of the proposed grenade ranges, number of firing points, number of pits, and estimated use rates.

6.2.1.2 Determination of Significance

Noise impacts result from perceptible changes in the overall noise environment that increase annoyance or affect human health. Annoyance is a subjective impression of noise wherein people apply both physical and emotional variables. To increase annoyance, the cumulative noise energy must increase measurably. Human health effects such as hearing loss and noise-related awakenings can result from exposures to noise. For this volume of the EIS/OEIS, noise is evaluated for airfield operations, aviation training, ground-based training, construction, and traffic. Since the noise metrics vary between various noise sources, the significance criteria for each activity is provided. It is not anticipated that maintenance activities would noticeably contribute to the noise environment due to their intermittent nature and short duration. The threshold levels of significant impacts for noise are:

- Airfield operations: The increase of any incompatible sensitive noise receptors (residences, hospitals, libraries, etc.) under noise contours where the effects are unmitigable. This threshold is intended to capture areas where there would be "high annoyance" effects from operational noise, alongside health effects and complaints. In general, noise increases of less

than three dBA DNL is considered insignificant regardless of underlying land use. This criterion applies to the airfield noise environment.

- Aviation training: SELs are used to describe the noise events from aircraft flying overhead. The training activities are generally dispersed except at landing zones so each discreet flyover is characterized by SELs. Generally, SELs are used for comparing the noise levels of different aircraft. Speech interference and sleep disturbance are the most common impacts associated with aircraft overflights using SELs as the noise metric for impacts. However, SELs are considered supplemental noise metrics and are useful for characterizing specific events and enhancing the public's understanding of potential affects resulting from aircraft overflights. Threshold levels of significant impact for supplemental noise metrics have not been established and there is no accepted methodology for aggregating these values into a cumulative impact description (FAA 2000).
- Ground-based training: Noise associated with ground-based training is generated by live-fire exercises. In this case, the significance criteria would be whether the increase in noise creates an incompatible land use in Zones II and III.
- Construction: Noise resulting from construction activities usually last only during daylight hours for approximately eight hours per day. The USEPA generated permissive noise levels based upon L_{eq} for eight and 24 hour periods. Since daily construction durations are about eight hours, the limit for 365 days per year exposure is 75 dBA. The 24 hour standard is 70 dBA.

The significance criteria expressed in this section applies to human receptors but noise could also affect biological resources, land use and cultural resources. Please refer to the specific resource section for details about the noise impacts to these other resources.

6.2.1.3 Issues Identified during Public Scoping Process

Comments received during the scoping process from the public, including regulatory stakeholders, do not specifically mention concerns about increased noise pollution due to the proposed action in Apra Harbor. However, numerous comments expressed concern over the anticipated increase in noise from fixed-wing aircraft and helicopters over both land and water, including cumulative impacts with existing and future noise sources. There were also comments expressing concern regarding ground-based training noise impacts to humans and wildlife, including noise from live-fire training and military land vehicles. Some scoping comments requested noise abatement projects/programs be initiated to protect communities near bases from increased noise pollution.

6.2.2 Alternative 1

6.2.2.1 North

Andersen AFB

Construction

Alternative 1 involves the construction of various facilities needed to allow the Marine Corps to carry out the Air Combat Element (ACE) mission, Air Mobility Campus (AMC), and the north gate access road and associated facilities. The ACE would be located adjacent to the north ramp and the AMC would be located adjacent to the south ramp. New north access road and entry control point (ECP) and other related facilities would be located adjacent to Route 9. Facilities construction would produce noise impacts to the surrounding environment. To characterize construction activity noise levels, U.S. Department of Transportation data (2006) were used. Noise from construction activity varies with the types of equipment

used and the duration of use. During operation, heavy equipment and other construction activities generate noise levels ranging typically from 70 to 90 dBA at a distance of 50 ft (15.2 m). During facilities construction, use of heavy equipment commonly occurs sporadically throughout the daytime hours.

Generally, heavy equipment would generate the highest noise levels throughout the construction phase, but would be temporary in nature, and would diminish the farther sensitive noise receptors are from the construction site. Although some heavy equipment would be used throughout the construction process, the noisiest heavy equipment would be associated with site preparation up to and including installation of foundations. The types of equipment necessary for site preparation would be graders, pavers, dump trucks, and concrete mixers and their use would tail off as construction of the structures begin. Use of heavy equipment also depends on the construction schedule, and would not be permanent. A compressed schedule versus a long-term schedule would likely use more pieces of heavy equipment for longer daily periods raising noise levels, but the duration would be shorter. Assuming 20 pieces of heavy equipment that includes multiple graders, excavators, dump trucks and pavers, the noise levels would be about 91 dBA at 50 ft (15 m) from the source.

For the ACE and the AMC, construction would be well inside Andersen AFB and construction noise would attenuate to almost ambient noise levels at the nearest off-base recipient. The north access area would be located nearest sensitive receptors at a distance of about 500 ft (152 m). Since the proposed construction for this alternative would be approximately 500 ft (152 m) to the nearest receptor, the noise levels would attenuate down to about 71 dBA L_{eq}. However, because the closest facility is a one-story ECP (204.4 square feet [ft^2]) (18.99 square meters [m^2]), the amount of heavy equipment required should be much less than 20 pieces of equipment, the noise levels should also be considerably less than 71 dBA. Outdoor noise levels would also be reduced due to the effects of terrain and distance from the construction site. Temporary increases in truck traffic used to transport materials on- and off-site would also produce greater noise disturbance within and near the construction corridors. Again, this would produce temporary, localized noise for brief periods, but it would not create any permanent, adverse noise impacts to human health or the local environment.

Under the proposed action, construction would occur over a period of time, but would be temporary. During facilities and infrastructure construction, minimal to negligible impacts (both inside the installations and outside in adjacent communities) from construction noise are expected to result for the following reasons:

- Heavy equipment that would generate the highest noise levels would not be used consistently enough to exceed the USEPA level limit of 75 dBA for more than 1 hour beyond the boundaries of the installations.
- Terrain and distance from construction activities would lessen noise impacts to sensitive noise receptors outside the construction areas.
- Temporary increases in truck traffic (e.g., dump trucks, fill transports) within and near the construction corridors would produce localized noise for brief periods, but would not create any adverse noise impacts to human health, the neighboring community, or within the installations.

Under Alternative 1 for construction activities at Andersen AFB, the noise levels impacts would be considered less than significant.

Operation

Airfield Operations. Under this alternative, additional aircraft would be based at Andersen AFB by the Marine Corps. Table 6.2-1 lists the number and type of aircraft and whether they are rotary or fixed wing, and local or transient. The addition of these aircraft would generate an additional 25,510 sorties at Andersen AFB.

Noise levels at and around Andersen AFB would be affected by this proposed action. By 2014, the number of airfield operations around Andersen AFB would increase from 68,139 to 99,344 annually as shown in Table 6.2-1. This analysis quantified noise impacts around Andersen AFB by comparing baseline and projected DNL contours. Impact analysis requires identification of affected areas and land uses. According to the Federal Interagency Committee on Urban Noise, noise exposure greater than 65 DNL is considered generally unacceptable over public services or residential, cultural, recreational, and entertainment areas. This section evaluates the noise generated from this alternative and its potential effects to the noise environment. It also evaluates the effects of noise on surrounding land ownership or land status, population, general land use patterns, land management plans, and special use areas. Figure 6.2-1 shows the proposed noise contours for the 60, 65, 70 75, 80, and 85 dB DNL contours. A comparison to the proposed action and the no action 60 and 65 dB DNL noise contours is presented on Table 6.2-1.

Table 6.2-1. Baseline and Proposed Flight Operations at Andersen AFB

Mission Group	*Aircraft Type*	*Current Operations (2006)*	*No-Action Alternative (2014)*	*Proposed Action (2014)*	*Total (2014)*
Based	Helicopter	18,951	18,951	19,255	38,206
	Jet	0	0	4,564	4,564
Visiting Aircraft Carrier Wing	Jet	602	602	1,704	2,306
	Propeller	52	52	156	208
	Helicopter	78	78	234	312
Transient ISR/Strike	Jet	NA	25,043	0	25,043
Other local and transient operations	Mix	9,841	23,413	5,291	28,705
	Total	29,524	68,139	31,204	99,344

Source: Czech and Kester 2008.

The noise analysis included estimation of Potential Hearing Loss (PHL). This analysis focuses on residents. The only residents exposed to 80 dB DNL or greater would be on-base at Andersen AFB, and only those associated with dormitory Buildings 25003 and 25017. The methodology for determining PHL employs the Leq_{24} metric (USEPA 1982). The estimated PHL for the no-action scenario would be approximately 3 dB. The estimated PHL for the proposed action would be identical to the no action (Czech 2009). Thus, this alternative would introduce no change to the no action PHL and therefore considered less than significant.

Table 6.2-2 provides the amount of acreage that noise contours due to this alternative would extend over land. Under the proposed contours at Andersen AFB, there are no additional schools, churches, hospitals, or parks. However, there may be some additional residences affected. While there would be a probable increase in the number of complaints and people annoyed, no significant or adverse impacts to human health or hearing would occur. Therefore impacts would be considered less than significant.

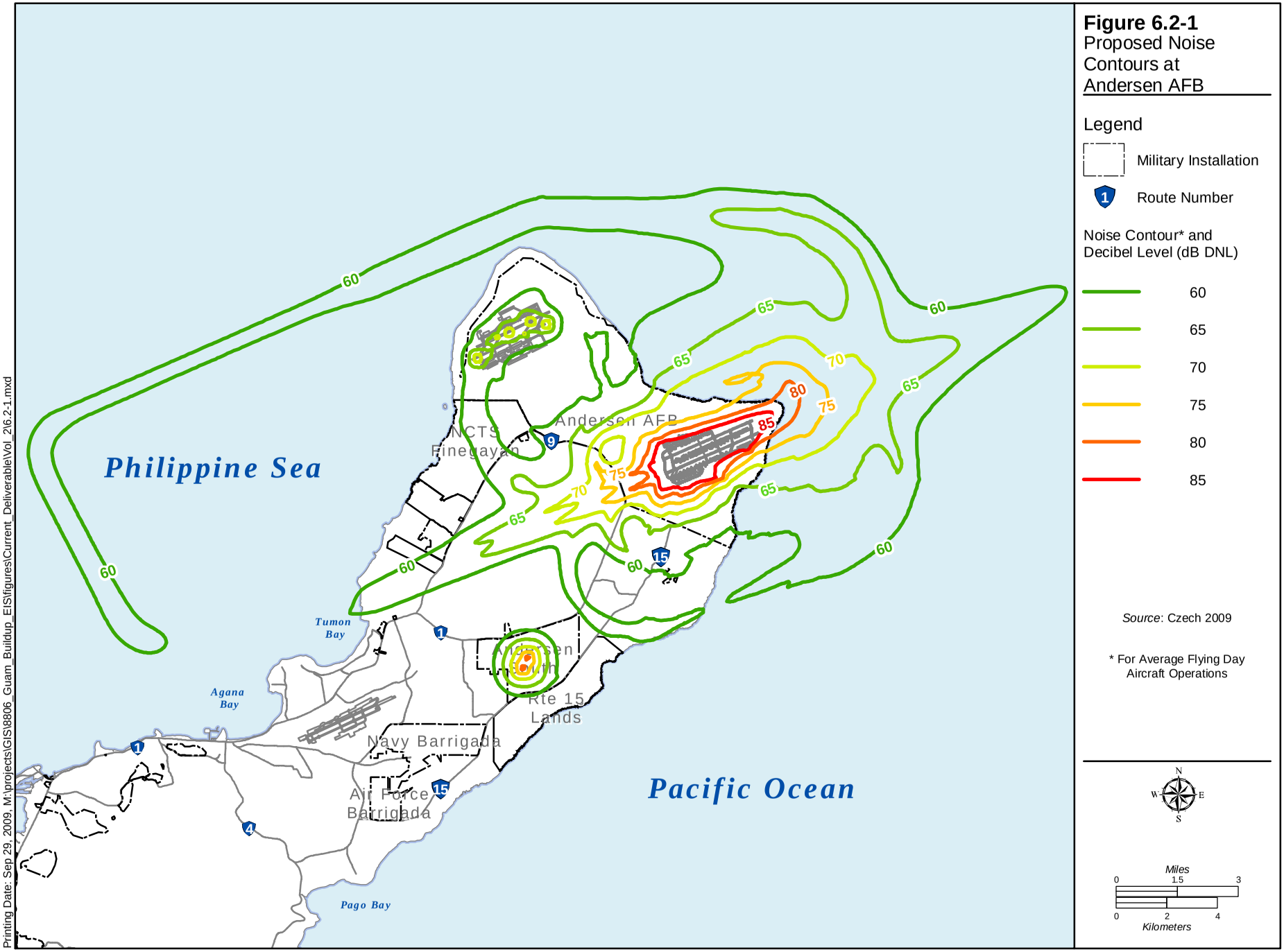

Figure 6.2-1
Proposed Noise Contours at Andersen AFB

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Table 6.2-2. Baseline and Projected Noise Contour Acreage for Andersen AFB and Vicinity (Onshore)

Average Noise Level (DNL)	*Baseline (ac [ha])*	*Proposed (ac [ha])*	*Change from Baseline (ac [ha])*	*Change from Baseline (%)*
Within Andersen AFB				
60-65 dBA	2,981 (1,206)	3,449 (1,396)	468 (189)	15.7
65-70 dBA	968 (392)	1,507 (610)	539 (218)	55.7
70-75 dBA	1,848 (748)	1,934 (783)	86 (35)	4.7
75-80 dBA	1,143 (463)	1,140 (461)	-3 (1)	-0.3
80-85 dBA	945 (382)	947 (383)	2 (<1)	0.2
>85 dBA	1,767 (715)	1,772 (717)	5 (2)	0.3
Total	**9,652 (3,906)**	**10,749 (4,350)**	**1,097 (444)**	**11.4**
Outside Andersen AFB				
60-65 dBA	6,940 (2809)	8,633 (3,494)	1,693 (685)	24.4
65-70 dBA	2,209 (894)	2,936 (1,188)	727 (294)	32.9
70-75 dBA	792 (321)	1,057 (428)	265 (107)	33.5
75-80 dBA	189 (76)	296 (120)	107 (43)	56.6
80-85 dBA	0 (0)	7 (3)	7 (3)	∞
>85 dBA	0 (0)	0 (0)	0 (0)	NA
Total	**10,130 (4,100)**	**12,929 (5,232)**	**2,799 (1,133)**	**27.6**
Total Onshore Acres	**19,782 (8,005)**	**23,678 (9,582)**	**3,896 (1577)**	**19.7**

Note: Acreages and hectares, including totals, may not correspond exactly due to rounding.

Aviation Training. On Guam, the specific types of aviation training required include:

- *Flight Crew Qualification*. This includes training flight crews in use of the aircraft such as familiarization training.
- *Aviation Support.* This category includes landing zone training, air traffic control training, and tactical air operations center training (e.g., airspace surveillance and management). This category also includes individual and crew training in air-ground support skill sets such as rappelling (Helicopter Insertion / Extraction [HIE] crew training), helicopter support team (External Lift air crew training), and related training events.

Aviation training would generate an estimated 2,246 sorties on Guam annually. Table 6.2-3 shows the types of training proposed, and the locations. Details regarding the number of operations proposed at the various locations around Guam are found later in the appropriate sections.

Table 6.2-3. Aviation Training Types, Total Required Sorties, and Locations

Training Type		*Facility/Airspace Requirements*	*Total Number of Sorties*	*Proposed Locations*
FAM	Familiarization and Instrument Flight	Improved airfield with air rescue available. FAM is a daylight operation. Instrument flight is day and night.	158	Andersen AFB North Ramp
FORM	Formation Flights	Designated military airspace. Day and night.	47	Guam SUA
CAL	Confined Area Landing	Ground space, helicopter landing zones in approximately 10 locations. Day and night.	375	NWF, Andersen South, NMS
TERF	Terrain Flights	One or more routes in military airspace over varying terrain for day and night flights at 50 to 200 ft above ground level.	100	South Guam and NMS

Training Type		*Facility/Airspace Requirements*	*Total Number of Sorties*	*Proposed Locations*
EXT	External Loads	Both unimproved and improved landing zones for day and night training in lifting and transporting loads external to the aircraft. Unimproved landing zones would be at remote sites. Ground access to site is needed to pre-position external loads. External loads cannot be carried across public roads or populated areas.	316	NWF, Andersen South, NMS, Orote
GTR	Ground Threat Reaction	Tactical flight maneuver area or route where ground based threat simulators (surface-to-air missile simulations, flares, lights, or electromagnetic radiation simulators) could be placed. Air routes similar to TERF. Day and night.	94	NMS
FCLP	Field Carrier Landing Practice	Simulated ship deck paved area. Day and night.	740	Andersen AFB North Ramp, NWF, Orote
TAC	Tactics	Routes over water or land of at least 50 nm (93 km), for chaff, flares, and .50 caliber machine gun engagements. Day and night.	94	Guam SUA
HIE	Helicopter Insertion and Extraction	Fast rope, rappelling, helo-casting, and parachute operations in improved fields, drop zones, and water operating areas. Day and night.	228	NWF, Andersen South
DM	Defensive Maneuvers	Airspace, routes similar to TERF, but would be at higher altitude. Day and night.	94	NMS

Source: NAVFAC Pacific 2009.

Noise levels around airports are expressed in terms of the DNL metric because it provides a reasonable approximation of the average noise level from aircraft traveling to and from a single location, the runways. On the other hand, training operations are not always fixed by going specifically to a certain centralized location. Consequently, a better approach to assess potential noise impacts is to use SELs for aircraft traveling overhead or laterally from an observer. Table 6.2-4 lists the aircraft proposed for this action and the associated SELs for cruising speeds at various altitudes. Operations applicable for using this noise metric are those where the aircraft is moving along a route or traversing through airspace such as formation flights, terrain flights, ground threat reaction, and defensive maneuvers.

Table 6.2-4. Sound Levels (SEL and L_{max} [dBA]) for Proposed Aircraft Associated with Marine Corps Relocation for Cruising Speeds

Altitudes (ft AGL)	*MV-22*		*CH-53*		*AH-1*		*UH-1*	
	SEL	L_{max}	*SEL*	L_{max}	*SEL*	L_{max}	*SEL*	L_{max}
100	108	104	106	106	98	97	106	97
250	96	96	101	98	94	89	100	89
500	92	89	98	91	91	83	96	83
1,000	88	82	94	85	87	76	91	76
KIAS	220		120		100		80	
Power Setting	Cruise		68% Q-BPA		LFO Lite 100 knots		100% RPM	

Legend: KIAS = knot indicated air speed; LFO = level flight operation; RPM = revolutions per minute.
Notes: Environmental conditions were assumed to be 80% humidity and 80° F. N/A indicates data not available.
Sources: Air Force 2002, Navy 2009a.

While the information is Table 6.2-4 is useful for assessing noise effects of aircraft passing by, these data do not accurately reflect noise associated with aviation training exercises such as hovering activities at landing zones (LZ). A better representation is provided in Table 6.2-5 for low-speed flights. However, these noise levels are modeled at the slowest speeds the models are capable of calculating. It is expected that noise levels in the hovering mode would be higher (Czech 2009).

Table 6.2-5. Single Event Maximum Noise Levels (L_{max}, dBA) for Low-speed Flights

Altitude (ft AGL)	*MV-22B*[1]	*CH-53E*[1]	*AH-1W*[1]	*UH-1N*[2]
	64 KIAS	*65 KIAS*	*65 KIAS*	*65 KIAS*
30	117	112	110	n/a
60	110	106	103	103
100	106	101	99	97
150	102	97	95	94

Notes:
[1]RNM Single Track Mode used for Lmax calculation
Receiver directly below flyover and at 5 feet AGL
Time spacing equal to 0.1 seconds
Modeled utilizing the appropriate slowest speed sound sphere available for each aircraft
[2]Modeled with MRNMAP single track flyover using Lmax metric mode
n/a = MRNMAP altitude limitations do not allow calculation down to 30 feet AGL.

Proposed exercises involving hovering maneuvers at LZs are confined area landing, external loads, helicopter insertion/extraction, and MAN-LFT. Familiarization and instrument flight and field carrier landing practice combines maneuvering, hovering, and landing, but are performed at developed airfields. Noise impacts of hovering aircraft would have considerably longer durations than those passing overhead. Hovering events can last a couple of minutes where the sound heard by a passing aircraft only lasts a few seconds. The number of minutes at a given altitude is necessary to calculate the SEL for hovering activities. A number of LZs are proposed in the training areas for this project and are described in detail in Chapter 2.

The north ramp at Andersen AFB would be used for FAM and FCLP training. These operations were not modeled in the Aircraft Noise Study (Czech and Kester 2008). The SEL at 1,000 ft (305 m) from these operations would be 93 dBA for a single CH-53 flying overhead. Noise contours for NWF are also shown on Figure 6.2-1.

NWF at Andersen AFB currently has two 10,000 ft (3,048 m) runways, with adjacent taxiways and is currently used for vertical and short field aviation landings. The airfield is in a state of disrepair as improvements have not been made since the 1970s. It is a remote site with no services or instrumentation. NWF is located approximately 3 miles (5 km) from the north ramp. Training activities expected at NWF include CAL, EXT, HIE, FCLP, and FAM.

The number and types of operations at the Andersen AFB north ramp and the NWF are presented in Table 6.2-6.

Table 6.2-6. Annual Sortie-Operations Specifications for NWF and Andersen AFB

Location and Type of Training	*Sortie-Ops by Aircraft Type*				*Total Annual Sortie-Ops*	*% Night*	*Night Sortie-Ops*	*% Below 3,000 ft (914 m)*	*Sortie-Ops Below 3,000 ft (914 m)*
	CH-53	*MV-22*	*AH-1*	*UH-1*					
Training Sites									
NWF									
CAL	20	60	30	15	125	10%	13	100%	125
EXT	20	60	0	15	95	10%	10	100%	95
HIE	24	72	0	18	114	10%	11	100%	114
FCLP	40	240	60	30	370	25%	94	100%	370
FAM	11	48	16	4	79	10%	8	100%	79
Andersen AFB (North Ramp)									
FCLP	20	120	30	15	185	25%	47	100%	185
FAM	22	96	32	8	158	10%	16	100%	158

Ground-based training would occur at the main cantonment area of Andersen AFB, but no live-fire or heavy maneuvering would occur. Therefore, no noise impacts would be expected for these activities. Marine Corps ground-based at NWF would include demolition activities similar to the activities the Air Force Silver Flag units conduct for cratering charges. Current operations detonate 40 pound (18kg) charges twenty-five times per year, but only one per any given day. The proposed action would add six more detonations to this total, but the training would be three charges per day twice per year. Figure 6.2-2 shows the noise contours associated with this activity. The noise levels would increase, but since the action only occurs twice per year, it would be considered less than significant.

Finegayan

Construction

Construction in Finegayan would be the main cantonment projects and produce noise levels as described above for Andersen AFB. Consequently, sensitive receptors would be much closer to the construction activities. Although the area across Route 3 is low density residential, sensitive receptors could receive higher than the 75 dBA L_{eq} EPA acceptable levels for residential during construction of the areas closest to Route 3. Though noise levels due to construction activities at Finegayan would result in adverse impacts to adjacent residences, best management practices, such as sequencing of equipment and sound barriers, would reduce impacts to less than significant levels.

Operation

Since there would be no airfield operations and resulting airfield noise at Finegayan, there would be no noise impacts.

Likewise, no aviation or ground-based training would occur at Finegayan, and there would be no noise impacts.

Non-DoD Land

Construction

Construction activities, and therefore noise impacts, on non-DoD lands for Alternative 1 would be similar to that at Finegayan. Similar to Finegayan, construction activities would occur throughout the area including at the border, therefore noise impacts would exceed 75 dBA. Best management practices would reduce impacts to less than significant levels.

Operation

The amount of acreage listed as projected acres outside Andersen AFB includes areas on non-DoD land which would be impacted by airfield operations at Andersen AFB.

No aviation training would occur at non-DoD lands and therefore no noise impacts would occur.

Ground-based training on Non-DoD lands would occur on the Former FAA lands, but no live-fire or heavy maneuvering would occur as shown as TRN on Figure 2.2-4. However, there would be an area designated for Engineering Equipment and Decontamination Training that would be used to practice grading, placement of fill, construction of drainage structures (e.g. earthen dams) and other similar activities. The area would be located over 4,000 ft (1220 m) from the nearest off-base residence along Route 3, but only about 500 ft (152 m) to the nearest on-base residence at the proposed BOQ. Activities would use standard construction equipment such as graders, excavators, tractors, etc. and the noise generated at the source would be about 91 dBA, similar to that described above for construction activities

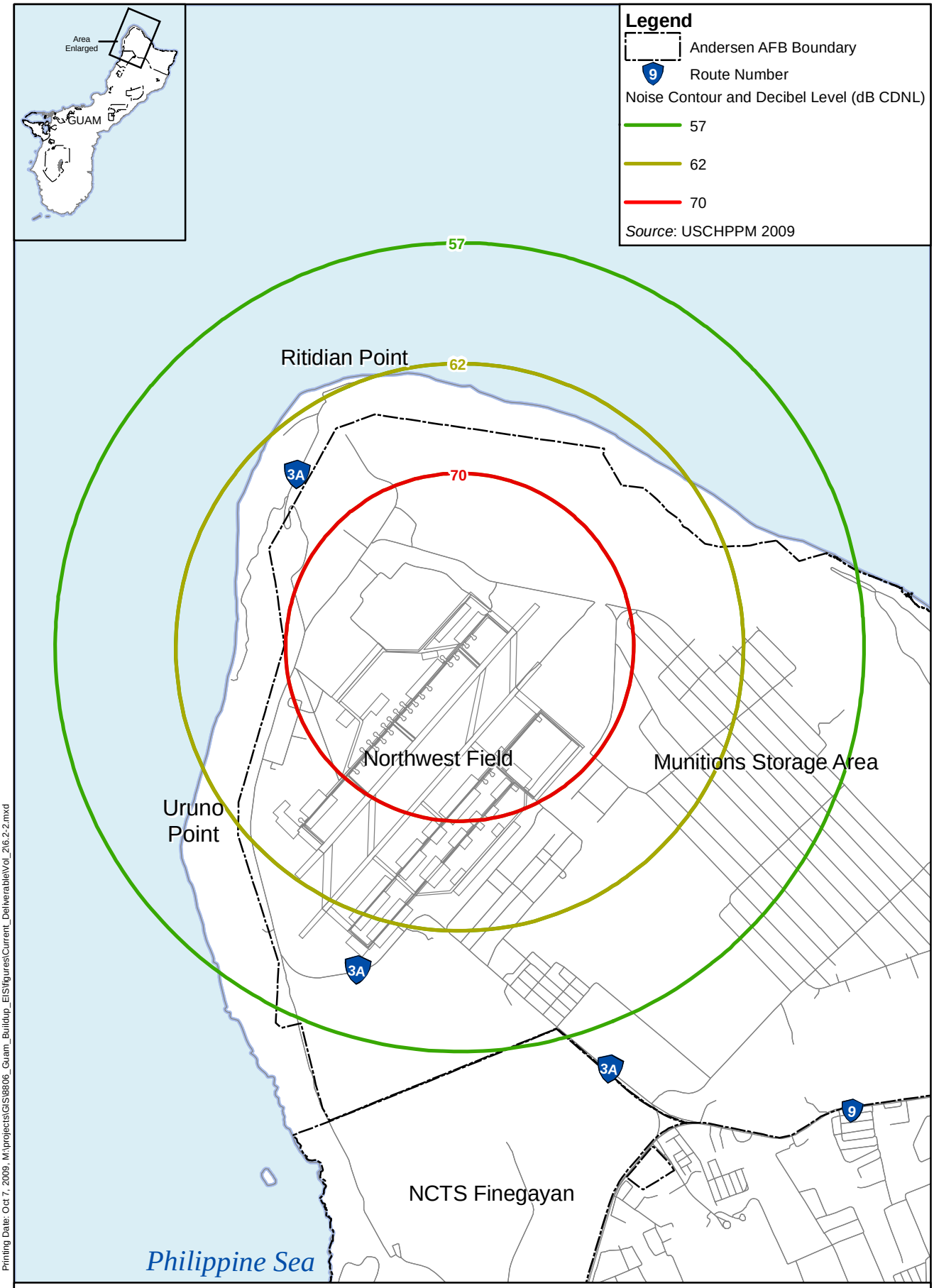


Figure 6.2-2
Projected Demolition Operational Noise Contours

at Andersen AFB. Because of the distance, the noise would attenuate down to approximately 71 dBA at the nearest on-base receptor. Noise levels would attenuate to about ambient levels at the nearest off-base receptor and be nearly unnoticeable. Therefore, noise impacts due to ground-based training activities on Non-DoD lands would be less than significant.

6.2.2.2 Central

Andersen South

Construction

Under the Alternative 1, construction activities at Andersen South involve building several live-fire and non-live fire ranges. Construction of these ranges would be well within the boundaries and noise levels would attenuate to below threshold levels. Noise impacts due to construction would be less than significant.

Operation

No airfield operations would occur at Andersen South, therefore there would be no noise impacts.

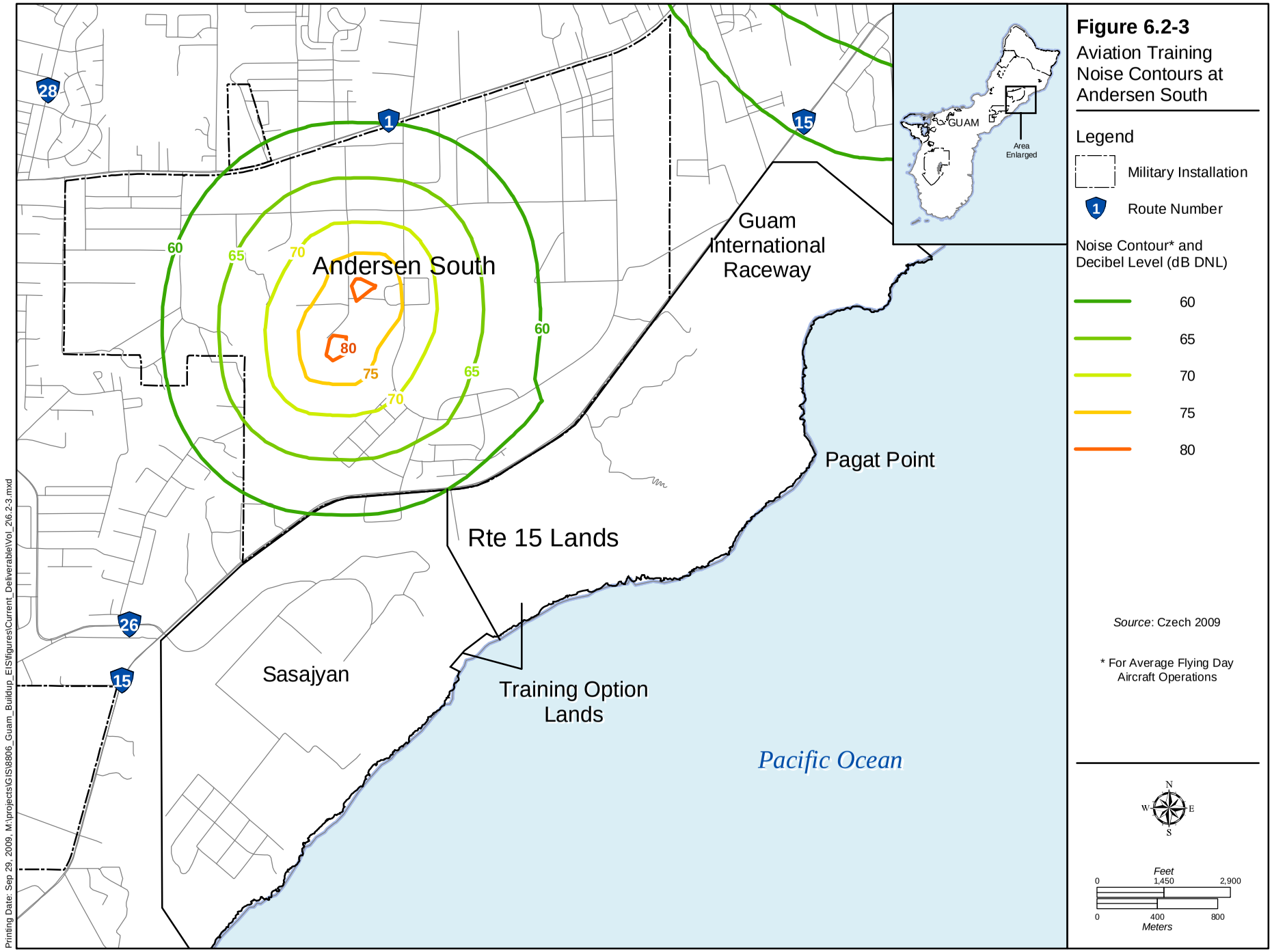
Aviation Training. Andersen South is a primary aviation training area comprising approximately 2,000 ac (809 ha) with no existing aviation training. Andersen South is located approximately 5 mi (8 km) from the north ramp. A maneuver area would be established in Andersen South and the associated aviation training facilities would support CAL, EXT, and HIE training exercises. In addition, sorties associated with the transport personnel from Andersen South north ramp to NMS or Andersen South for maneuver training is also estimated in Table 6.2-5 (as MAN-LFT). Similar to operations at NWF and Andersen AFB north ramp, operations for aviation training concentrated at LZs and the noise contours surrounding the LZs are shown on Figure 6.2-3.

Table 6.2-5. Annual Sortie-Operations Specifications – Andersen South

Location and Type of Training	*Sortie-Ops by Aircraft Type*				*Total Annual Sortie-Ops*	*% Night*	*Night Sortie-Ops*	*% Below 3,000 ft (914 m)*	*Sortie-Ops Below 3,000 ft (914 m)*
	CH-53	*MV-22*	*AH-1*	*UH-1*					
CAL	20	60	30	15	125	10%	13	100%	125
EXT	13	40	0	10	63	10%	6	100%	63
HIE	24	72	0	18	114	10%	11	100%	114
MAN-LFT	720	0	0	0	720	10%	72	80%	576

Ground-based Training. Possible noise exposure from Andersen South non-firing training would include new sources of ground-based noise in addition to ground-based noise from existing training at the site. This noise would include vehicle use in maneuver area training on existing roads, the convoy course, and the Advanced Motor Vehicle Operator's Course. The noise emitted by an automobile is due primarily to tire noise generated at the tire/road surface interaction. The noise characteristics of the types of vehicles to be used in the non-firing training at Andersen South are similar to those of standard commercial automobiles. The noise from an individual vehicle is transient in nature. Under this scenario, the noise exposure would be a function of the volume flow and average speed for each class of vehicle on the roadway. Most maneuver area training would occur within the core of the proposed maneuver area as noise setbacks would be established along the boundaries with urban interface. This would result in existing roads closest to the Andersen South boundary not being used in maneuver area training.

The breacher charges, pyrotechnics, and blanks used in maneuver and MOUT area training would be authorized at the internal locations of the installation. Fragmentation grenades that would be used at the


Andersen South
Guam International Raceway
Pagat Point
Rte 15 Lands
Sasajyan
Training Option Lands
Pacific Ocean
60
65
70
75
80
28
1
15
26
GUAM
Area Enlarged
Figure 6.2-3
Aviation Training Noise Contours at Andersen South
Legend
Military Installation
Route Number
Noise Contour* and Decibel Level (dB DNL)
60
65
70
75
80
Source: Czech 2009
* For Average Flying Day Aircraft Operations
N
W
E
S
Feet
0
1,450
2,900
0
400
800
Meters
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proposed hand grenade range are composed of 185 grams (g) (.185 kg) of Composition B explosive, which has a net NEW of 0.5 lbs (84 kg). Noise that would be generated by the proposed small arms and hand grenade training activity is characterized as impulsive noise, which is associated with a higher level of annoyance as compared to more continuous noise sources (such as traffic noise). Impulsive sound is of short duration (typically less than one second) and high intensity. It has abrupt onset, rapid decay, and often a rapidly changing spectral composition. Other sources of impulse sound include explosions, impacts, and the passage of supersonic aircraft (sonic booms). Two options would be considered for the location of the hand grenade range at Andersen South. Noise contours (C-weighted) and Complaint Risk Contours associated with breacher charges and the hand grenade range are shown for each option on Figure 6.2-4. Under Option 1 (co-located with Training Range Complex Alternative A), the LUPZ extends onto adjacent private lands and a small portion of Zone II overlies residences near the intersection of Jesse Dydasco Street and Route 15. Moderate noise complaint risk contours extend onto adjacent lands in all directions. Contours associated with Option 2 (co-located with Training Range Complex Alternative B) extend much farther east and encompass numerous residences in Zone II and a few in Zone III. Noise complaint risk would be moderate to high.

Under these conditions, the noise exposure levels associated with hand grenade range option 1 would not be incompatible with the residential noise sensitive land uses located adjacent to the proposed hand grenade ranges and therefore the noise impacts would be less than significant. Hand grenade range Option 2 would have areas exposed to noise levels considered incompatible with residential use and would be considered significant.

Barrigada

Construction

Under Alternative 1, facilities construction would not take place at Barrigada. Therefore, there would be no noise impacts from construction.

Operation

No airfield operations would occur at this location, therefore there would be no noise impacts.

Likewise, no aviation or ground-based training would occur on Barrigada, thus there would be no noise impacts.

Non-DoD Land

Construction

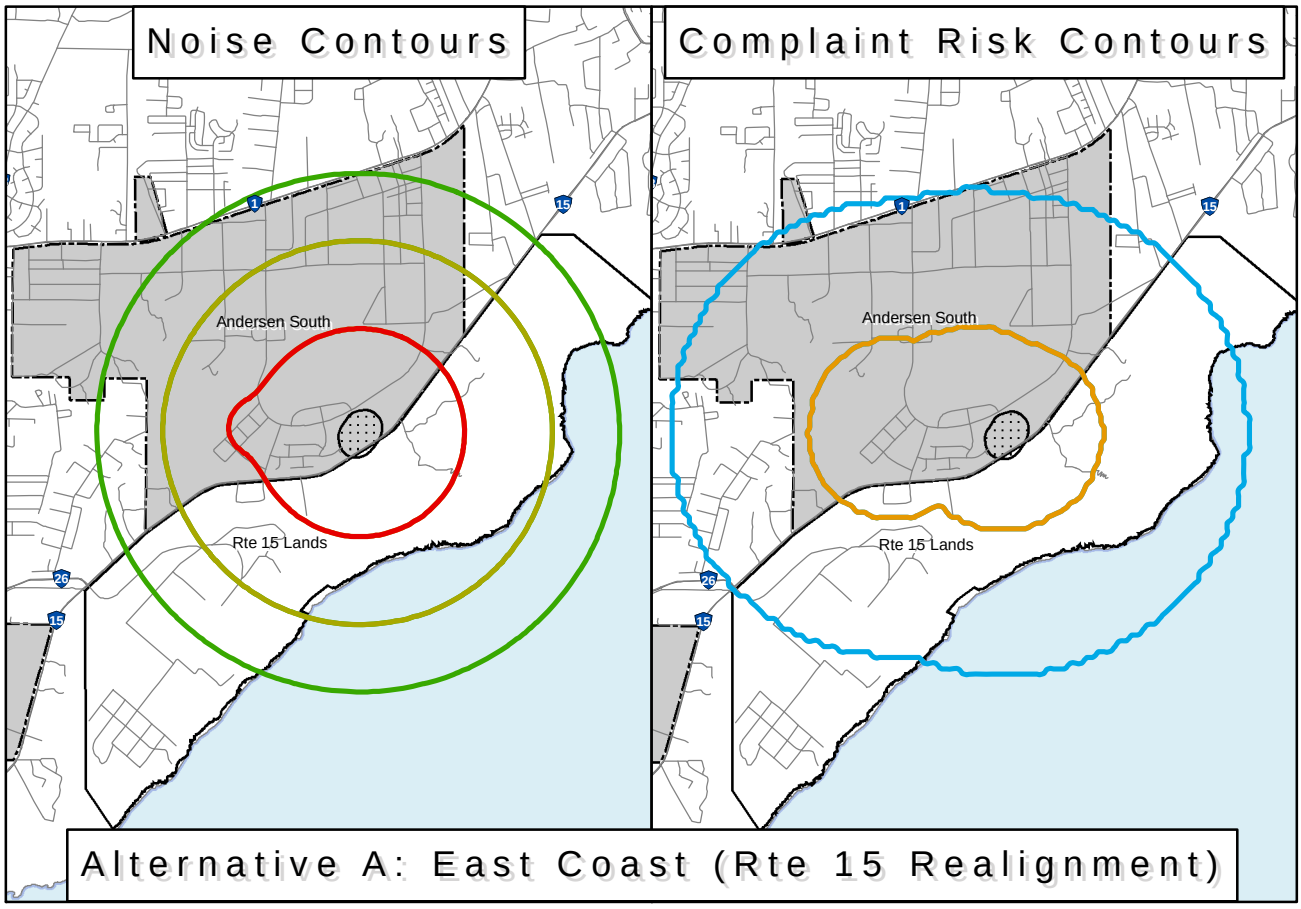
Under Alternative 1, range construction would take place at non-DoD land. Noise impacts from construction would be the same as those described for Andersen South and would be less than significant.

Operation

Airfield Operations. Alternative 1 would not alter flight operations currently occurring at Guam IAP so the noise impacts would remain the same and would be less than significant.

There would be no other airfield operations associated with the central region of Guam, so there would be no noise impacts.

In addition, no aviation or ground-based training would occur in non-DoD lands so there would be no airfield operations noise impacts at non-DoD lands.



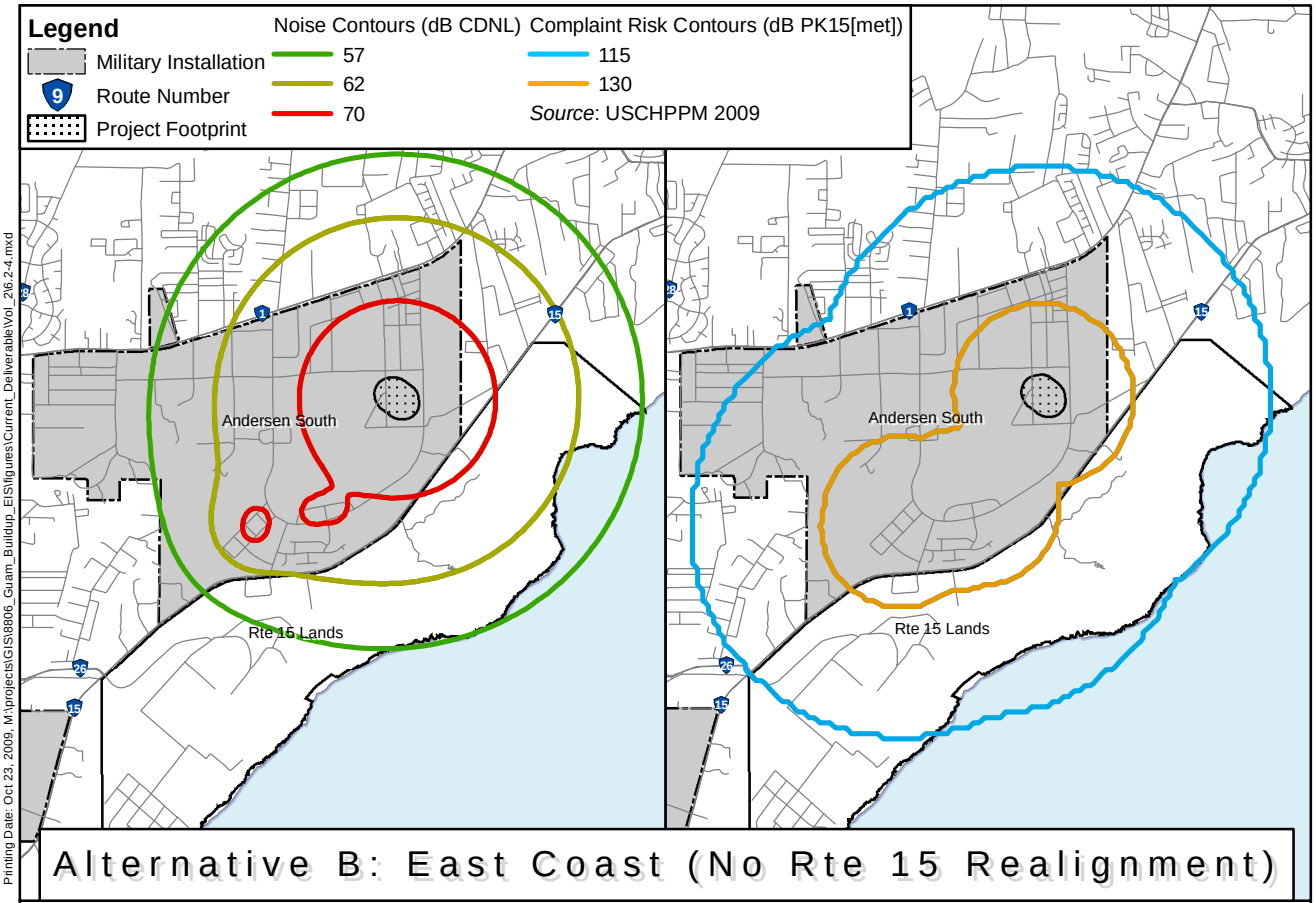
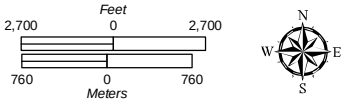


Figure 6.2-4
Noise Contours and Complaint Risk Contours for the Breacher House and Hand Grenade Range



Route 15 Lands and Training Range Complex Alternatives. The main source of noise on non-DoD land resulting from implementation of the Alternative 1 would be the small arms noise generated at the proposed range complex. Small arms to be fired at these ranges would include 9 millimeter (mm) pistol, .45 caliber pistol, 5.56 mm rifle, and the .50 caliber machine gun. Because it is an inert training round, the 40 mm MK 19 TP to be authorized for use at the machine gun multipurpose range was also assessed as small arms munitions. Two alternatives were considered for the layout of the ranges.

There are two major noise sources generated from small arms munitions firing. The first is the muzzle blast from the firing of a bullet. The second is the noise from the bow shock wave (also known as ballistic wave) generated by the super-sonic bullet. The bow shock wave propagates out from the path of the bullet. The bullet from an M16 has an exit velocity of approximately 3,100 ft (945 m) per second, but decelerates quickly. After approximately 3,937 ft (1,200 m), it is no longer flying at supersonic speeds and the shock wave would likely end within 6,562 ft (2,000 m).

Firing noise from single shots merged in bursts, machine gun burst, and concurrent firing of multiple weapons, as would occur at the proposed ranges, would result in short periods of intense firing followed by longer periods of silence. There is increased annoyance associated with this noise exposure pattern. Under these conditions, the number of shots becomes less important than the dB level of the typical (average) shot. It has been found that small arms fire is usually not a concern unless the linear peak sound pressure level of individual shots is above 85 dB PK 15(met).

The results of the modeling of Range Complex Alternatives A and B are provided in Figure 6.2-5. Under the Alternative A, the Zone II noise contours extend approximately 13,100 ft (4,000 m) beyond the eastern boundary of Route 15 lands and Zone III contours extend to just under 330 ft (100m) beyond the eastern edges of the Route 15 land. Alternative B would generate a Zone II extending 2,00-4,000 ft (600-1,200m) east of the Andersen South and Route 15 lands and approximately 4,600 ft (1,400m) west of the Route 15 boundary. The Zone II contour would extend approximately 230 ft (70m) across Route 15 just to the west of Andersen South. Both alternatives encompass residential areas in Zone II which would be considered incompatible for such usage.

Best management practices available for reducing the noise impacts include limiting the use on .50 caliber on the machine gun range, using plastic .50 caliber rounds and constructing berms to contain the sound. The most effective BMP would be constructing the berms and would reduce noise levels 10-15 dB. Using BMPs could reduce the noise levels to less than significant levels.

6.2.2.3 Apra Harbor

Harbor

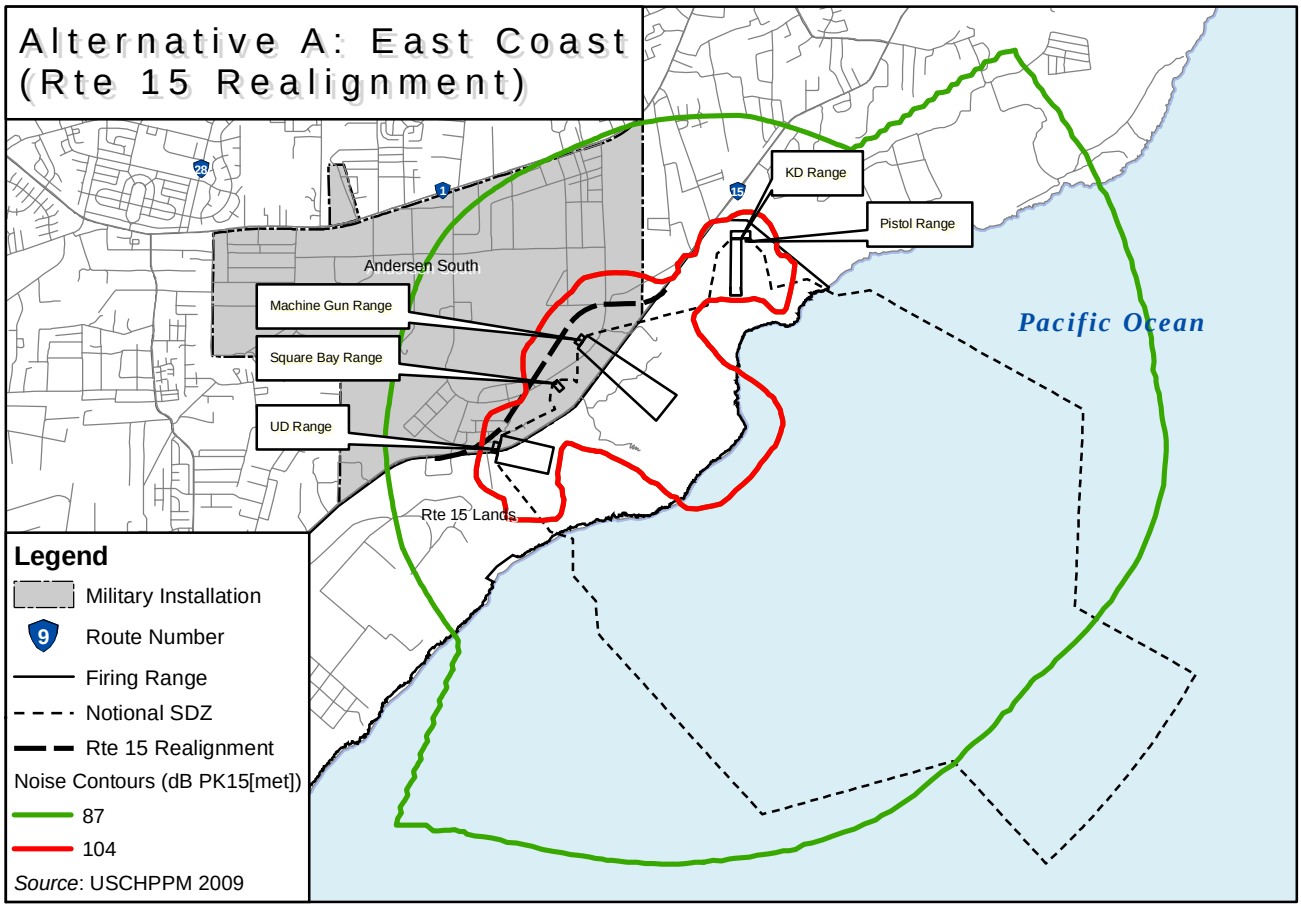
Construction

Alternative 1 would require general purpose Navy wharves to be repaired and upgraded and new facilities to be constructed to accommodate proposed usage increases by amphibious task forces. Repair and upgrade of these wharves would entail utilization of heavy equipment and barges for these construction projects. Refer to Volume 4 of this EIS/OEIS for detailed noise impacts from construction at Apra Harbor.

Operation

No *airfield operations* would occur at Apra Harbor, so there would be no noise impacts.

No impacts due to limited *aviation training* are expected at Apra Harbor.



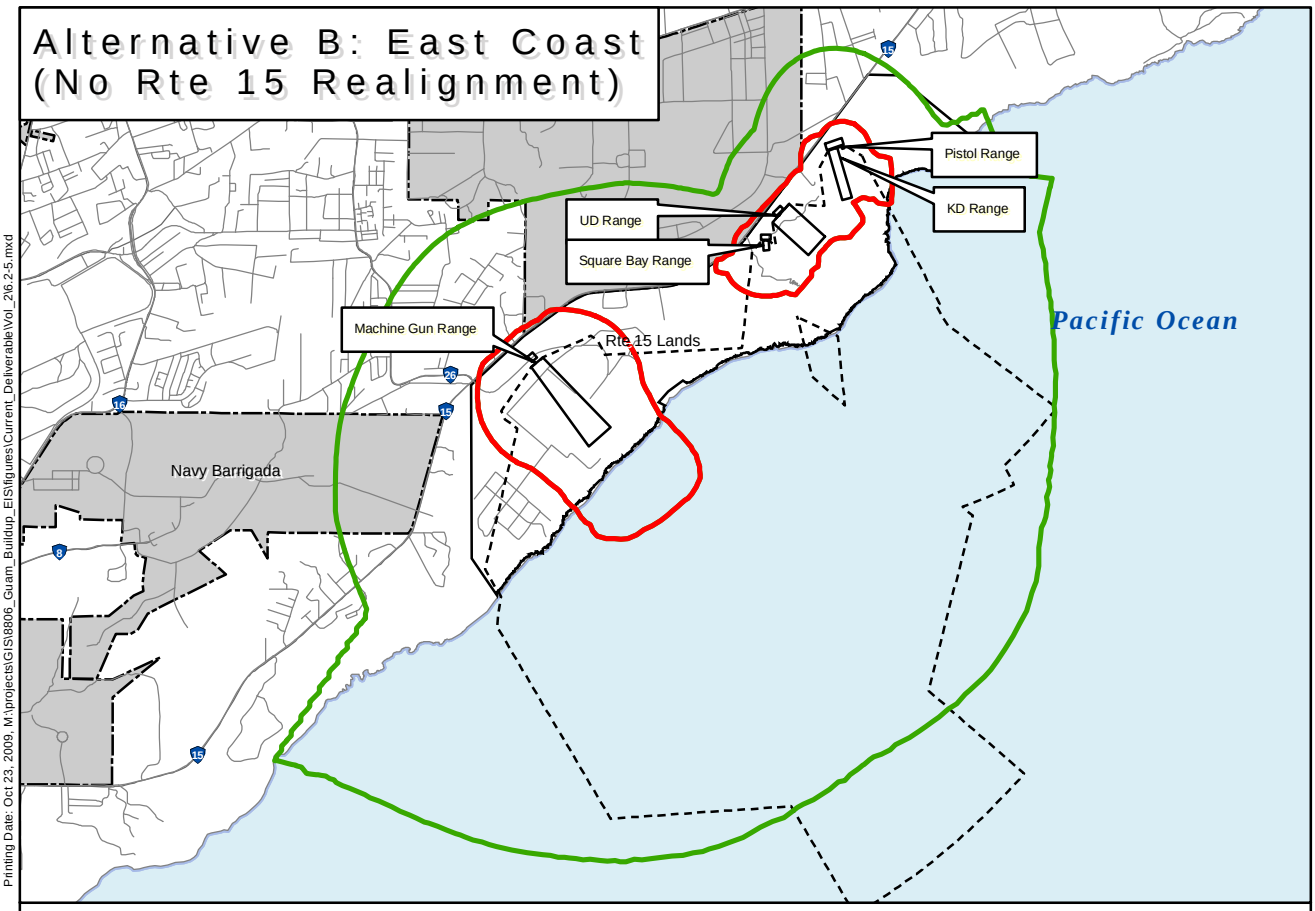


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Figure 6.2-5
Noise Contours for Route 15 Small Arms Ranges

Feet
2,750 0 2,750
790 0 790
Meters

N W E S

Ground-based training activities currently occur in Apra Harbor, but no additional live-fire or other exercises would take place. Therefore, there would be no additional noise impacts.

Vessel operations in the Inner Apra Harbor include tugs, barges, work boats, but the Landing Craft Air Cushion (LCAC) is by far the loudest. These vessels ride on a cushion of air generated by powerful engines driving fans elevating the vessel. LCACs generate noise levels of 98 dB Lmax at 200 ft (61m) underground run-up conditions and SELs up to 104 dBA at 40 knots (NSWC PCD 2008). Since the LCAC will operate at no-wake speeds, the ground run-up noise conditions prevail at the Inner Harbor. The nearest receptor would be residences approximately 3,000 ft (914 m). At this distance, the sound would attenuate down to 74 dB. This would be a less than significant impact because the operations only occur during MEU visits four times a year and the LCACs would be used to unload/load cargo only about 15-20 times per visit.

Naval Base Guam

Construction

Under Alternative 1, facilities construction would take place at Naval Base Guam. However, construction activities would be well away from any sensitive receptor so noise impacts would be less than significant.

Operation

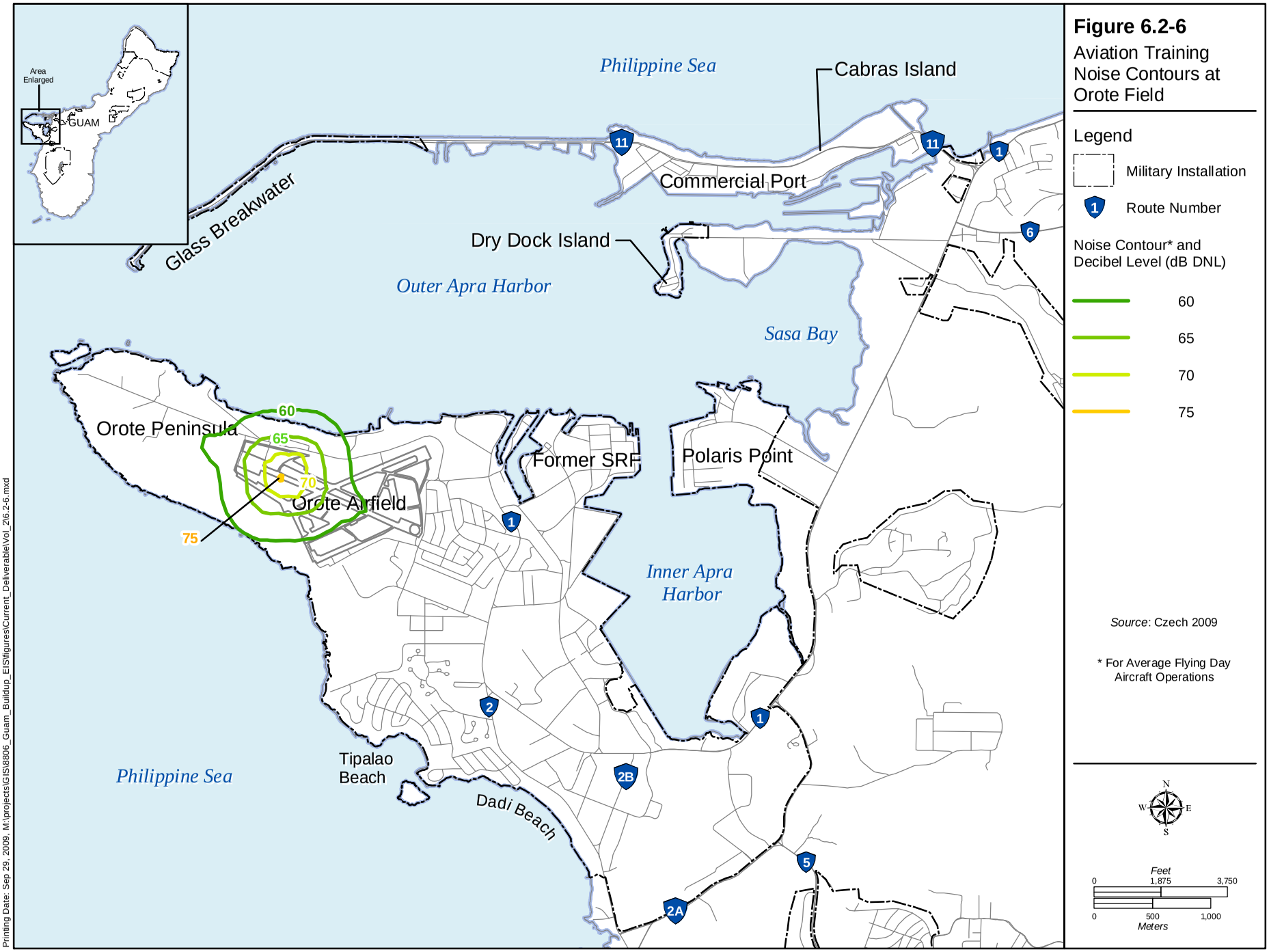
Airfield Operations. Orote airfield would be sporadically used for aviation training and discussed in the following section.

Aviation Training. Orote Airfield currently consists of improved expeditionary runways and taxiways used in field training exercises by helicopters and some fixed-wing aircraft. The airfield has no services or instrumentation and is constrained by Explosive Safety Quantity Distance arcs from Kilo Pier and associated munitions storage. Potential flight routes to and from prospective landing points can be made over water without crossing over habitation areas or roads. Triple Spot, an existing helicopter landing zone on the airfield runway, supports personnel transfer, logistics, parachute training, etc. Orote Airfield is located approximately 16 mi from north ramp. Aviation training operations occurring at Orote Field are EXT and FCLP as shown in Table 6.2-6. The noise contours associated with aviation training at Orote Airfield is shown on Figure 6.2-6. The noise levels would be very localized and would not impact any sensitive receptors so noise impacts would be less than significant.

Table 6.2-6. Annual Sortie-Operations Specifications for Orote Field

Location and Type of Training	*Sortie-Ops by Aircraft Type*				*Total Annual Sortie-Ops*	*% Night*	*Night Sortie-Ops*	*% Below 3,000 ft (914 m)*	*Sortie-Ops Below 3,000 ft (914 m)*
	CH-53	*MV-22*	*AH-1*	*UH-1*					
EXT	20	60	0	15	95	10%	10	100%	95
FCLP	20	120	30	15	185	25%	47	100%	185

Ground-based training activities currently occur at Orote Point, but no additional live-fire or other exercises are proposed in these areas. Therefore, there would be no additional noise impacts.



6.2.2.4 South

Naval Munitions Site

Construction

Construction activities for this alternative at NMS would be limited to a new munitions storage facility and utilities. The munitions storage facility would be at least 1250 ft (381 m) inside the boundary to comply with explosive safety quantity distance regulations. At this distance, 90 dBA at 50 ft (15 m) would attenuate to less than 65 dBA. Therefore, noise impacts would be less than significant.

Operation

No airfield facilities exist at NMS so there would be no noise impacts.

Aviation Training. NMS is an approximately 8,000-ac (324 ha) area that is primarily used for munitions storage and does not currently support aviation training. NMS is located approximately 16 mi (25.7 km) from the north ramp. Under Alternative 1, this area would be opened up for extensive Marine Corps training activities. Aviation training would entail CAL, EXT, and MAN-LFT and are shown in Table 6.2-7. The majority of the flights would be CH-53E ferrying personnel from Andersen AFB. Sound levels

Table 6.2-7. Annual Sortie-Operations Specifications for NMS

Type of Training	*Sortie-Ops by Aircraft Type*				*Total Annual Sortie-Ops*	*% Night*	*Night Sortie-Ops*	*% Below 3,000 ft (914 m)*	*Sortie-Ops Below 3,000 ft (914 m)*
	CH-53	*MV-22*	*AH-1*	*UH-1*					
CAL	20	60	30	15	125	10%	13	100%	125
EXT	13	40	0	10	63	10%	6	100%	63
MAN-LFT	192				192	10%	19	80%	154

1,000 ft (305 m) below a CH-53E would be about 93 dBA. TERF training would also occur at NMS, but modeling indicates that the noise levels due to TERF training are below 60 dB DNL and cannot be mapped because the mapping routines start at 60 dB. The noise contours associated with aviation training at NMS is shown on Figure 6.2-7. Aviation training noise levels would not impact any sensitive receptors so noise impacts would be less than significant.

Ground-based training activities currently occur at NMS, but no additional live-fire or other exercises are proposed in these areas. Therefore, there would be no additional noise impacts.

Non-DoD Land

Construction

Road construction is planned for non-DoD lands in south Guam, but the noise impacts would be short-term and less than significant.

Operation

No airfield operations would occur on non-DoD lands in south Guam so there would be no noise impacts.

No aviation training is planned to occur on non-DoD lands in south Guam and therefore there would be no noise impacts.

No ground-based training is planned to occur on non-DoD lands in south Guam so there would be no noise impacts.

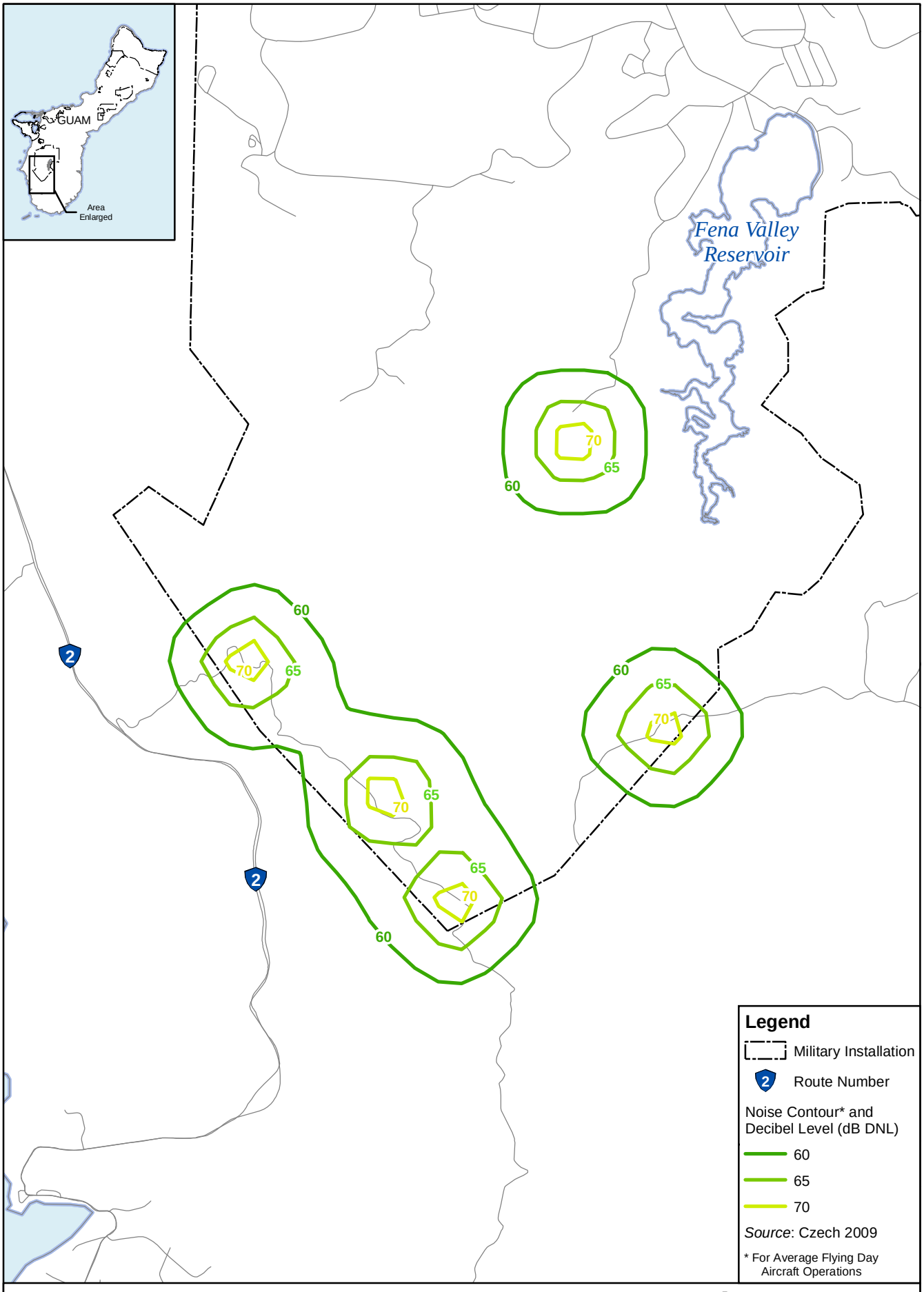


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Figure 6.2-7
Aviation Training Noise Contours at NMS

6.2.2.5 Summary of Impacts

Under Alternative 1, most of the impacts would be less than significant. For those potential noise impacts that may exceed acceptable noise levels, the use of best management practices such as project sequencing and sound barriers would reduce noise levels to less than significant levels.

6.2.2.6 Potential Mitigation Measures

Mitigation measures have not been identified for any of the activities or locations associated with the Alternative 1 since noise levels above casual receptors not permanently living or working under a noisy location would be within acceptable limits.

Because under Alternative 1, no residences would occur in the Route 15 area where the range complexes are proposed, and this alternative includes the establishment of a noise buffer interior to Andersen South for maneuver area and MOUT training, no additional mitigation measures would be required.

6.2.3 Alternative 2 (Preferred Alternative)

Impacts due to operations and training activities would be similar to Alternative 1 since the activities are similar for Alternative 2. The exception is construction and the resulting construction noise. Specifically, the noise impacts would vary slightly, as construction project locations are modified by this alternative, but the noise impacts would be the same as the Alternative 1.

6.2.3.1 North

Andersen AFB

Construction

Construction noise impacts from facilities construction under Alternative 2 would be similar to those described for Alternative 1.

Operation

All activities and locations would be the same as Alternative 1 so the potential noise impacts would be the same as described for Alternative 1.

Finegayan

Construction

Construction noise impacts from facilities construction under Alternative 2 would be similar to those described for Alternative 1, except the activities would extend farther north. Consequently, the potential noise impacts would be considered less than significant.

Operation

All activities and locations would be the similar to Alternative 1, except the training area described at the Former FAA site on Non-DoD lands would be located at the north end on Finegayan (shown as TRN of Figure 2.2-6), so the potential noise impacts would be the same as Alternative 1. The area designated for Engineering Equipment and Decontamination Training would be used to practice grading, placement of fill, construction of drainage structures (e.g. earthen dams), and similar activities. The area would be located over 2,000 ft (610 m) from the nearest off-base residence along Route 3 and about twice that distance to the nearest on-base residence at the proposed BEQ. Activities would use standard construction equipment such as graders, excavators, tractors, etc. and the noise generated at the source would be about 91 dBA, similar to that described above for construction activities at Andersen AFB.

Because of distance, the noise would attenuate down to approximately 59 dBA at the nearest off-base receptor and be imperceptible to on-base receptors. Therefore, noise levels due to ground-based training activities on Finegayan would be less than significant.

Non-DoD Land

Construction

Construction would be the similar to that described for Alternative 1 for non-DoD lands, except Harmon Annex would not be included in this Alternative.

Operation

All activities and locations would be similar to Alternative 1, except ground-based training would occur at the north end of Finegayan under this Alternative, so the potential noise impacts would be the same as described in Alternative 1.

6.2.3.2 Central

Andersen South

Construction

Construction noise impacts from facilities construction under Alternative 2 would be similar to those described for Alternative 1 for central Guam. Consequently, noise impacts due to construction would be less than significant.

Operation

All activities and locations would be the same as Alternative 1, so the potential impacts would be the same as Alternative 1.

Barrigada

Construction

Under Alternative 2, facilities construction would not take place at Barrigada. Therefore, there would be no noise impacts from construction.

Operation

All activities and locations would be the same as Alternative 1, so the potential impacts would be the same as Alternative 1.

Non-DoD Land

Construction

Under Alternative 2, facilities construction would not take place on non-DoD lands. Therefore, there would be no noise impacts from construction.

Operation

All activities and locations would be the same as Alternative 1, so the potential impacts would be the same as Alternative 1.

6.2.3.3 Apra Harbor

Harbor

Construction

Construction noise impacts from general facilities construction under Alternative 2 would be the same as Alternative 1.

Operation

All activities, locations, and impacts would be the same as Alternative 1.

Naval Base Guam

Construction

Construction noise impacts from general facilities construction under Alternative 2 would be the same as Alternative 1.

Operation

All activities, locations, and impacts would be the same as Alternative 1.

6.2.3.4 South

Naval Munitions Site

Construction noise impacts from facilities construction under Alternative 2 would be similar to those described for Alternative 1.

Operation

All activities and locations would be the same as Alternative 1 so the potential noise impacts would be the same as described for Alternative 1.

Non-DoD Land

Construction

Construction noise impacts from general facilities construction under Alternative 2 would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.3.5 Summary of Impacts

The impacts would be the same as for Alternative 1, except for the construction and operations in Finegayan.

6.2.3.6 Potential Mitigation Measures

Mitigation measures have not been identified for any of the activities or locations associated with the Alternative 2 since noise levels above casual receptors not permanently living or working under a noisy location would be within acceptable limits.

6.2.4 Alternative 3

Noise impacts due to operations and training activities would be similar to Alternative 1 since the activities are similar for Alternative 3. The exception is construction and the resulting construction noise, consequently the noise impacts would vary slightly by location and are described below.

6.2.4.1 North

Andersen AFB

Construction

Construction noise impacts under Alternative 3 would be the same as Alternative 1.

Operation

All activities, locations, and potential noise impacts would be the same as Alternative 1.

Finegayan

Construction

Construction noise impacts from facilities construction under Alternative 3 would be the same as Alternative 2.

Operation

All activities, locations, and potential noise impacts would be the same as Alternative 2.

Non-DoD Land

Construction

Under this Alternative, no construction would occur on the Harmon Annex and the Former Federal Aviation Administration (FAA) properties, so there would be no impacts.

Operation

All activities, locations, and potential noise impacts would be the same as Alternative 2.

6.2.4.2 Central

Andersen South

Construction

Construction activities and potential noise impacts at Andersen South would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Barrigada

Construction

Construction noise impacts under Alternative 3 would be similar to those described above for Alternative 1, except the family housing and community support construction activities would occur on Navy Barrigada and Air Force Barrigada. Construction activities in the Barrigadas would generate noise levels at nearby residences and sensitive receptors exceeding 75 dBA. However, the use of best

management practices such as sound barriers and project sequencing would reduce the levels to less than significant.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Non-DoD Land

Construction

Construction would not occur on non-DoD lands in the central region of Guam. However, noise generated from construction activities on the Barrigadas would affect residences in non-DoD lands above 75 dBA. However, use of best management practices such as sound barriers and project sequencing would reduce the levels to less than significant.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.4.3 Apra Harbor

Harbor

Construction

Construction noise impacts from general facilities construction under Alternative 3 would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Naval Base Guam

Construction

Construction noise impacts from general facilities construction under Alternative 3 would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.4.4 South

Naval Munitions Site

Construction noise impacts from facilities construction under Alternative 2 would be similar to those described for Alternative 1.

Operation

All activities and locations would be the same as Alternative 1 so the potential noise impacts would be the same as described for Alternative 1.

Non-DoD Land

Construction

Construction noise impacts from general facilities construction under Alternative 3 would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.4.5 Summary of Impacts

The impacts would be the same as for Alternative 1, except Non-DOD land in the north and Barrigada.

6.2.4.6 Potential Mitigation Measures

Mitigation measures have not been identified for any of the activities or locations associated with Alternative 3 since noise levels above casual receptors not permanently living or working under a noisy location would be within acceptable limits.

6.2.5 Alternative 8

Alternative 8 noise impacts due to operations and training activities would be similar to Alternative 1. The exception is construction project locations and the resulting construction noise, so the noise impacts would vary slightly by location and are described belowNorth

Andersen AFB

Construction

Construction noise impacts under Alternative 8 would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Finegayan

Construction

Construction noise impacts under Alternative 8 would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Non-DoD Land

Construction

Construction noise impacts under Alternative 8 would be similar to those described for Alternative 1, except no construction would occur on Harmon Annex. Construction activities would generate noise levels at nearby residences and sensitive receptors exceeding the 75 dBA. However, use of best management practices such as sound barriers and project sequencing would reduce the levels to less than significant.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.5.1 Central

Andersen South

Construction

Construction noise impacts under Alternative 8 would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Barrigada

Construction

Construction noise impacts under Alternative 8 would be similar to those described for Alternative 3, except the family housing and community support construction activities would occur all on Air Force Barrigada. Construction activities in Air Force Barrigada would generate noise levels at nearby residences and sensitive receptors exceeding 75 dBA. However, use of best management practices such as sound barriers and project sequencing would reduce the levels to less than significant.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Non-DoD Land

Construction

Construction would not occur on non-DoD lands in the central region of Guam. However, noise generated from construction activities on Air Force Barrigada would affect residences in non-DoD lands above 75 dBA. However, use of best management practices such as sound barriers and project sequencing would reduce the noise levels to less than significant.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.5.2 Apra Harbor

Harbor

Construction

All activities, locations, and potential impacts would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Naval Base Guam

Construction

All activities, locations, and potential impacts would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.5.3 South

Naval Munitions Site

Construction

All activities, locations, and potential impacts would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

Non-DoD Land

Construction

All activities, locations, and potential impacts would be the same as Alternative 1.

Operation

All activities, locations, and potential impacts would be the same as Alternative 1.

6.2.5.4 Summary of Impacts

The potential impacts would be the same as for Alternative 1.

6.2.5.5 Potential Mitigation Measures

Mitigation measures have not been identified for any of the activities or locations associated with the Alternative 8 since noise levels above casual receptors not permanently living or working under a noisy location would be within acceptable limits.

6.2.6 No-Action Alternative

Under the no-action alternative, Marine Corps units would remain in Japan and would not relocate to Guam. No construction, dredging, training, or operations associated with the potential military relocation would occur. Existing operations on Guam would continue. Therefore, implementation of the no-action alternative would maintain existing conditions and there would be no noise impacts associated with the proposed action and alternatives. However, implementation of the no-action alternative would not meet the mission, readiness, national security, and international treaty obligations of DoD.

6.2.7 Summary of Impacts

Table 6.2-8 summarizes the potential impacts of each Main Cantonment alternative evaluated. Table 6.2-9 summarizes the potential impacts of each Firing Range alternative evaluated. Tables 6.2-10 and 6.2-11 summarizes the impacts at NMS for the Ammunition Storage Alternatives and the Access Roads Alternatives, respectively. A summary of potential noise impacts due to Other Training, Airfield, and Waterfront is provided in Table 6.2-12. A text summary follows the summary tables.

Table 6.2-8. Summary of Main Cantonment Impacts – Alternatives 1, 2, 3 and 8

Main Cantonment Alternative 1 (North)	*Main Cantonment Alternative 2 (North)*	*Main Cantonment Alternative 3 (North/Central)*	*Main Cantonment Alternative 8 (North/Central)*
Construction			
LSI • Construction impacts would be less than significant in all areas; at Finegayan and on non-DoD lands, BMPs would reduce the impacts to less than significant.	LSI • Construction impacts would be less than significant in all areas; at Finegayan and on non-DoD lands. BMPs would reduce the impacts to less than significant. • No construction on Harmon Annex. Construction would extend farther north at NCTS Finegayan.	LSI • Construction impacts would be less than significant in all areas; at Finegayan, BMPs would reduce the impacts to less than significant. • Navy and Air Force Barrigada and adjacent non-DoD lands would receive greater than 75 dBA, but BMPs would reduce noise to less than significant levels.	LSI • Construction impacts would be less than significant in all areas; at Finegayan and on non-DoD lands, BMPs would reduce the impacts to less than significant. • Air Force Barrigada and adjacent non-DoD lands would receive greater than 75 dBA, but BMPs would reduce the impacts to less than significant levels.
Operation			
LSI • Noise impacts during the operational phase of Alternative 1 would be less than significant.	LSI • Noise impacts during the operational phase of Alternative 2 would be less than significant.	LSI • Noise impacts during the operational phase of Alternative 3 would be less than significant.	LSI • Noise impacts during the operational phase of Alternative 8 would be less than significant.

Legend: LSI = Less than significant impact.

Table 6.2-9. Summary of Training Impacts – Firing Range Alternatives

Firing Range Alternative A (Central)	*Firing Range Alternative B (Central)*
Construction	
LSI • Construction impacts would be less than significant.	LSI • Construction impacts would be less than significant.
Operation	
LSI • During the operational phase, BMPs would be used to reduce noise impacts to less than significant levels.	LSI • During the operational phase, BMPs would be used to reduce noise impacts to less than significant levels.

Legend: LSI = Less than significant impact

Table 6.2-10. Summary of Training Impacts – Ammunition Storage Alternatives

Ammunition Storage Alternative A (South)	*Ammunition Storage Alternative B (South)*
Construction	
LSI • Noise impacts would be less than significant	LSI • Noise impacts would be less than significant.
Operation	
LSI • Noise impacts during the operational phase would be less than significant.	LSI • Noise impacts during the operational phase would be less than significant.

Legend: LSI = Less than significant impact

Table 6.2-11. Summary of Training Impacts – NMS Access Roads Alternatives

Access Road Alternative A (South)	*Access Road Alternative B (South)*
Construction	
LSI • Noise impacts would be short-term and less than significant.	NI • No construction.
Operation	
LSI • Noise impacts during the operational phase would be less than significant.	LSI • Noise impacts during the operational phase would be less than significant

Legend: LSI = Less than significant impact.

Table 6.2-12. Summary of Other Training, Airfield, and Waterfront Component Impacts

Other Training (North/Central/South)	*Airfield (North)*	*Waterfront (Apra Harbor)*
Construction		
LSI • Construction impacts would be less than significant in all areas.	LSI • Construction impacts would be less than significant in all areas.	LSI • Construction impacts would be less than significant in all areas.
Operation		
LSI • Noise impacts during the operational phase would be less than significant.	LSI • Noise impacts during the operational phase would be less than significant.	LSI • Noise impacts during the operational phase would be less than significant.

Legend: LSI = Less than significant impact.

Noise levels associated with the proposed action and alternatives would increase locally by only one or two dB DNL around the Andersen AFB airfield. Aviation operations would raise noise levels locally, but

only as the aircraft fly overhead. The training is assumed to be somewhat dispersed, but when combined with ground training activities, such as maneuvering and live-fire training, the impacts could be localized.

Of particular concern would be the Air Force and Navy Barrigada areas where noise levels would be above compatible land use standards. Noise impacts due to construction noise are expected to exceed limits to off-base receptors because some of the projects would be located right up against the fence-line. However, construction noise would be short-term and only last during construction and BMPs would be employed to minimize impacts to a less-than significant level.

All of the Alternatives would have the same impacts because the operations part of this proposal would be identical for each alternative, except for noise from construction activities, where there are differences in activities in Former FAA, South Finegayan, Harmon Annex, and the Air Force and Navy Barrigadas.

Under the no-action alternative, there would be no buildup of Marine Corps aircraft, operations, construction or traffic. Though there would be no noise impacts associated with the no-action alternative, the purpose and need for the proposed action would not be met.

6.2.8 Summary of Potential Mitigation Measures

As there are no significant impacts under any of the alternatives, no mitigation measures are proposed for noise.