3.5 NOISE

3.5.1 Introduction/Region of Influence

The ROI for noise depends on the intensity of noise generation. For most common noise sources, the ROI is limited to areas within 0.5 mile (1 kilometer) of the noise source. High intensity noise sources, such as ordnance detonations, may have an ROI extending several miles from the noise source.

During the scoping process for this EIS, the public expressed general concerns regarding noise from ordnance use, helicopter flight operations, and vehicle traffic.

3.5.2 Noise Overview

Noise and sound are often used interchangeably. The sensation of sound is produced when pressure variations having a certain range of characteristics reach a responsive ear. Sound is the term describing pressure variations that are pleasant or useful for communication. Noise is generally defined as unwanted sound, often made up of different frequency components.

Noise is among the most pervasive pollutants today. Unwanted sounds from road traffic, jet planes, garbage trucks, construction equipment, manufacturing processes, lawn mowers, leaf blowers, and chain saws, to name a few sources, are among the noises routinely broadcast into the air. Noise negatively affects the health and well being of both humans and wildlife in many ways (NPC 2001). Responses to noise vary, depending on the type and characteristics of the noise, expected level of noise, distance between the noise source and the receptor, the receptor's sensitivity, and the time of day. The most conspicuous problems related to noise are hearing loss and hearing impairment. Other health impacts include stress and exacerbation of mental health problems; high blood pressure and restricted blood flow; sleep loss, distraction, and loss of productivity; and a general reduction in the quality of life and opportunities for tranquility. Noise can provoke annoyance responses and changes in social behavior. The effects of noise can be immediate or latent as a result of long-term exposure (Plog 1993; EPA 1974; Berglund et al. 1995).

Sources of noise that have the potential to affect wildlife include aircraft overflights; recreational activities, such as motor boating; domestic sources such as leaf blowers, lawnmowers, and chainsaws; automobile traffic; and heavy machinery and equipment. Responses vary among species of wildlife, as well as among individuals of a particular species (Busnel and Fletcher, 1978, cited in Radle, no date), although the problems are similar to those found in humans. Increased noise levels

mask sounds used by wildlife for communication; for example, they mask mating calls and the sounds that parents use to locate their young (Dooling, no date; Schubert and Smith 2000). Disturbed mammals sometimes trot short distances; birds might walk around flapping their wings. Panic and escape behavior results from more severe disturbances. Behavioral and physiological responses have a potential to cause injury, energy loss due to movement away from the noise source, decreased food intake, habitat avoidance and abandonment, and reproductive losses (National Park Services 1994; Nature Sounds Society 2001). All species, wildlife and humans, initially respond to an impulse noise with some form of startle response which diminishes with each subsequent exposure. There is a strong tendency for species to acclimate or habituate to a repetitive noise disturbance.

One common response to noise is annoyance. A person's expectation of a sound level associated with an activity has a direct bearing on the level of annoyance. For example, noise is tolerated at a bowling alley, but it is not tolerated at a library. The annoyance might be personal or experienced as a group. The five factors identified as indicators for estimating community complaint reaction to noise are the following:

- Type of noise;
- Amount of repetition;
- Type of neighborhood;
- Time of day; and
- Amount of previous exposure.

Sound levels, reported in decibels (dB), are used to summarize how people hear sound and to determine the impact of noise on public health and welfare. Table 3.5-1 presents a range of sound levels by various sources of noise. The following are six different noise-weighting descriptors, used to equate noise impacts on the human ear:

- L_{eq} (equivalent sound level) is used to describe a time varying noise energy as a steady noise level;
- L_{max} (maximum sound level) is used to measure the highest decibel level during a noise event;
- SEL (sound exposure level) is used to measure the cumulative sound exposure of a particular event integrated into a 1-second time frame;

Table 3.5-1
A-Weighted Decibel Values for Example Noise Sources

Characterization	dBA	Example Noise Source or Condition	Other Noise Examples
Threshold of pain	130	Surface detonation, 30 pounds (13.6 kilograms) of TNT at 1,000 feet (305 meters)	Jackhammer and power drill at one foot
Possible building damage	120	Mach 1.1 sonic boom under aircraft at 12,000 feet (3,658 meters)	Air raid siren at 50 feet (15 meters); B-1 flyover at 200 feet (61 meters)
	115	F/A-18 aircraft takeoff with afterburner at 1,600 feet (488 meters)	Commercial fireworks (5-pound [2.3-kilogram] charge) at 1,500 feet (457 meters)
	110	Peak crowd noise, pro football game, open stadium	Peak noise at firing position of rifle range
	100	F/A-18 aircraft departure climbout at 2,400 feet (732 meters)	Jackhammer at 10 feet (3 meters); B-52 flyover at 1,000 feet (305 meters)
Extremely noisy	95	Locomotive horn at 100 feet (30 meters); 2-mile (3-kilometer) range foghorn at 100 feet (30 meters)	Wood chipper processing tree branches at 30 feet (9.1 meters)
8-hour OSHA limit	90	Heavy truck, 35 mph (56 kmph) at 20 feet (6 meters); leaf blower at 5 feet (1.5 meters)	Person yelling at 5 feet (1.5 meters); dog barking at 5 feet (1.5 meters)
Very noisy	85	Power lawn mower at 5 feet (1.5 meters); city bus at 30 feet (9.1 meters)	Pneumatic wrench at 50 feet (15 meters); jet ski at 20 feet (6 meters)
Noisy	75	Street sweeper at 30 feet (9.1 meters); idling locomotive at 50 feet (15 meters)	Beach with medium wind and surf
	70	Auto, 35 mph (56 kmph) at 20 feet (six meters); 300 feet (91 meters) from busy six-lane freeway	Stream bank 10 feet (3 meters) from small/medium waterfall
Moderately noisy	65	Typical daytime busy downtown area conditions	Beach with light wind and surf; tree branches, light wind. Air conditioner at 15 feet (4.5 meters). Sewing machine.
	55	Typical daytime urban residential area away from major streets	Leaves, tall grass rustling in light/moderate wind
	50	Typical daytime suburban conditions	Light traffic. Normal conversation. Quiet office. Open field, summer night, insects
Quiet	45	Typical rural area daytime conditions	
	40	Quiet suburban area at night	Living room, refrigerator
Very quiet	30	Quiet rural area, winter night, no wind	Library; quiet bedroom at night, no air conditioner
	20	Empty recording studio	Barren area, no wind, water, insects, or animals
Barely audible	10	Audiometric testing booth	
Threshold of hearing	0		

Source: Data compiled by Tetra Tech staff from various published sources, noise monitoring studies, and noise modeling analyses.
Indicated noise levels are average A-weighted decibel (dBA) levels for stationary noise sources or peak dBA levels for brief noise events and noise sources moving past a fixed point.
Average and peak dBA levels are not time-weighted 24-hour day-night average sound level (DNL) values.
Decibel scales are not linear. Apparent loudness doubles for every 10 dBA increase in noise level, regardless of the dBA values.

- ADNL or L_{dn} (A-weighted day-night average sound level) is used to evaluate human response or annoyance to noise, typically aircraft and ground transportation;
- CDNL (C-weighted day-night average sound level) is used to evaluate human response or annoyance to blasts, commonly associated with large-caliber ammunition and explosives; and
- dBP (linear decibel) is used to evaluate human response to a sudden sharp noise.

Additional general information on noise is presented in Appendix F.

3.5.3 Federal and State Noise Standards and Guidelines

Federal Guidelines

Several laws require the federal government to set and enforce uniform noise control standards for aircraft and airports, interstate motor carriers and railroads, workplace activities, medium- and heavy-duty trucks, motorcycles, and portable air compressors and for federally assisted housing projects located in noise-exposed areas. Among these laws are the Noise Control Act of 1972 (Public Law 92-574), Aviation Safety and Noise Abatement Act of 1979, the Control and Abatement of Aircraft Noise and Sonic Boom Act of 1968. According to the Federal Aviation Administration 's 2000 Aviation Noise Abatement Policy, "noise relief continues to be a shared responsibility…. The FAA and the aviation industry have the primary responsibility to address aircraft source noise…. Airport proprietors, state and local governments and citizens have the primary responsibility to address airport noise compatibility planning and local land use planning and zone."

The EPA, the federal agency charged with enforcing the Noise Control Act, recommends the use of the day-night sound level for environmental noise to quantify the intrusiveness of nighttime noise. The day-night sound level is the A-weighted equivalent sound level for a 24-hour period, with an additional 10-dB weighting imposed on the equivalent sound level occurring during the nighttime hours (10:00 PM to 7:00 AM). These sound levels represent an annual average exposure, where on any given day the level may be greater. Table 3.5-2 presents examples of outdoor DNLs in decibels measured at various locations.

The Federal Interagency Committee on Urban Noise (FICUN) has developed land use guidelines for areas on or near noise-producing activities, such as highways, airports, and firing ranges. The Installation

Table 3.5-2
Examples of Outdoor Day-Night Average Sound Levels

Outdoor Location	Sound Level (DNL) in dB
Apartment next to freeway	88
0.75 mile (1.2 kilometers) from touchdown location at major airport	86
Urban high-density apartment	83
Old urban residential area	59
Wood residential	51
Agricultural cropland; Beach area (ambient)	45
Rural residential	40
Wilderness background noise	35

Source: EPA 1974

Compatible Use Zone (ICUZ) program designates noise zones for land use planning. The program considers land areas with noise-sensitive land uses that are exposed to generally unacceptable noise levels. Noise-sensitive land uses include, but are not limited to, residences, schools, medical facilities, and churches.

The DoD began developing noise evaluation programs in the early 1970s. Initial program development involved the Air Installation Compatible Use Zone (AICUZ) program for military airfields. Early application of the AICUZ program emphasized Air Force and Navy airfields. The Army implemented the ICUZ program by addressing both airfield noise issues and other major noise sources, such as weapons testing programs and firing ranges. Joint Air Force, Army, and Navy planning guidelines use annual average DNL values to categorize noise exposure conditions on military installations.

The Army uses three noise zones described in AR 200-1 (US Army 1997a) and DA PAM 200-1 (US Army 2002c), referred to as LUPZ. Chapter 7 of DA PAM 200-1, the Army Environmental Noise Management Plan (ENMP), outlines procedures to meet the objectives of minimizing the impact of environmental noise on the public without impairing the mission of the installation. The Army's three noise zones are as follows:

- Zone I—compatible with noise-sensitive land use;
- Zone II—normally incompatible with noise-sensitive land use; and
- Zone III—incompatible with noise-sensitive land use.

These noise zones serve as guidance for land use planning and may be used as tools for both noise abatement planning and noise complaint management as seen in Table 3.5-3.

Table 3.5-3
Land Use Planning Guidelines

Noise Zone	Percent Population Highly Annoyed	Transportation/Small Arms Noise ADNL in A-weighted dB	Impulsive Noise CDNL in C-weighted dB
Zone I	<15	<65	<62
Zone II	>15	65–75	62–70
Zone III	>39	>75	>70

Source: US Army 2002c

Notes:
Noise levels from all sources should be evaluated in terms of annual averages of the identified noise metric.
Noise from transportation sources (aircraft and vehicles) and common industrial sources should be evaluated using A-weighted DNL values.
Noise from impulsive sources (such as armor, artillery, and demolition activities) should be evaluated using C-weighted DNL values.
Noise from small arms ranges should be evaluated using peak unweighted dB values until the Z-weighting standard is adopted, at which time peak A-weighted decibel values should be used.
Noise-sensitive land uses include housing, schools, and medical facilities.
Compatibility determinations for existing conditions and proposed actions should be supplemented by descriptions of projected noise increases and potential public reactions where:
(1) the noise environment is determined by a few infrequent but very high level noise sources (such as blast events over 110 dBC SEL);
(2) single event noise levels from the proposed action are 10 dB or more greater than existing levels;
(3) where the A-weighted DNL is between 60 and 65 dBA and the proposed action would increase the DNL by 3 dB or more; and
(4) where the A-weighted DNL is above 65 dBA and the proposed action would increase the DNL by 1.5 dB or more.

The historical expected annoyance complaints within each zone are identified as follows (US Army 2001):

- Zone I is defined by the noise exposure that would be expected to result in less than 15 percent of the population described as "highly annoyed";
- Zone II is defined by the noise exposure that would be expected to result in more than 15 percent of the population described as "highly annoyed"; and
- Zone III is defined by the exposure resulting in more than 39 percent of the population describing themselves as "highly annoyed."

According to the Army's Environmental Noise Management handbook (US Army 2001), many of the complaints received by installations are from people living in Zone I. The document further states, "These are people who are living in quiet areas but who are disturbed by infrequent events such as helicopter flyovers, or a single large detonation of explosives" (US Army 2001).

The Army has recently supplemented these guidelines to develop a more comprehensive ENMP, as described in DA PAM 200-1. The ENMP program incorporates ICUZ evaluations. Other components of the ENMP include programs for handling noise complaints and undertaking supplemental noise evaluations when warranted by the nature of discrete noise events.

Criteria for evaluation of noise levels have been expanded beyond the normal A-weighted DNL descriptor. Criteria include the use of C-weighted DNL values to characterize major blast noise sources and the use of A-weighted decibel values to characterize small arms firing (Table 3.5-3). These levels are in agreement with the planning use guidelines and percent of population annoyed, published by the Department of Housing and Urban Development (HUD), the WHO, and other numerous studies performed over the past two decades.

The US Army Center for Health Promotion and Preventive Medicine (US Army CHPPM) assists Army installations in developing environmental noise management plans. US Army CHPPM also undertakes special noise studies to evaluate noise problems associated with various types of noise sources. When investigating noise conditions related to weapons firing or ordnance detonations, US Army CHPPM typically measures peak unweighted decibel levels and/or C-weighted SEL levels and develops noise contours using a computer model (BNOISE2) for land use guidelines. Table 3.5-4 indicates compatible land uses for the identified zones.

Table 3.5-4
Compatible Land Use Guidelines

Noise Zone	Residential	Schools and Hospitals	Recreational	Industry
Zone I	Yes	Yes	Yes	Yes
Zone II	Not recommended	Not recommended	Yes	Yes
Zone III	Not compatible	Not compatible	Not compatible	NLR = 30

Source: US Army 2002c
NLR = Noise Level Reduction Factor

Several studies have been performed at MMR on accepted "dose-response" relationship annoyance due to aircraft, impulse, and overall noise. Other studies have shown that although annoyed by the noise levels, people become more tolerant over time and accept the noise exposure levels.

State Regulations

The Army has stated that "In light of this (Noise Control Act), we think the correct Army policy with respect to the Noise Control Act is that all Army activities should endeavor to comply with all federal, state and local requirements respecting the control of noise as stated in Section 4(b) of the Act, unless to do so would conflict with the Army's mission. The obligation to comply arises out of the Army's policy of cooperation on environmental matters generally" (US Army 2002c).

The State of Hawai'i has adopted statewide noise standards that apply to fixed stationary noise sources, agricultural equipment and construction equipment. The alternatives under this project do not involve introduction of or modifications to stationary sources, and thus Title 11 of Chapter 46 of the Hawai'i Administrative Rules does not apply to any of the alternatives.

3.5.4 Existing Noise Conditions Mākua Military Reservation

The ambient noise level at Mākua Beach is estimated to be 40 to 50 dBA during quiet time, with peaks greater than 70 dBA during periods of high tide and afternoon winds; typically, noise levels range from 55 to 70 dBA. Beach areas closer to Farrington Highway will have typical background noise levels of 45 to 55 dBA. Noise level contributions resulting from MMR activities vary greatly, depending on whether or not live-fire training exercises are in progress. When there are no training exercises in progress at MMR, noise conditions are dominated by wind, bird songs, and insects. Under such conditions, noise levels typically vary between about 25 dBA and 45 dBA, depending on wind conditions and proximity to bird or insect noises. Noise levels during live-fire training exercises include periods of vehicle activity, helicopter activity, weapons firing, and ordnance detonation superimposed on background noise conditions.

Live-fire training at MMR during a company-level CALFEX typically lasts about four hours, so DNL values are not very useful in characterizing the peak noise levels associated with these events. Noise monitoring was conducted at MMR during three CALFEX events between May 2002 and January 2003 (Figure 3.5-1).

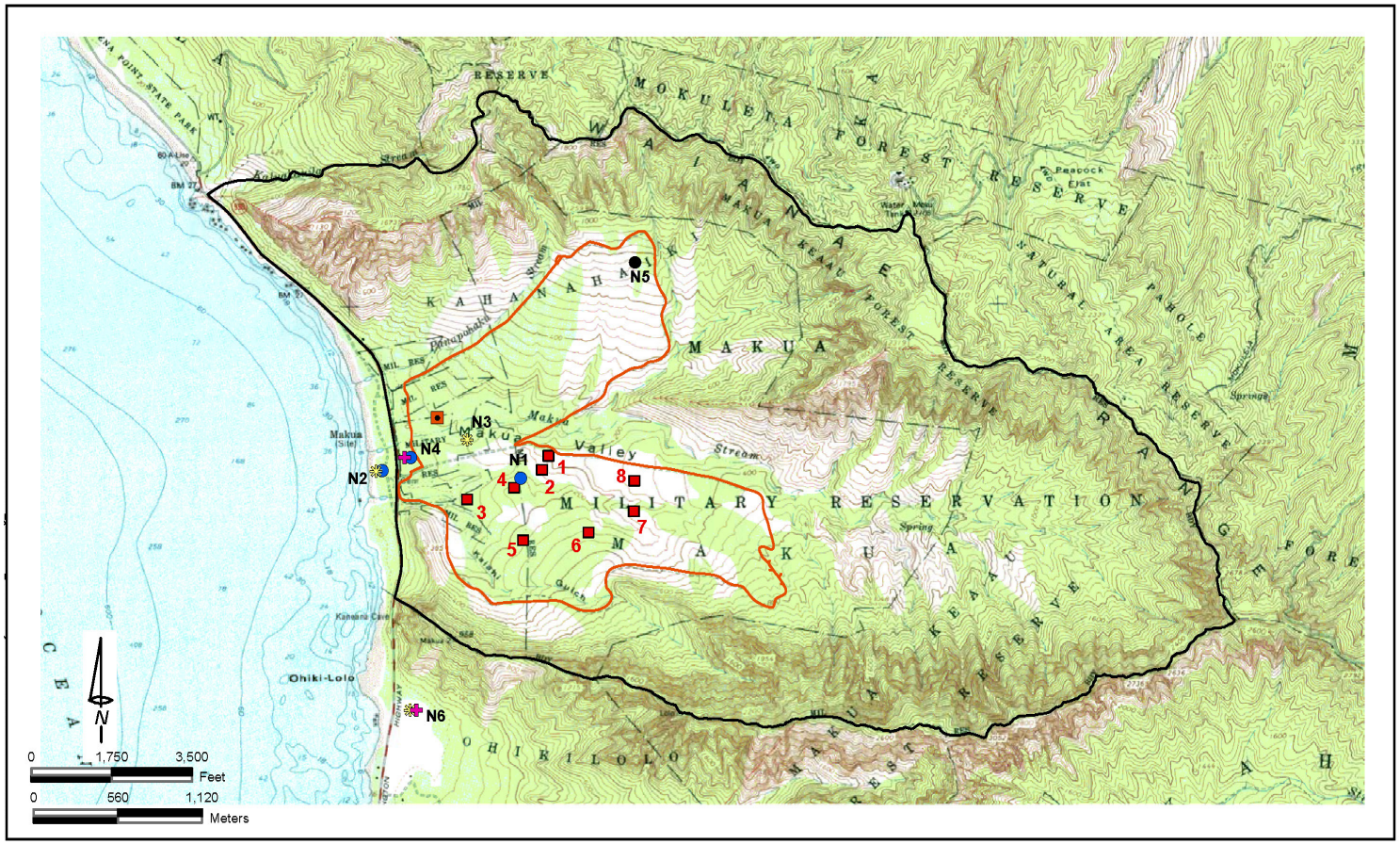
While differences among these three CALFEXs (for example, use of weapons and sequence of events) required different instrument placements within MMR, a Mākua Beach location, routinely used for public recreation and picnicking, was used for all three exercises. One noise meter was placed on Mākua Beach opposite the observation tower area of MMR. A second meter was placed either on the north side of the administrative trailers at MMR or at the eastern end of the helicopter landing pad area east of the administrative trailers. During the May 2002 CALFEX, the third meter was located at Objective Coyote, which was used as a forward exercise viewing point. During the two January 2003 CALFEX exercises, the third meter was located on Silva Ranch property, the nearest residence, immediately south of MMR (Figure 3.5-1).

Table 3.5-5 lists the weapons used for a typical daytime CALFEX conducted between 2001 and 2003. No nighttime CALFEXs were conducted during that period. Night rounds in the table represent those rounds fired before 6:59 AM. Noise monitoring was conducted during one CALFEX in 2002 and three CALFEXs in 2003. As an example of the data collected during those exercises, Table 3.5-6 summarizes noise monitoring data from the January 31, 2003, CALFEX. Data for both the Mākua Beach and Lower Mākua Valley sites included significant contributions from helicopter activity. Noise levels at Silva Ranch were influenced by traffic on Farrington Highway.

Table 3.5-5
Existing Weapons Used at MMR for One CALFEX

Type of Artillery	Day	Night
60mm mortar inert	27	19
60mm mortar HE	22	15
81mm mortar HE	29	20
105mm howitzer HE	71	50
Bangalore	2	1
Claymore (M18A1)	5	4
C4, 2 lbs.	2	1
Grenades	20	14
Smoke	7	5
Javelin and AT-4 antitank rockets	4	1
Small arms ammunitions	24,264	10,399

Note: Small arm ammunitions include M24, M249, M16A2, M4, M240, M2, MK19 and .50-caliber machine gun. Inert artillery does not create detonation noise upon target impact (noise is only from firing of projectile).



Noise monitoring was conducted during the May 22, 2002, January 31, 2003, and April 10, 2003 CALFEXs. Background noise data was collected at location N5.

Legend

- Noise Monitoring Location (May 22, 2002)
- Noise Monitoring Location (January 31, 2003)
- Noise Monitoring Location (April 10, 2003)

Objectives:

1 Deeds
2 Fox
3 Wolf
4 Coyote
5 Buffalo
6 Badger
7 Elk
8 Deer

Ordinance Firing Point

Mākua Military Reservation

Training Area

Noise Monitoring Locations

Mākua Military Reservation
O'ahu, Hawai'i

Figure 3.5-1 Noise Monitoring Locations, MMR

Table 3.5-6
Summary of Noise Data From 31 January 2003 CALFEX

Parameter	Units	Mākua Beach	Lower Mākua Valley	Silva Ranch
Meter Model		Larson Davis 824	Larson Davis 824	Larson Davis 824
Start Time		7:38:16 AM	7:26:33 AM	7:48:46 AM
Duration	Hours:min:sec	6:23:15	5:02:12	4:59:52
L_{eq}	DBA, fast	62.7	69.2	56.3
	DBC, fast	76.7	81.3	67.1
	DBF, fast	79.6	83.1	69.2
L_{max}	DBA, fast	96.8	97.6	92.7
	DBC, fast	115.2	116.7	107.2
	DBF, fast	120.5	121.9	110.7
L_{min}	DBA, fast	41.1	51.9	48.7
	DBC, fast	51.6	55.6	53.9
	DBF, fast	53.3	56.3	54.6
L_{pk}	DBA, fast	122.3	125.5	115.7
	DBC, fast	124.6	126.1	125.2
	DBF, fast	129.6	130.4	125.5
L_{max}	DBA, slow	89.4	93.8	83.9
	DBC, slow	107.4	109.0	100.2
	DBF, slow	112.5	113.8	104.8
L_{min}	DBA, slow	42.1	52.4	49.4
	DBC, slow	53.0	56.4	55.0
	DBF, slow	55.8	57.4	55.9
L_{05}	DBA, fast	66.5	74.0	61.0
L_{10}	DBA, fast	63.9	68.2	57.7
L_{33}	DBA, fast	57.3	61.3	52.5
L_{50}	DBA, fast	52.7	55.9	51.6
L_{90}	DBA, fast	47.5	52.9	50.2
L_{95}	DBA, fast	46.5	52.8	50.0

Source: site-specific data collected at MMR by Tetra Tech

Notes:
dBA, fast = fast response setting (32 samples per second, 1/8 second integration), A-weighted readings
dBC, fast = fast response setting (32 samples per second, 1/8 second integration), C-weighted readings
dBF, fast = fast response setting (32 samples per second, 1/8 second integration), unweighted readings
dBA, slow = slow response setting (8 samples per second, one-second integration), A-weighted readings
dBC, slow = slow response setting (8 samples per second, one-second integration), C-weighted readings
dBF, slow = slow response setting (8 samples per second, one-second integration), unweighted readings

Noise measurements were taken at various locations during four CALFEX (Appendix G-4). The instruments used to monitor noise levels during three CALFEXs in 2003 included an impulse event detector, in addition to the conventional detector used to measure fast and slow response data. Minimum and maximum impulse detector readings were slightly higher

than the comparable fast response readings. For all three events, the impulse noise is comparable. The peak noise is a short duration event occurring only a few times during each CALFEX week. There are no schools, day-care centers, hospitals, or nursing homes within two miles of MMR.

To evaluate the complaint potential from impulsive noise, a set of guidelines were developed by the Naval Surface Warfare Center, Dahlgren, Virginia (Pater 1976). These guidelines for delaying tests at the Dahlgren installation are based on over 10 years of experience using meteorological forecasts. The guidelines are shown in Table 3.5-7. These levels resulted from the best compromise among cost, efficiency of range operations, and good community relations.

Table 3.5-7
Noise Complaint Guidelines

Predicted Sound Level (dBP)	Risk of Complaints
<115	Low risk of noise complaints
115-130	Moderate risk of noise complaints
130-140	High risk of noise complaints, possibility of damage
>140	Threshold for permanent physiological damage to unprotected human ears; high risk of structural damage claims

Source: Pater 1976

For 90 percent of the time during a three- to six-hour exercise per week the noise level is below 65 dB. It is estimated that for 60 percent of the time the noise level over the beach would be less than 55 dB. A DNL for each event can be calculated using the SEL fly-over noise level (A-weighted decibel [dBA] compressed into one second) of the louder Chinook, 99.9 dB at 100 feet (30 meters) or 87 dB at 400 feet (122 meters) for one minute, and then correcting for the 86,400 seconds in a day. This calculation gives the ADNL over the beach area to be 50.5 dB. This ADNL will increase by approximately 3 dB for each doubling of overflights. It is estimated that all the combined intermittent Chinook helicopter activity during the six hours per week (16 overflights per week) would result in an ADNL of 59.5 dB at the beach area (each doubling of helicopter operations results in a 3 dB increase to the ADNL). Weather conditions have an effect on sound levels. Noise becomes louder during overcast high humid periods.

The Army uses UH-60 Blackhawk, OH-58D Kiowa Warrior, and CH-47D Chinook helicopters to support the infantry training at MMR. The UH-60 is used primarily for standby in case of a wildfire. The OH-58D Kiowa is primarily used for exercise observation and assault support during a CALFEX. The Chinook CH-47 is used for transporting troops and equipment from SBMR to MMR. Noise levels for Army helicopters are

shown in Table 3.5-8. The Chinook helicopter has a louder slant angle noise than the Blackhawk or the Kiowa, but the Chinook is used much less of the time.

Table 3.5-8
Measured Levels of Aircraft Noise (Maximum dBA)

Slant Distance (feet [meters])	CH-47D Chinook	OH-58D Kiowa	UH-60 Black Hawk
200 (61)	97.5	89.0	91.0
500 (152)	89.3	80.5	82.5
1,000 (305)	83.0	73.8	75.9
2,000 (610)	76.5	66.7	68.7
5,000 (1,524)	67.1	56.1	57.8
10,000 (3,048)	59.1	47.1	48.0

Source: US Army CHPPM 1999; NTIS 1988

The typical uses of these helicopters during a CALFEX exercise are as follows:

- Two UH-60s fly from DMR to MMR via Ka‘ena Point. These two helicopters cross Mākua Beach at approximately 400 feet (122 meters) AGL and set down inside the MMR installation prepared for wildfire fighting. The UH-60s would perform one approach to and one departure from MMR on two days during each CALFEX. This activity would result in eight beach overflights per CALFEX, exposing beach receptors for one minute of noise per overflight. This results in a single event SEL of 88 dBA to the beach receptors for a total of four minutes per week per CALFEX. The calculated ADNL resulting from this noise exposure would be 47.6 dBA.
- Two OH-58D Kiowa helicopters and one UH-60 participate in air assault support during CALFEX exercises, flying over the beach at 100 to 200 feet (30 to 60 meters). Typically these aircraft would make a combined total of four to five practice approaches during the rehearsal phase of the CALFEX and another four to five approaches during the actual exercise day of the CALFEX week. This results in an average total of eight to 10 beach overflights per CALFEX week. Each beach overflight would result in a single event SEL of 89 dBA for a period of one minute and an ADNL of 58.5 dBA. Beach receptors would experience this SEL level eight to ten times for one minute on two days of each CALFEX week. Occasionally, one of these helicopters would hover inside the MMR over the ridge from the beach area. This activity would result in an SEL at the beach of 82.5 dBA for two to three 20-minute periods during the two assault days of each CALFEX. The resultant ADNL from this activity would be 39.1 dBA.

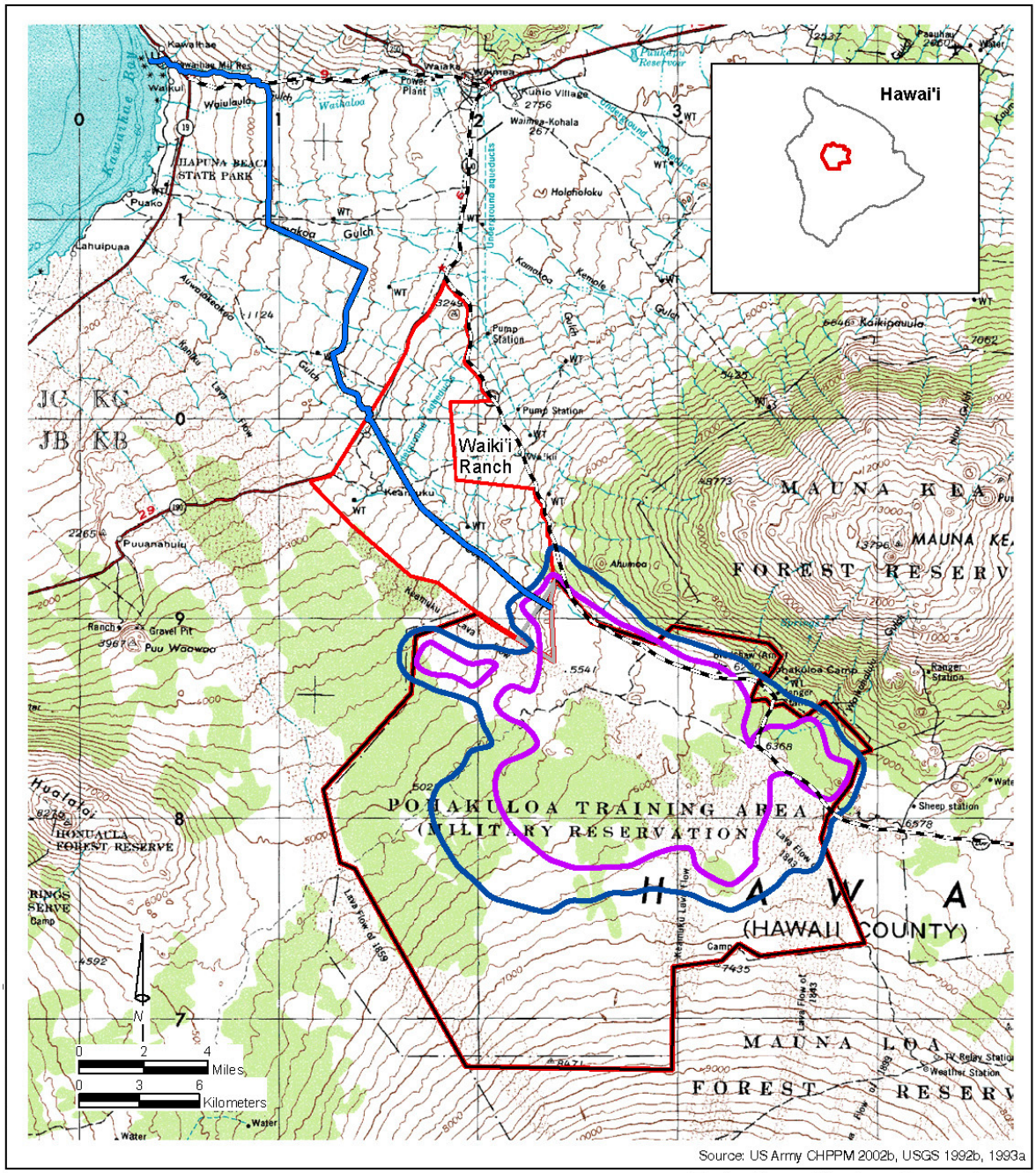
- The CH-47 Chinook is louder than the other helicopters used at MMR. However, it is used less frequently and mainly for transporting troops and equipment from SBMR to MMR during exercises. The CH-47 would approach the MMR by flying over the beach area at 400 to 500 feet (122 to 152 meters) AGL, set down inside the MMR and depart over the beach after unloading its cargo. It is estimated that two CH-47s would make a total of four to five beach overflights per CALFEX week. Although the CH-47 is louder than the UH-60 and the UH-58, its approach to and departure from MMR would be at a higher altitude. The calculated beach overflight noise level for each CH-47 flying at 400 feet (122 meters) would be 87 dBA for one minute. The resultant ADNL from this activity would be 50.4 dBA.

In summary, the existing noise conditions resulting from aircraft activity from one CALFEX per week would be short periods of time (one minute duration) 85 to 87 dBA for a total of 22 minutes per week and an ADNL of 54.6 dBA. Most of this noise would be early morning hours of the weekdays (Wednesday and Thursday) when the number of beachgoers is small. In general, the Army does not train at MMR during weekends when beaches are typically more crowded.

Troops and equipment would be transported by military vehicles from SBMR to MMR during each week of a CALFEX. Table 4.6-1 in Section 4.6, Traffic and Transportation, details the type of vehicles and time of transport for a typical CALFEX. The noise generated from these vehicles on Mākua Valley Road and Farrington Highway would result in very short periods of localized noise as the convoys pass by.

Pōhakuloa Training Area

Noise conditions on PTA vary depending on location and time of day. Main sources of noises are explosive detonations, aircraft, and vehicles. Because of the unpopulated nature of the area and the relatively low volume of traffic on Saddle Road, ambient noise levels within the PTA are generally low. Figure 3.5-2 illustrates estimated annual average noise contours from heavy weapons firing at PTA. Zone III noise conditions are contained within the present boundaries of PTA. Zone II noise conditions affect BAAF and the western portion of the cantonment area. Zone II noise conditions extend beyond the boundaries of PTA from BAAF westward to the northwest corner of the post. Except for the cantonment area, no noise-sensitive land uses are affected by existing Zone II noise conditions (US Army and USACE 2004). No troops are permanently based at PTA. All troop housing is used for troops who are visiting PTA to participate in training exercises.



An illustration estimating annual average noise contours from heavy weapons firing at Pōhakuloa Training Area

Legend

- Pōhakuloa Training Area Boundary
- 1010 Land Acquisition Area
- P3/P4 Pōhakuloa to Kawaihae Trail
- P7 West Pohakuloa Training Area Land Acquisition Area
- Main Road
- Zone II (62-70 dBC)
- Zone III (>70 dBC)

Existing Noise Levels at Pōhakuloa Training Area

Island of Hawai'i, Hawai'i

Figure 3.5-2 Existing Noise Levels, PTA